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Tuning Journal

for Higher Education

Educational
Journeys in times
of uncertainty:
Weathering
the storms

10th Anniversary
(2013-2023)

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University of Deusto
Bilbao
2023

University of Groningen
Groningen
2023

Tuning Journal for Higher Education (TJHE), Tuning Journal in short, is an international peer-reviewed journal publishing in English original research studies and reviews in all aspects of competence-based, student-centred, and outcome-oriented education reforms at university level across the globe. It is a joint initiative of the University of Deusto (Spain) and the University of Groningen (The Netherlands) that is run by the Tuning International Academy (<http://tuningacademy.org/>): an international meeting point for fostering innovative teaching, learning, and research in higher education.

The main goal of the Journal is to promote quality research into the 'Tuning Methodology' for designing, implementing, and assessing context-sensitive degree programmes and to subject the tools developed during Tuning projects and other educational projects to full academic scrutiny and debate among students, teachers, policy makers, administrators, and academics across societies, cultures, professions, and academic disciplines. To this end, the Journal invites applications for thematic issues, conference proceedings or monographs from all stakeholders. Guidelines for the preparation and submission of manuscripts are appended to this Issue and available at the web of the Journal: <http://www.tuningjournal.org/>

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Educational Journeys in times of uncertainty: Weathering the storms

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Editorials

Educational Journeys in times of uncertainty: Weathering the storms

Editorial

Mary Gobbi

Editor

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E-published: November 2023

This edition is the tenth anniversary of the Tuning Journal for Higher Education (TJHE). We are delighted to welcome two guest editorials and a contemporary review. The first editorial is from Paul Ryan our founding editor and the second from Luigi Filippo Donà dalle Rose and Anna Serbati my immediate predecessors. As Paul outlines, the Journal was launched in 2012 in an endeavour to disseminate, and value, through open access, the knowledge and experience of those developing high quality teaching programmes. Paul traces the origins of the Journal in the preceding ten years, capturing the ‘conception, gestation, birth and infancy’ period of the TJHE. Paul’s determination and enthusiasm, ably supported by the core Tuning team and Ladislav Bizimana, the Managing Editor, enabled the crucial Journal infrastructure to be constructed and stand the test of time. Lupo and Anna then managed the transition from childhood to young adult maturity. Both Lupo and Anna make explicit their energy, love, and care as they ‘parented’ the Journal, authors, and reviewers. Lupo aptly commented that, while there were periods of “roses and flowers”, there were many days of difficult patient work and iterative dialogue with the various actors involved in the Journal. Despite the challenges, Lupo and Anna secured SCOPUS listing in 2018- a major landmark achievement.

Initially, the papers received were primarily from those within the Tuning community and their partners. There was an unsurprising focus on competences as the European inspired Bologna process unfolded. This remains at the heart of the Journal, albeit extended to reflect the global audience and the process of university reforms and programme innovation over time. From the TJHE website, this focus is described as “original

research studies and reviews of student-centred learning and outcome-oriented education reforms at university level, with reference to the national, regional, and international environments.” (<https://www.tuningjournal.org/about/#focusAndScope>)

Anna’s reflection drew attention to three ‘values’ of the Journal, namely the value of individual and collective reflections on themes; an inclusive international approach; and the reporting of a ‘kaleidoscope’ of experiences, reflections, and activities. These values endure in the Journal today.

Our third invited guest contribution is a paper by Julia González and Robert Wagenaar entitled “*Tuning in Higher Education: Ten years on.*” This editorial paper provides a comprehensive outline of the impact of Tuning over the past decade as well as a critical reflection on the early years. One can note that, while the global reach of Tuning might have been an emerging aspiration, the practical achievements could not have been envisaged at the beginning. At present nearly 130 countries have been / are involved in one or more of the Tuning projects. Their paper demonstrates the multifaceted, complex, and political nature of Higher Education with its challenges, cultures, and dynamics. Their account shows how the unfolding of the Bologna Process revealed the hidden influences within the Higher Education system, and, in some cases, the lack of alignment, coherence and logic exhibited between different stakeholders and actors in the field. Conversely, the various projects have also shown that when committed academic teachers gather, especially within their subject disciplinary fields, innovative and solution-based initiatives emerge.

Key features of the Tuning approach, namely student centred, competence and outcome-based quality assured education that promotes active student engagement, social and ethical responsibility, require necessary infrastructures and staff who have appropriate pedagogical expertise. Tuning and its associated projects have shown that the link between effective competence-based education, employability, and entrepreneurship is contingent upon the engagement of a range of stakeholders relevant to the disciplines concerned, the labour market and civic society. The thorny questions of mobility, mutual recognition, work-based learning, and recognition of prior learning within, and between, countries remain practical challenges. Recent projects are responding to these problems.

The title of this edition, “*Educational Journeys in times of uncertainty: Weathering the storms*” captures the Tuning Journey, the development of the Journal and the realities expressed in the papers within this edition. Each new step along the road to improvement requires an awareness of change management, effective leadership, and a clear vision of the ‘desired future’

from which the initiatives are launched. Yet as recent history has demonstrated, the unplanned (e.g. COVID-19), if not unexpected (conflicts and wars), storms can buffet and threaten the educational journey of individual students, as well as the teachers, institutions and communities to which they belong. In a literal sense, the storms caused by nature, accelerated by global warming and other ecological and environmental disasters, have had serious impacts with repercussions for future generations in many parts of the world. Tuning competences, both the generic and subject specific ones are not fixed: with stakeholder engagement they develop over time and enable our graduates to be better equipped to ethically anticipate, prevent, mitigate, and respond effectively to the current and future storms of life.

As we celebrate the ‘ten-year anniversary’, on behalf of all the editors and myself, let me express our sincere gratitude to Ladislav Bizimana, the Managing Editor, who to paraphrase Lupo, is ‘a true and lasting pillar of the Journal’ who gifts us welcome, kindness, and expertise. To our founder members, guides, and confidants, ‘thank you, good health and enjoy the fruits of your endeavours’. May we continue to uphold the values, spirit, and quality of the Journal as we enter the next educational journeys of uncertainty.

Editorial Team
November 2023

**Guest Editorials
and Articles for the
10th Anniversary
of TJHE**

Guest Editorial for the 10th Anniversary of TJHE

The early years

Paul D. Ryan*

Founding Editor

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Abstract: Setting up an international academic journal is no easy task. This article reviews the planning stages and the publication of the first issues of the Tuning Journal for Higher Education. The need for such a journal and its role in supporting the objectives of the Tuning Academy are outlined.

Keywords: Tuning; Journal; Higher Education; planning; citations.

“Ah Paul, do you want to do something wonderful for your science?” One day, very early in the new Millennium, I answered a circular email about Geological Education in Europe. The resultant phone call from Julia González began the 23-year long journey that led to this Issue of the Tuning Journal for Higher Education (TJHE).

With 12 countries and 5 subjects the early days of Tuning Europe were lively. We were tasked with developing a competence-based system for higher education in our disciplines. Robert Wagenaar and Julia distilled the reports from the working groups into technical documents which were much debated. Eventually, with the addition of more disciplines and countries, reports following a common template were developed for each subject area. These reports, still accessible on the Tuning website,¹ bridged the divide between diverse educational cultures and structures. They provided agreed

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More information about the author is available at the end of this Editorial.

¹ <http://www.unideusto.org/tuning/>.

guidance on what was needed to develop transparent and transferable degree programmes in the context of the Bologna Process. The British Prime Minister Margaret Thatcher reputedly described reforming academia as “herding cats”. Tuning had developed a method to “herd European cats”! Soon, academics, universities and Education Ministries worldwide wanted to understand and develop such systems for their region. I have called this the Tuning Phenomenon.

We debated the need for a peer reviewed journal to present the results of this research into the delivery of competence-based degrees which focused on the student. However, knowledge of the language and philosophy of such systems was then largely restricted to educational researchers who were well served by their specialist journals. About 12 years later the wider academic community began to catch up and there was an increasing body of pedagogic research undertaken by discipline rather than educational experts. The Tuning Academy decided to host a journal to publish such material and appointed me Editor in 2012 and tasked me with establishing the product as an open access journal. I was delighted to take on this task. I was convinced that developing high quality teaching programmes was not valued as much as academic research and this journal would break this mould.

Setting up such a journal from scratch is no easy task. My inbox received over 2000 messages with the subject ‘Tuning Journal’ over the 18 months of the planning stage. Many, many decisions had to be made. These included: the title of the journal (there was much debate as to whether the preposition should be “for” or “of”); the structure of the Editorial Board; the management structure; the software platform to support the editorial process; adoption of an Ethical Statement; Editorial Policy; and even the design of the front cover. First though was gaining approval for the journal’s mission statement by the Tuning academy and its sponsors, the University of Deusto, Spain, who host the journal, and the University of Groningen, The Netherlands. I include that statement below.

The Tuning Academy as part of its mission to serve as an international meeting point for innovation and research in Higher Education has established the Tuning Journal for Higher Education. This Journal will facilitate the collaborative efforts of hundreds of international researchers who are working to develop Tuning in global higher education. The Journal will concentrate on the development of innovative degree programmes and the challenges of their recognition, relevance and quality.

In the early stages I was ably assisted by Paulina Sierra. Guiding wisdom was always available from Julia, Robert and Pablo Beneitone. The professionalism and expertise of Ladislav Bizimana, our Managing Editor, was absolutely essential to the success of the project. Journals must be professional.

They promote the reputations of scholars and their institutions. Each issue of TJHE represents perhaps five thousand to ten thousand hours of scholarship.

In 2013 the first issue of TJHE, “New Profiles for New Societies”, was published and this has been followed by two issues each year. The birth of a journal follows a predictable pattern. In the early stages excitement for the project ensures good quality copy and reviewing. After the first few issues it becomes more difficult to obtain articles, especially as journals are not considered for listing on citation platforms until they have been established for several years. We survived this stage thanks to the strength of the Tuning fellowship and the work of editors and reviewers in helping authors, especially those for whom English was not their first language, in developing their work. Under the leadership of Luigi F. (Lupo) Donà dalle Rose and Anna Serbati the journal was listed by SCOPUS in 2018 with a very favourable review. This was a spectacular accomplishment. Journals that achieve listing move to another phase where the problem becomes processing an increase in submissions. The number and efficiency of reviewers and sub-editors must increase to meet this need. This is a dangerous phase and it requires commitment. Reviewing articles is time consuming but if academics wish their work to be peer reviewed they must be prepared to peer review that of others. It is not a one-way street. TJHE acknowledges the work of our reviewers in print. Please continue to support the journal with your expertise by reviewing and helping the Editor as well as contributing your research. All are essential if there is to be a 20th year issue.

I recently conducted a survey of the citations, the crypto-currency of academia, for all articles published in TJHE using Google Scholar, which is free to access and includes citations in all publications including theses. Using the baseline values for Social Sciences suggests that we already have 9 “highly cited” articles (> 5 citations per year) plus 20 “top 10%” articles (<5 and > 2.5 citations per year) and approximately half of the articles published have citation values (< 2.5 and > 1 citations per year) “typical” of the top 50%. Citations accumulate with time, so these are very encouraging results for a young journal. My congratulations to the present Editor, Mary Gobbi.

I would like to end by thanking all my dear Tuning friends, some now departed, who have debated, created and laughed with me over the years. Without them you would not be reading this article in this journal.

About the author

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the management board of the ‘Tuning Project’: the European Universities’ response to the Bologna process. He co-chaired the Earth Sciences Subject Area Group from 2000-2009 and was principal author of the validated Tuning Template for Earth Science Higher Education in Europe. He has given over 40 invited presentations on Tuning and the Bologna Process throughout Europe and has acted as adviser to both Government Agencies, Thematic Networks and Tuning Projects including: Africa; Georgia; Ireland; Russia; Spain; UK; USA; AFANET; MRENET, EurAges and EAR-HEI. He was appointed Founder Editor of the Tuning Journal for Higher Education in 2011. Paul graduated with a First-Class Honours Degree in Geology and Chemistry from Keele University, Staffordshire, where he also read for a Ph.D. in Geology. He worked at NUI Galway since 1970 until his retirement at the end of 2009. He was Professor of Geology since 1997 and acted as University Bologna Advisor since 2005. He is now Emeritus Professor and an active researcher in a wide range of fields in the Geosciences and in Higher Education with over 30 000 citations.

Guest Editorial for the 10th Anniversary of TJHE

Editing the Journal during transition

Luigi F (*also known as Lupo*) Donà dalle Rose*

Past Editor

Anna Serbati**

Past Assistant Editor

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Abstract: Both authors express their gratefulness to the whole Tuning Academy and to the many colleagues who cooperated to their editorial experience. Moreover, revisiting that period, they present some new remarks and reflection on that “incredible 5-years journey”. Anna’s contribution focusses on three big added values, that – according to her editorial experience – TJHE offered (and offers) to the higher education community worldwide. Indeed, TJHE offers – in the first place – a platform of individual and collective reflection on the themes emerging in the international scenario; in the second place, it offers an inclusive international approach, the variety of countries represented by authors being very large; finally, it offers a reference database, since it collects a variety of scholarly experience, from more structured projects and reforms to local teaching innovation and scholarship of teaching and learning. In Lupo’s contribution, the focus is “a meditation on competences”, those which are the heart of the Tuning community. The contribution starts from a description of the different competences and roles, which occur in a

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** **Anna Serbati** (anna.serbati@unitn.it); PhD in Education Sciences, is currently associate professor of Educational Research at the University of Trento (Italy). She served as assistant editor of the *Tuning Journal for Higher Education* from 2015 to 2019 and she is currently a member of its Editorial Board.

More information about the authors is available at the end of this article.

well-structured editorial process (whose achievement was the aim of those 5 years). Such an example – in its particular context – shows the complementarity and the circularity of competences, qualities which are present even in more general contexts of human life. Moreover, this example leads to a deeper understanding of the splendour and magnificence, that the competences may generate.

Keywords: Tuning Journal mission; editorial process; HE database; generic and specific competences.

Lupo's part

One day, walking with Julia and Robert in a street of Rome, where we were for a meeting of the early Tuning, we were talking about “when” it is appropriate to put an article down on paper. And Robert emphasized that this can occur only when the whole content is mature in the author’s mind. I must confess that I found it very difficult to reach this stage in writing this editorial. I thought about it for some months. At the end, I had to write: the focus is “a meditation on competences”. More precisely, a focus on the complementarity and the circularity of competences in human life or, in other words, on their splendour and magnificence.

In these last years, after leaving the editor role in the precious hands of Mary, I devoted most of my life to my family, in the small or sometimes committing actions of everyday life. And I had time to “*look back at*” previous periods of my life. The period at the Tuning Journal for Higher Education appeared to me in a deeper perspective, which I had lived somewhat unconsciously at the time of action.

The light which triggered my reflection was a short stanza in a prayer of Mother Teresa of Calcutta, which I found on the songs book of my parish church in Padova and which I report here in my translation from the Italian version.¹

*When I sing for You Lord
You are present there
in my singing ability.
Hallelujah.*

When I acted as editor, I developed new competences, simply while doing, and – along the way – the competences of many other persons were of great help to me. As a whole, “*a tuning of actors and competences*” occurred

¹ Mother Teresa of Calcutta, “Ringraziamento per la musica ed il canto,” in *Pregchiere di Madre Teresa di Calcutta* (Milano: Mondadori Editore, 1997), 10

and it led finally to the Journal issues. Each actor, while giving, was at the same time receiving and growing. Moreover, *tuning* was in this case assured by the initial wishing caress of Julia and Robert.

The launch of a given Journal issue involved many actors, who interacted offering their own personal gifts. All of them inherited a smoothly working online platform and a robust Journal organization, set up in the previous years by Paul Ryan, the Journal founder, and by Ladislav Bizimana, the Managing Editor, with much of competence, wisdom and love. My Assistant Editor Anna Serbati and myself, were very grateful to Paul for his being Guest Editor in the first issue of our mandate. Among all actors of our editorial period, I mention at first Anna, who offered to the Journal her most valuable previous research and editing experience, made at her department in Padova in the area of university education. She also brought to all of us the freshness of her age and her special gift of being most concrete and well-balanced in deciding. Moreover, her being rich in academic relations became extremely useful when looking for reviewers or even when hunting for new submissions, asking potential authors – met at Conferences or occasionally – to contribute to TJHE with a manuscript of their own. The other essential person for our editorial work was Ladislav Bizimana, the Managing Editor, a true and lasting pillar of the Journal, who – as a first gift – made us feeling at home. He offered us his expertise not only in the crucial role of editing and copyediting the two annual issues, but also shared his precious knowledge and familiarity with the procedures for the validation of the Journal. Finally, his ability in managing all technicalities related to the on-line nature of the Journal was basic for the Journal growth and success. In the first years of our editorial period, most precious was the role of Pablo Beneitone, who in the dawn of Buenos Aires was coaching us three by skype, on behalf of the Tuning Academy, often helping us with concrete ideas and suggestions and cooperating in this also with Maria Yarosh, who at the time took care of the Tuning short grant visits in Deusto. Sometimes, these latter led to publishable submissions.

The Editorial Board acted in those days in several ways: after its enlargement, on the basis of a balanced gender and geographical distribution, the topics of the TJHE mission were detailed under four new points, in order to make it clear that the Journal – even though inspired by the richness of the many Tuning projects experience – was accepting worldwide contributions by all academic communities concerned with innovation in university education. Several EB members and Advisory Editors were involved in preparing this decision: here I would like to remember especially the enthusiasm of Arlene Gilpin. Many EB members and Advisory Editors also

committed themselves in promoting submissions in their own academic milieu: as a whole, their sensitivity and competences gave an unbelievable help to our work.

Among the group of cooperating actors, the Reviewers – and again the Advisory Editors – were most important: their wisdom, specific competences, patience and respect of deadlines were crucial for the overall quality of the Journal. Each issue, on a special page, witnesses our personal gratitude to each one of them. Many qualitative aspects about the “fruits” of this whole editorial period are described in our Guest Editorial of Vol 7,1 of the Journal.² We only recall here that, until when the handover to Mary occurred, the published “non-Tuning” articles were slightly more in number than the “Tuning” ones, thus confirming the strategic global role of the Journal. Moreover, we learned with joy that the Journal was accepted for indexing by Scopus on September 2018 and by ESCI (WoS) on June 2019.

Of course, all the efforts of these actors got sense only because authors submitted for a Journal evaluation their articles. The authors and their manuscripts, rich in findings and reflections, were the focal point of the whole process. Only rarely submissions were accepted as they were sent in. In my opinion, the most valuable aspect of the whole editorial process – whatever it takes in dialogue, suggestions and patience – is the interaction between authors and all the other actors of the editorial process in order to shape the relevant submissions into publishable manuscripts. This is the aspect, which I name “healing aspect” of the process, i.e. a respectful service to authors.

“Looking back at” and “reading through” those editorial years, I feel as most important to underline the cooperative nature of the whole editorial process and the complementarity of the different competences (related to knowledge) and roles (related to action), offered and played by each actor. Of course, the real process, which we went through, never was only “roses and flowers”, but involved several difficult days of patient work for paper hunting, of submissions’ reading, of reviewers availability and of dialogue and wait for the answers of the reviewers; sometimes we experienced days of anguish, especially when the copyediting phases were approaching. Recently, the editorial pains were vividly described by the EB member Damtew Teferra,³ who runs an appreciated HE journal in a different context.

² Luigi F. Donà dalle Rose and Anna Serbati, “Four Years of TJHE at a Glance,” *Tuning Journal for Higher Education* 7, no. 1 (2019):19-22, [https://doi.org/10.18543/tjhe-7\(1\)-2019pp19-22](https://doi.org/10.18543/tjhe-7(1)-2019pp19-22).

³ Damtew Teferra, “The arduous journey to establish a successful journal,” *University World News Africa Edition*, March 23, 2023, <https://www.universityworldnews.com/post>.

The “*reading through that period*” revealed some deeper aspects to me. The first aspect is the complementarity of the competences offered by each of the many actors: in this respect, the editorial process can be a parable for all good human activities. I quote here the address by pope Benedict XVI to the participants of the Bologna Seminar held in Rome in 2006 on “The cultural heritage and Academic Values of the European University and the attractiveness of the EHEA”.⁴ There, he recalls “*the Christian vision that recognizes the human being as the masterpiece of creation, since he is formed in the image and likeness of God* (see Gen 1: 26-27)”.⁵

As said above, I had an enlightening inspiration by the words of mother Teresa, and connected the Genesis words to the beginning of the Gospel of John:

*In the beginning was the Word, and the Word was with God, and the Word was God. He was in the beginning with God. All things came to be through him, and without him nothing came to be.*⁶

The Word is Jesus Christ, the incarnate Logos, who pre-exists to the creation and who reveals God the Father.⁷ Each human being was/is in the mind of God before the creation, each one is an image of Him, but since – being creatures – we are limited, each one is a wonderful and small spark of Him, who is infinite. When many human beings bring together these sparks, embodying among all their own gifts their own competences, the image of God shines forth in their being together, in their communion:⁸ in our humble context, in the group taking part in the editorial process. This whole, which is not the sum of the single ones, becomes the splendour and magnificence of the competences. We must not forget that, because of the present futility of the whole creation,⁹ human beings need to be cured: in particular competences need education, i.e.

php?story=20230321085410216&utm_source=newsletter&utm_medium=email&utm_campaign=AFNL0398.

⁴ I thank prof. Hendrik Ferdinande, University of Gent, for pointing out to me the Seminar Proceedings.

⁵ Pope Benedict XIV, “Human Beings Must Not Be Sacrificed to the Success of Science,” *Higher Education in Europe* 31, no. 4 (2006): 351-353, <https://doi.org/10.1080/03797720701302725>.

⁶ The Gospel of John, 1:1-3 in *THE NEW AMERICAN BIBLE*, downloaded on 01/09/2023 from https://www.vatican.va/archive/ENG0839/_PX9.HTM.

⁷ *Ibidem*, footnote 1(1-18) in ch.1

⁸ See “#1702 of Article 1, Man: the Image of God,” in *CATECHISM OF THE CATHOLIC CHURCH*, Part Three, Section One, Chapter One (Latin text copyright (c) Città del Vaticano: Libreria Editrice Vaticana, 1993).

Downloaded on 01/09/2023 from https://www.vatican.va/archive/ENG0015/_P5G.HTM.

⁹ New Testament Letters, Romans, 8: 20 in *THE NEW AMERICAN BIBLE*, downloaded on 01/09/2023 from https://www.vatican.va/archive/ENG0839/_PX9.HTM.

taking out¹⁰ of the persons being educated their own competences: competences which were already in the mind of the Creator before creation. This is to me the “presence there” mentioned by mother Teresa.

A second deeper aspect in this “parable of the Editorial process” concerns the link between knowledge and action. Continuing in the above quotation of pope Benedict XVI, we find the statement that

*the conviction that there is a profound unity between truth and good, between the eyes of the mind and those of the heart, ... has always been typical of this vision. Love makes one see. Universities came into being from the love of knowledge and from the curiosity of knowing, of knowing what the world is, what man is, but also from a knowledge that leads to action, that leads ultimately to love.*¹¹

Thus, a circularity appears between knowledge and love, between competences and actions nurtured by competences. In a way, applying knowledge in practice becomes a “gym”, where we train ourselves to love the others.

As a conclusion, I thank with my heart all the actors I mentioned above for what they gave me.

Anna’s part

Writing an editorial for TJHE 10 years celebration brings me back to the period 2015-2019 when Luigi F. Donà dalle Rose (Lupo) and I were editing the journal.

Those 5 years were really an incredible journey: we began our work building on the solid basis established by Paul Ryan and we enthusiastically contributed to this voice of Tuning!

From my personal perspective, I’d like to say that there were and still are three big added value that TJHE offered and offers to the higher education community worldwide.

The first is to be a platform of individual and collective reflection on the themes emerging in the international scenario: the journal in fact collects manuscripts on key topics as competence-based learning in higher education, academic teachers’ professional development and teaching competences, cooperation and partnership building, emergence and development of higher education areas, higher education in times of emergencies. Individuals,

¹⁰ See the etymology of the word “education” from the Latin verbs *e-ducere* and *e-ducare*, i.e., “take out, ex-tract, raise,....”.

¹¹ See footnote 5 above, *ibidem*.

groups, institutions, countries can find useful directions and practices through this open access database of evidence-based research.

The second added value is to offer an inclusive international approach: the variety of countries represented by authors is very large and this reflects the contribution of Tuning to the world community of higher education particularly in the effort to move programs towards competence-based approaches and towards answering to the current challenges of students and teachers in our millennium.

The third added value, in my view, is to collect a variety of scholarly experience, from more structured projects and reforms to local teaching innovation and scholarship of teaching and learning. TJHE offers a kaleidoscope of experiences, practices, reflections, activities, documented by research and double blind reviewed, that constitutes an interesting database that can enrich and stimulate Tuning Academy projects and activities and can contribute to the worldwide culture of student-centered approach.

I have great memories of the period when I was editing with Lupo the journal: in 2018 the journal was indexed in Scopus and in 2019 in Web of Science Core Collection Emerging Sources Citation Index. These achievements demonstrated the quality of the work done by the editorial team.

The collaboration with Lupo as main editor and Ladislav Bizimana, journal manager, was great: I learnt a lot from both of them and I am very grateful for our collaboration. Reviewers were also very helpful; I appreciated their competence and their willingness to provide feedback that could help for the development of the reviewed paper when possible.

My TJHE journey was based on collaboration and supportive approach, competence and professionalism: my gratitude goes to Editorial Board, to the Advisory editors and to the whole Tuning Academy. And finally, my best wishes to the current editor, prof. Mary Gobbi, who is leading the TJHE journey with greatest competence and commitment.

Let's continue enjoying TJHE as international platform and network for the development of and reflection on higher education!!

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Guest Article for the 10th Anniversary of TJHE

Tuning in Higher Education: Ten years on

Julia María González Ferreras and Robert Wagenaar*

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Abstract: When the first issue of the Tuning Journal for Higher Education was published in November 2013, the Tuning initiative had become of global significance, running projects in all continents. These all focussed on curriculum reform backed up by an internationally defined approach based on the paradigm of outcome based, that is, student-centred and active learning, in addition to agreed reference points. Around the same time, the Tuning aims and objectives were extended. This reset followed societal and technical developments. More emphasis was put on social inclusions, the involvement of students, identifying relevant topics, and to the development of practical tools. Also, more attention has been given to staff development responding to the notion that the modernisation of the higher education sector as well as the reform of degree programmes proved to be rather slow and a bit disappointing. To boost the process, Tuning – very recently - developed general Qualifications Reference Frameworks for all learning cycles as well as a Guideline to use these for Quality Assurance. For five disciplinary fields it also developed transnational diagnostic tests as a means to identify shortcomings in degree programmes, pushing for change. As a result, Tuning has reinvented itself to stay highly relevant for the years to come.

Keywords: Tuning Project; Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe (CALOHEE); Qualifications (Reference) Frameworks; OECD Assessment of Higher Education Outcomes

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(AHELO); Joint Programmes; European Standards and Guidelines for Quality Assurance (ESG); practical tools; inclusiveness; paradigm change; role of academics.

I. Introduction

The decision to launch a *Tuning Journal for Higher Education* did not come out of the blue. November 2013 was exactly 13 years after the idea of launching a large-scale project to reform higher education in Europe was born. In these years, Tuning developed from a European initiative to a global one, involving all continents. It showed great interest in the reform agenda set by Tuning. Key being the Tuning model for the modernisation of higher degree programmes, based on the student-centred approach and backed-up by reference point documents for disciplinary areas. During the years, the Tuning approach developed further as a result of the many projects that were set up with the financial, moral and political support of the European Commission.

In November 2012 the Tuning World Conference took place in Brussels which was organised together with the Directorate General Education and Culture of the European Commission. The conference was attended by approximately 750 academics and representatives from all parts of the world. The initial idea of the Tuning Educational Structures in Europe project to create a platform for discussion among academics to enhance the quality and relevance of higher education by modernising degree programmes had turned into a reality. Having an applicable model in place is one thing, the World Conference confirmed that it would be very helpful to support this model by research for which a related academic journal would be useful. An academic peer-reviewed journal of high standard to offer researchers worldwide, a scholarly platform to publish on educational topics initiated by Tuning, or at least related to its aims and objectives. The composition of its Educational and Advisory Board should reflect its global outreach.

The foundation for such a Journal was created in the years just preceding its launch. Years which proved to be highly fruitful and successful to share and discuss the Tuning concepts with other world regions. Tuning projects were launched and implemented concerning Africa (2011-2013), Australia (2010-2011), Canada (2011-2012), Central Asia (2012-2016), Latin America (Tuning America Latina III) (2011-2013), Lithuania (2009-2012), Russia (2010-2013), Thailand (2011-2013) and the USA (2011-2012), the last one supported by the Obama government.¹ Implementing projects in different

¹ See for an overview of projects implemented, the website of the International Tuning Academy: <https://tuningacademy.org>.

world regions also allowed for comparison.² On request of the European Commission, in 2012 a study started in close cooperation with the Ministry of Education of China.³ It would cover a period of 7 years. In the same year the outcomes were published of the Sectoral Qualifications Project HUMART, Humanities and Performing and Creative Disciplines, co-financed by the European Commission (2010-2012).⁴ It was a follow-up of a comparable project focusing on Social Sciences (2008-2010).⁵ These two projects show that although going global, Tuning still kept seeing an important role for itself in Europe.⁶ The year the first issue of the Tuning Journal was published, November 2013, was also the start of the Tuning Middle East and North Africa (T-MEDA) project (2013-2016).⁷

II. New initiatives and directions

All projects which started in 2013 and before had in common that they focussed on (1) curriculum reform based on the paradigm change from expert or staff driven education to student-centred and active learning – introduced Europe wide by Tuning in 2001 – and (2) the development of agreed reference points / standards for individual subject areas (disciplinary approach, including multi-disciplinary and interdisciplinary degree programmes). This was also the case for the regional projects Tuning Asia-South East (TA-SE) (2016-2019)⁸ and Tuning India (2016-2018).⁹

² Pablo Beneitone and Maria Yarosh, “Trans-regional generic-competences: The core of an internationalized curriculum,” *Research in Comparative and International Education* 17, no. 3 (2022): 486-510, <https://doi.org/10.1177/17454999221097026>.

³ Robert Wagenaar, Arlene Gilpin, and Pablo Beneitone, *Tuning in China. An EU-China Feasibility Study into the Modernisation of Higher Education*, Bilbao and Groningen, 2015, ISBN: 978-84-15772-95-8.

⁴ *Tuning Sectoral Qualifications Frameworks for the Humanities and the Arts. Final Report 2010 – 2011*, Bilbao, 2012, https://tuningacademy.org/wp-content/uploads/2014/02/SQF_HUMART_Final_Report_2010-2011.pdf

⁵ *Tuning Sectoral Qualifications Frameworks for Social Sciences. Final Report 2008 – 2010*, Bilbao, 2010, https://tuningacademy.org/wp-content/uploads/2014/02/SQF_Social-Sciences_EN.pdf.

⁶ Robert Wagenaar, “Quality efforts at the disciplinary level: Bologna’s Tuning process,” in *Research Handbook on Quality, Performance and Accountability in Higher Education*, ed. Ellen Hazelkorn, Alexander McCormick, Andrew Gibson, and Hamish Coates. Cheltenham: Edward Elgar Publishing Ltd., 2018: 275-289.

⁷ T-Meda website. <http://tuningmeda.org>.

⁸ Tuning Asia – South-East website. <https://tuningasia-southeast.org>.

⁹ Tuning India website. <https://tuningindia.org>.

However, the Tuning agenda was also reset from 2013 which was triggered by a number of experiences, resulting from the implementation of the projects mentioned, and observations made, based on global educational and societal developments. From the Sectoral Qualifications Projects, it was learned that the two competing overarching European qualifications frameworks, the Framework of Qualifications for the European Higher Education Area (Bologna Process) and the European Qualifications Framework for Lifelong Learning as well as the national qualifications frameworks for both and the Tuning Reference Points for subject areas, were not sufficiently aligned, to be effective in practice. Building on the European Commission Implementation Reports and EUA and ESU reports concerning the Bologna Process, it was noticed that the modernisation process of the EHEA made limited and uneven progress in many ‘Bologna’ countries.¹⁰

To obtain more insights about the level of implementation of the paradigm change to output-based or student-centred learning – one of the main objectives of Tuning and formally made an aim of the signatory countries of the Bologna Declaration from 2009 – Tuning implemented a study in the years 2013-2016. This *Tuning EU-USA Study* was co-financed by the European Commission and the Lumina Foundation. This Foundation based in Indianapolis had been a strong promotor of the Tuning philosophy in the USA for years, supporting in organising projects and offering financial support to a range of disciplinary fields, of which History, stands out.¹¹ The findings were published in a paper published in the *Tuning Journal for Higher Education*.¹² Although it was concluded in the paper that there was broad knowledge of the outcome-based approach among in particular higher education management and partly university staff, there was a disappointing level of implementation in many universities and departments which resulted in its title: A Long Way to Go

¹⁰ European Commission et.al, *The European higher education area in 2012: Bologna process – Implementation report*. Brussels, 2012; European Commission/EACEA/Eurydice, *The European Higher Education Area in 2015: Bologna Process Implementation Report*. Luxembourg: Publications Office of the European Union, 2015; European Students’ Union (ESU), *Bologna With Student Eyes 2012*. Brussels, 2012; ESU, *Bologna With Student Eyes 2015. Time to meet the expectations from 1999*. Brussels, 2015. Andrée Surssock, *Trends 2015: Learning and Teaching in European Universities*. Brussels: European University Association, 2015.

¹¹ American Historical Association website. <https://www.historians.org/teaching-and-learning/tuning-the-history-discipline>

¹² Tim Birtwistle, Courtney Brown and Robert Wagenaar, “A long way to go ... A study on the implementation of the learning-outcomes based approach in the EU,” *Tuning Journal for Higher Education* 3, no. 2 (May 2016): 429-463.

III. AHELO and CALOHEE

In these years, a learning experience was also the OECD Assessment of Higher Education Outcomes (AHELO) feasibility study.¹³ This global multi-million project aimed to measure the level of learning of generic competences / transferable or soft skills, e.g. ‘critical thinking’, and of economic studies and civil engineering at the end of the first cycle at country level. In its design it was comparable to the PISA test for secondary education. Tuning obtained the assignment to develop the reference frameworks for both academic fields.¹⁴ The outcomes of this study proved to be disappointing, due to its approach to focus mainly on subject specific competences and, in a separate strand, ‘critical thinking’. The critical thinking test applied, was based on a US one which proved not to be very appropriate for many other world regions. A possible follow-up proposed by the OECD obtained severe criticism from in particular UK and US academics, who made the argument that educational programmes were highly culture bound.¹⁵ It was terminated as a result. Only a much smaller study was implemented focussing again on ‘creative and critical thinking skills’.¹⁶

The International Tuning Academy, established on the basis of the Tuning projects experience at Deusto and Groningen Universities in 2011 and 2012, was of a different opinion. An opinion discussed in much detail with the Directorate General for Education and Culture of the European Commission. The analysis of the Tuning directors was that the OECD project

¹³ OECD website: <https://www.oecd.org/education/skills-beyond-school/ahelo-main-study.htm>

¹⁴ OECD, *Tuning-AHELO Conceptual Framework of Expected / Desired Learning Outcomes in Engineering*. OECD Education Working Papers, no. 60. Paris: OECD Publishing: 2011, https://www.oecd-ilibrary.org/education/a-tuning-ahelo-conceptual-framework-of-expected-desired-learning-outcomes-in-engineering_5kghtchn8mbn-en; OECD, *Tuning-AHELO Conceptual Framework of Expected and Desired Learning Outcomes in Economics*. OECD Education Working Papers, no. 59. Paris: OECD Publishing, 2011, https://www.oecd-ilibrary.org/education/tuning-ahelo-conceptual-framework-of-expected-and-desired-learning-outcomes-in-economics_5kghtchwb3nn-en; See also: R. Wagenaar, *Learning Outcomes a Fair Way to Measure Performance in Higher Education: the Tuning Approach. Outcomes of higher education: Quality relevance and impact*. Paris: OECD, 8-10 September 2008, <http://www.oecd.org/site/eduimhe08/41203784.pdf>.

¹⁵ Philip G. Altbach, “AHELO: The Myth of Measurement and Comparability,” *International Higher Education* 82 (Fall 2015), 2-3, <https://doi.org/10.6017/ihe.2015.82.8861>.

¹⁶ OECD, *Fostering and Assessing Students' Creative and Critical Thinking Skills in Higher Education*: <https://www.oecd.org/education/ceri/fostering-assessing-students-creative-and-critical-thinking-skills-in-higher-education.htm>; Van Damme, D. and D. Zahner (eds.), *Does Higher Education Teach Students to Think Critically?* Paris: OECD Publishing, 2022, <https://doi.org/10.1787/cc9fa6aa-en>.

had its flaws and weaknesses but the basic idea to identify the strength or weaknesses of educational programmes and in summary national systems by applying a transnational test, could be an indicator and stimulus to promote reforms. Conditional would be that any test should take into account the variety of missions and profiles of degree programmes, different educational cultures and be focussed on a combination of high-level generic and subject specific competences, formulated as learning outcomes.

This philosophy resulted in the project *Measuring and Comparing Achievement of Learning Outcomes in Higher Education in Europe* (CALOHEE).¹⁷ In terms of implementation three stages were identified. A first on defining qualifications reference frameworks and more detailed assessment / learning outcomes frameworks for initially five academic fields: civil engineering, history, nursing, physics and teacher education. Learning from the HUMART project these frameworks to be based on a combination/merger of the two overarching European Qualifications Frameworks. They were published in 2018.¹⁸

Comparable frameworks have been developed for an additional 6 academic fields since, that is creative and performing arts and design, business administration, ICT, international relations, medicine and occupational therapy, which will be published at the end of 2023. The initial group of disciplines moved on to the second stage, the design of comparable international *diagnostic tests* to be understood as a feasibility study. In 2023 the outcomes of this study were published. The main conclusion: it is indeed possible to develop fair and reliable tests or assessments which indicate the level of learning of high level subject specific and generic competences as an instrument for diagnosis of the quality of individual degree programmes and their relevance for society. Each of the disciplinary groups developed detailed examples of applicable tests.¹⁹

As part of the CALOHEE projects, two other initiatives were initiated to support the preparation process of state-of-the-art reference frameworks. The first one was defining separate frameworks for five burning societal topics: multicultural society, political awareness, ethics and values, information society and sustainable society/ies / climate change integrating UN Sustainability Goals in all educational programmes.²⁰

A second initiative was developing Tuning-CALOHEE General Reference Frameworks for the short or associated degree and the first and second cycle

¹⁷ CALOHEE Project website: <https://www.calohee.eu>.

¹⁸ Ibidem.

¹⁹ Idem.

²⁰ Idem.

degree – Bachelor and Master – and the doctorate.²¹ These frameworks are based on the same ‘merger’ approach as the academic fields. Defined not to compete or replace the existing overarching frameworks, but as a state-of-the-art completion of the existing ones. In addition, also a detailed Guideline was developed to apply the CALOHEE general and subject-specific frameworks in the European Standards and Guidelines for Quality Assurance (ESG).²² The Frameworks and the Guideline are expected to be of a great help for developing profiles of joint programmes and degrees as well as to serve as a foundation for robust cooperation in European Universities Alliances, enhancing quality, jointness and consistency of curricula. This is evidenced in the successful, inspirational and standard-setting Erasmus Mundus Joint Degree Programmes, Euroculture²³ and NOHA,²⁴ which are both based on the Tuning philosophy; joint degrees being perceived as the most profound experience of jointness and genuine European “Products” linked with quality and excellence.

The CALOHEE initiative should be perceived as a fundamental addition to its original aims and objectives. By making international comparative tests, it moved from offering references of quality to measuring whether the quality standards defined, are actually being met.²⁵ These initiatives should be understood against the notion that three key Bologna tools need urgent updating, taking societal and technology developments into account: European / national frameworks, ESG and the ECTS Users’ Guide 2015, now between 8 to almost 20 years of age.

The CALOHEE model and experience has been used as an important foundation for defining and designing new Erasmus+ Capacity Building Projects, e.g. Aprendizaje Centrado en el Estudiante en América del Sur

²¹ General Qualifications Reference Frameworks for Higher Education in Europe: <https://www.calohee.eu>

²² Guideline for Applying Tuning – CALOHEE Qualifications Reference Frameworks for Higher Education in Europe in the European Standards and Guidelines for Quality Assurance (ESG), <https://www.calohee.eu>

²³ EMJMD Society, Politics, and Culture in a Global Context: Euroculture website. <https://www.euroculturemaster.eu>.

²⁴ EMJMD in International Humanitarian Action (NOHA). <https://www.nohanet.org>.

²⁵ Robert Wagenaar, “What Do We Know – What Should We Know? Measuring and Comparing Achievements of Learning in European Higher Education: Initiating the new CALOHEE Approach,” *Assessment of Learning Outcomes in Higher Education. Cross-National Comparisons and Perspectives*, ed. Olga Zlatkin-Troitschanskaia, Miriam Toepper, Hans Anand Pant, Corinna Lautenbach and Christine Kuhn. Cham: Springer International Publishing, 2018, 169-189; Robert Wagenaar, “Evidencing Competence In a Challenging World. European Higher Education Initiatives to Define, Measure And Compare Learning,” *International Journal of Chinese Education (IJCE)*. SAGE (April 20, 2021), <https://doi.org/10.1177/22125868211006928>.

(ACE) (2020–2024)²⁶ and Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Asea (CALOHEA) (2021–2024), in practice covering the ASEAN region.²⁷

IV. Higher level of inclusiveness

Has the societal responsibility of the higher education sector being highlighted in the CALOHEE projects, the data about educational reforms not yielding sufficient results, inspired to additional action. The Bologna Follow-up Group (BFUG)²⁸ as well as Tuning noticed lack of progress of implementing the Bologna key commitments. One of the reasons: substantial lack of training of academic staff in the vast majority of countries to act successfully as 21st century teachers. Tuning observed that higher education teachers in practice are ‘operating as pilots with the experience of passengers’. Therefore, it included substantial training of staff in all of its new initiatives. It also stipulated explicitly in the project designs that internationalisation and curriculum reform go hand in hand and should involve not only disciplinary experts, but also administrative and supporting staff and management, e.g. in ACE, CALOHEA and Resources for Internationalisation of Higher Education Institutions in India (RISHII) (2020–2024). Although student representatives had been present in nearly all Tuning projects, in the ACE one it was decided to involve substantial numbers of students, making them comparable in roles and contributions to members of staff. Process and outcomes showed this to be a very successful strategy for developing ownership and reform.

A second line has been the focus on social educational issues and practical tools; all focussing to empower the position of the learner. In the Latin America III project attention was given to the social dimension as part of it. An explicit first initiative regarding the social dimension was the Developing All-Round Education (DARE+) project (2014–2017) coordinated by the University of Granada but conceptually developed by Tuning Academy staff.²⁹ The aim: to identify and to find recognition for non-formal but in particular informal learning in a higher education context.

²⁶ ACE website. <https://vrip.unmsm.edu.pe/aprendizaje-centrado-en-el-estudiante-de-america-del-sur/>.

²⁷ CALOHEA website. <https://calohea.org>.

²⁸ BFUG, *The Bologna Process Revisited: The Future of the European Higher Education Area*. Doc. Code: BFUG_LV_IS_43-4. Last modified 10.12.2014.

²⁹ DARE+ website. <http://dareplus.eu/content/about-dare>; Maria Yarosh, Anna Serbati and Aidan Seery, ed., *Developing Generic competences outside the University Classroom*. Granada, 2016.

Another initiative worth mentioning in this respect is the project FORTH: Formation of Teachers in Challenged Areas (2018-2023).³⁰ The aim of this project to develop a Bachelor Minor and a Master Major for teacher education to empower primary and secondary teachers to operate more successfully in challenged (and remote) areas, has been fully met. The model developed allows for implementation in and adaptation to the needs in all world regions. The project involved the ministry of education, key stakeholder organisations, and five universities and fifteen schools spread well over the country. The Master Major obtained full accreditation of the Philippine authorities and its vice-president and minister of education paid tribute in a video message to those involved to make the initiative a success.³¹

V. New and better practical tools

Another new direction has been the development of helpful tools to be applied by practitioners. Already in 2010 such a tool was published in the *A Tuning Guide to Formulating Degree Programme Profiles. Including Programme Competences and Programme Learning Outcomes*, prepared in close cooperation with credential evaluators (ENIC-NARIC).³² The instrument proved to be very useful and needed. At present, an update is prepared applying the CALOHEE frameworks and findings. Another project fitting this context, is the Knowledge Alliance project ‘Integrating Entrepreneurship and Work Experience in Higher Education (WEXHE)’ (2016-2020).³³ This project resulted in nine comprehensive information packages for organising work placements / internships, traineeships and entrepreneurship. Identifying three types for each of them. The WEXHE Guides are based on the Tuning-CALOHEE approach defining three levels of achievement of generic competences in statements / learning outcomes. The initiative has been continued in the project eWBL: electronic work-based learning which is coordinated by the Fachhochschule Münster

³⁰ Project FORTH website. <https://www.project-forth.org/>.

³¹ Ibidem.

³² Jenneke Lokhoff et al., ed., *A Tuning Guide to Formulating Degree Programme Profiles. Including Programme Competences and Programme Learning Outcomes*. Bilbao, Groningen, The Hague, 2010, https://tuningacademy.org/wp-content/uploads/2014/02/A-Guide-to-Formulating-DPP_EN.pdf

³³ André Perusso and Robert Wagenaar, “The State of Work-based Learning Development in EU Higher Education: Learning from the WEXHE Project,” *Studies in Higher Education* 47, no.7 (2022), <https://doi.org/10.1080/03075079.2021.1904233>.

involving a crucial role of the International Tuning Academy based in Groningen.³⁴

Recently, a project, entitled Supporting Teachers Who Support Student Transition (START) (2022-2025), started that focusses on preparing academics teaching in the first year of the Bachelor better for their role in the educational process. A toolbox of effective strategies is developed by teachers, involving students, which intend to help freshmen with different backgrounds in higher education to learn more successfully.³⁵

VI. Academic contribution

As said, the *Tuning Journal of Higher Education* was established to offer a platform for Tuning related research, although the Tuning approach also obtained a high level of visibility in academic publications of scholars not directly involved in the Tuning initiatives. By far most citations are related to the project implemented in Europe and Latin America.³⁶ To boost the prestige in academic circles it was thought helpful to publish not only project reports – some 100 so far³⁷ - but also present findings in academic volumes and scholarly papers published in prestigious international journals, besides the Tuning one. This strategy is partly visualised in the footnotes and biography of this paper. In addition, it was thought useful, may be even necessary, to outline the role of Tuning in the context of the development of the Bologna Process and that of the European Credit Transfer and Accumulation System.³⁸

It was Tuning – on invitation of the European Commission and with support of the European University Association (EUA) - that transferred ECTS from a credit into a credit and accumulation one in the period 2001-

³⁴ eWBL website. <https://www.ewbl-project.com/>; Andre Perusso and Robert Wagenaar, “Electronic work-based learning (eWBL): a framework for trainers in companies and higher education.” *Studies in Higher Education*, 8 Nov. 2023, <https://doi.org/10.1080/03075079.2023.2280193>

³⁵ START website. <https://supportingstart.eu>.

³⁶ According to Google Scholar: Tuning Europe projects appr. 4750 citations; Tuning Latin America appr. 1000 citations (d.d. October 2023).

³⁷ International Tuning Academy website. <https://tuningacademy.org/publications/>.

³⁸ Robert Wagenaar, *Reform! TUNING the Modernisation Process of Higher Education in Europe. A Blueprint for Student-Centred Learning*. Bilbao and Groningen: International Tuning Academy, 2019, ISBN: 978-84-1325-032-8. Two chapters of this book were also published in a separate publication: Robert Wagenaar, *A History of ECTS, 1989-2019. Developing a World Standard for Credit Transfer and Accumulation in Higher Education*. Bilbao and Groningen: International Tuning Academy, 2019, ISBN 978-84-1325-042-7.

2004.³⁹ Tuning experts played a central role again in the preparation of the ECTS Users' Guides of 2009 and 2015. Nevertheless, despite the different strategies applied and the Tuning approach and toolbox developed, the implementation of the key instruments has been slow. At one moment the director for higher education sector of DG EAC, Adam Tyson, raised the question whether Tuning had been able to make a difference.⁴⁰ The response was formulated in an academic contribution entitled *The Myth of Power: Governing Reform in the Bologna Process of Higher Education*.⁴¹ It makes the argument that change in higher education is a multi-level process and can only succeed when all levels involved, European/national policy makers, higher education management, academic staff, educational experts and students. In other words, Tuning is a factor among others.

VII. Contribution in the formation of academics and champions in higher education

Might the policy impact of Tuning initiatives having its limitations, the contribution of Tuning in the formation of academics and champions in Higher education reform in Europe and the world is surely most important, decisive and successful. Many hundreds of people involved in each project developed ideas, gave shape to detail, shared their contributions, convinced their authorities and colleagues both at their university and at country level to make change. They dreamt the programmes and shaped in their minds the new profiles, they owned the project and provided the passion that made it possible; they travelled many airports and gave their time freely with great generosity. They shared their vision, their knowledge, and their commitment attending meetings and writing summaries, coordinating ideas and creating new and challenging experiences for the students. These are the Tuning experts, those who made the projects possible, those who involved departments and faculties to embrace a new and more demanding way of thinking of indicators and profession for a global world looking for common points of reference.

³⁹ European Commission, *ECTS Users' Guide. European Credit Transfer and Accumulation System and the Diploma Supplement*. Brussels, 14 August 2004; European Commission, *European Credit Transfer and Accumulation System. Key Features*. Luxembourg: Office for Official Publications of the European Communities, 2004, ISBN 92-894- 4742-7.

⁴⁰ Robert Wagenaar, *Reform!:* 268-269.

⁴¹ Robert Wagenaar, "The Myth of Power: Governing Reform in the Bologna Process of Higher Education. *From Actors to Reforms in European (higher) Education. Festschrift for Pavel Zgaga,*" ed. Manja Klemenčič. Higher Education Dynamics Series. Series Editors: Peter Maassen and Johan Muller. Cham: Springer-Nature, 2022.

Without these Tuning champions, the initiatives would have been sets of lifeless imaginations. Without their robust academic background and their capacity to share and to build, learning from each other's cultural roots, Tuning would never have crossed frontiers and reached different regions of the world. They were the actors and the authors of a blow of inspiration that shook higher education during now close to a quarter of a century in a genuine search for transparency and internationalization for quality and relevance.

VIII. In conclusion

Without exaggeration, one can claim that overtime Tuning has developed into the largest and most influential initiative globally to reform higher education. At present nearly 130 countries have been / are involved in one or more of the Tuning projects. The initiative keeps enjoying prestige in all world regions due to the projects which were running in the years around 2013 and after. Operating in a worldwide context allowed not only for tailoring the approach to regional and national settings, but also to enrich continuously the models taking into account the findings of the different projects. These showed that besides difference - mainly related to different educational philosophies developed in Europe - there proved to be very much in common: the need to make degree programmes more relevant towards the needs to society and to take into account global technical and societal developments. Programmes proved to be very less culture bound than initially might have thought.

Noticing that the paradigm change towards outcome-based learning developed very slowly, forced to re-think the Tuning strategy to modernise higher education. This resulted in the CALOHEE projects, which as the original Tuning ones, proved to be agenda setting again not only for Europe but worldwide. Maybe the greatest contribution of Tuning has been during in particular the last decade in which it has been able to bring academics from different world regions together by offering a platform for cooperation and to give them a voice in the policy making theatre. The many Tuning initiatives have facilitated academics to discuss their experiences as teacher and develop strategies with peers to enhance the quality of learning and teaching. As a result, an informed group of thousand and more academics have been created who perceive(d) involvement in Tuning as a very helpful and positive experience.

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Introductions

Educational Journeys in times of uncertainty: Weathering the storms

Introduction

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Editor

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Abstract: This Edition of the Journal comprise eleven papers, of which six are related to the COVID- 19 pandemic. The papers are balanced between those mainly concerned with media or online pedagogies (four), staff development and experiences (three) and strategic university wide policy or institutional change (four). The papers continue to reflect a varied range of participant countries both in terms of the authors, but perhaps more importantly the study sites, (Colombia, Italy, Indonesia, Iran, Lebanon, South Africa, Spain, and Turkey). Universities from both the state and private sector are represented, either through individual case studies or via multi-site studies in subject areas, departments, or institutions.

What is fascinating, and perhaps unsurprising, is that common themes emerge from different countries. From the papers in this edition, several issues emerge. First, we can conclude that with distance learning there was/is a particular challenge of dealing with cheating and plagiarism- and exhibited during the pandemic. Second, responses, or readiness to change, with respect to new initiatives and pedagogies can vary by discipline within the same institution, between institutions and within a country. Third, it was noted that when change is made, either planned or in an emergency, the extent of the impact is related to the prior experience and expertise of both teachers and students and the available infrastructure with respect to the new situation. Several papers raised concerns about the pedagogical competences of the teaching staff and how, when this is limited in relation to a required change in

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pedagogy, stress and workload problems are encountered by both teachers and students. Furthermore, the learning experience is hindered and, where technology changes are involved, students can become isolated and demotivated. Accessibility and equality e.g. (gender, age, income, access to resources) issues were also raised, most evident during the pandemic and emergency remote teaching. The conclusion is perhaps that universities need to plan more carefully for emergency situations taking account of their demographic and socio-economic community – whether teachers, students or other stakeholders.

Keywords: COVID-19; staff development; on line support; higher education strategies; institutional change.

Our first paper “*Shifting the scientific paradigm for the transformation of higher education: Experience at State Islamic University (UIN) in Indonesia*” by Ahmad Muthohar, Abdul Ghofur, M. Muksin Jamil, and Muhammad Sulthon, offers an intriguing perspective on the recent ten-year transition from a national system of State Islamic Institutions to one of State Islamic Universities (UIN). Private universities, the predominant provider, co-exist alongside the national provision with state provision comprising 6.7% (58 universities) of the total Indonesian provision of Higher Education (HE). Two aims underpinned the national change, namely the transformation of HE and better integration of the sciences in its Islamic context. Through four UIN qualitative, narrative case studies, the authors analysed this significant transformation with particular emphasis on how the scientific paradigms from old to new change, give rise to anomalies, how these anomalies are managed and to explore the nature of the new paradigm. The paper offers helpful analyses on the general transformations happening globally within HE, the specific nature of scientific paradigms in HE and their connections with Islamic concepts in comparison with Western traditions of science. One difference noted is that Islamic scientific traditions may add textual and intuitive methods as well as rational methods. For readers unfamiliar with the history of these developments, and the Islamization model of the general sciences versus the choice model between Integration and Interconnection science, this paper is very informative. The paper includes comparisons with other Islamic countries that have made comparable transitions in the past.

The main finding was that in Indonesia, the Integration of Science model encouraged former Islamic religious institutes that were restricted to one discipline, religious studies, to become universities when they were authorised to deliver and conduct multidisciplinary studies. The case studies portrayed the challenges and successes of these transitions and proposed a model of

implementation that may be helpful to other HE providers in a similar situation.

The introduction of video-based formats as a pedagogic strategy is now well established. In the second paper by Luis Navarro-Ardoy, Antonio Castro-Higueras, and Carmen del Rocío Monedero-Morales. The authors outline a pilot study that compared the video format with traditional text-based guides for students in their paper “*The use of the video format as a teaching guide in university studies*”. Teaching guides in this context refer to course information concerning the learning, teaching and assessment experiences, expectations and opportunities students can encounter on their programme journey. In addition to the investigation of the two modes of delivery (written versus video) the team were interested in the retention and relevance of the information provided in the guides. Three subjects were chosen from Journalism, Audiovisual Communication, and Sociology degrees from two universities in Malaga, Spain. The paper provides a detailed account of the research design, including that of the video and written materials themselves, together with rationale for the content of the guide. The experimental and control groups were compared using a quantitative survey that included generic questions and aspects specific to the respective video or written guide.

Results demonstrated that, perhaps as suspected, most students tend to either not read, or skim read, text-based guides. In contrast the video format, improved student understanding of the contents, and was rated more highly than the text format (despite some technical quality improvements that were needed). The authors suggest that there could be some form of corporate element to the video guide. They propose keeping the text version as a reference document augmented by the video guide that is more attractive, accessible, and dynamic for students.

Another form of student guidance forms the basis of the next paper “*Improving undergraduate students’ learning through Online Educational Guidance Meetings (OEGMs)*” by Begüm Ceylan and Bünyamin Bavlı. While the context was during COVID- 19, the paper is in this section of the Journal due to its link with student guidance in the previous paper. The setting is an English preparatory programme in Istanbul, Turkey. The Online Educational Guidance Meeting (OEGM) in this study comprises a voluntary meeting between teacher and student. Its purpose is to address low student achievement in learning English- the teaching language of this university, can be improved by revealing the instructor’s and students’ experiences and perspectives during their first year at university. Interviews and focus groups were conducted with 12 students and 8 English Language instructors

teaching at the same school. Students' ages ranged between 17 to 21 and all of them attended at least one educational guidance meeting with their instructors. Qualitative data yielded two impacts, psychological and academic. Psychological benefits of the guidance sessions included, increased motivation, student self-awareness of their learning habits, enhanced self-confident and improved performance. In addition, during COVID- 19 their anxiety was reduced, they felt valuable, and the session improved the communications between staff and students.

Academic benefits of the sessions included a better orientation to online education, learning how to improve their own language skills through the exploration of their individual learning needs and characteristics. The instructors stated that they made some positive changes in their teaching in response to their improved awareness of the students' individual needs and characteristics. The paper is of course limited by the sample size; however it does provide useful points for reflection.

This next paper by Monica Fedeli and Edward W. Taylor "*The impact of an active-learning designed faculty development program: A students' perspective of an Italian university*" shows how change can be enhanced through active learning strategies employed with Faculty members. A particular point of interest in this paper is that in the context of a national system, an individual case study of a representative university addressing change has generalisable features of benefit to other universities in the same country. This multilevel study analysed the extent to which enabling Faculty members to experience active learning strategies helped them to have a positive impact on students who hitherto had very traditional teacher led, rather than student led education. The authors explain the Italian context, the transmission mode of education, and the passivity that has emerged amongst the student population over many years. For example, students are allowed to resit examinations as many times as they like and for many courses, the final examination is the only assessment of student performance.

The theoretical lens informing the case study included communities of practice, constructivism, and active learning- concepts well explained and applied to the context. Following five years of running the development programme, University wide data were analysed comprising surveys addressing student satisfaction and experience of teaching and course organization. In addition, the effectiveness of the training programme upon student pass rates at the final examination was also analysed to see if students who had been taught by trained teachers had a higher pass rate/score at the first attempt. The study generated a huge data set and outlined limitations that included the transition to online learning due to the pandemic. None the less,

interesting findings were that increased student satisfaction and pass rates were related to individual programmes/disciplines particularly, and perhaps unsurprisingly, in face-to-face settings. Nuances of the Italian context included inherent resistance to new teaching methods. The study revealed the importance of faculty learning communities in promoting active learning- an area for further research.

Our next paper, “*An exploration of the role of transformational leadership in times of institutionalization of change*” (Ursula El-Hage and Dina Sidani) takes us to a private university in Lebanon engaged in accreditation. Adopting a qualitative methodology, the data comprised semi structured interviews with fifteen senior university executives, eighty-five Faculty members in fifteen focus groups drawn from four disciplinary fields. The study explored four dimensions associated with transformational leadership in times of the institutionalization of change. Findings highlighted that two dimensions were critical, namely intellectual stimulation and inspirational motivation. The other two, idealized influence and individualized consideration, were of limited value in the case study site. The authors acknowledged the instability of the Lebanese socio-political environment. They discussed the role of charisma and inspirational motivation to enable the entire accreditation team to meet the institutional goals. From their data, the authors gained insights into the skills transformational leaders require to overcome resistance to change, institutionalise the change, and hence improve performance within the university. Readers interested in how to apply the principles of transformational leadership to their academic setting will find the literature review and study of benefit.

Suphi Önder Bütüner and Serdal Baltacı’s study, “*The effects of online learning self-efficacy and attitude toward online learning in predicting academic performance: The case of online prospective mathematics teachers*”, aimed to discover if Online Learning Self-Efficacy (OLSE) and attitude toward online learning (AOL) significantly predicted the academic performance (AP) among Turkish prospective mathematics teachers. This was a gap found in the existing literature. Both quantitative and qualitative data were collected. The study comprised 1106 prospective mathematics teachers’ responses from 76 universities across the seven regions of Turkey. 2 convenient Faculties of Education from each region were also included. Additionally, to gain deeper knowledge within the scope of the study, the written opinions of 118 volunteers added to the richness of the data. To ascertain academic performance, course transcripts were analysed during from the pandemic period (2019–2020 spring and 2020–2021 fall terms). Of note, is that there was a return to online distance learning during the earthquake of 2023 that affected ten provinces.

The detailed literature summaries in this paper are particularly helpful, namely the topics themselves (self-efficacy, attitude to online learning, and academic performance), and the instruments/scales deployed to measure these three dimensions. The authors carefully explained the statistical tools employed and factors limiting the study. In essence, they found that the level of academic performance could be predicted by online learning self-efficacy and attitude toward online learning. The authors debated the implications of these findings for teaching staff. They advocate the importance of motivating students through a variety of strategies to strengthen communication and interactions through the virtual platforms. They noted factors that influenced the students' concentration and participation before, during and after the session with respect to the communications of teachers and/or students. They advocated that the online course, and its delivery, should be organised in ways that attracts students' attention and motivates them. They emphasised how the learning environment can positively (and of course negatively) influence the attitudes and self-efficacy of the prospective mathematics teachers. Their critical reflection points out the challenges of generalization when different countries (including the students and teachers) vary in their access to technological tools, familiarity with distance education process, and their technological infrastructures. They also suggested that results may vary by discipline. This point was raised by Fedeli and Taylor in the study above with respect to teacher development.

The next two papers, from Colombia and Spain respectively, focus on the experience of the academic teachers during the pandemic. Together they form a helpful overview of the trends that emerged during the pandemic, together with some informative literature summaries. Due to the lockdowns and infection control measures required by the pandemic, universities were required to deliver suddenly- without, or with limited, preparation- new or augmented modes of teaching, learning and assessment especially through online or virtual formats. The expression '*Emergency Remote Teaching*' is now a widely accepted term used to describe this phenomenon and its associated challenges.

First, Lina Sofia Valenzuela, Yeny E. Rodríguez, Henry A. Taquez, José Roberto Concha, Ana M. Ayala Román, and Laura Romero-García explore the situation in a private Colombian University, "*Emerging strategies and challenges faced by professors during Emergency Remote Teaching (ERT) at a Colombian university*". The speed of transition from face to face to ERT happened within a week at this university with 7500 students. Normally, the university adopted an active learning and constructivist approach to its pedagogical strategies. Of significance, over 60% students came from low-

income families with the university having a strong social inclusion policy. However, the quick transition to remote teaching, accompanied with home quarantine soon afterwards, meant that these students were more likely to have problems with access to internet networks and computer equipment. The authors sought to establish any relationships between how faculty (academic teachers) experienced the transition and the emergent strategies deployed. They were also interested in any differences between teachers related to demographic variables and departments. The paper has drawn on existing literature throughout the design and analytical phases of the research.

An online survey was conducted involving 725 university professors from five different schools, with varying response rates and some staff answering more than one survey if they taught in more than one school. The questionnaire inquired about the teaching strategies used and their challenges: technical, academic, emotional, or affective during the early stages of the pandemic. The data were analyzed using correspondence analysis to consider both data content as well as the interactions between professors and students. It emerged that only a few teachers had pedagogical background, so most found themselves challenged when they had to change delivery mode quickly. Consequently, most of the staff simply transferred their previous lesson content into a format suitable for uploading, rather than adapting the material for more interactive strategies on line.

Professors identified emotional challenges in 45.5% of the courses. These challenges were related to feelings or emotions that the teachers identified in the students or within themselves and the perception of a more significant workload from both ends. Examples of this were their fears (shyness, for example), the lack of demarcation between work and personal environment (since work moved into the house) and changes in the interactions employed with the students. Unsurprisingly, Technical aspects, such as connectivity and information and communication technology (ICT) knowledge, were also critical challenges. There were differences between staff from different schools based on gender and age. For example, older female teachers expressed more problems due to ICT literacy with engineering having the least difficulty. Women reported more strongly concerns with workload- this required further research.

Considering their findings, the authors recommend that teacher training programmes should include the management of emotional challenges with students and personal time management. The differences in responses associated with gender, age, and the school or discipline of the teacher indicates that staff training and support may need to have a local faculty-based element to accommodate the diversity of the professorial population.

From Colombia to Spain, with Lucía Sánchez-Tarazaga, Aida Sanahuja, Carla Colomer, and Reina Ferrández-Berrueco similarly seeking the perspectives of university faculty, “*Teaching in a COVID-19 pandemic: perceptions and practices of university faculty in Spain*”. Face to face teaching was suspended in Spain from March 2020, with blended learning being introduced from the academic year 2020/2021. This paper reports a third phase of a larger project by the authors. In this case, the focus is on the teaching staff’s point of view, gathering information about their experiences during the pandemic through a focus group methodology. The main goal was to explore the challenges and reactions faced by Spanish academics during emergency remote teaching and later, in the discussion section, to triangulate these results to the answers provided by students. Video focus groups were conducted with twenty Faculty members from four sites in Spain. Questions addressed both the academic and personal dimensions of the teacher.

The findings showed how peer support by the staff and training enabled the teachers to become more digitally competent as they developed alternative ways of teaching and learning using technology (mainly to encourage student engagement and communication). In contrast, their earlier study had revealed that the students considered that most of the teaching staff did not adapt to the new situation, even though they may have been digitally competent. This finding is different to the literature where most teaching staff adapted teaching materials without changing the curriculum or the methodology in a planned way. Also, the staff in this study indicated that they had significant pedagogical knowledge that they applied to this sudden emergency. As reported in the other studies in this edition, assessment was challenging for these teachers. On the personal side, workloads were perceived as high and, in many cases, involved certain difficulties in work–life balance. Staff described that they felt like psychologists as they were required to support students in distress and who had a lack of personal resources. This observation aligned with student comments that they often felt alone and thought that online lessons were not enough. Students had also raised concerns about work placement management: an area for further exploration. The study concluded that institutional support was crucial so that a sense of belonging could be fostered. Professional development could assist staff to adapt their pedagogical skills not only to new situations (as seen by the pandemic), but also to address the full spectrum of student experience whether learning and teaching, assessment challenges, or the socio-emotional wellbeing of both students and staff.

The next paper is one of two studies that involve engineering studies during the pandemic, the first in South Africa and the second in Iran. Both

studies address aspects of the move to electronic and virtual models of delivery. The South African study seeks to look at the education systems themselves, involving eight universities, whereas the Iranian papers singles out a particular aspect of pedagogy, the learning of mathematical concepts.

Olutayo Oyeyemi Oyerinde and Ada Mukanya Dienga's study, "*Immediate and long-term impact of the COVID-19 pandemic on South African higher education*" analysed the experiences and perspectives of engineering students and lecturers at eight universities in South Africa between November 2020 and January 2021. The authors were interested in (1) whether the new technologies/tools enhanced teaching, learning and assessments during the pandemic; and (2) the extent to which these pedagogies might endure beyond the pandemic. They adopted a mixed method study comprising qualitative and quantitative surveys.

The quantitative survey invited teachers and stakeholders to rate factors like impacts of the pandemic on student commitment, accessibility, ability to use the virtual platforms, student support and ability to ask questions. Student preferences between the new and traditional models of teaching and learning were sought, together with teacher views on the pedagogies deployed. Data were then explored in more detail through the open-ended qualitative surveys, for example student and teacher views on assessment strategies. The final total sample of respondents was 280 students from five named universities (of whom twenty-six did not identify their university) and 44 lecturers from six universities. There is a wealth of statistical data and qualitative findings embedded within the paper, with some of direct relevance to the South Africa experience (e.g. impact on loans, infrastructure, accessibility for second language English speakers and those with disabilities). More generalizable conclusions include that most of the interventions deployed during the pandemic will remain relevant, and in the case of disciplines requiring face to face tuition associated with practical learning, blended learning is becoming the new 'norm'. The study confirmed that both staff and students require training on the new virtual learning platforms, particularly with respect to assessment literacy and efficacy.

The security of online assessments, management of remote centres, and invigilation strategies were highlighted as requiring further investment and attention to ensure there is confidence in the systems. From a policy perspective, the authors noted that traditional funding mechanisms may need review to accommodate the balance between traditional and the 'new' virtual/remote pedagogies with their accompanying infrastructures.

The social responsibility of universities is a crucial aspect of modern Higher Education. In their paper "*Areas and dimensions of universities*

response to COVID-19: Diversity, trends, and evidence from the University Social Responsibility Network”, Fernando Palacio, Paola Sanoni, and Nikan Sadehvandi explored how the concept of University Social Responsibility (USR) was implemented and understood during the COVID-19 pandemic. USR is understood to be the way Universities contribute to society, communities, and the environment. The Tailloires network is a global network of universities committed to strengthening the civic role and responsibility of their institution (see <https://talloiresnetwork.tufts.edu/>). The network has a set of principles underpinning its actions including access, equality, the provision of curriculum-based opportunities for students to foster their engagement in civic roles, outlining the institutional role of the university in social engagement. One example of USRN actions was the decision in 2018 to develop a four module MOOC (Massive Open Online Course) titled an *Introduction to University Social Responsibility*. Two universities (Kyoto University and The Hong Kong Polytechnic University) lead this initiative. In July 2020, as the pandemic developed, the course was extended to include a fifth stand-alone module showcasing the response of universities to address COVID-19. Thirteen universities from ten countries engaged with the MOOC and it is the experiences of this module that forms the basis for the paper. A Special Session of the MOOC gathered information from the participating universities concerning policies, initiatives, challenges, and responses that universities experienced prior to the MOOC production phase in December 2020. This included information on how they variously engaged socially through both academic and non-academic activities during the pandemic.

Textual data were gathered voluntarily, according to an agreed ethical framework. The narratives were clustered into broad themes, analyzed for sub themes, dimensions and trends. The wealth of data collected and analysed in this study is substantive, with the authors finding new ways of organizing these data. Readers with little experience of USR, will find the paper offers sound literature reviews on the nature of USR, the response of the universities to the challenges of the pandemic, especially in innovative ways beyond traditional academic work. The paper captures the policies, projects and COVID-19 related initiatives and innovations demonstrated by this sample of USRN institutions. Its open-source data provides information for other universities interested in how civic engagement can be fostered. The data exposed a key aspect of USRN activity, namely the value and impact of non-academic engagements that were hitherto underexplored and represented. The authors provide a critical discussion on how these data and findings provide challenges to existing theories and models of USR. The authors offer an honest critique of the study limitations and the possibilities for further research in this field.

Fateme Moradi, Zahra Rahimi, and Zohreh Nekoue investigated whether, within an engineering course, the teaching move to virtual delivery, some mathematics content may not have been appropriately understood. (*Analysis of Engineering students' errors and misunderstandings of integration methods during the COVID-19*). The literature on errors, mistakes, slips and lapses is well known in several subject areas from mathematics to health sciences. Morade et al. provide a fascinating account of theories concerning errors and mistakes within the field of mathematics education. As they note, an error can lead to false concept understanding with subsequent negative implications for further mathematical application in the future. One of the roles of the educator is to elicit common misconceptions so the teacher can evaluate their teaching and students 'errors' can be addressed constructively. During face-to-face teaching this sometimes happen as the session develops through concurrent interactions between students, teachers, and their task. In this case the virtual nature of the learning inhibited this. The research team were therefore interested in any errors made through this mode of delivery-particularly their typology. During a core mathematics series of six sessions for both engineering and mathematics students, the programme was run virtually for forty students. After each session a three-step formative assessment was undertaken by the students and analysed by the research team using an existing framework. For mathematics educators, the data presented in the paper would be of particular interest showing the different types of conceptual error that emerged within the student group. As the authors concluded, conducting this type of analysis for both classroom-based, and virtual learning, enables teachers to identify common student errors with specific curriculum content and thus teaching strategies can be reviewed to help prevent such misunderstandings developing in the first place.

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Articles

Shifting the scientific paradigm for the transformation of higher education: Experience at State Islamic University (UIN) in Indonesia

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Abstract: Every university has many ways to make changes, and institutional transformation is one of the strategic choices to achieve excellence. However, the transformation of higher education is still dynamically defined and open. The practice also has many models and differences. This article examines the scientific paradigm shift to rethink the practice of transformation for higher education. Identifying new scientific paradigms, shifting processes, models used, practical steps, factors, and challenges is the primary concern of research work. This research was conducted qualitatively with a narrative approach. Multi-site studies at several State Islamic Universities (UIN) in Indonesia were reviewed to obtain findings about the different models applied. The results show that the transformation of higher education is simultaneously carried out by changing the institutional status and renewing the scientific paradigm. Science integration is used as a new scientific paradigm even

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though, in practice, each university has a different model. This new paradigm has wide-ranging impacts, such as eliminating scientific dichotomies that have long been practiced, expanding multidisciplinary scientific structures, and adding authority to develop faculties and study programs. Another impact is the existence of new awareness and enthusiasm for several changes in the aspects of it. Many challenges need to be anticipated to obtain better quality, such as the need for curriculum reformulation, changes in organizational behavior, a new image, and many other programs. We recommend this finding as an example of good practice in improving the quality and institutional system of higher education. To understand the wider impact of this transformation process, such as competency and graduate outcomes, changes in organizational behavior, the direction of research and community service programs, and their social impact in the future, more research on sustainability is needed.

Keywords: Dichotomy of science; higher education; integration of science; paradigm; transformation; university.

I. Introduction

Indonesia has a new policy on the development of higher education (HE). In the last 20 years (2002 to 2021), the president of the Republic of Indonesia changed the status of 23 HE institutions to universities. The university was previously in the form of the State Islamic Institute (IAIN) and was changed to the State Islamic University (UII). The HE database shows that Indonesia currently has 4,550 institutions in various forms: universities, institutes, polytechnics, colleges, and academies.¹

In the Indonesian education system, the institutional status consists of state and private. The state status is owned and managed by the government. While the private status is owned and managed by the community, generally by foundations and community organizations. In particular, the management of general HE is the task of the Ministry of Education and Culture. While religious HE by the Ministry of Religion. Indonesia currently has 863 religious HE consisting of three forms, universities, institutes, and colleges. 58 of them are public and the remaining 805 are private.² Although only 6.7% of the total, the presence of these 58 state-owned institutions represents the central government in 34 provinces. The majority are located in every provincial capital and important city in Indonesia.

¹ Ministry of Education and Culture of the Republic of Indonesia, "Higher Education Database," [in Indonesian] Database of Higher Education in Numbers, 2022, <https://pddikti.kemdikbud.go.id>.

² Ministry of Religious Affairs of the Republic of Indonesia, "Number of Islamic Religious Higher Education," [in Indonesian] Education Management Information System (EMIS), 2022, <http://emispendis.kemendikbud.go.id/ptkidashboard/Kelembagaan/PTKIBerdasarkanStatusLembaga>.

With such a position, the new status of 23 UIN becomes a unique and interesting phenomenon to study because it has occurred massively in the last 20 years. Every change in institutional status generally contains the aspired goals and visions. The transformation process carried out will be followed by steps of change, creating better opportunities and facing challenges that must be resolved to meet the expected goals and ideals.

Based on the Presidential regulation of the Republic of Indonesia, there are two main reasons and considerations for the change in the status of many of these universities, namely institutional transformation of higher education (THE) and integration of sciences (IOS).³ Direct mention in the text of state regulations shows that these two reasons are very important for Indonesia in providing directions for future HE development. Universities that have recently changed status must also take steps to transform their institutions by using IOS as a new scientific approach.

In global discourse, the THE and IOS are the topics that are widely discussed. The two are also closely related to the study of scientific paradigm shifts. THE discusses ideals and innovations about the university's future, builds expectations, criticizes old practices, and develops the necessary steps to present fresh ideas to organize the university to become a center of sciences and the development of a better civilization. At the same time, IOS relates to becoming a new agenda as a value system or scientific system that underlies the aspirations of university change on a broader scale. IOS is also known as a scientific paradigm that has existed for a long time and has become an agenda that continues to spread to various countries in the world. It is not only limited to countries with a majority Muslim population, such as Indonesia, but also Western countries since the 20th century.

Since the 1970s, the relationship between organizational change and paradigm shift has begun to be discussed but there are still many perspectives to date. Is organizational change a paradigm shift in itself, or does a particular paradigm shift affect the forms of organizational change? Allen W. Imershein and other scientists once wrote about organizational change as a paradigm shift.⁴ But at the same time, the discourse around the IOS is also widespread

³ President of the Republic of Indonesia, "Presidential Regulation Number 40,41,42,43,44,45 of 2021 Concerning the Transformation of IAIN into UIN," [in Indonesian] 2021, <https://setkab.go.id/perpres-terbit-enam-iaian-bertransformasi-jadi-uin/>.

⁴ Allen W. Imershein, "Organizational Change as a Paradigm Shift," *The Sociological Quarterly* 18, no. 1 (January 15, 1977): 33–43, <https://doi.org/10.1111/j.1533-8525.1977.tb02160.x>; Hasan Simsek and Karen Seashore Louis, "Organizational Change as Paradigm Shift," *The Journal of Higher Education* 65, no. 6 (November 1, 1994): 670–95, <https://doi.org/10.1080/00221546.1994.11774746>.

among scientists in various countries as one of the scientific paradigm models which is considered to be able to contribute to organizational change, especially HE as an educational institution.⁵ In scientific contexts, the IOS also has been the subject of much research and remains an open and challenging discourse. It is acknowledged that there has been extensive discussions and differences about the definition, level, and structure of scientific integration.⁶

This research investigates the experience of the State Islamic University (UIN) in Indonesia, which received an official state mandate to THE institutions with a paradigm based on IOS. Therefore, this article examines the process of shifting paradigms based on science integration, defining concepts, and explaining implementation models, impacts, and challenges faced. Practically, the findings are expected to contribute to and inspire good practices in THE institutions in the world, both in developing institutional organizations and comprehensive science structures, and can eliminate the sciences dichotomy that has been practiced so far.

II. Theoretical framework

Discourses about paradigm shifts and THE can be identified as starting in the 1960s when systems theory began to dominate the study of organizational change. Organizations are understood as adaptive organisms that aim for balance due to a changing environment. Systems theory has directed its focus on the importance of the relationship between the internal conditions of an organization and its environment.⁷

The systems theory uses the basic assumption that the organizational environment should be served slowly with adaptive change. While some experts also argue that educational organizations are systems that tend to be unusual with changes on a large scale and quickly but loosely and couple

⁵ Ulyana Parpan, "Paradigm of Higher Education in Conditions of Integration Challenges," *Visnik Nacional'nogo Universiteta «Lvivska Politehnika»*. *Seria: Uridicni Nauki* 2018, no. 889 (March 20, 2018): 30–36, <https://doi.org/10.23939/law2018.889.030>; Donna L Rogers, "A Paradigm Shift: Technology Integration for Higher Education in the New Millennium," *AACE Review (Formerly AACE Journal)* 1, no. 13 (2000): 19–33, <https://www.learntechlib.org/p/8058>; David Skorton and Ashley Bear, *The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree* (Washington, DC: The National Academies Press, 2018), <https://doi.org/10.17226/24988>.

⁶ Jarosław Boruszewski and Krzysztof Nowak-Posadzy, "From Integration to Modelling. On a Neglected Function of the Methodology of Humanities," *Studia Metodologiczne* 39, no. March (2019): 253–96, <https://doi.org/10.14746/sm.2019.39.10>.

⁷ Simsek and Louis, "Organizational Change as Paradigm Shift," 670.

system.⁸ Therefore, the THE as a relevant educational organization is studied through the perspective of a paradigm shift.

II.1. *The scientific paradigm shift*

Paradigm is still understood with many definitions, such as ways of thinking, perspectives, conceptual schemes, and worldviews; some are interchanging with the term ideology. However, it is generally agreed that a paradigm is a set of beliefs and values that trigger action. Thus, in the context of the THE, the shift in the scientific paradigm here is meant as a shift in values and beliefs about the scientific system that will be applied and can include changes and actions in HE. These changes can be structure, strategy, culture, leadership, management, achievement, and role of each person.

Scientist Thomas S. Kuhn has contributed greatly in laying the foundation for the study of paradigm shifts through the theory of scientific evolution.⁹ According to him, the paradigm is a normal science in which certain scientific theories are dominant and not questioned in the long term and has become a world view can be changed through predictable paths through revolutionary leaps. Kuhn's scientific theory of evolution consists of five separate and sequential phases: Normality, anomaly confrontation, crisis, selection/revolution, and the new normal.

Normality or often called *Normal Science* is a period in which scientists work and develop science with a certain dominant paradigm. However, in the next phase, an *Anomaly*, the scientific paradigm cannot avoid conflicts or discrepancies between theory and reality so a deadlock occurs and the existing paradigm cannot provide adequate answers. The peaking anomaly caused a crisis and the existing paradigm began to be considered insignificant. *Revolution*, responding to a serious crisis as a major change in science, where a new paradigm emerges to solve the problems faced by the old paradigm. Furthermore, the old paradigm began to decrease in influence and was replaced by a paradigm as a form of the *New Normal* or *New Paradigm*.¹⁰

In the context of organizational change, normality is a period marked by a particular paradigm that dominates organizational activities and guides every

⁸ Karl E. Weick, "Educational Organizations As," *Administrative Science Quarterly* 21, no. 1 (1976): 1–19, <http://www.jstor.org/stable/2391875>.

⁹ Thomas S Kuhn, *The Structure of Scientific Revolutions*, II (Chicago: The University of Chicago Press, 1970), <https://doi.org/10.5840/philstudies196413082>.

¹⁰ Ahmad Muthohar, *Emancipatory Islamic Education Paradigm*, [in Indonesian] ed. Anni Rosyidah, 1st ed. (Semarang: Fatawa Publishing, 2022), 19–20, <http://repository.uinsi.ac.id/handle/123456789/2915>.

scientific activity that is carried out. Anomaly is a period when the organization begins to feel slow change either due to unanswered puzzles or unpreparedness in dealing with sudden changes outside the organization. Therefore, the organizational elite must face anomalies with various stimuli that are uncertain for a long time. As a result of the mounting anomaly, the organization will experience multiple problems, such as declining market share, stagnant organizational culture, low performance, and so on. Every member of the organization began to look for new perspectives both from within themselves and transferred from outside the organization. The selection of revolution is when an organization chooses a new paradigm accompanied by revolutionary steps, including accessing certain powers and other important decisions to produce renewed normalcy. When a new paradigm starts to dominate, it will be accompanied by organizational enthusiasm accompanied by a new structure and way of working by the mainstream of its renewal.

This justification leads to one of the goals of this study, which is to look at how scientific paradigms change. This article is meant to 1) investigate the old paradigm (what is the prevalent paradigm before the new paradigm?); 2) investigate anomalies (what are the problems that trigger the need for a replacement paradigm?); 3) explore scientific aspects (what model of action is taken when facing anomalies, events, external trends, and competing paradigms that exist globally?); and identify new paradigms (what main meaning, characteristics, symbols, metaphors, and models are chosen?).

II.2. *The transformation of higher education*

The transformation has become an important term in every discipline and area of life. We can easily identify the meaning that transformation is closely related to a better future, building hope and the emergence of fresh ideas on how an entity is conceived, organized, practiced, and maintained for change and excellence. Transformation relates to the production of knowledge for the benefit of society, cultural growth, and focusing on meeting the challenges of the future.¹¹ THE means the process of building university progress that is carried out consistently to produce a better future through knowledge that is useful for society.

Du Preez et al. have suggested that although the transformation is a complex construction process, it is open to changes in structure, institutional

¹¹ Søren S.E. Bengtson and Ryan Evely Gildersleeve, *Transformation of the University: Hopeful Futures for Higher Education*, 1st ed. (London: Routledge, 2022), <https://doi.org/10.4324/9781003102922>.

culture, and specific elements such as curriculum and academic and student experiences.¹² The process, according to Pine and Gilmore, relates to the experience of seeking more lasting benefits and values and may want to be changed by their experiences, realizing dreams, or achieving aspirations.¹³ Mermiri considers that transformation is related to ‘meaning’ and ‘interaction’. Products and services are selected based on how they will change people’s lives or the way they think.¹⁴ Transformation is created through the interaction between products, consumers, and producers who together make changes according to the meaning and ideal perspective that is believed so that there is a shared process.

Therefore, transformation is related to a paradigm as a way of thinking and worldview. The essence of transformation is the development of a new worldview.¹⁵ Anderson calls it an extension of people’s worldview.¹⁶ Tolliver and Tisdell also view that transformation focuses on changing or shifting the way a person is in the world, understanding about oneself, and relationships with others.¹⁷ There is also a belief dimension related to revising their belief system and a behavioral dimension related to making lifestyle changes. Another major part of the transformation is the ability to connect and communicate with others, namely socialization.¹⁸ Personally, socialization

¹² Petro Du Preez, Shan Simmonds, and Anné Hendrik Verhoef, “Rethinking and Researching Transformation in Higher Education: A Meta-Study of South African Trends,” *Transformation in Higher Education* 1, no. 1 (2016): 7, <https://doi.org/10.4102/the.v1i1.2>.

¹³ B Joseph Pine, “How B2B Companies Create Economic Value by Designing Experiences and Transformations for Their Customers,” *Strategy & Leadership* 43, no. 3 (January 1, 2015): 2–6, <https://doi.org/10.1108/SL-03-2015-0018>; B. Joseph Pine and James H. Gilmore, “A Leader’s Guide to Innovation in the Experience Economy,” *Strategy and Leadership* 42, no. 1 (2014): 24–29, <https://doi.org/10.1108/SL-09-2013-0073>.

¹⁴ Tina Mermiri, *Beyond Experience: Culture, Consumer and Brand* (London: Nutmeg house, 2009).

¹⁵ Jack Mezirow 1923-2014, *Education for Perspective Transformation : Women's Re-Entry Programs in Community Colleges* (New York : Center for Adult Education, Teachers College, Columbia University, 1978., 1978), <https://search.library.wisc.edu/catalog/999504700102121>.

¹⁶ Dean Anderson and Linda Ackerman Anderson, *Beyond Change Management : Advanced Strategies for Today's Transformational Leaders* (San Francisco, CA: Jossey-Bass a Wiley Company, 2001).

¹⁷ D. Tolliver and E. Tisdell, “Engaging Spirituality in the Transformative Higher Education Classroom,” in *New Directions for Adult and Continuing Education. Teaching for Change: Fostering Transformative Learning in the Classroom*, ed. Taylor Ellis, 19th ed. (San Francisco, CA: Jossey-Bass, 2006).

¹⁸ Jack Mezirow, “Learning to Think Like an Adult : Core Concepts of Transformation Theory,” in *Learning as Transformation, Critical Perspective on a Theory in Progress*, ed. Jack Mezirow (San Francisco: Jossey-Bass, 2000).

will help develop openness, self-confidence, and self-esteem,¹⁹ but Mezirow's theory also emphasizes that transformation requires critical reflection, which can change beliefs, attitudes, opinions, and reactions.

Based on these conceptions, the transformation has a relationship with the paradigm. The paradigm shift is a natural and open process resulting from critical reflection on the reality based on experience to seek better values to produce changes and future progress. In this process, the transformation is carried out based on understanding and belief and then followed by more systematic action steps so that the worldview can obtain the future. This concept is in line with Thomas S. Kuhn's theory of the paradigm shift process. Paradigm as a normal view of science when experiencing anomalies and crises will encourage revolutionary steps to produce a new paradigm that is believed to be more appropriate. This process has changed.

Thus, we understand that the THE through a scientific paradigm shift set by the university is an open process of a reflective, interactive, and collaborative process to produce changes in the structure and institutional culture of the university by the ideals of a world view that is considered ideal.

II.3. The integration of science and its concepts in an islamic context

The concept of IOS is still open and dialectical. Terms, definitions, and methodologies will be adapted to the contexts. Integration linguistically means assimilation into a unified or merging different activities, programs, and components into one functional unit.²⁰

When associated with science, it means assimilation or merging of different sciences into one functional unit. IOS can be understood as a concept of an approach to the development of scientific structures based on paradigms and principles of integration. Integration is an effort to reunite conditions and models that have been separated. Generally understood as harmonize the relationship between religious science and general science.

But in practice, there are many differences in trends both in definition, level and structure. Jarosław Boruszewski and Krzysztof Nowak-Posadzy in their research stated that in the definition of science integration, there are still differences, whether integration means juxtaposition, connection, or merging.²¹

¹⁹ Gail Holland Wade, "A Concept Analysis of Personal Transformation," *Journal of Advanced Nursing* 28, no. 4 (1998): 713–19, <https://doi.org/10.1046/j.1365-2648.1998.00729.x>.

²⁰ Ministry of education and culture of the Republic of Indonesia, "Indonesia Dictionary," [in Indonesian] 2020, <https://kbbi.kemdikbud.go.id/>.

²¹ Boruszewski and Nowak-Posadzy, "From Integration to Modelling. On a Neglected Function of the Methodology of Humanities," 255.

According to him, integration is connecting findings from various scientific disciplines; it is not just a juxtaposition and it is not yet a merger. In addition, the term integration is also often interchanged with unification,²² interdisciplinary or multidisciplinary.²³ However, the difference between these terms can be used to understand the purpose of this research.

Furthermore, at the level of integration, it is known that there are several aspects including epistemological-methodological, practical-institutional, and ideational aspects. Whereas in the structure of science, integration discusses aspects of how integration is realized, so finding the best model is a dynamic project.

In particular, IOS in the context of the Islamic scientific tradition also has its own form, although it cannot be separated from general discourse. Its specificity lies more in terms of history, internal agenda, and manifestation of concepts. According to the object of this study, IOS at UIN in Indonesia is related to the concept of Islamization of sciences that has been studied by Muslim scientists before. But in Indonesia, its manifestation is better known as IOS.

In contemporary Islamic history, the IOSs is a follow-up to the idea of Islamization of science initiated by past Muslim scientists as a follow-up to the Islamic reform movement. It can be traced from the scientific works of Hossein Nasr which were spread in the 1960s. Nasr assessed that there was no fundamental difference between 'al Ilm' (Islamic science) and 'Scientia' in Latin terms or Western tradition. The difference is in the methodological aspect. The Islamic scientific tradition does use not only rational methods but also textual and even intuition. However, because of the condition of Muslims who are left behind in global civilization, it is necessary to Islamize science, as an effort to transform modern science so that the Muslim community can understand it.²⁴

The next idea was developed by Muhammad Naquib al Attas through the Islamization of the science project.²⁵ The Islamization of science cannot be

²² Philip Kitcher, "Explanatory Unification," *Philosophy of Science* 48, no. 4 (May 28, 1981): 507–31, <http://www.jstor.org/stable/186834>.

²³ J Britt Holbrook, "What Is Interdisciplinary Communication? Reflections on the Very Idea of Disciplinary Integration," *Synthese* 190, no. 11 (July 25, 2013): 1865–79, <https://doi.org/10.1007/s11229-012-0179-7>; Rolf Hvidtfeldt, "Interdisciplinarity as Hybrid Modeling," *Journal for General Philosophy of Science* 48, no. 1 (May 28, 2017): 35–57, <http://www.jstor.org/stable/44697645>.

²⁴ Syed Hossein Nasr, *Science and Civilization in Islam* (Cambridge: Harvard University Press, 1968); Syed Hossein Nasr, *An Introduction to Islamic Cosmological Doctrines* (Cambridge: Harvard University Press, 1964); Syed Hossein Nasr, *Islamic Science an Illustrated Study* (London, 1976).

²⁵ Syed M. Naquib Al Attas, *Islam and Secularism* (Kuala Lumpur: ABIM, 1978); Syed M. Naquib Al Attas, *Islam and The Philosophy of Science* (Kuala Lumpur: ISTAC, 1989);

done simply by bringing together aspects of epistemology and axiology but requires ontological reconstruction. its main basis is to change the secular perspective. The Islamization of science is an effort to liberate science from secular meanings, ideologies, and principles so that a new science is formed by Islam. This view is slightly different from Nasr's who links the Islamization of science with epistemological and ontological paradigms related to the scientific perspectives that exist in the world today.

Operationally, Ismail Raji Al-Faruqi suggested reintroducing modern scientific disciplines into Islamic insight after critically examining and establishing procedural steps for the implementation.²⁶ The International Institute of Islamic Thought (IIIT) founded by al Faruqi in Washington, also recommends the importance of transforming the Islamization of science in Education. However, It is not just a synthesis of modern sciences with Islamic sciences but must start from the ontology aspect.²⁷ Fazlur Rahman gave a critical note that all disciplines are unified. Human morality as a user of science and technology makes a difference. Science is neutral; mastering it is mandatory, even though it is taken from western civilization.²⁸

The concept of Islamization of science in its development has influenced Muslim scientists in Indonesia. With the same substance, it is better known as the IOS in Indonesia. Amin Abdullah, with the concept of Integration-interconnection of Science, explained that dialogue is needed to complement each other when there is a gap between religion and science. So far, there has been a view that clashes religion with modernity, giving rise to a dichotomous epistemological construction of sciences. It needs to be objectified by understanding science theoanthropocentrically. We need an interconnection approach between general science and Islamic science. Dialogue between the two is a strategy for integrating religious texts into the context. Integration-interconnection of knowledge is the concept of reuniting Islamic sciences with general or modern sciences to achieve an integrated and interconnected science unity as a solution.

Syed M. Naquib Al Attas, *Islam the Concept of Religion and The Foundation of Ethics and Morality* (Kuala Lumpur: Angkatan Belia Islam Malaysia (ABIM), 1976).

²⁶ Ismail Raji al Faruqi, *Islamization of Knowledge: General Principles and Work Plan*, 2nd ed. (Virginia, USA: International Institute of Islamic Thought (IIIT), 1981), https://www.muslim-library.com/dl/books/English_Islamization_of_Knowledge_General_Principles_and_Work_Plan.pdf.

²⁷ Ziauddin Sardar, *Intellectual Jihad: Formulating Parameters of Islamic Science*, [in Indonesian] ed. AE Priyono (Surabaya: Risalah Gusti, 1998), 35–37.

²⁸ Fazlurrahman, *Islam and Modernity* (Chicago: University of Chicago, 1982).

The concept of IOS in Indonesia can also be studied through the work of Abdurrahman Mas'ud, known as 'Non-dichotomous education; or 'Humanist Education'.²⁹ Also Imam Suprayogo with the concept of 'Tarbiyah Ulul Albab' that symbolized by 'Tree of science'.³⁰ The concept of Imam suprayogo inspired Azhar Arsyad with the name 'cemara ilmu' (the fir science).³¹ The choice of this 'fir' tree is an illustration of the emphasis on the importance of the 'conical' for IOS that symbolizes a synthetic interconnection between elements that ultimately represents the highest transcendental.

In the operational scope, two models can be used, namely the Islamization model of the general sciences and the choice model between Integration and Interconnection. If general science and religion can be combined, integration is used, if not, interconnection is used. Armahedi Mahzar also provides advice on the operationalization of scientific integration including institutional, conceptual, operational, and architectural implementation. Each of these aspects of implementation must be clearly defined in a methodology.³² From this reason, in the context of the THE institutions, the IOS needs to follow up on a more operational formulation into the scope of these aspects so that it does not stop only on scientific discourses.

III. Methods

This research is field research³³ with a multisite sample consisting of 4 UINs, namely UIN Sunan Kalijaga (SK) Yogyakarta, UIN Maulana Malik

²⁹ Abdurrahman Mas'ud, *Initiating Nondichotomic Education* [in Indonesian] (Yogyakarta: Gama Media, 2002); Abdurrahman Mas'ud, *Towards a Humanist Islamic Paradigm* [in Indonesian] (Jogjakarta: Gama Media, 2003); Abdurrahman Mas'ud, *Paradigm of Humanist Islamic Education* [in Indonesian] (Jogjakarta: Ircisod, 2020).

³⁰ Imam Suprayogo, "Building the Integration of Science and Religion: The Experience of UIN Malang," [in Indonesian] in *Integration Sciences and Religion: Interpretation and Action*, ed. Zainal Abidin Bagir (Bandung: Mizan, 2005); Imam. Suprayogo, *Paradigm of Islamic Scientific Development Perspective of UIN Malang* [in Indonesian] (Malang: UIN-Maliki Press, 2006).

³¹ Azhar Arsyad, "Fir Integration and Interconnection of Science and Religion," [in Indonesian] *HUNAFa: Jurnal Studia Islamika* 8, no. 1 (2011): 1, <https://doi.org/10.24239/jsi.v8i1.82.1-25>; Azhar Arsyad, "Integration Tree and the Interconnectivity of Science and Religion," *Kalimah* 14, no. 2 (2016): 115, <https://doi.org/10.21111/klm.v14i2.608>.

³² Armahedi Mahzar, "Science Integration and Religion : Models and Metodology," [in Indonesian] in *Sciences Integration and Religion: Interpretation and Action*, ed. Zainal Abidin Bagir (Bandung: Mizan, 2005).

³³ Bogdan and Biklen, *Qualitatif Research for Education: An Introduction to Theory and Methods* (Boston: Aliyn and Bacon. Inc, 1998), 62.

Ibrahim (MALIKI) Malang, UIN Sunan Ampel (SA) Surabaya, and UIN Walisongo (WS) Semarang. Changes in status to university from ‘institute’ in the first cluster in Indonesia were considered in selecting the sample and determining it. Their step in implementing a new scientific paradigm based on IOS in their institutional transformation is also an important reason for us to choose them. The aim is to understand the processes and models they use and their impact on the THE institutions so that they can be transferred to a wider situation to contribute to the development and innovation of HE institutions.

The method uses a qualitative research model by following Creswell’s theory with a narrative approach.³⁴ The narrative approach is used to explore and explain the experience of changing the scientific paradigm and its impact on the transformation of tertiary institutions carried out by each UIN. To interpret it, several data collection techniques were used, including Field observations, interviews, and a study of the university’s main documents and archives.³⁵

Primary documents and university archives (N=29) were examined including statutes, vision and mission, institutional profile, quality policies, quality manuals, quality standards, curriculum documents, annual reports, and research programs, community service programs, and others. Three main documents (statutes, vision and mission, and institutional profile) issued after the change in status to a university with a new scientific paradigm were analyzed to find a new model for university transformation. Because the document contains the intent and design of a new scientific paradigm, the design direction for institutional transformation and becomes a reference for derivative documents.

Information from the document is also compared with similar documents but published before the change in status to the university to see significant changes. Secondary documents in the form of many research literature and scientific publications by lecturers and professors are also reviewed to see if there is an influential role associated with this research. Likewise, the shape and design of the new logo are also reviewed to find out the ideals, vision, and values developed.

Purposive sampling interviews with university officials such as rectors, deans, heads of study programs, unit heads, lecturers, and administrative

³⁴ John W Creswell, *Qualitative Inquiry and Research Design : Choosing among Five Approaches*, ed. Vicki Knight, 3rd ed. (London: Sage Publication Ltd., 2013).

³⁵ Creswell, 100; Bogdan and Biklen, *Qualitatif Research for Education: An Introduction to Theory and Methods*; Norman K. Denzin, *The Research Act A Theoretical Introduction to Sociological Methods* (Routledge, 2009), 81.

staff (N=47) were conducted to find out the goals and direction of the transformation after reviewing the important published documents. Direct observations were also carried out to see facts on the ground and reveal the impact of changes in personal and organizational behavior. To complete the data, some of the required information was also checked through the university's website which had previously been permitted because the information content could be accessed openly. Detailed participant information as shown in Table 1.

Tabel 1
Sampel of study

University	Gender	Job Position					N	%
		Rector	Dean/ Deputy	Head of Study program	Lecturer	Admin. staff		
UIN SK	Male	1	2	2	2	1	8	17,02
	Female	0	1	1	1	1	4	8,51
UIN MALIKI	Male	1	2	2	2	1	8	17,02
	Female	0	1	1	1	1	4	8,51
UIN SA	Male	1	1	2	1	1	6	12,77
	Female	0	2	1	1	1	5	10,64
UIN WS	Male	1	2	2	2	1	8	17,02
	Female	0	1	1	1	1	4	8,51
N		4	12	12	11	8	47	100,00
%		8,51	25,53	25,53	23,40	17,02	100,00	

The data collected was analyzed by a holistic analysis model³⁶ and also following the three steps suggested by Huberman and Miles: data reduction, data display, and data verification.³⁷ All data are described, then sorted by

³⁶ Creswell, *Qualitative Inquiry and Research Design : Choosing among Five Approaches*, 100, 191; Robert K Yin, *Case Study Reserach: Design and Methods*, Fifth edit (California: Sage Publication Inc, 2014), https://edisciplinas.usp.br/pluginfile.php/1742025/mod_resource/content/1.

³⁷ Huberman and Miles, *Qualitative Data Analysis* (Beverly Hills California: Sage Publication Inc, 1984), 21–23.

categorizing key issues or analyzing themes according to research objectives. The theme is then analyzed by means of interpretation to find the essence of the existing phenomenon through the triangulation process. The final data is presented in depth through narrative and can be clarified with tables and figures.

IV. Results

IV.1. Shifting scientific paradigm at UIN in Indonesia

The main finding of this study is that there is a shift in the scientific paradigm at UIN in Indonesia with the integrated science model as a new paradigm. Even though there is a role for state policy factors, the process of shifting is more influenced by internal factors regarding the need for a new scientific model that must be used by a university. The following are university profiles as shown in Table 2 below:

Table 2
University profile

Aspect	UIN SK	UIN MALIKI	UIN SA	UIN WS
Status	State University	State University	State University	State University
Established	1950	1961	1961	1970
UIN status change	2004	2004	2013	2014
Legality: Decree President RI	No. 50 of 2004	No. 50 of 2004	No. 65 of 2013	No. 130 of 2014
Faculty before UIN	Tarbiyah, Syariah, Dakwah and Ushuluddin	Tarbiyah, Syariah, Dakwah and Ushuluddin	Tarbiyah, Syariah, Dakwah and Ushuluddin	Tarbiyah, Syariah, Dakwah and Ushuluddin
New Vision	Excellence and Leading in the Integration and Development of Islam and Science for Civilization.	The realization of an integrative HE in combining science and Islam with an international reputation.	To become an excellent and competitive international Islamic University	Leading Research Islamic University Based on Unity of Science for Humanity and Civilization in 2038

Aspect	UIN SK	UIN MALIKI	UIN SA	UIN WS
Number of Faculties after become univesity	9 Faculties : – Adab and Cultural Studies – Da'wah and Communication – Sharia and Law, – Tarbiyah and Teacher Training, – Ushuluddin and Islamic Thought, – Science and Technology, – Social Sciences and Humanities – Islamic Economics and Business. – Post Graduate (Master and doctoral)	8 Faculties: – Tarbiyah and Teacher Training – Sharia, – Humanities, – Economics, – Psychology – Science and Technology, – Medicine and health Sciences. – health – postgraduate (master dan doctoral level)	10 Faculties: – Tarbiyah and Teacher Training, – Da'wah and Communication – Sharia and Law, – Ushluddin and Philosophy, – Economics and Islamic Business, – Social and Political Sciences, – Psychology and Health, – Science and Technology – Adab and Humanities – Postgraduate programs.	9 Faculties: – Da'wah and Communication, – Sharia and Law, – Tarbiyah and Teacher Training – Ushluddin and Humanities – Economics and Islamic Business, – Social and Political Sciences, – Psychology and Health, – Science and Technology, – Postgraduate program
Number of study programs	41	43	56	47

The table confirms that the change in status to become a new university occurred in 2003/2004 and 2013/2014. This shows that changes to the institutional organization and scientific paradigm require a long period of up to half a century. It is known that these universities were founded in the 1950s, or the early years of the Republic of Indonesia's independence, 1945.

From the perspective of the evolution of science by Thomas S Kuhn, the period of 50 years can be called a period of normality, where they both have the status of institutes and during that time the university focuses on mono scientific discipline, namely the Islamic studies such as *Tarbiyah* (Islamic education), *Syariah* (Islamic law), *Da'wah* (Islamic communication), and *Ushuluddin* (Fundamentals of Islamic Studies). The period in which they were very proud and comfortable to be called an Islamic religious of HE (PTAI). Indonesian people are also very familiar with the names IAIN or STAIN.

Why change the status to university and shift the scientific paradigm to IOS? This is the main question in our investigation. This study found that there are external and internal factors that influence. Externally, changing the status of HE institutions and the importance of IOS is a state policy mandated

by the President of the Republic of Indonesia, Joko Widodo. It is known that the change in status from IAIN to UIN in several state Islamic universities in Indonesia was based on a presidential decree as shown in the table. However, the difference in the time when the presidential decree was issued shows that the government did not immediately change the status of the university.

The decision is based on the internal readiness of each internal institution toward transformation. Previously the government of Indonesia selected and evaluated the internal readiness of universities based on existing conditions, plans for change, the science integration model used, and certain unique characteristics.

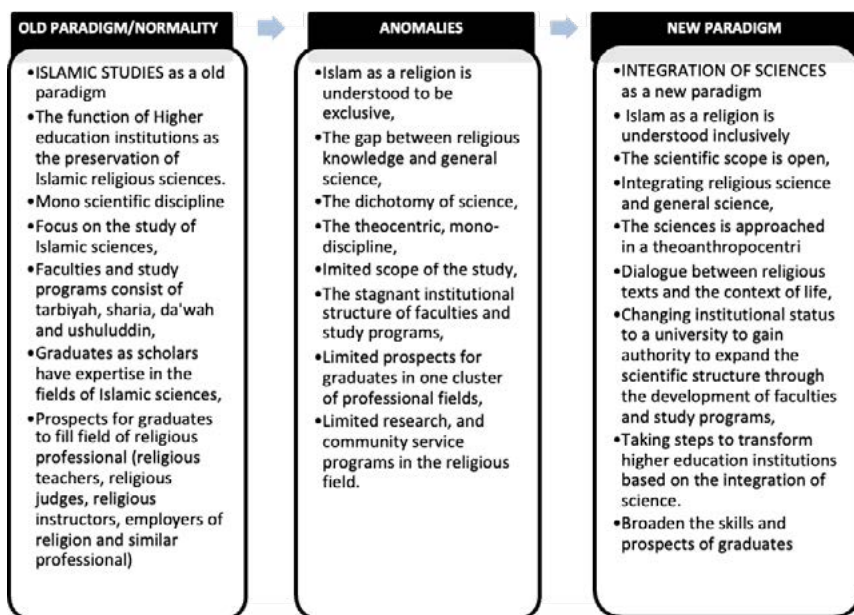
This can be read from the proposal documents for the transformation into UIN from each tertiary institution and the report documents for activity agendas in the stages of changing status which can take up to five to ten years. The existence of direct state involvement as a reinforcing factor and trigger for institutional transformation and the importance of IOS is an important finding of this research.

Internally, changes in the status become universities are influenced by a new scientific awareness that must be developed by Islamic HE institutions in Indonesia. This is possible if the status becomes a university. Because, in the HE system in Indonesia, universities have the authority to conduct multi-disciplinary studies, and institutes are limited to one discipline, namely only the religious sciences. While the IOS is only possible to develop if multi-disciplinary authority is obtained.

In several primary documents such as the proposal for transformation into UIN and the UIN profile document, their reasons can be identified as a new awareness of the importance of IOS which must be used to develop or replace old scientific paradigms both in a philosophical and practical scope. Several works by professors and rectors at each UIN, both in the form of books and conference papers that sparked the theme and concept of IOS, also played an important role in creating this new scientific awareness.

These reasons from the perspective of the evolution of science can be interpreted as anomalies and crises. Table 3 below identifies a scientific paradigm shift based on scientific integration at UIN in Indonesia following Kuhn's theory:

Table 3
Shifting of the scientific paradigm at UIN in Indonesia



Internal universities must immediately stop and implement revolutionary modifications in order to stop the accumulation of the anomalies in the table above. The change in status to become a university is a revolutionary step that was fought for because it relates to the authority held by the state. Perhaps this is a unique case study in that state policy factors are very dominant in the process of shifting the scientific paradigm. The state responds and provides strong support for the aspirations of university scientists and establishes it as a state policy.

Furthermore, new normal steps were taken by UINs in Indonesia to transform their institutions to adapt to IOS as their new scientific paradigm. This study identified them as:

1. Changes in university structure;
2. Adding and merging faculties and study programs;
3. Changes to the university's vision, mission, and logo
4. Changes in the structure of the curriculum;
5. Changes in policy on research and community service programs;

6. Completing HE supporting infrastructure to support the scientific integration process;
7. Recruitment of lecturers and education staff to meet the needs according to the qualifications of the new study program;
8. Strengthening the scientific capacity of lecturers according to the new paradigm
9. Improvement of institutional management.

IV.2. New scientific paradigm models at UIN in Indonesia

The IOS as a new scientific paradigm at UINs in Indonesia uses different models, both in the choice of terms, metamorphic symbols, and logos that are applied. Even though the IOS has become their new scientific mainstream, its applications have their uniqueness. This shows that the transformation carried out is autonomous. University internal factors such as the origin of the concept of thinking about IOS, influential scientists, and the terms and symbols used are original from the local university which are then agreed upon and determined as a university decision. The difference in models is as shown in Table 4 below:

Table 4

Models of integration of sciences as new paradigm at UINs in Indonesia

	Model/Term	Metaphorical Symbol	Influential Scientists	Logo
UIN SK	Integration-interconnection of science (IIOS)	The Spider Webs	Prof. Amin Abdullah	Figure 1
UIN MALIKI	<i>Tarbiyah Ulul Albab</i> (TUA)	The Tree of Science	Prof. Imam Suprayogo	Figure 2
UIN SA	Integration of Science (IOS)	the Twin Towers	Prof. Nur syam, Prof. Abul A'la	Figure 3
UIN WS	<i>Wahdatul Ulum</i> /Unity of Science (UOS)	The Diamond	Prof. Qadry A Azizy, Prof. Abdurrahman Mas'ud	Figure 4

UIN SK uses the IIOS model with the symbols 'Jaring Laba-laba' (*The Spider Webs*) has the view that conducting studies on religious sciences and general sciences will open intensive dialogue between humanity (*hadlarah*

an-nas), science (*hadlarah al-ilm*), and philosophy (*hadlarah al-falsafah*). With this paradigm, UIN SUKA needs to emphasize its concern for the development of Muslims in particular and society in general. Fields of science that were rare before can be integrated to gain an understanding of Islam that is friendly and democratic and by the Islamic vision of mercy to all the worlds (*Rahmatan lil Alamin*).

Professor Amin Abdullah's thoughts, as can be read from his various works,³⁸ greatly influenced the process of transforming UIN SUKA and shifting its scientific paradigm. Apart from being an Indonesian Muslim scientist, he also served as Rector when the campus changed its status. The concept of IOS with the term IIOS with the symbol 'the spider Webs' is officially used by the university as a new scientific paradigm and a reference for the transformation process. The spider's web describes a scientific construction that is 'theoanthropocentric-integralistic', broad-minded and develops skills in every aspect of life in the era of globalization. This model aspires to produce skilled Muslims, able to solve humanitarian and religious problems in the modern and postmodern eras with a new approach through integrated and interrelated contemporary natural sciences, social sciences, and humanities. IIOS is operationalized through methods that represent all scientific entities, including humanity, philosophy, and science itself. Graduates are expected to become 'Madani' (citizenship) with a family character and an advanced culture.

UIN Maliki establishes a new scientific paradigm with the term 'Tarbiyah Ulul Albab' with the symbol 'Tree of Knowledge' (Knowledge Tree). This paradigm is a universal integration of the new scientific structure of UIN Maliki to become an integrative Islamic educational institution while still having strong Islamic characteristics like a tree with strong trunks and roots. This concept was developed by Professor Imam Suprayogo who is the Rector of this university.

Through his works, it can be understood that the symbol of a tree with strong roots is a science tool that every student must master well including Arabic and English, logic, introduction to science, and social studies. The strong tree trunk depicts the study of the sources of Islamic teachings, namely the Al-Qur'an and hadith, Islamic thought, and Islamic history.

³⁸ M. Amin Abdullah, *Islamic Studies: Normativity or Historicity?* [in Indonesian] (Yogyakarta: Pustaka Pelajar, 2001); M. Amin Abdullah, *Islamic Studies in Higher Education: Integrative-Interconnective Approach*, [in Indonesian] 1st ed. (Yogyakarta: Pustaka Pelajar, 2006); M. Amin Abdullah, "Religion, Science and Culture: An Integrated, Interconnected Paradigm of Science," *Al-Jami'ah* 52, no. 1 (2014): 175–203, <https://doi.org/10.14421/ajis.2014.52.1.175-203>.

While the many branches of the tree are used to explain several general sciences with their various branches, such as natural sciences, social sciences, and humanities. Each part of the tree has a different role but unites to produce fruit that will be used for human life. Thus, every student who studies science, with good language skills, and understands social sciences, and philosophy will be used as a tool to explore sources of sciences, both in the form of 'Qouliyah' (doctrinal) verses and 'Kauniyah' (reality).

With the Twin Towers approach, UIN SA constructs a new scientific paradigm implementing IOS. The goal of this model is to achieve a balanced value with a link between both of them. Three integration pillars in both towers serve as a gradual plan for success, namely: 1) bolstering Islamic science as a whole; 2) integrating social science and the humanities with Islamic science; and 3) emphasizing science and technology alongside Islamic science.

The integrated twin tower model is based on the idea that academic integration between Islamic sciences, social-humanities, and general sciences and technology develops according to the characters and objects they have, but can greet each other, meet and get along with each other in connected growth. UIN SA firmly stated that the integrated twin towers operate not for the Islamization of science, but for the Islamization of reason to create a scientific system that complements each other between the Islamic sciences, social humanities, general science and technology.

Meanwhile, UIN WS is building a new scientific paradigm with the term 'Wahdatul Ulum' (Unity of Sciences). This paradigm emphasizes that all knowledge is a unity that originates from and leads to God, Allah through His revelations either directly or indirectly. For that, all sciences must dialogue with each other and focus on one goal to bring its essence to know and draw closer to God as 'al-Alim' (God Who Knows All). The UOS is expected to produce encyclopedic scientists, who master many sciences and have the view that all branches of science are a holistic unit and are capable of dialogue. To achieve this paradigm, UIN WS uses the principles of integration, collaboration, dialectic, prospective, and pluralistic. The three strategic models used include: 1) humanization of Islamic sciences, 2) spiritualization of modern sciences, and 3) revitalization of local wisdom.

UIN WS symbolizes the paradigm of UOS with 'Diamond' which means very beautiful, of high value, emits light, and has interconnected axes and sides. Five scientific clusters were developed including: 1) religion and human sciences, consisting of Islamic sciences, art, history, languages, and philosophy; 2) social sciences consisting of sociology, economics, geography, politics, and psychology; 3) natural sciences consisting of chemistry,

physics, aerospace, and geology; 4) arithmetic and computing consisting of computers, logic, mathematics, and statistics; and 5) professions and applied sciences, including agriculture, architecture, business, law, management, and education.

IV.3. New logo at UIN in Indonesia

A new scientific paradigm shift in every UIN in Indonesia, apart from being followed by a new vision as shown in Table 2, there is also a change in the university logo as a new identity that is adapted to each scientific paradigm as illustrated below:

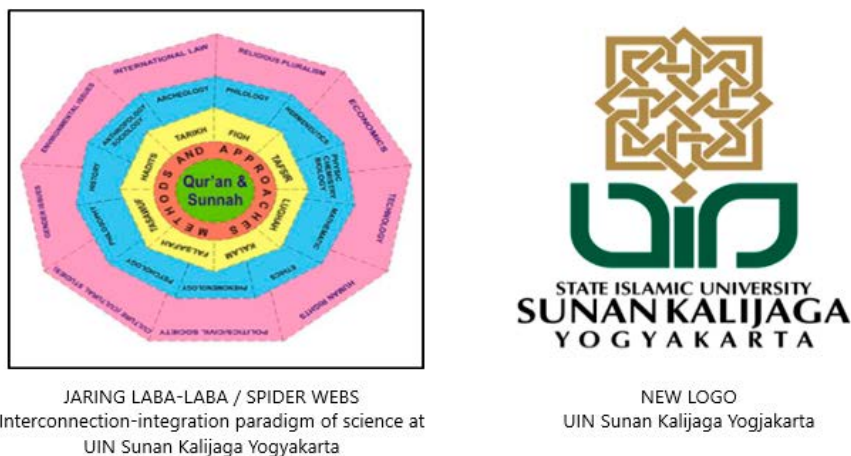


Figure 1
Symbol of the scientific paradigm and the logo of UIN SK

UIN SK has used this new logo since 2010.³⁹ The basic shape is a sunflower with one petal and two leaves. Flower petals are depicted with classical Islamic ornament. The left leaf blade visualizes the letter ‘U’, the stem ‘I’, and the right leaf ‘N’ so that it can be read as UIN. Flowers symbolize beauty, fragrance, harmony, balance, and kindness. Allah loves beauty and fragrance and Allah is the most beautiful and fragrant God. That is, they are carries the mission of coolness and beauty of the surrounding

³⁹ UIN Sunan Kalijaga, “University Symbol and Logo,” [in Indonesian] 2010, <https://uin-suka.ac.id/id/page/universitas/62>.

environment as well as a fragrance in carrying out all its roles and instilling a human spirit and character of ‘Rahmatan Lil ‘Alamin’ (grace to all). The yellow color which is synonymous with gold denotes luxury, honor, nobility, immortality, loyalty, and devotion. Luxury and wealth are realized through the depth of knowledge, rich character, self-maturity, and local cultural wisdom. UIN SK wants to excel but remains polite and humble. While the green color on the leaves symbolizes continuity, freshness, naturalness, and renewal. Green is a symbol of hope, growth, birth, prosperity, fertility, and regeneration through innovation, transformation, and sustainability.

The symbol a floral motif is described as resembling a spider’s web, which means that there is a connection between science and religion. The icon was taken from the wall ornaments of the Alhambra Palace during the Umayyad Caliphate. In Granada, Spain which has a blend of artistic motifs between Eastern and Western civilizations. That is, the new vision and mission want to eliminate the scientific dichotomy towards integration and interconnection of various scientific disciplines to achieve civilizational excellence.

UIN MALIKI made a new logo symbolized by the domination of the words ‘Ulul Albab’⁴⁰ as below:

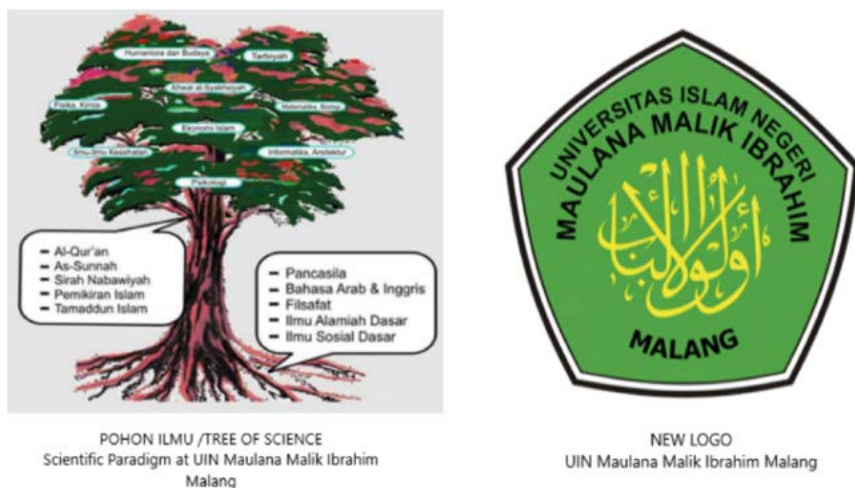


Figure 2
Symbol of the scientific paradigm and the logo of UIN MALIKI

⁴⁰ UIN Maulana Malik Ibrahim, “Symbol,” [in Indonesian] 2021, <https://fkik.uin-malang.ac.id/index.php/lambag/>.

The shape of the logo is five sides with a dominant green color with the Arabic word ‘Ulul Albab’ in yellow. According to its meaning, this word symbolizes the commitment of the UIN Maliki academic community to become scholars who always obey and remember Allah (*al Dzikir*), humans who always think (*al Fikr*), and humans who always do good. The yellow color on the Ulul Albab writing symbolizes the spirit of struggle (*Jihad*) in studying and developing it to give birth to experts in science (*Mujtahid*). The green base color symbolizes the attitude of always prioritizing trust, honesty, and peace. The five-sided image symbolizes the understanding and practice of the 5 pillars of Islam as a whole, broadly, and deeply.

To realize this goal, operationally, UIN Maliki requires the importance of ‘pesantren’ of university (Islamic boarding University) which is supported by academic support institutions and other technical implementing institutions in an integral way. The university also formulates the pillars of HE (*Arkanul Jami’ah*) consisting of lecturers, mosques, ma’had al Jamiah/ Pesantren of University, libraries, laboratories, lecture halls, offices, arts and sports development centers, and broad and strong sources of funding. With operational implementation like this, it is hoped that the fruit of integration will be humans who have the competence of faith, good deeds, and morals.

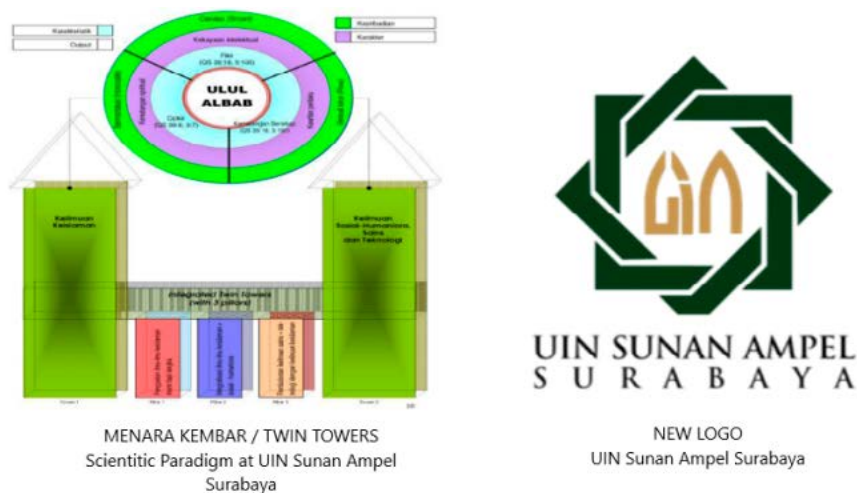


Figure 3
Symbol of the scientific paradigm and the logo of UIN SA

The new logo of UIN SA below is visualized with a symbol in the shape of a box with nine corners. the number of angles represents ‘Walisongo’ as Muslim Founding fathers of Islam in ‘Nusantara’ (the archipelago), which consists of nine figures. Knitting and ties by forming nine interrelated corners is a symbol of ‘Bhineka Tunggal Ika’, the Indonesian national philosophy that shows harmony in diversity. The golden yellow Twin Towers symbol represents IOS, indicating that this integration will bring glory. The green color which means life is the basic color of the University’s identity.⁴¹

UIN WS followed up on the ‘Unity of Science’s new scientific paradigm with a new logo that depicts a lantern as a symbol of science that illuminates life. The lantern’s function demonstrates UIN WS’s implementation of the “Tri Dharma,” Indonesia’s three primary HE functions of education and teaching, research, and community service.⁴²

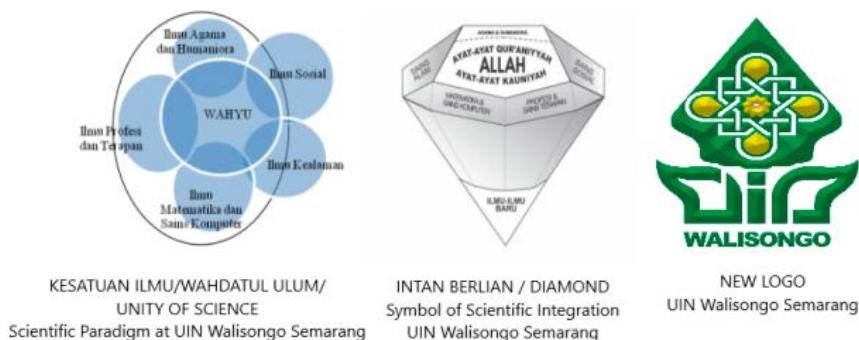


Figure 4

Symbol of the scientific paradigm and the logo of UIN WS

This logo consists of several elements. First, ‘Gunungan’ is one of the properties in ‘Wayang’. Wayang is a traditional Indonesian performing art of Javanese culture that has been designated by UNESCO as a World Heritage Masterpiece in the Art of Speech and an Intangible Heritage of Humanity. It is shape tapers upwards like a mountain peak. Gunungan was created by Sunan Kalijogo, one of the ‘Walisongo’ (9 Muslims Founding Fathers at Nusantara) in 1521 AD. The ‘Gunungan’ here is a symbol that UIN WS’s

⁴¹ UIN Sunan Ampel, “Sunan Ampel University Symbol,” [in Indonesian] 2021, <https://w3.uinsby.ac.id/logo/>.

⁴² UIN Walisongo, “Meaning of Logo,” [in Indonesian] 2021, https://walisongo.ac.id/?page_id=4371.

mission is to explore, develop, and apply local wisdom. Gunungan also contains spiritual meaning. In the wayang tradition, gunungan, or often also “Kelir” is synonymous with the shape of a mosque’s crown symbolizing the unity of God, humanity, and the universe.

Second, the five sides of the logo represent the five principles of “Pancasila,” the Indonesian state’s philosophy and foundation. Third, the four vertices’ geometry. The ‘Nusantara (archipelago’s) classical Islamic art is represented by this geometry, which has four intersecting and integrated segments. Its meaning represents the four primary aspects of UIN WS’s development: theocentric, Islamic sciences being made more human, modern science’s spiritualization, and the revival of indigenous wisdom. Fourthly, the five yellow spaces represent the Islamic pillars; Fifth, the number of reform committees in Java, represented by the nine stars. In a variety of fields, including religion, culture and art, health, agriculture, and social affairs, they carry out *ijtihad* with complete wisdom; Sixth, the axis of God Almighty is depicted by the white dot in the middle. Seventh, an open book represents a scientific foundation and a determination to become an Islamic research university for the benefit of Islam, science, and society; and eighth, ‘Walisongo’ writing as the university’s name.

UIN WS currently carries out the following mission in accordance with the meaning of the symbol:

1. Organizing science and technology education and teaching so that professional graduates with *alkarimah* character are produced based on the unity of science;
2. Improving the quality of research for the benefit of Islam, science, and society;
3. Putting together useful services for community development;
4. Examining, developing, and putting into practice the values of local wisdom;
5. Developing cooperation with a variety of institutions on a regional, national, and international scale that adhere to international standards; and
6. Realizing the management of professional institutions of international standards.

V. Discussions

From the description of the research results above, five aspects can be studied as good practices to advance and achieve university excellence based on the experience of UINs in Indonesia.

First, state contribution. Through a presidential decree with two objectives, namely institutional THE and IOS, Indonesia changed its institutional status to a university based on national policy. Even though this aspect does not determine the THE organizations, it has become a very influencing fact, a triggering force, mandate of authority, and certainty of legal status for universities whose management is regulated by the state by the established HE system. The alignment and involvement of the state are important to ensure the responsibility and support of the government in fulfilling every citizen's right to education in an effective way to achieve the goal of providing quality HE.⁴³

This finding reinforces Stephen J. Ball's theory of education policy and social class⁴⁴ and adds to Ivonaldo Leite's list of alternative studies on the importance of public policy innovation.⁴⁵ Here also shows the awareness that HE has a role as an instrument to improve the quality of human resources and the country's competitiveness at the world level. State policy here requires that the THEs means giving HE roles and functions more broadly, not limited to one scientific discipline and it is necessary to strengthen autonomous scientific principles for each university. Thus, every policy on changing institutional status must have an impact on opportunities for transformation, expansion, and massification of the functions of HE.⁴⁶

Second, the reasons and process for shifting the scientific paradigm for THE. The existence of a new scientific paradigm at universities based on the integration of different variations of science at each UIN in Indonesia is an important experience in the THE institutions. The dichotomy of science, institutional stagnation in developing scientific autonomy, and limitations in expanding university functions are identified anomalies and have prompted new awareness about the importance of shifting the old scientific paradigm used.

This experience further strengthens Thomas S Kuhn's theory about the need for a scientific revolution: that the old paradigm can shift to a new

⁴³ Ivar Bleiklie and Maurice Kogan, *Transforming Higher Education*, ed. Maurice Kogan et al., *Transforming Higher Education: A Comparative Study*, vol. 13, Higher Education Dynamics (Dordrecht: Springer Netherlands, 2006), <https://doi.org/10.1007/978-1-4020-4657-5>.

⁴⁴ Stephen J Ball, *Education Policy and Social Class* (London and Newyork: Routledge : Taylor & Francis Group, 2006).

⁴⁵ Ivonaldo Leite, "Society, Public Policies and Education: Alternative Approaches in Uruguay," *Journal for Critical Education Policy Studies* 18, no. 1 (2020): 136–63, <http://www.jceps.com/archives/8227>.

⁴⁶ Philip G Altbach, Liz Reisberg, and Laura E Rumbley, "Trends in Global Higher Education : Tracking an Academic Revolution Trends in Global Higher Education. A Report Prepared for the UNESCO 2009 World Conference on Higher Education," *Unesco*, 2009, 22, <http://unesdoc.unesco.org/images/0018/001832/183219e.pdf>.

paradigm in the presence of harmful anomalies.⁴⁷ Thus, it can be understood that the THE requires new awareness through internal university consensus through the open-mindedness of scientists and their institutional policies. Transformation requires a philosophical review and the formation of a new scientific paradigm that is set to improve the static and stagnant situation experienced by many universities.

This research also identified that the choice to integrate science as a new paradigm or new normal was greatly influenced by thoughts produced by local scientists at each UIN which had long been disseminated through various works and forums before changes in status and new scientific paradigm changes occurred. Professors who also act as university leaders have previously influenced IOS-based scientific discourse, such as Prof. Amin Abdullah at UIN SK, Prof. Imam Suprayogo at UIN Maliki, and prof. Abul A'la at UIN SA, Prof. Qodry A Azizy and Prof. Abdurrahman Mas'ud at UIN WS. Although dialectically, their scientific genealogy is also heavily influenced by the thoughts of scientists outside Indonesia because they are alumni of Western universities. they study with Western scientists in developing IOS scientific discourse and methodology and aspire to be accommodated in Indonesia.

However, the shift in the scientific paradigm at the university cannot be personalized by individual roles. The new paradigm shift is determined institutionally. The process of transferring IOS as a new paradigm that is appropriate will affect the success of implementing the current UIN. This could mean according to the study of Bazana et al., that the transformation is determined by the transfer process.⁴⁸ We consider that the change in the scientific paradigm that occurs at UIN in Indonesia is a dialectical process. We understand it as a modification, not a scientific revolution. This may differ from Thomas S Kuhn's theory which states that a new paradigm shift does not have to be accompanied by anomalies and crises. But it could be because of new interpretations, new needs, and anticipated improvements for the future.

Third, IOS as a new scientific paradigm. As explained earlier, IOS is one of the main goals of Indonesia's national education policy in changing the status of several Islamic religious colleges into universities. Integration was chosen as an effort to achieve HE excellence. Here, we can understand that

⁴⁷ Kuhn, *The Structure of Scientific Revolutions*.

⁴⁸ Sandiso Bazana, Logan McLaren, and Trust Kabungaidze, "Transforming While Transferring: An Exploratory Study of How Transferability of Skills Is Key in the Transformation of Higher Education," *Transformation in Higher Education* 3 (July 26, 2018): 1–14, <https://doi.org/10.4102/the.v3i0.35>.

there is a mutual relationship between THE and IOS. Both are not only to the needs of the Indonesian state but also respond to the university's internal aspirations and expectations to develop knowledge and services more broadly. The institutional status of IAIN is an obstacle because it is only authorized in one cluster of Islamic disciplines. So it is important across contexts and disciplines. Internally, IOS is a solution to restore long-lost scientific traditions and an answer to criticism of the practice of science dichotomy.

Restoration is based on theological and historical reasons. Islamic theology has a strong doctrine about the importance of unity, balance, and harmony (read Al-Qur'an surah al 'Alaq 1-5; al-Tahrim: 6; al MujJadilah: 11, al Nahl: 43, Al Taubat: 22 and others). Islam also emphasizes 'Rahmatan lil Alamin' (religion of mercy to the whole nature/world). While dichotomous practices are often found internally in Muslim society, including in the development of knowledge in Islamic educational institutions. Historically, IOS is also an agenda that has long been coveted by Muslim scientists in the world to restore scientific practice in the 7-11th centuries AD which succeeded in building world civilization with the presence of multidisciplinary Muslim scientists. Thus IOS as a new scientific paradigm at Islamic universities in Indonesia is a continuation of the project of Islamization of knowledge that has been initiated by some of the great Islamic reformers in the Western world since the 1950s which is currently becoming a real action at Islamic Universities in Indonesia.

Even though it is the case in Indonesia, this experience can inspire a world view that quality HE services can give hope for community revival and an increase in people's living standards. The assertiveness of the state is a positive response because it opens up the authority to expand scientific disciplines according to the university's internal aspirations as well as world thoughts. Thus, the THE based IOS shows collaboration between state policies, the role of scientists, and the aspirations of HE institutions.

Fourth, the practice of shifting scientific paradigms for THE. This study shows the practice of shifting scientific paradigms in the THE process by forming a new scientific paradigm followed by operational steps in both academic and non-academic aspects. Based on the documents we examined, the implementation involves steps including:

1. Formulate a new scientific paradigm that will be used, including concepts, principles, and strategies;
2. Establish new values for HE;
3. Change the old vision and mission by formulating a new vision and mission;

4. Create and design a new university logo; and
5. Revise and implement academic and non-academic programs based on new scientific paradigm.

Formulating a new scientific paradigm, including concepts, principles, and strategies, is an essential initial step as a directional guide for the transformation process and the next steps. All subsequent practice steps refer to the new paradigm. This step can complement the proposed conceptual framework for university transformation recommended by Shariffuddin et al., which only involves aspects of academic identity, academic career, and academic activity in the transformation process.⁴⁹ Each university institution can produce products and models of different scientific paradigms, but in the same view and frame as the IOS paradigm as happened in Indonesia. Therefore, creativity, innovation, and formulation can influence this step.

Meanwhile, updates to the vision and mission, cultural values, and university logo follow the agreed formulation of a new scientific paradigm. Changes in these aspects represent the desire for the importance of a new identity, new needs, and the spirit of a new movement. This step strengthens the theory formulated by Mezirow et al., which offers 10 phases of transformation.⁵⁰ The resulting impact will go through a long dialectical process in improving performance towards excellence performance.

In the implementation step of the academic aspect, this research experience shows that the transformation has expanded faculties and study programs through additions or mergers. The impact of the change to a university at UIN in Indonesia is a massive increase in the number of faculties and study programs by opening new faculties and study programs and incorporating new general sciences into existing faculty clusters or study programs. For example, the merger of the Tarbiyah faculty into the Tarbiyah and Teacher Training Faculty, the Ushuluddin faculty into Ushuluddin and

⁴⁹ Sara Asmawati Shariffuddin and Jamal Rizal Razali, "Transformation of University Colleges to Full-Pledged Universities: A Proposed Conceptual Framework for Malaysian Higher Learning Institutions," *International Journal of ADVANCED AND APPLIED SCIENCES* 4, no. 12 (December 2017): 168–73, <https://doi.org/10.21833/ijaas.2017.012.030>.

⁵⁰ Mezirow, "Learning to Think Like an Adult: Core Concepts of Transformation Theory"; Colleen Aalsburg Wiessner et al., "Transformative Learning in Action: Building Bridges Across Contexts and Disciplines," in *International Transformative Learning Conference*, ed. Colleen Aalsburg Wiessner et al. (New York: teacher College Columbia University, 2003), <https://storage.ning.com/topology/rest/1.0/file/get/2865643287?profile=original>; Colleen Aalsburg Wiessner, Jack D Mezirow, and C. A. Smith, "Theory Building and the Search for Common Ground," in *Learning as Transformation: Critical Perspectives on a Theory in Progress*, ed. Jack D Mezirow (San Francisco: Jossey-Bass, 2000), 329–58.

Humanities, and the Da'wah (Islamic communication) faculty become the faculty of Da'wah and Communication Sciences, the Faculty of Economics and Islamic Business, as well as the faculty of sharia and law. Additions occurred in the faculty of science and technology, medicine, arts, and Islamic architecture. Additions and mergers are free to make according to needs and internal resources.

The IOS paradigm shift in this study opens up general scientific disciplines in existing faculties and religious studies programs and strengthens Islamic philosophy in general scientific disciplines. At the same time, the methodology of general scientific disciplines is expected to influence the methods in the Islamic scientific tradition that has been practiced so far. The addition of teaching fields to the Tarbiyah faculty, for example, is intended to strengthen educational discipline based on Islamic values and open up innovations that have yet to be studied and practiced internally in Islam so far. The result is an excellent education.

So that the IOS paradigm is applied appropriately, the curriculum structure is also reformulated. New courses are given to study programs considered dichotomies, such as adding hermeneutics and philosophy courses to the Islamic religious studies study program to strengthen the interpretation of Islamic teachings to benefit a more comprehensive understanding. Meanwhile, faculties and general science study programs must study the Al-Qur'an, Arabic, Hadith, and Sufism, which have been the basis of the Islamic scientific tradition. With this model, UIN hopes that there will be multidisciplinary and interdisciplinary science, dialogue, and harmonization between general science and Islamic science so that the integration of knowledge is operationally practiced in studies. Because so far, the sciences that have developed in the Islamic world and the Western world can influence each other because science crosses national and religious boundaries.

Fifth, the challenge of shifting the scientific paradigm. THE with a new scientific paradigm shift has complex challenges. The semi-structured interviews of this research show that in the early stages, many did not understand the intended new paradigm and the difficulty of building changes in values and new visions. Study of Othman et al.⁵¹ supports this finding that a better evaluation is still needed in terms of the integration of academic aspects and is a major weakness factor. Therefore, this challenge demands an increase in university management performance.

⁵¹ Azam Othman et al., "Islamic Integrated Education System Model in the Malay Archipelago: Implications for Educational Leadership," *Intellectual Discourse* 25, no. 1 (2017).

This study also identifies challenges in creating behavior change, both personal and organizational. The new vision, values, and logo generated in this transformation certainly have implications for the importance of building the right personality brand and can change optimistic behavior and enthusiasm which is marked by increasing the competence of actors, strengthening loyalty, user satisfaction, and product quality through good management of lecturers and students. It is important here to follow the recommendations of Mitchell J. Moore's cycle pattern through the stages of change.⁵² This new identity also requires the ability of HE management to be able to build a scientific structure according to the principle of scientific integration as a paradigm. Thus it will become a tertiary institution that has excellence in scientific disciplines, academic infrastructure, and scientific productivity.

Finally, we realized that perhaps the practice of shifting the scientific paradigm in the transformation process at UIN in Indonesia could be different from other countries. But the formulation of a new scientific paradigm, IOS as a choice of paradigms, models, and practical steps can be used and developed. It is necessary to be conscious of both the quality of tertiary institutions and the quality of human resources in the future since the scientific paradigm for tertiary institutions is changing and evolving dynamically.

VI. Conclusions

The excellence of HE can be the key to improving the quality of human resources in building global civilization and transforming university institutions is an important step that can be taken. Every HE has many ways and strategies to create change. Changes in institutional status can create new opportunities that are wider and have better impacts, especially in carrying out the functions of HE, but of course, have complex challenges.

HE transformation can be carried out simultaneously through changes in institutional status and shifting the scientific paradigm to a new paradigm that is considered more ideal. The IOS paradigm is a viable option. IOS is a scientific paradigm construction that unites and eliminates the dichotomy between religious sciences and general science that has been practiced for a long time in scientific traditions in the world. IOS seeks to bring together, dialogue, and harmonize scientific practices that have been dichotomous.

⁵² Mitchell J. Moore, "The Transtheoretical Model of the Stages of Change and the Phases of Transformative Learning: Comparing Two Theories of Transformational Change," *Journal of Transformative Education* 3, no. 4 (2005): 394–415, <https://doi.org/10.1177/1541344605279386>.

This paradigm has been chosen and practiced in Indonesia as a national education policy in the THE at UINs in Indonesia. This study concludes that the THE with an IOS paradigm has encouraged Islamic religious universities in Indonesia to be more capable of developing science in a multidisciplinary.

Implementation can be done through state policy and followed up by universities by formulating and establishing it as a model for a new scientific paradigm even with variations in terms, symbols, and steps that differ between universities. Still with the same values and framework to integrate science. Spiritualization of general sciences, humanization of Islamic sciences, and revitalization of local wisdom are the operating strategies. The next step can be carried out by establishing renewal in the aspects of vision, mission, academic cultural values, and logos and followed by practical operational aspects of academic and non-academic aspects, unit functions, and infrastructure.

The THE practice is followed by important steps to create a university brand. The socialization process is recommended to strengthen self-confidence and create expectations and a culture of working together. It must also ensure a better impact on graduates and society. Strengthening the quality of institutions, developing faculties and study programs, formulating curricula and new research directions, strengthening the capacity of lecturers and education staff, and strengthening infrastructure support is an important agenda with a new scientific paradigm shift.

The shift in the scientific paradigm in this transformation has shown the impact of university progress, but several challenges must be evaluated such as better operational follow-up at the faculty and study program levels, curriculum reformulation, strengthening human resource capacity, and fulfillment of the required infrastructure. Changes in organizational behavior are also important things that need to be considered by the performance of HE management so that this transformation can be maximized. We recommend that these challenges be studied further to strengthen this research. Finally, the THE with the IOS paradigm is open, and dialectical, and is recommended to be continued by every HE institution in the world as a civilizing process so that science in its development does not look at cultural, civilizational, and religious barriers. Science is universal and its presence is for the advancement of all human civilization in the future.

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The use of the video format as a teaching guide in university studies

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Abstract: This article presents a pilot experiment on subjects from three Social Sciences degrees at two public Andalusian universities. The aim is to analyze the teaching guides and their presentation to students as a means of communicating with them, primarily through the video format instead of the conventional written format. To this end, attractive, clear and relatable video teaching guides have been developed to present to students, aware of the success of short videos dominating digital social networks, especially among younger age groups. A knowledge test was given to 99 students on the subject contents, as well as a satisfaction test; the following information was processed through the SPSS program. The main conclusion is that students have a high degree of satisfaction and a better knowledge of the new video guide format than the conventional written model.

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Keywords: Control group; experimental group; teaching guide; video; video guide.

I. Introduction

This paper presents a pilot experiment in the university environment through video guides to improve the communication of essential information to students about their respective subjects. Videos have become an important channel for disseminating and consuming all types of data; their potential is amplified by the ease which they can be shared on social networks. As Mayer (2001) points out, videos allow the user to take in content more efficiently by combining visual and auditory information (images, sound, and text, often through captions and annotations) in a single format (Nagy 2018). As Zhou et al. (2020, 584) state, “micro-video teaching is a new mode for a new generation of information education, which takes micro-video as an information medium to have a unique visual impact”. Based on this reality, we argue the potential videos have to transmit basic information from university teaching guides within the European Higher Education Area (EHEA). We will show that students generally lack knowledge about the contents of these guides, despite their importance.

Since the beginning of the 21st century, the importance of audiovisual material in all its forms has become evident not only on television but on all digital platforms, especially on social networks. Mobile phones are the primary access device, whose numerous applications are primarily image-based. Such material, if professionally produced, has great potential to connect with students quickly, directly and even “emotionally” to convey information simply and originally (Navarro, Castro, and Monedero 2020). In 2021, the average user spent 7 hours a day connected to the Internet, mainly through their mobile phones. Of the 4.95 billion Internet users (62.5% of the world’s population), 91.9% watch video content. YouTube, the leading platform used by users, had an average daily consumption of 47minutes by its 2.56 billion users (Hootsuite 2021).

The teaching guide adapted to the European Higher Education Area (EHEA) arose from the need to obtain a standard credit system for student mobility and to adopt comprehensible systems to compare degrees in Europe. It is thus a valuable tool to “promote European cooperation in quality assurance through the development of comparable methodologies and criteria” (European Higher Education Area 1999). In reality, the so-called teaching guide, course description, and study guide is a detailed planning of any subject based on the principles guiding the Convergence process to

create a European Higher Education Area. The focus is twofold, the content and the students' work based on that content while in other types of curricula or module planning the focus was on the content itself.

The main objective of the Manual for the Elaboration of Teaching Guides Adapted to the EHEA is the standardization of ECTS credits (European Credit Transfer System) to improve the understanding, mobility and academic recognition of the students' study process. The Teaching Guide helped universities organize and revise their curricula, resulting in a more attractive and transparent offer for the higher education system. It is the most significant contribution to the European Community (Quan 2014).

This public written document is the result of the commitment of the lecturer/teaching team and its department to the subject, and it is accredited and endorsed by the competent bodies who approve the University's teaching program (University of Malaga 2012). Although it is a document with key information for students, there is widespread ignorance of the subject teaching guides, "thus they lose their *raison d'être* due to the scarce monitoring and reading of these guides" (Monedero, Castro, and Navarro 2019, 490).

There are three types of teaching guides in the new Bachelor's and Master's Degrees framework: the degree guide, teaching guide and didactic guide. Good teaching planning integrates them into each other like Russian dolls to create the best tool for guiding teaching and foster learning (Sánchez, Ruiz, and Pascual 2011, 57). According to the same authors, the difference between these resources is the following: while the degree guide is an informative and organizational framework for the set of subjects that make up the degree; the teaching guides are didactic documents that fulfill a twofold function of informing and guiding students in their learning. This should not be confused with what is usually known as the course syllabus; finally, the teaching guides explain the entire course planning and are aimed at students. Therefore, they should detail all the learning that is expected to be achieved and the procedures and appropriate means to achieve them. Their specification must be detailed so that the students themselves can carry out the work independently (Sánchez, Ruiz, and Pascual 2011, 57-58).

All the recommendations highlight the need to reinforce planning and the development of the centre's educational offer of the degree programmes and their subjects. There must be a balance between the degree programme's demands, the academic year's organization, and the means available to students to meet these demands. Using the teaching guide is one of the best ways to carry out subject planning. It allows the subjects to be contextualized within the degree and improve their sought-after professional profile (Sánchez, Ruiz, and Pascual 2011, 54).

Students' ability to learn for themselves, i.e. learn to learn, is ensured only when students' work is the focus of teaching planning. However, for this to be possible, students and teachers must realize the need to renew usual methodologies and plan the teaching-learning process- taking the students' face-to-face and offsite work as a focal point. This planning does not only consist of telling them what they have to do or achieve, but also how they should do it, and the means and resources they can use to do so. It is not designed to tell them to change their work system but rather indicates how they must act to achieve the planned objectives and accompany them in this transition process (Sánchez, Ruiz, and Pascual 2011, 61).

Therefore, based on the above, a team of professors from the University of Malaga and the Pablo Olavide University (Seville) considered that, in addition to the contents of the subjects themselves, there was other academic information that could be adapted to the audiovisual format to make it more dynamic and attractive. This is the case with university course teaching guides.

Despite the importance of this essential document, there is a significant research deficit. Some works examine their form (in written format) and what elements they should not omit. This is the case of Altman's (1989), Birdsall's (1989) and Lowther's, Stark's, and Martens's studies (1989), who laid the foundation for the subsequent literature on teaching guides. Other more recent studies such as Sánchez's, Ruiz's and Pascual's (2011), highlight the need to reinforce the planning and development of the centre's educational offer for both the degrees themselves and their related subjects; there should be a balance between the degrees' demands and the organization of the academic year itself and the means available to students to respond to those demands. Diez et al. (2016) defend including the gender perspective in the teaching guides to make students better qualified and understand the importance of not contributing to maintaining gender inequalities. Lekue, Rodríguez, and Andrieu (2016) studied students' perception of the Bachelor's Degrees in Early Childhood Education and Primary Education of some subjects' teaching guides, concluding that these guides helped facilitate the monitoring of the subjects.

However, as mentioned above, no studies analyze the usefulness of other teaching guide formats or how to improve students' general lack of knowledge of them. Consequently, this perspective is often based on personal teaching experiences and anecdotal evidence.

Explanatory videos of the teaching guides for three subjects from Journalism, Audiovisual Communication, and Sociology degrees from the Malaga and Pablo de Olavide de Sevilla (Spain) were produced to encourage

university students to find out basic information about subjects. This study aims to verify whether the level of knowledge about these guides improves after viewing the new video format compared to reading the conventional written format and to find out the students' degree of satisfaction with the video guide. For this purpose, an experiment was carried out in which the classes were divided into two groups, an experimental one that watched the video guide and another control group that read the conventional written teaching guide. The measurement instruments were the same knowledge questionnaire for both groups and a satisfaction questionnaire for the experimental group to evaluate their experience with the video guide.

This paper makes empirical and analytical contributions. It provides new information about a new video guide format for communicating the teaching guide's contents. The method used and the measurement instruments also allow them to be replicated in other contexts and branches of knowledge. The analytical contribution is to explore whether this format, compared to the traditional written format, improves students' level of knowledge. Based on these analyses, it is possible to discuss more precisely the communication dynamics in universities, teaching guides' strengths and weaknesses, and obtain recommendations to improve and optimize the information flow between university-teacher-student.

The article is divided into four sections. The first and second sections set out a theoretical framework to examine the key concepts related to the teaching guides and the debate surrounding teaching planning and how it is communicated to university students. The third section describes the methodology used and the measurement instruments for the exploratory and descriptive experiment, together with the procedure for developing the video guides. The fourth section includes the analysis of the results, and the fifth discusses them and draws a series of conclusions intending to extrapolate them to other contexts.

II. Teaching planning and its communication with university students

The reality of university teaching is marked, on the one hand, by the standardization, homogenization, and verification of most academic procedures resulting from the European Higher Education Area's (EHEA) harmonization process. On the other hand, it is marked by the unstoppable digitalization process of the productive, educational and social fabric. Moreover, the pandemic that emerged in March 2020 has accelerated the implementation of telematic procedures in both teaching and university management.

In this context, strategies must be redefined and adapted to achieve learning objectives, planning, selecting didactic tools and resources, using or implementing them in the classroom, and evaluating them.

Regarding the first phase, teaching planning is specified and detailed in the teaching program, summarized and synthesized in the teaching guide, a document that serves as a contract between the parties involved in the educational process of a subject.

Although there is no single model or a common name, the teaching guides follow the National Agency for Quality Assessment and Accreditation's (ANECA 2012) indications. They must at least include information on educational objectives, specified in the general, specific, and transversal competences that students must acquire throughout the teaching-learning process, the subject's fundamental contents, teaching methods and resources, learning activities, information sources or bibliography, and the evaluation system, together with other useful information such as scheduling, class timetables, teaching staff or the tutorial system.

The teaching guide provides the students with all the information they need to follow the subjects. Thus, information transparency in teaching is fostered. However, it also enables the subject teaching staff to coordinate between them, and the degree's subjects also play a part in accrediting the degree (University of Malaga 2012).

Suppose the usefulness of the teaching guides has been demonstrated, we must question the effectiveness of their communication, that is to say, do students access these documents? We respond to this question in the research results section. However, it is necessary to focus on the universities' institutional communication and the new forms emerging due to digital technology, especially the Internet.

University communication is a product of the adaptation to society's new models and communicative practices (De Aguilera, Farias, and Baraybar 2010), and internal communication is one of its pillars. According to Simancas-González and García-López (2017), this communication has certain shortcomings determined by the multiplicity of actors that comprise university institutions and the predominance of strategies focused on external communication in which top-down and unidirectional channels predominate.

These gaps in internal communication are amplified by the lack of use and optimization of available digital tools and resources (De Aguilera, Farias, and Baraybar 2010; Paniagua-Rojano and Gómez-Calderón 2012).

Among the different channels university institutions use for communicating with internal and external audiences, the web is the most important, followed by social networks and traditional media. Channels such

as email, newsletters, or institutional means are the least used (magazines, university radios, and TV) (Simancas-González and García-López 2017).

It is worth noting the format of the messages sent through these channels. Images and videos are increasingly used in messages on the Internet, as seen in online video consumption data accessed by over 90% of the world's population (Hootsuite 2021). This is the result of several factors; on the one hand, video production is easy and costs little, and can be freely distributed on different platforms. On the other hand, the images are more credible and connect emotionally with the viewers.

Audiovisual material has also been increasingly used in universities. Proof of this is the proliferation of audiovisual and multimedia resource centres in universities, whose objectives range from producing educational materials to teacher training and development (de Lima Lopes et al. 2019; Zanelidin and Ahmed 2018; Dong et al. 2015). Despite this, universities do not leverage the potential of image and sound to communicate with their target audiences, as shown in the study by Navarro, Castro and Monedero (2020).

Therefore, the University faces challenges in the prevailing institutional communication model and the format and resources used to communicate with students. As mentioned in the introduction, this study shows an innovative experience in academic communication between the University, teachers and students.

III. Methodology

This work is characterized by the transparency in creating the video guides, data collection and analysis. It provides keys to creating and designing video guides and details the experiment's phases with the students. As shown next, the research is based on a quantitative approach through two questionnaires and by describing and analyzing a case that is of interest for research in the field of Universities, such as teaching guides or any other document that contains the essential information for taking a subject (teaching staff, number of credits, teaching planning, syllabus, assessment system, bibliography, etc.).

III.1. Procedure for creating video guides

We must consider the uniformity of video guides when creating them and design a format that students can recognize. Initially, a group of students highlighted the key elements from the user's point of view during a group dynamic.

Secondly, a pilot guide was recorded and edited. For this purpose, the Adobe Premiere application was used to create a template, as shown in Figures 1 and 2, which would later be used by the rest of the teachers to self-edit their guides using the same structure and design format. A user's guide was written and designed as a help tool, which contained the necessary instructions for adapting it.

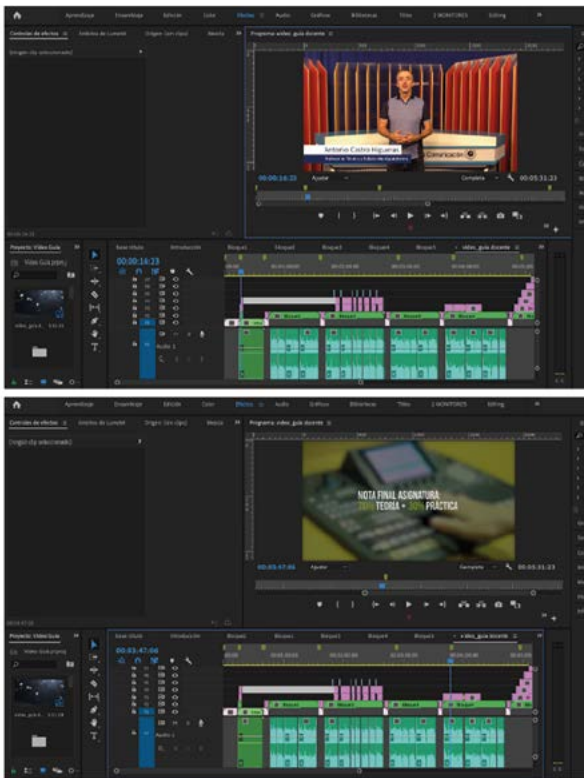


Figure 1-2

Video guide design template examples

Regarding the structure, the video guide follows the outline of the written teaching guide, i.e., there is a presentation preceded by an intro common to all the video guides and a section describing the subject's contents, objectives, and methodology. Next, the learning activities are listed, and finally, the evaluation process and criteria are defined. Each video

guide ends with practical information about the teaching staff (contact, email, tutoring, schedule, etc.).

The design format is minimalist, as seen in the video guide that we use as a template (Castro-Higueras 2019) highlighting the key concepts from graphs and labels that result in the professor's narration or voice-over. These video and musical resources and careful editing make it more enjoyable to watch.

Once video guides were edited, a YouTube channel was set up that acted as a repository that included all the video guides. The insertion code is extracted from each video hosted on YouTube to allow it to be included in any content manager through an HTML editor, for example, on the university's virtual campus. In this way, students do not have to access the platform to see the video guide but can do so directly from the location chosen by the teaching staff.

III.2. Analysis strategy

This work uses a quantitative methodology to obtain and analyze primary data from an experiment to evaluate the video guides' impact as a new model for improving the usability of the teaching guides among the students. The method can be replicated in other contexts. Although the research design focuses on the case of two universities mentioned above from Journalism, Audiovisual Communication, and Sociology degrees, the empirical works can be contextualized in other universities and degrees. The analysis provides evidence for creating a new guide model that can grab the university students' attention.

The experiment has control and experimental groups among students with the same profile (same subject, course, degree, and university). In this way, we ensure that we can later compare the results as the characteristics of the two groups are similar, which could influence the results (Bailey, 2008). There is no intervention in the control group; it is compared to the group where there is an intervention, and the difference in the group outcomes are attributed to the effects of the intervention; using nonrandomized means in quasi-experimental designs such as the one used (Hinkelman and Kempthorne 2008).

During the first day of class, the control group (99 subjects) read the conventional written teaching guide (48 students in Journalism, 29 in Audiovisual Communication and 22 in Sociology) while the control group watched the video guide (35 in Journalism, 33 in Audiovisual Communication and 23 in Sociology). The guide contents were the same in both cases. Next, the two groups filled out the same questionnaire on their knowledge of the guide. The experimental group filled out a satisfaction survey to evaluate their experience with the video guide.

The questionnaire about the knowledge of the guide was composed of four questions that included aspects of the subject's evaluation, thematic units, learning methodology, and practical activities; each was adapted to each degree. We have designed an index with the following options that summarize the students' degree of knowledge about the guide from the three degrees analyzed based on the responses obtained from these four questions: one correct answer out of four questions (1), two correct answers out of four questions (2) three correct answers out of four questions (3) and four correct answers out of four questions (4).

The questions for the experimental group that evaluated the experience included the degree of general satisfaction with the video guide for each subject and, in particular, the duration, quality of the images, sound, texts, written messages, and the ability, clarity, and way in which the lecturer presented the information, among other issues.

The data has been analyzed with the statistic program for Social Sciences SPSS. The results from different statistical tests are shown in the following sections through graphs and tables with data in percentage and descriptive statistics according to the measurement of the indicators. An annotation indicates whether the differences are statistically significant (with p-values of less than 0.05 and a confidence level of 95%). The chi-square test compares observed and expected frequencies to indicate whether the differences among groups are statistically significant. It gives us information to say when the contrast is non-significant (we do not reject H_0) or essential (H_0 is rejected).

III.3. Ethical considerations

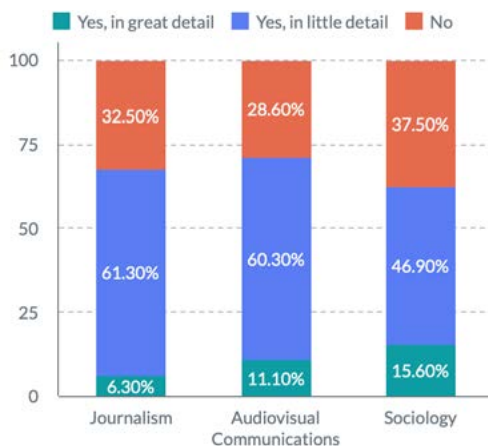
The questionnaire used in the research was reviewed by the team of the Practical Sociological Research Committee of the Spanish Federation of Sociology. The research was carried out within the framework of an Educational Innovation Project, promoted and financed by the University of Malaga, fulfilling all the requirements of the call and achieving a final assessment of Excellent. Regarding the BERA guidelines, we have the implicit consent of the students since the online questionnaire was voluntary, as expressed in the email that included the link. Likewise, all the questionnaires were anonymous. Regarding the protection of minors, it should be noted that only university students of legal age participated in the study. Regarding transparency, the completed questionnaires are available. This research respects the right to withdraw and did not use incentives to encourage participation.

IV. Results

This work aims to analyze teaching guides and their presentation to students, especially the video format, as opposed to the conventional written format to communicate with students. In other words, the communication between the University and the student body. For this purpose, we carried out two types of analyses. The first (section IV.1.) is comparative to determine whether differences in the degree of knowledge of the teaching guide contents depend on the format (conventional written and video guide). The second analysis (section IV.2.) explores the experimental group students' evaluation of the video guide to detect the strengths and improvements to be made in the future.

IV.1. The conventional guide compared to the video guide

As shown in Figure 3, most of the students consulted in the three degrees analyzed tend to skim over the traditional teaching guide. A considerable percentage do not read it: 32.5% of Journalism students, 37.5% from Sociology, and 28.6% from communication. The rate of those who are in the habit of reading it in more depth ranges from 16% in Sociology to only 6% in Journalism. The conclusion is evident and confirms the initial hypothesis of this work: the conventional teaching guide is a document in disuse because very few students are in the habit of reading it in detail.

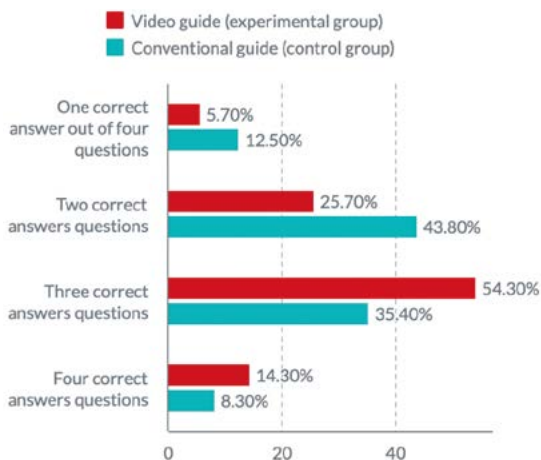


Source: Authors.

Figure 3

In general, are you in the habit of reading the subject's teaching guide?

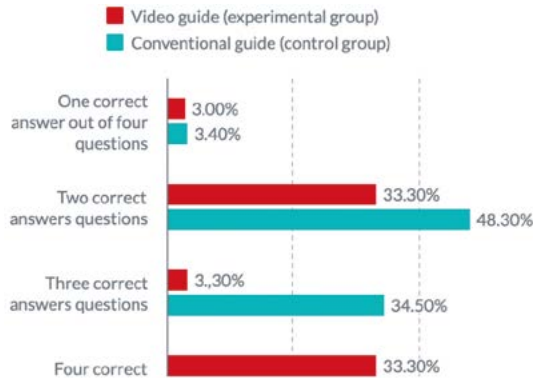
The students gain more knowledge from the video guide as opposed to the conventional guide. When asked about different issues related to the content of the guides, the highest scores (four correct answers out of four questions presented) were obtained by students who viewed the video guide compared to the students who read the conventional guide. As shown in the following figures, 14.3% of Journalism students in the experimental group answered all four questions correctly, 33.3% of Audiovisual Communication students, and 39.1% of Sociology students (respectively, 6, 20, and 12 percentage points higher than students in the control group). The differences are statistically significant for some results. Previous studies in this field, such as Miller and Redman's (2010), conclude that the use of videos as a teaching guide increases students' understanding and knowledge of the syllabus.



Chi-square test: 0.067.

Source: Authors.

Figure 4
Percentage of questions answered correctly about the contents of the guide. (Journalism)

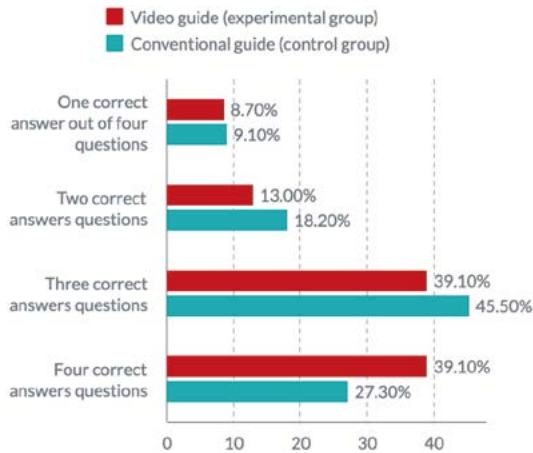


Chi-square test: 0.336.

Source: Authors.

Figure 5

Percentage of correct answers to questions about the contents of the guide (Audiovisual Communication)



Chi-square test: 0.918.

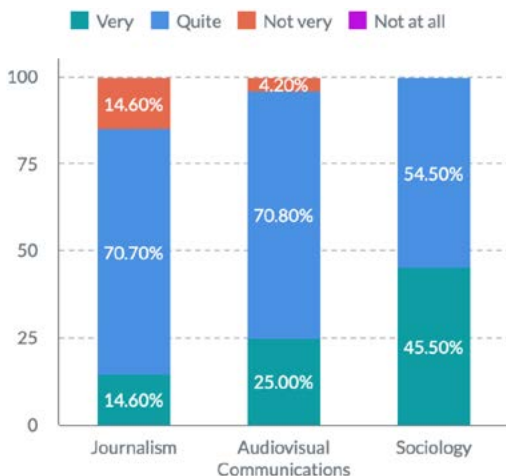
Source: Authors.

Figure 6

Percentage of correct answers to questions on the contents of the guide (Sociology)

IV.2. Towards a new teaching guide model. The experience with the video guide

The study's second objective is to analyze students' evaluation of the video guide, who are from the three degrees in the control group. It is essential to note the format's originality since practically all the students answered that they had "never" seen a video guide in other subjects before (90.2% in Journalism, 87.5% in Audiovisual Communication, and 100% in Sociology).



Source: Authors.

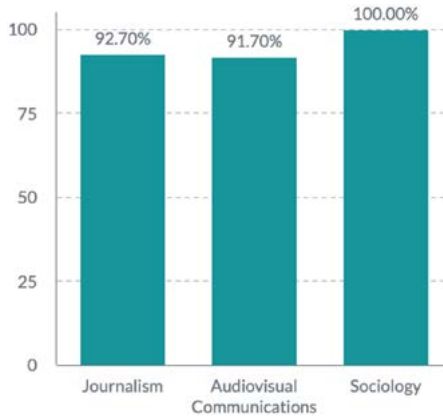
Figure 7

Degree of satisfaction with the video guide

As shown in Figure 7, the students rate their experience with the video guide highly in the three degrees analyzed: most students consulted from Journalism, Audiovisual Communication, and Sociology state that they are somewhat or very satisfied with this format for communicating essential information about the subject. The two recommendation indicators confirm the high rating: practically all students would recommend the video guide format for the rest of the subjects instead of the conventional guide (Figure 8) and suggest that other students view it (Figure 9).

These results are consistent with the study mentioned above by Miller and Redman (2010), which found higher satisfaction among students who participated in classes with teacher-created video content versus the traditional classroom. Others, such as Dennen (2011) and Cheung, Hew, and

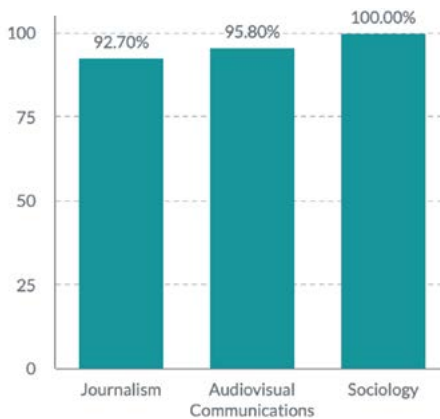
Ng (2008), determined that creating personalized videos fosters higher levels of university student participation and engagement, leading to more solid relationships between students and faculty to be established.



Source: Authors.

Figure 8

Recommendation to use this video guide format for the rest of the subjects instead of the conventional guide and recommendation to other students to watch it



Source: Authors.

Figure 9

Recommendation to other classmates to watch the video guides

It is possible to extract general evidence about the three video guides' best and worst-rated aspects from the data in Table 1 using central tendency statistics; generally, the three video guides are rated very positively in all eight rating indicators. The mean value in all the cases is the same or higher than 3.5 on a scale from 0 (lowest rating) to 5 (highest rating). It is also worth noting that the most repeated value (the mode) in all the indicators in the three degrees is 3.

Most students rate the lecturer's presentation of the information positively (4.1 in Journalism, 4.3 in Audiovisual Communication, and 4.7 in Sociology) and the clarity, structure, and sections (4.1 in Journalism, 4.2 in Audiovisual Communication, and 4.7 in Sociology). The comprehension of the sociology video guide is rated positively (4.8), while it is somewhat lower in Audiovisual Communication (4.2) and especially in Journalism (3.9).

Table 1
Average rating of different aspects of the video guide by degree

	Journalism	Audiovisual Communication	Sociology
1. Image quality	3.6	4.0	3.8
2. Sound quality	3.5	3.8	4.1
3. Quality of text and written messages	3.6	3.7	4.5
4. Lecturer's capacity to convey information (if it motivates, or sparks interest)	3.9	3.8	4.5
5. The lecturer clearly presents information (yes it is well understood)	4.1	4.3	4.7
6. Duration	4.2	4.0	4.5
7. Understanding of the content in general	3.9	4.2	4.8
8. Structure and sections (whether they are clear and organized)	4.1	4.2	4.7

Source: Authors.

In general, as shown above, the indicators that received a somewhat lower score in the evaluation of the three video guides are related to the quality of the image, sound, text, and written messages. These indicators can be better contextualized due to a question in the survey allowing students to

express (openly) the aspects they liked the least about the video guide. We present some of the students' literal responses below:

"Sometimes the images distracted from the audio," "Sometimes the images distracted you from what the video was saying," "sometimes the music did not match too well with the dynamism of the video," "on many occasions, the content and the visual aid were unrelated," "a bit more text on the screen while the lecturer is speaking," "some aspects were not written on the screen, I think that hearing and seeing it makes the concepts more understandable."

V. Conclusions

We analyzed students' opinions regarding the new teaching guide model in video format to communicate essential information about the subjects and measured their satisfaction with assessment indicators. Results are based on two unpublished questionnaires designed in 2020 and applied to three subjects from the Journalism, Audiovisual Communication, and Sociology degrees from the University of Malaga and Pablo de Olavide de Seville, Spain. Two groups in each of the three subjects were created: a treatment group (which viewed the video guide) and a control group (which did not view the video guide and read the conventional format of the guide) in order to implement the program, which was evaluated with an experimental methodology. The work provides evidence of the advantages towards using the teaching video guide instead of the conventional guide to improving communication between the University and students. Also, the advance is the methodological design and analysis strategy can be replicated in other degrees.

The starting hypothesis of this work has been broadly demonstrated in the three degrees analyzed. As we have shown, most students are not in the habit of reading the conventional teaching guide. Those who did read it tend to skim it. This is a significant issue as the teaching guide is a valuable academic document for the university, students, and teaching staff. It contains the subject's teaching planning and information necessary for following the subject in a given academic year.

The new video guide format can be considered an innovative proposal compared to the conventional one as it improves students' understanding of the contents and is rated highly. In other words, it has been shown that the students who viewed the video guide instead of reading it in the traditional format gained more knowledge about teaching guide's contents. On the other hand, there was a consensus among students as they positively evaluated this

new teaching video guide format for communicating essential information about their respective subjects. However, the data also highlights aspects to improve concerning the quality of the images, sound, texts, and written messages for future video guides.

As some works also point out (Cuéllar and Navarro 2019; Perona 2020), in an increasingly visual world where there is an increasing number of images sent and received, the potential for audiovisual products can be used to improve academic communication between the university, professors, and students. Images are a powerful resource for communicating as it appeals to the viewer's cognition, emotions, and subjective meanings, favoring the assimilation of the content. We are in one of the periods that Salvador Giner (2007) mentions as "great creativity", and universities should harness this.

We believe that the teaching guides are an essential tool for transparent teaching management since they must contain a description of the fundamental aspects of each subject, such as the credits for the course, competencies that will be acquired after passing the course, the methodology, and the assessment methods to be used. Each university's teaching guide has attempted to standardize the format. However, in practice, it has been observed that these design standards are not met, and we have even found notable deficiencies in the way the information is shown. This is why the pilot project provides a more attractive format for students and encourages the creation of a corporate design. The design could be coherent with the institution's, which lecturers could easily replicate so that institutional and academic communication reaches the end-user through more everyday digital consumption, but no less formal, and does not detract from the institution's corporate image. Public universities have been on the Internet and the leading social networks for years, but it is not enough to merely be present on them; they must also speak the same language as the users.

Finally, it should be noted that adopting the new proposed format does not mean that the written teaching guides must disappear, as we consider them more complete. In any case, this work is committed to the coexistence of both models. The video guide is more attractive and dynamic way for more students to access and understand the information. The conventional teaching guide is a reference document for those who wish to explore the subject's contents.

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Improving undergraduate students' learning through Online Educational Guidance Meetings (OEGMs)

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Abstract: This study aimed at obtaining reflections on Online Educational Guidance Meetings (OEGMs), executed in the English preparatory program during COVID-19 Pandemic in a university in Istanbul. The OEGMs were voluntary meetings between a student and the instructor. Students were able to ask for suggestions to study more effectively via an online meeting platform. The qualitative collaborative action research design was operated in the study. One-on-one interviews with 8 instructors and focus group interviews with 12 students were conducted to obtain the data. Content analysis method was employed to analyze obtained data. The findings revealed that this new method, which brought the students together with their instructors in personal one-to-one meetings, provided numerous advantages psychologically and academically in the learning process.

Keywords: Higher education; educational guidance; online education; university student.

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I. Introduction

Schools aim at making students gain certain abilities, behaviors and attitudes through educational activities. In order to monitor learning outcomes, schools administer assessment techniques and call the results as academic achievement (Özkanal and Arıkan 2011, 68). As a result of assessment, it becomes possible to discriminate between higher achievers and lower achievers. Many reasons such as lack of planning, psychological factors, lack of motivation, overcrowded classes and lack of technology can play role in learning loss and in low achievement (Al-Zoubi and Younes 2015; Alrabai 2016, 21). Similarly, individuals' low academic self-efficacy, low self-motivation and regulation skills and their possible negative ideas about the school trigger the low achievement (McCoach and Siegel 2001). Furthermore, environment and conditions in which learning takes place, namely the classroom environment, competitive school culture and perfectionism are among the reasons behind underachievement (Siegle 2018, 286). On the way to the solution of the problem, it is critical to discover the reason first, however, it is impossible to apply a single way to clear up low achievement problems for each learner (Siegle 2018, 285-288). Each student has unique learning styles, learning preferences and personal backgrounds. Discovering these unique characteristics will provide educators the opportunity to design instructional process that can increase the learning effectiveness for each student (Chen et al. 2014, 46). Academic advisory is one way to understand the student differences. In higher education, the faculty staff learns about the challenges that students face and start generating solutions for the challenges in front of student achievement through advisory meetings (Owens 2015, 18).

Instructors wising up to potential reasons are capable of ceasing or lessening their impact on student learning (Rimm 2008, 3). As to the physical conditions, it is better to meet students' basic needs if the idea is to achieve true learning (Rahal 2010). Instructors may get to know students better to identify their physical needs and create a better classroom environment. It is pointed out that in addition to providing skills to study more effectively, universities must take some preventive actions, such as offering strategies to teach undergraduate students how to study (Balduf 2009, 275). In this way, students learn to set clear goals, pace their learning and prioritize their tasks. It is highlighted that making students aware of their own learning is the key to increase achievement (Siegle 2018, 285-286). In a similar way, building discipline, responsibility and diligence among university students is crucial to improve the quality of learning process and outcome (Olowookere et al. 2015). It is evident that to improve students' learning affective problems behind underachievement should also be managed.

Online Educational Guidance Meeting (OEGM) is a kind of guidance for students to be able to overcome the challenges in learning environments regarding each factor in the curriculum (Jan and Mattoo 2018). OEGM is also characterized as a process of achieving objectives and identifying personal development phases at school (Subasinghe 2016, 11). Students must be able to use the process of acquiring knowledge effectively regarding what and how to learn, what kind of support to take and in which ways to make this knowledge permanent, and to actively manage their own learning by combining all these (Ağır 2017, 183). As a result, students' learning motivation can be boosted via OEGMs (Fejes 2008, 654).

Apart from these, the COVID-19 pandemic has affected all stages of education. Online education initiated in the world during this period as a way of conducting education at schools or universities. The Higher Education Council (HEC), the authority responsible for higher education in Turkey, also proposed to maintain education online at universities. Starting from October 2020, Universities all around Turkey initiated online education for students. However, the lack of experience in online education led to adversity adapting to the new conditions and to the new roles that students had to take on (Moser et. al. 2021). With this new way of education, university students had some challenges regarding adaptation and digitalization. During the first phases of online education, students all over the world encountered some challenges, one of which was low digital literacy (Eraslan 2021, 359), which ended up with low achievement. Likewise, Turkish university students experienced university-related communication problems and psychological problems caused by physical isolation during the pandemic (Tüzün and Yörük Toraman 2021, 841). Furthermore, students in higher education endured anxiety and pessimism during the physical isolation period (Genç and Köker 2021, 199). It is also highlighted that COVID-19 related learning loss was inevitable among students in all stages of education (Moscoviz and Evans 2022; Donnelly and Patrinos 2021), which means students felt academically weak. Considering all these challenges underlined in the literature, Higher Education Institutions should provide more facilities regarding students' affective domains (Bozkurt 2020, 131). Recent study suggested that the guidance and psychological counseling units in higher education institutions should be more active to support students (Yolsal and Yorulmaz 2022, 469).

In addition to learning loss and the psychological challenges in the pandemic period, low student achievement in learning English as a foreign language is a common problem in Turkey. It is considered that genuine practices such as OEGM can contribute to the solution of the problem. The aim of this study is to reveal that OEGMs also continue at higher education

in order to foster student learning and make up for learning loss during online education. Considering that online education will be an inevitable part of higher education from now on, it is noteworthy to provide solutions to students' learning challenges and to support them academically. Therefore, this study is valuable in terms of suggesting a solution for the challenges experienced by the students and determined in the literature. Whereby OEGMs are of great importance, the purpose of this study is to uncover instructors' and students' reflections on improving student learning at English Preparatory Programs, which constitute the first year of universities.

II. Method

II.1. Research design

Qualitative collaborative action research design was employed in this study to discover both students' and instructors' reflections on OEGMs. Collaborative action research is a type of action research where different parties who act as co-researchers collaborate to understand a social process (Messiou 2019). The basic purpose of collaborative action research is to come up with an improvement in education together with different stakeholders (McNiff 2002). The instructors and the undergraduate students who experienced OEGMs as a process were included in the frame of this study collaboratively.

II.2. Research content

The study was conducted in an English Preparatory Program in a private university in Istanbul, Turkey. Since the medium of instruction at the university is English, it is obligatory for all students to prove their proficiency in English according to the Common European Framework of Reference for Languages (CEFR) before they start their undergraduate education at their faculties. At the beginning of the academic year, students take a placement test in which their proficiency level is determined. Students having B1 and above can take the English Proficiency Test to be exempted from the mandatory English Preparatory Program. Students proving their proficiency test can start their undergraduate education at their faculties but those below B1 level and who failed in the proficiency test are required to take English Preparatory Program. This program is one-year long with the modular system and aims at having students complete B2 level which is demanded during the undergraduate education. Students with B1 level can take the Proficiency test at the end of the academic year. Each module covers 8 weeks and students who complete a module successfully are eligible to take the upper level. In the 2020-2021

academic year fall term when this study was conducted, the university hosted 235 students in the English Preparatory Program offering fully online 24-hour English classes per week due to COVID19 pandemic.

II.3. Research procedure

OEGMs between the instructors and students were implemented for eight weeks. The meetings were based on voluntary participation and the instructors were asked to fill in a form about the student following the OEGMs. This form consists of demographic information about the student, strengths, areas for development and goals set for the student (Annex A).

After each completed module, online semi-structured one-on-one interviews were conducted with the instructors and semi-structured online focus group interviews were conducted with the students following the OEGMs.

II.4. Study group

All the participants were selected via the purposeful sampling method, managed to identify the richest sources of information in a limited time (Patton 2002). In line with this, Criterion Sampling technique was operated to attain study participants. Criterion sampling technique is one of the most convenient techniques to reach the participants according to a criterion determined for a critical situation which is in line with the nature of the study (Creswell and Clark 2016). The criterion determined for the participants in this study was to have attended the OEGMs. The interviews were conducted with 12 students and 8 English Language instructors teaching at the same school. Students' ages ranged between 17 to 21 and all of them attended at least one OEGM with their instructors. Table 1 presented at the following summarizes the demographic information of the participant students.

Table 1
Demographic Information of Participant Students

Variable	Group	Number
Gender	Female	7
	Male	5
Age	17	3
	18	8
	21	1

Variable	Group	Number
Attending Educational Guidance Meetings	Only once	4
	Two times	6
	More than two times	2

5 female and 3 male instructors attended the semi-structured interviews. They are experienced in teaching English and 3 of them hold a master's degree in English Language Teaching. The demographic information of the instructors is presented in Table 2.

Table 2
Demographic Information of Participant Instructors

Variable	Group	Number
Gender	Female	5
	Male	3
Age	26-28	2
	29-31	3
	>31	3
Experience in Teaching	4-6	3
	7-9	3
	>9	2
Holding Master's Degree	Yes	3
	No	5

As it is seen in Table 2, 5 female and 3 male instructors took part in the interviews. Two of the instructors are aged between 26 and 28; three of them are aged between 29 and 31. Also, there were 3 instructors whose age was above 31. The number of instructors whose experience in teaching is between 4 to 6 years is three. Similarly, other two instructors had 7 to 9 years of experience in teaching English. Only two instructors stated that they had more than 9 years of experience in teaching. Regarding the Master's degree in English Language Teaching, 3 instructors stated that they had master diplomas while the rest stated that they did not hold a Master's degree.

II.5. Data collection

The data of this study were collected in the fall term of the 2020-2021 academic year when the Emergency Remote Teaching (ERT) was initiated due to the COVID19 pandemic. In this collaborative action research, data were collected from the instructors and the students via interviews and focus group interviews. At the end of the first module, OEGM records were examined, and it was noticed that 29 students and 11 instructors attended the OEGMs. Both students and instructors were sent an email informing them about the nature and the purpose of the study and asking for their consent to participate in the study. 12 students and 8 instructors accepted to take part in the interviews. Both the one-on-one interviews and the focus group interviews were carried out via an online meeting platform, called Zoom. The interviews with the instructors lasted approximately 160 minutes whereas the focus group interviews with the students lasted 90 minutes in total. The data collection process took about 3 weeks to be completed.

II.6. Validity and reliability

In order to increase the validity and reliability of a qualitative research, using various sources of data such as participants, other members and stakeholders is called data triangulation (Guion et.al. 2011, 3). The data in this study were gathered from not only the students who actively experienced the learning change but also the instructors who were active managers of the OEGMs. The validity of the research was also enhanced as one of the researchers is teaching in the same institution and therefore familiar with the context. However, other field experts were consulted during the data analysis process in order to prevent bias. By giving participants the chance to confirm or dispute the correctness of the data, member checking gives the qualitative study more credibility and helps the researcher assure the appropriate presentation of participant utterances (Creswell and Miller 2000). To provide member checking in this study, the transcriptions of the recordings were sent to the participants to obtain their approval on the interview data.

II.7. Data analysis

Content analysis method was executed to analyze obtained data from students and instructors. Content analysis allows the researcher to analyze the qualitative data under codes, categories, and themes based on the similar content. It is data sensitive analyze process and requires the researcher to review the data several times (Kynğäs 2020, 13-21). In line with this, the

interviews were transcribed firstly (see sample transcriptions in Annex B), and the analysis was carried out by two researchers at different stages. In the first stage, one of the researchers conducted the analysis. Then, another researcher reviewed the current analysis via auditing the codes and themes. In the final stage of the analysis, expert reviews were obtained from experts in educational sciences. Following the reviews, final codes and themes were emerged.

II.8. Ethical issues

The ethical approval was obtained from the Institution Ethics Committee (IEC) prior to the study. Following the IEC approval, researchers initiated the data collection process. Each participant was invited orally by giving comprehensive information about the study. Interviews were held with each voluntary participant at any time and place. Before each interview, consent forms were presented to the participants, and they were informed about their rights, the purpose and scope of the research. One-on-one interviews and the focus group interviews were all recorded after the participants were informed about the study. Participants' real names were avoided during the analysis. Instead, students were coded as S1, S2, S3 and pseudo-names were adopted for the instructors.

III. Results

This part represents two main themes and ten codes that emerged based on the data obtained from both students' focus group interviews and instructors' interviews.

III.1. Theme one: Psychological effects

The first theme emerging from the data is Psychological Effects. Both the instructors and the students underlined the psychologically positive effects of online educational guidance meetings. Psychological Effects theme covers the following codes: increasing motivation, developing self-awareness, developing self-confidence, reducing anxiety, feeling valuable and improving instructor-student relationship.

III.1.1. Increasing motivation

It was detected that the meetings increased the students' motivation towards the lesson and studying in COVID19 period. Student 1 (S1) stated the situation as follows: "That really increased my motivation actually. I wasn't in

a good mood to study, but I have started to study again”. These meetings also changed the students’ in-class performances by increasing their motivation. S2 said the following regarding this issue: “I told what I have difficulties in understanding. I was always quiet in the lesson. She supported me and told me that I could. I have started participating in activities more”. The students whose motivation towards studying increased became more enthusiastic about the lesson and the tasks they planned to do to be more successful. S3 summarized this by the following statements: “I was really excited to keep my promise to my teacher and to do the things we planned together for each and every time”.

III.1.2. Developing self-awareness

Students had a chance to learn more about themselves from someone’s perspective and they evaluated their own performances, deciding on their weak and strong sides on their own. Some stated that they did not know much about themselves and their learning strengths. S5 shared her experience as follows: “I got information that is going to be useful for me and my learning. It was beneficial for me to know myself better. I have seen my pluses and minuses about learning”. Students were given an opportunity to learn more about themselves and they were mostly happy with the result. S6 said the following on this topic: “I didn’t know what I was good at or what I was bad at. I thought I was completely unsuccessful. That I have learned about myself is something good”.

It was also explored in the interviews with instructors that following the online educational guidance meetings, students gained an insight into their own learning process. They could criticize themselves and recognize their weak and strong sides about learning a foreign language. One of the female instructors, Zeynep, stated that students noticed the best practices for them and tried out them after the meetings. She stated this as follows:

To be able to see their weak sides, to notice the wrong method or applications that they have adopted so far and to improve studying strategies that are more suitable and necessary for them.... These are the things that educational guidance meetings provided them with.

III.1.3. Developing self-confidence

Self-confidence is another code of the psychological effects. Some students stated that they felt better in terms of what they can do next, and their self-confidence increased after those meetings. S6 stated the following: “I don’t know what to say but I became more self-confident about the lesson.

I didn't use to participate in the lesson but then the more I spoke up, the more I wanted to do". Students could realize the changes in themselves, and this made them feel confident about their progress. S8 is one of those who noticed the positive change and stated this change as follows: "I think I definitely improved my grammar and vocabulary. I was nothing at the beginning. I followed everything my teacher told me and a program on my own. In the end, I have seen that I can actually manage this". Instructors also stated that some students were not confident enough to do something on their own and that they felt scared and lonely in the learning process. One of the male instructors, Burak, stated the followings:

It was just like teaching them how to study on their own. They could easily define the areas they wanted to improve. While saying this, they were a bit desperate too but at the end they understood that they weren't actually alone. We were there to help them in this way. I recommended some websites and books for them. They recognized that they could do.

III.1.4. Reducing anxiety

After the educational meetings, most of the students felt more comfortable as they had a chance to express themselves and there was an instructor listening to them and coming up with suggestions. Feeling relaxed mostly depends on being able to share and express problems regarding learning. And the fact that nobody judged them during those meetings helped them feel better. In this regard, S7 mentioned how he felt during and after the meetings as follows: "I felt more relaxed, and it was good that I could tell someone about my problems". S10 expressed that it was the teacher who made her relaxed during the meetings by saying "At first, I was nervous but my teacher's positive attitude towards me made me feel relaxed, even his voice did this". S11 is one of those who were nervous at the beginning but changed her mind afterwards during the meeting and stated her experience in the following lines: "I got worried, couldn't know what to tell but then the teacher asked me a few questions and we had a chat about my exam results. It was like chatting with a friend. Then I relaxed". Feeling relaxed was followed by 'trust' in some statements. Students associated feeling relaxed with the trust they had in their instructors.

III.1.5. Feeling valuable

As a result of the analyses, it was discovered that those meetings helped the students to feel valuable, which ended up in more participation in lessons. S7

mentioned something he noticed during the meetings and stated the following: "I have noticed the interest in me. The teacher was interested in me. I could tell my problems and she listened to me". Having those guidance meetings one-on-one is another reason why students felt special. They found a space for them to speak up and mention their problems, private issues as they were alone with the teacher. In this context, S9 stated the following: "I felt extremely special. Why? Because it was only me in the meeting. I was alone to speak".

III.1.6. Improving instructor-student relationship

Improving relationship between instructors and students is another code that emerged as a result of the analysis. Instructors mostly highlighted that COVID-19 period decreased the relationship with the students. Educational guidance meetings contributed to eliminate this challenge. Ece, one of the female instructors holding MA in ELT and has been teaching English for over 7 years, stated the followings:

...because we don't have any one-on-one communication with students outside of the lesson. Normally we used to socialize with them in the corridors and break times in face-to-face teaching. Now, we can't be that sincere since it is online. You know your students and their private issues and so do they. In other words, you are able to communicate with the students.

The instructors also agreed that educational guidance meetings offered a chance to have a connection between instructors and students during online teaching. If students have a relationship with their instructor, they can feel more comfortable, and the instructor can help them in a better way. Emel, one of the female instructors teaching English for 6 years, stated this as follows:

I think this lockdown process has affected students as much as everybody psychologically. What I have understood through my meetings (educational guidance), students want to have a special relationship with their instructors, and I guess this need is met with guidance meetings. I have observed that students could express the topics that they normally hesitate to share when with other students, their fears and problems. Therefore, I am for the idea that educational guidance meetings have been beneficial for both students and instructors in this extraordinary process.

Osman, one of the male instructors with 5 years professional experience, also stated the fact that educational guidance meetings helped him get to know his students better especially newcomers to the class in the following modules.

The communication between students and instructors has been stronger. For instance, I can tell this. As you know, some new students joined my classes. I thought I should invite them to those meetings first to communicate with them, to get to know them and to have a warm relationship with them. If we were in the real class (physical learning environment), we would do this differently, but we managed this perfectly with educational guidance in online education since we are all at home.

III.2. Theme two: academic effects

The second theme emerging from the data is Academic Effects. Both the instructors and the students mentioned the positive effects of online educational guidance meetings on the academic issues related to teaching and learning. Theme two covers the following codes: Providing academic support, providing online education orientation, learning how to improve language skills, and exploring learner needs and characteristics.

III.2.1. Providing academic support

Educational guidance was interpreted as an academic support by the instructors. Accordingly, educational guidance was an opportunity for students to overcome the challenges encountered through online education, to learn how to learn on their own and to have a close relationship with their instructors. Guiding students, supporting students, and creating a road map for students are the subcategories of this theme. Within this context, Zeynep, one of the female instructors with 5-year-experience, stated the followings:

These meetings are meetings that we as instructors had with our students in order for them to have a successful academic year in prep school and to eliminate the possible problems that they may face during this process.

Some instructors stated that educational guidance was the academic support given in terms of keeping a developmental track of students and becoming aware of the students' deficiency in learning. Emel, one of the female instructors who is 31 years old and has been an instructor for 6 years stated her opinions as follows:

Educational guidance means providing academic support for students where teachers can follow their students' skills in the learning process and where psychological barriers to learning are easily noticed and solved. This guidance strengthens the relationship between the teacher and the students, and it is beneficial for both sides.

Educational guidance was also defined as a support provided by the instructors to be able to find out students' weak and strong sides and to decide on the goals to be achieved together with the students. These goals are to help them improve their learning. One of the male instructors, 28-year-old Osman with 5-year experience and holding MA in ELT stated his opinion as follows:

It is, I mean, educational guidance means to draw a road map for students for their learning by focusing on their weak and strong sides regarding learning. It is also to support them by setting up goals together that they are able to achieve.

Similarly, students who attended the meetings received academic recommendations or suggestions from their instructors to improve their learning. Almost every student stated that they learned alternative ways to improve themselves, received worksheets, learned new websites and mobile applications to study on their own academically. S12 and S5 are two of those students who stated that they have taken necessary academic advice from their teachers and said: "I have learned websites which I can make use of, and I got ideas regarding how to study alone." (S5) and "I asked my teacher about what I could do about English, and he suggested a few ways for that. Like mobile applications and books" (S12).

Finally, it was observed that the students left the meetings with the feeling that everything was clearer in their minds since they had a chance to speak about the problems and learned what to do based on their instructors' advice. S2 summarized this as follows: "When I left the meeting, I knew better what to do and how to study. I learned these. I noticed the things I did wrongly actually. I started to study for the exams more to the point". S11 is also one of the students who expressed that everything was clearer after the meetings and stated: "The things that I should do got clearer. I felt better. I learned how to study. We handled many problems that confused me for so long".

III.2.2. Providing online education orientation

Another code emerged regarding educational guidance is about the challenges in online education. Since this was an extreme situation and all education was maintained online, students had some challenges regarding online education, how it worked and what it included for preparatory schools. When the schools were closed for the first time in spring term in 2020, those students were getting prepared for the university entrance exam, and they could not exactly focus on online education since they all concentrated on the exam. However, having the first experience in providing online education,

especially private universities developed their systems in online education to provide a more effective teaching and learning environment. As a result, when students started the preparatory program, they were a bit confused about what to do. One of the male instructors, Burak holding MA in ELT and 8-year experience of teaching, stated the followings:

...students didn't have online lessons as we do now. They could ask us when they had a problem. Secondly, they were sure of what to do for the exam last year since they had the book, and they knew what to study. However, they started preparatory program and they had to follow the classroom activities on the internet, do activities on the online platforms, follow their regular main course books, and maintain their online projects. They were all lost about what to do. They could ask their questions in their minds via educational guidance meetings.

One of the female instructors, 34-year-old Miray with 9-years teaching experience, expressed the benefits of educational guidance in terms of informing students about the program to help them adapt the system better.

Especially for the first module. You know, they have no idea about the school or the system. They are scared and hesitate to ask others in class since they do not know anybody yet. But we were there. They could ask us about what they couldn't understand about the system in the school.

One of the female instructors, Zehra, who has been an instructor for 12 years, is among the instructors who think educational guidance meetings play a role in informing students about the online education that is maintained in the school. She stated the fact that students, especially the newcomers, had difficulties in adapting to the learning environment. She expressed this as follows:

These students had orientation programs at the beginning of the term, but they all forget, they do not attend, or I mean they are young, and they do not care. But when they realize that the system is complicated, then they understand and want to ask us. There are also those who join the classes late. They have no idea regarding the system. In those meetings I helped them understand what they are supposed to do.

One of the basic benefits of OEGMs was stated by the students to be the support they received from their instructors especially on the difficulties they experienced in online education. Because of COVID19 period, students have been through a difficult period in which they encountered online education for the first time as part of their university and it was not definitely like they had imagined before. The English preparatory program was different from the systems they had been familiar with before, which

ended up having some problems in online education. S8 mentioned the problems he faced through online education and stated the following: "I could tell my teacher about the problems I experienced in online education and asked for her advice. She suggested some ways; these were all practical for me". S1 is also one of those students who had difficulties in online education and received help via guidance meetings. S1 said: "Online education is really hard. Especially at the beginning it was harder. And I started school a bit late, so I asked about everything. That made it easier to follow the tasks".

III.2.3. Learning how to improve language skills

The instructors mostly mentioned that students lacked in studying techniques for learning a foreign language and OEGMs helped the students with this. Since they did not focus on foreign language classes at high school, they did not know how to study a foreign language which ends in being lost and failure. Studying techniques and language awareness are the subcategories of this theme. One of the female instructors Miray stated her experience regarding this topic as follows:

For the language...I asked them to tell me where they have problems with and most of them told me that they did not know how to improve their listening and reading skills. I presented some ways to follow and helped them make a study program for themselves.

Similarly, one of the male instructors 32-year-old Niyazi with 10-years of teaching experience stated the followings:

They have a bad studying habit. They always memorized grammar and vocabulary so far. But it is different here. We are teaching them language skills. And they don't know how to study these 4 skills: reading, writing, speaking and listening. They don't know what to do or how to improve themselves. Acquiring skills is something different from grammar or new vocabulary.

III.2.4. Exploring learner needs and characteristics

Exploring learner needs and characteristics include individual needs and differences, lesson plans and classroom management. As a result of those meetings, there were some changes during active teaching in the class as stated by the instructors. Adapting the lesson plan, accordingly, arranging activities and paying attention to students' needs are amongst the changes observed. An instructor who is more aware of students' special needs can

change the way he or she teaches and approach those in accordance with their needs. In some cases, the instructors stated that they could not know students well before the meetings. They had a negative impression about them regarding the lesson. When the instructors noticed the reasons why they behave so in the class, they can act immediately. One of the male instructors Niyazi shared his experience on this topic as follows:

I have noticed their individual needs; they can tell more comfortably. Secondly, for example, I have noticed that I couldn't know students in the lessons. I mean one of them really studies and tries to do something, but I evaluate that student wrongly because he or she doesn't speak even a word in the lesson. However, with those meetings, I can now get what the students understand or not, so I reteach the topics that I am sure they haven't understood.

According to some instructors, educational guidance meetings have made the teaching process clearer on both sides. Students know what to do and instructors know what is behind the problems, which means a teaching process with more awareness. One of the female instructors Zeynep told her feelings in the following lines:

Knowing students' weak and strong sides and noticing the questions and problems that they would hesitate to share in class provided me with the opportunity to have a more sincere relationship with the students. At the same time, I have always considered their needs while planning my lessons, which made it possible to have a teaching atmosphere with more awareness.

Knowing students in person lets the instructors be able to understand other students in their classes who have not attended those guidance meetings. In this way, they could develop a more general idea about the students who may have the same problems with their peers, which in a way helped the instructors maintain their classes better. One of the female instructors Ece expressed her thoughts in the following:

...that's to say, I have cared about knowing students one by one this term. I also tried to create my lesson plan in accordance with the students' demands. Since I know where the students who attended the meetings are weak, this has offered me some generalizable knowledge for the students in that profile. For that reason, I can say that it affected my lesson plans.

IV. Discussion and conclusion

This study aimed at discovering instructors' and students' reflections on OEGMs and improving student learning at English Preparatory Programs.

Instructors in charge of guidance should know non-academic issues have an inadvertent impact on students' academic success (Dey 2020, 99). The findings revealed that the online educational guidance meetings provided the instructors with opportunities to communicate better and more closely with their students and to know their individual needs and demands in a more detailed way during online education. Having more information related to their students, the instructors stated that they made some positive changes in their teaching considering the students' individual needs and characteristics. Similarly, it was revealed in a study that instructors of English adopted some strategies for motivating students and increasing the interaction between instructors and students to compensate for the drawbacks of online education (Shorna and Suchona 2021, 51-52). Educational guidance forms an environment where the responsibility is shared, and students become more autonomous at the end (Owens 2015). According to the instructors, the students benefited from the educational guidance meetings in terms of learning how to study and becoming aware of their learning processes. It was mainly stated that it had always been difficult for students to follow their own learning process and to decide on how to study but it was even more difficult in COVID19 pandemic when students were away from the school environment and their instructors.

Students can acquire the academic motivation and the self-confidence that they need to hold on until they graduate with the help of high-quality interactions via educational guidance (Owens 2015, 24). The findings revealed that the students mostly considered those meetings as a place where they could tell their problems freely and get advice on their weak sides. Based on their statements, it is possible to say that the students benefited from the meetings in terms of psychological issues. They stated that their motivation for the lessons increased, they became more self-confident, and they felt valuable as the instructors were interested in their personal problems and issues. They felt comfortable as they liked their instructor and trusted them. Educational guidance was found to be effective in making students realize their full potential and achieve their goals (Dey 2020). Likewise, the students in this study were also glad to learn more about their weak and strong sides during those meetings. In addition, those meetings with the instructors provided the students with a chance to get academic recommendations to improve their English and study skills. Most stated that they had not known how to study a foreign language and had problems and hesitations especially in COVID19 period. This provided further evidence that educational guidance has also a role of promoting student involvement in university life (Almedina et. al. 2016, 29).

Upon exploring the situation from multiple perspectives, it can be seen that educational guidance meetings are beneficial not only academically but also affectively. Affective domain in Bloom's taxonomy is defined as the domain that includes attitudes, beliefs, and values and that shapes human behavior. Therefore, it is possible to say that if individuals adopt a value, a belief, or an attitude, they behave accordingly (Gömleksiz and Kan 2012, 1175). If students, especially the lower achievers, develop a positive attitude towards learning through educational guidance meetings, they will be more motivated for learning.

Although it has been a long time since the first COVID19 period, contemporary considerations of solutions still cover many aspects of higher education such as student performance during digital learning and support services (Greere 2021, 203). The students who attended the meetings within the research felt more comfortable and clearer, knew themselves better and felt more valuable, all of which affected their learning processes. Hence, it can be said that educational guidance meetings are a good opportunity to support students in their learning journey in addition to helping the instructors learn more about their students even when they are physically away from their students in cases like COVID19 pandemic.

V. Recommendations

As a result of the study, educational guidance meetings are recommended to be included in the English programs at university level as it is found to be beneficial for both the students and the instructors. It is also clear that online education will be a part of our educational activities from now on and it is significant to monitor and support students with this. It is also recommended that educational guidance meetings can be effective in boosting learning in face-to-face education not only for language education but also for other disciplines.

As the current study was conducted at a private university with 8 instructors and 12 students, future studies may be carried out at a state university with a larger study group to be able to see the differentiation and to generalize the findings to all students.

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Annexes

A) *Online Educational Guidance Meeting Form*

EDUCATIONAL GUIDANCE FORM (This form should be filled with the student during the meeting.)	
Student Number:	
Name- Surname:	
Module- Class- Level:	
Department:	
Strengths:	
Areas for Development:	
Goal Setting & Advice: (The goals should be set together with the student)	
Name of the Instructor:	
Date and Time of the Meeting:	

B) *Sample Transcription from the interviews*

Interview Transcription for Instructors

Instructor pseudo-name: Burak

Year of experience: 8 years

Education: MA in ELT

Date & Time: 20.11. 2020 / 19:00-19:30

1. How do you define educational guidance?

Immm, for me, educational guidance is helping students. Supporting them in the areas where they need. This can be about lessons, school, their weak sides and also their motivation. This is guidance in terms of everything especially during online education...

2. Do you think guidance meetings are beneficial for your students at COVID-19 period? Why? Please explain.

Sure. It is beneficial for students. I told you before. This emergency online education has made the students confused. Actually, they started online education in the spring term but since they were in high school last year and getting ready for the national university entrance exam, they did not pay extreme attention to the online courses. Some did not even experience online lessons because they continued to study for the exam. Some attended the online lessons, but it was not a case for them to continue. You know our country's exam system. But, this year is totally different. Now that they have started their university education and they need to follow our English Program before they start taking lessons in their departments, they have to pay special attention for our courses, do assignments and projects online, and follow the online lessons etc. This is the time when they need guidance most. Ha, okay.... Also it was good for their mental health. They are all alone at home. Some days even it is forbidden to go out just for the supermarket. This was an opportunity for them to talk to someone about something rather than teaching and learning. What I mean, sometimes we had just chatting too.

3. What areas does educational guidance help your students in? How? Please explain.

As I told before, this online education is new to the majority of students. So, first of all the guidance meetings served as a way of introduction of the system and the school. Students didn't have online lessons as we do now. They could ask us when they had a problem. Secondly, they were sure of what to do for the exam last year since they had the book, and they knew what to study. However, they started preparatory program and they had to follow the classroom activities on the internet, do activities on the online platforms, follow their regular main course books, and maintain their online projects. They were all lost about what to do. They could ask their questions

in their minds via educational guidance meetings. Also, students do not understand or see their weak sides in language learning. They were unaware of the parts where they had problems. I saw students who claimed they were good at writing but actually could not produce accurate sentences in line with their levels. With educational guidance meetings, we were able to make them aware of this. They noticed that they should do something for these areas to improve themselves. Sometimes we need to be clear about the problems students have and tell them those problems just to make them aware of the situation. They have wrong implications of themselves. Yeah, this is it. That's why guidance meetings were good for students.

4. What areas does educational guidance help you teach in? How? Please explain.

My teaching... yes. It helped me to change my style according to my students' weak areas. If I had not known those, I would have continued with my own way ignoring their weaknesses, emotions or problems. These weaknesses do not have to be academic all the time. This is isolation period. This is the first time we are experiencing something, pandemic... We are older than them and we can manage maybe but they are just 18 years old. They want to socialize, they have just passed an important exam to enter the university. You know they spend their years to study for this exam. And what is the conclusion? They are at home. They feel alone. They have some mental problems blah blah blah... Knowing these helped me direct my teaching accordingly. I integrated more group work to make them socialize more with each other. Also, this educational guidance meeting was just like teaching them how to study on their own. They could easily define the areas they wanted to improve. While saying this, they were a bit desperate too but at the end they understood that they weren't actually alone. We were there to help them in this way. I recommended some websites and books for them. They recognized that they could do. Otherwise, they were totally lost. This is the case we experienced. I think this is enough for this question.

Interview Transcription for Students

Focus Group Number: 1

Number of Students in Group: 6 students (S1, S2, S3, S4, S5, S6)

Date & Time: 18.11.2020 17:00-17:37

1. How did guidance meetings influence you?

S1: Teacher, I think it influenced me in a positive way. I attended the meetings with my teacher, and I was, immm, how can I say, I was weak in

English. There are some topics I have problems in. In the meeting I shared my ideas with my teacher and that really increased my motivation actually. I wasn't in a good mood to study, but I have started to study again.

S5: Yes, teacher, the same is for me, too. I got information that is going to be useful for me and my learning. It was beneficial for me to know myself better. I have seen my pluses and minuses about learning.

Silence.

Researcher: E.g. Influence on your attitude, motivation, achievement? etc.

S5: Teacher, I have learned websites which I can make use of, and I got ideas regarding how to study alone.

S2: For me, good influence. I told what I have difficulties in understanding. I was always quiet in the lesson. She (the instructor) supported me and told me that I could. I have started participating in activities more.

S1: Also, online education is really hard. Especially at the beginning it was harder. And I started school a bit late, so I asked about everything. That made it easier to follow the tasks at sch....

S3: Teacher! I promised to study more in the meetings. I was really excited to keep my promise to my teacher and to do the things we planned together for each and every time.

S6: It was good for me.

Researcher: Dear S6, can you elaborate on it?

S6: Hmm, I didn't know what I was good at or what I was bad at. I thought I was completely unsuccessful. That I have learned about myself is something good. Good sides as well.

Researcher: Thank you! Is there anybody who wants to add another thing?

Silence.

2. What kind of experiences did you have after the guidance meetings? Do you think there is a difference before and after? Why? Please explain.

S2: Teacher there are a lot of differences before and after. When I left the meeting, I knew better what to do and how to study. I learned these. I noticed the things I did wrongly actually. I started to study for the exams more to the point. Namely...

S5: For example, me. I have learned websites which I can make use of, and I got ideas regarding how to study alone. I used those websites later, after the meeting.

S4: There is a difference, yes.

Researcher: What kind of difference?

S4: I agree with my friend. I learned websites where I can improve my English from my teacher.

S6: Can I speak teacher?

Researcher: Sure, please go ahead.

S6: I don't know what to say but I became more self-confident about the lesson. I didn't use to participate in the lesson but then the more I spoke up, the more I wanted to do. After the meeting, I participated in the activities more.

S2: I have one more opinion I want to share about the meeting. I told what I have difficulties in understanding. I was always quiet in the lesson. My teacher supported me and told me that I could. I have started participating in activities more.

S5: Well, teacher I want to say something. I asked my teacher about what I could do about English in the meetings, and he suggested a few ways for that. Like mobile applications and books. After that, I used those to study. I changed my way of studying.

S1: Teacher, I changed my way too. I learned how to use Cambridge dictionary online and form my own vocabulary list there. After the meeting, it was easy for me to study for vocabulary.

Researcher: Thanks a lot. Do you want to add anything else?

S2: No teacher.

3. If you want to relate guidance meetings and COVID-19 process, what do you want to say? Please explain.

S6: Can I start?

Researcher: Sure, please.

S6: Covid period is very difficult for me. My family have to work. They are not at home in spite of the regulations. I do not have sisters or brothers. I see nobody these days. But the meetings...In the meetings I talked to the teacher. The teacher listened to me, my problems and my sentences. It was a long time....I feel better to be listened.

Researcher: So, how do you feel?

S6: I feel valuable, teacher. Covid made us lonely people.

S4: I have a similar idea, teacher. I think it was good because it was only me in the meeting. Normally I cannot speak in the lesson but in the meeting. There is the teacher. Ready to listen to me. She cares my ideas.

S1: Teacher, Covid period is a time that is worrying for all of us. We see many sick people. In our families too. Some people die. Thanks to these meetings, I became less worried. I talked to my teacher. She understood me. Her existence was enough.

S3: The meetings helped me understand online education.

Researcher: Oh, how? How did it help you?

S3: Teacher, we just started the online education very quickly. This is university. This is our first time. I did not do any online writing assignment before. I do not know how to use Google Classroom. Even websites. I do not know which website to click. But in the meetings, I got opportunity to ask my questions to the teacher.

S1: I thought we were all alone in the process and I did not believe in myself because of the covid pressure. But then, the meetings were enjoyable.

Researcher: Okay, thank you everybody.

The impact of an active-learning designed faculty development program: A students' perspective of an Italian university

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Abstract: This study aims to understand the impact of a faculty development program emphasizing active learning (innovative teaching) attended by instructors of diverse disciplines at the University of Padova in Italy, which has had an 800-year history of using traditional approaches to teaching and learning. Using a community of practice theoretical framework, it recognized that the development of faculty learning communities provided a supportive medium for fostering innovative teaching. A multilevel research design involving surveys collected from 2019 to 2020 explored the program's impact in terms of student satisfaction and program effectiveness. Findings showed varied levels of impact, among student examination attempts, pass rates and average grades. These findings, although involving one university, are organizationally and culturally emblematic of other Italian universities and have related implications when considering the implementation of innovative approaches to teaching via faculty development programs. This study also revealed challenges (faculty engagement) and limitations when measuring (e.g., satisfaction, exam attempts) the impact of active learning in relationship to learning outcomes.

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I. Introduction

The study of innovating teaching and learning in higher education has been moving from the margins to the center of scholarly discussions throughout Europe (Standards and Guidelines for Quality Assurance in the European Higher Education Area [ESG] 2015). This was particularly an issue for Italian state universities, most of which are many centuries old, where preparing faculty for improving practice had rarely ever been addressed. In response, over the last five years, there has been an effort to improve teaching and learning through faculty development (FD) among a few universities leading to a renaissance in the modernization of teaching in the classroom (Fedeli and Taylor 2016; Ghislandi and Raffaghelli 2014).

Higher education in the Italian context can be characterized as one of the oldest in the world - the first university in Italy was founded in 1088. Contextual factors include its size, long history, strong traditions, central management, and large class sizes, all situated within a society deeply regulated by longstanding regulations and laws. Although none of the factors are unique in themselves if compared to other universities, together they pose a significant challenge when introducing change and innovative approaches in teaching.

A primary example of this long history and tradition can be found at the University of Padova, which recently celebrated its 800th anniversary. The University of Padova is one of the ten largest public universities in Italy and is quite representative of the Italian higher education system. The state-run universities in Italy represent the main part of the system and are managed at a central level by the Italian Ministry of University and Research. Historically, like all Italian universities, the University of Padova's academic culture affirms a strong hierarchical relationship between instructors and students and lecturing is still the most used instructional format (transmission model), with low interaction between student and instructor in the classroom (Fedeli and Taylor 2016).

In addition, many courses do not require readings and/or assignments while a course is underway. Students are expected, in a self-directed manner, to read the required text/course material in preparation for the final examination given at the end of the course. Any additional work (projects, individual/group assignments, assigned readings) outside of class is often seen by students and faculty as burdensome and compromising their time to attend to the needs of other courses and for faculty to conduct research.

Course attendance is not a requirement in many disciplines and, generally, the only requirement is successful completion of the final examination (oral or written) at the end of a course. This final examination in most courses is the only assessment of student performance/learning. Examinations can be retaken with no limits by students until they pass. These unique practices encourage passive learning in the classroom and a transmission model of teaching. Teaching is also highly individual, such that peer evaluative teaching observations are not practiced or required. Formal and informal faculty learning communities (Cox 2004) about teaching are generally not a part of the higher education context in Italy. In essence, what goes on in the classroom is between the students and the instructor with little discussion among faculty about teaching within the university. Since all universities in Italy are similar in terms of organization, culture, and student demographics, the University of Padova offers an ideal setting to explore the impact of introducing innovative approaches to teaching in Italy.

II. Theoretical framework and review of related literature

Scholarship concerning faculty development (FD) has predominantly been grounded in a “constructivist learning philosophy that situates knowledge as generated through interaction with others, through engagement with one’s environment, and as existing in a constant state of renewal” (Brooks 2010, 265). Situated from this perspective, faculty develop new knowledge through participation in an academic community (e.g., teacher study groups; faculty learning communities) committed to innovative teaching and learning (Cornelius-White 2007; Hagenauer and Volet 2014).

Conceptually, a “community of practice” construct offers a theoretical understanding of the process of change, especially in terms of fostering FD within an authentic and collaborative context. Wenger (1998, 15) defined a community of practice as a “unique combination of three fundamental elements: a domain of knowledge, which defines a set of issues, a community of people who care about this domain and the shared practice that they are developing to be effective in their domain.” The following factors are consistent across variations of faculty learning communities (FLCs). FLCs are generally small groups of eight to 15 instructors who seek to establish an equal, non-hierarchical relationship among participants and co-plan meeting agendas, with an aim to improve teaching (Cox 2004, 2013; Fedeli and Taylor 2016; Nugent et al. 2008; Wenger n.d.).

In addition to FLCs, a second model that informs teaching innovation is the implementation of active learning (AL) in the classroom. An abundance

of studies has demonstrated the importance of implementing active learning in faculty development to improve teaching strategies and learning processes (Bierema 2019; Fedeli 2019; Nelson and Bianco 2013; Prince 2004). AL is seen as a “method that engages students in the learning process, an instructional approach that allows students the opportunity to participate in the process of learning and requires them to do something more than just passively receive instruction” (Allsop et al. 2020, 418). However, traditional passive lecture still predominates most undergraduate classrooms, particularly in Italian universities (Stains et al. 2018). Research confirms that an AL approach can be implemented within lectures across different disciplines and settings and could promote greater learning outcomes (Freeman et al. 2014). AL involves new approaches on the part of teachers as well as awareness and involvement on the part of students. It encourages students to participate in learning activities, thereby promoting student engagement (Bonwell and Eison 1991; Freeman et al. 2014) both inside and outside the classroom.

Meanwhile, assessing the impact of faculty development programs (FDPs) on improving teaching remains a perennial challenge in higher education (Bamber and Lorraine 2016; Moya et al. 2018). Measuring the nature of educational development has always been very complex, raising questions such as “what constitutes impact for students and instructors? How is the impact best measured? What is considered effective FD (Beach et al. 2016; Chism et al. 2012; Sutherland and Hall 2018)?” For example, Wheeler and Bach (2021) studied the outcome of FD grounded in AL on STEM classroom instruction and student achievement and found AL had the potential to close the achievement gap in underrepresented student groups. A related study from an Italian university involving AL teaching methods (social platforms, flipped classroom) and student satisfaction in an online physics course found positive student experiences and greater perceived interaction, although no significant change in the grades of specific physics exercises (Tuveri et al. 2022). However, this study involved only one course of students (19 students) and did not address other factors unique to the Italian higher education context. Research in general about AL related to its impact has explored a variety of perspectives such as student and faculty satisfaction (Hyun et al. 2017; Lumpkin et al. 2015), effective teaching methods (Freeman et al. 2014; Waltz et al. 2014), and the change in course design and in learning environments (Stover and Ziswiler 2017; Wieman 2007).

With this research as background to this study, in 2016, the University of Padova initiated a faculty development program, which aimed to introduce AL and other core concepts of community of practice into higher education.

Along with using an AL approach in the FD program, there is also an emphasis to de-privatize teaching through peer teaching observations, micro-teaching with feedback, facilitating faculty learning communities, and emphasizing the importance of positive student-teacher relationships. Now that the program has been in existence for almost five years, questions have been raised about student satisfaction (“the perception of enjoyment and accomplishment in the learning environment”) (Sweeney and Ingram 2001, 57) and program effectiveness. Questions include: how different is the learning experience between students whose instructors participated in the program vis-à-vis those whose did not? What is the impact of active learning on exam attempts and overall course grades?

In addition to student satisfaction, no studies were found that considered two additional factors relevant to the Italian higher education context when measuring the effectiveness of AL in the classroom. The first factor is the number of students passing the course examination at the first attempt (taking the course exam) and the second is the scores of students who successfully completed the exam at the first attempt. In Italy, the final exam is typically the only assessment of student learning for an entire course, and upon concluding the course, students can decide when to take it. Students have at least five or six attempts each year and can enroll and take/retake the exam with no limits, which is a national norm in Italian universities. Taking an exam at the first attempt indicates that students are more prepared and confident about the course material compared to students who do not. Furthermore, students completing a course at the first attempt is a strong indicator that a) these students will more likely complete their degree within the standard time frame (three years for bachelor’s degree and two for master’s degree); b) there will be higher pass rate among students; c) students will attain higher scores on the final exam and d) reduce the economic cost of the degree.

The following research questions are used to guide this study:

- What was the satisfaction of the students related to the teaching of faculty who participated in the programs compared to those students who attended courses of faculty who did not participate in the program? (Satisfaction.) Related to the satisfaction, the data refers to three level of satisfaction captured by a survey that all students completed before enrolling for the final exam. The three levels are: a) overall course satisfaction, b) teaching methods, and c) organization of teaching.
- How effective was the program in terms of examination pass rates and average grades obtained at the first attempt of students in the courses of

the faculty who attended the FDP compared to those in the courses of faculty who did not participate in the program? (Effectiveness.)

III. Methodology and results

To understand the impact of the faculty development on students' satisfaction and exam successful completion at the University of Padova a multilevel research design was developed using different statistical analyses and related surveys implemented from 2019 to 2020. There were two levels of analysis including satisfaction (students) and program effectiveness (number of students that passed the exam and average grade obtained at the first attempt).

The data was aggregated to explore the relationship of AL to discipline/research areas in the Fields of Research and Development classification (FoRD). The FoRD classification is used to classify research and development (R&D) units by fields of inquiry, broad knowledge domains based primarily on the content of the R&D subject matter. "The six main FoRD areas are 01 natural sciences, 02 engineering and technology, 03 medical and health sciences, 04 agricultural and veterinary sciences, 05 social sciences, 06 humanities, and the arts" (UNESCO, n.d.). Exploring this relationship would offer insight into what disciplines are more receptive to the application of AL.

The first level investigated the degree of **satisfaction** among the students who attended the courses taught by the trained faculty. Data on the satisfaction of students was collected via survey for the academic year 2019/20 for all courses taught by faculty that had and had not participated in the FDP. Three main areas of satisfaction were analyzed: a) overall course satisfaction b) teaching methods, c) organization of teaching, face-to-face and online. In the Fall 2019, there were 2,215 face-to-face courses and in the Spring 2020, there were 2,094 online courses (due to the COVID-19 pandemic) offered at the University of Padova. The number of students' surveys analyzed included 103,430 from the fall semester of face-to-face classes and 117,819 surveys of online classes for a total of 221,249 surveys.

A comparison of the satisfaction among students who attended courses of trained faculty and students who attended the courses of not trained faculty was conducted to investigate if students of trained faculty were more satisfied than those who attended courses of not trained faculty. Trained faculty predominantly included new faculty (1-2 years' experience). Although, there were some faculty inclusive all the ranks (assistant to full).

Table 1
Data for the analysis of students' satisfaction

Type of survey	FoRD area	Sample of courses-instructors for the analysis of students' satisfaction						
		N. of courses	N. of courses taught by FDP Instructors	% Courses FDP instructors	Total n. of surveys	N. of students' surveys of courses taught by FDP instructors	% Students' surveys evaluated of courses taught by FDP instructors	
Face-to-face	01 - Natural sciences	683	171	25	33.015	9.037	27	
	02 - Engineering and technology	304	35	12	15.954	1.599	10	
	03 - Medical and health sciences	317	52	16	9.684	1.626	17	
	04 - Agricultural and veterinary sc.	186	39	21	6.228	1.313	21	
	05 - Social sciences	304	53	17	16.885	2.609	15	
	06 - Humanities and the arts	421	36	9	21.664	2.110	10	
	Face-to-face Total	2.215	386	17	103.430	18.294	18	
Online	01 - Natural sciences	557	110	20	30.072	6.247	21	
	02 - Engineering and technology	360	50	14	23.168	2.651	11	
	03 - Medical and health sciences	230	43	19	8.530	1.702	20	
	04 - Agricultural and veterinary sc.	208	43	21	7.905	1.562	20	
	05 - Social sciences	313	50	16	21.777	3.311	15	
	06 - Humanities and the arts	426	41	10	26.367	2.452	9	
	Online Total	2.094	337	16	117.819	17.925	15	
Total		4.309	723	17	221.249	36.219	16	

Concerning students who completed the survey, 36,219 surveys were by students who attended courses held by trained instructors compared to 221,249 surveys completed by students who attended courses of instructors not trained in active learning. The data is organized in Table 1 by: a) type of questionnaires (face-to-face, online, in classrooms); b) the six FoRD areas; c) the numbers of courses evaluated; d) the number of courses taught by trained instructors; e) the percentage of courses taught by trained instructors; f) the total number of surveys; g) the number of surveys related to courses taught by trained instructors, and h) the percentage of surveys completed by students who attended courses taught by trained instructors.

To detect significant differences, we use the student's t-test; that is, a test of a statistically significant difference between two groups. A student's t-test was performed for overall course satisfaction, teaching methods, and organization of teaching, divided between face-to-face and online teaching, and split among the six scientific areas to investigate if there were differences. Therefore, the supported hypothesis was that students who attended courses of trained instructors were more satisfied, than those who attended courses of not trained instructors. Therefore, the following hypotheses concerning satisfaction developed (where μFDP and μNOFDP represent the values of the sample of FDP trained and not trained instructors, respectively):

- $H_0: \mu\text{FDP} = \mu\text{NOFDP}$ (null hypothesis). There is not a significant difference in term of satisfaction related to students who attended courses of trained instructors compared with students who attended courses of instructors who did not participate in the training.
- $H_1: \mu\text{FDP} > \mu\text{NOFDP}$ (alternative hypothesis). Students who attended courses of instructors who participate in the training express higher satisfaction than those students who attended courses of instructors who did not participate in the training.
- $H_1: \mu\text{FDP} < \mu\text{NOFDP}$ (alternative hypothesis). Students who attended courses of instructors who participate in the training express lower satisfaction than those students who attended courses of instructors who did not participate in the training.

The second level of analysis explored teaching **effectiveness** related to two impact factors: number of students who passed the exam (pass rate) and average grade obtained at the first attempt. Involved in the analysis of these factors were the students who attended the 231 courses in the Fall semester taught by 180 trained faculty and 199 online courses in the Spring Semester,

taught by 160 faculty who had participated in the FDP training program. Data regarding the two impact factors were compared with the sample of 1,804 faculty who did not participate in FDP with their 2,379 courses. The courses were also distinguished between face-to-face courses (1,233 in the Fall) and online courses (1,146 in the Spring). The description of the faculty sample concerning the effectiveness of the FDPs is organized in Table 2 as follows: a) six FoRD areas in face-to-face Fall 2019 and online Spring 2020; b) not trained instructors, trained instructors, and total instructors; c) the number of trained instructors and courses taught.

Table 2
Sample of teachers and number of courses analyzed

	Not trained faculty		Trained faculty		Total	
	Instructors	Courses	Instructors	Courses	Instructors	Courses
FoRD areas face-to-face Fall 2019						
01 - Natural sciences	265	338	80	97	345	435
02 - Engineering and technology	154	196	23	29	177	225
03 - Medical and health sciences	75	83	12	15	87	98
04 - Agricultural and veterinary sciences	90	117	24	32	114	149
05 - Social sciences	127	167	21	29	148	196
06 - Humanities and the arts	216	332	20	29	236	361
Total	927	1.233	180	231	1.107	1.464
FoRD areas online Spring 2020						
01 - Natural sciences	218	263	60	70	278	333
02 - Engineering and technology	149	180	24	34	173	214
03 - Medical and health sciences	64	75	15	15	79	90
04 - Agricultural and veterinary sciences	93	119	17	22	110	141
05 - Social sciences	114	148	18	22	132	170
06 - Humanities and the arts	239	361	26	36	265	397
Total online	877	1.146	160	199	1.037	1.345
Total	1.804	2.379	340	430	2.144	2.809

In comparing the values of the indicators obtained from the two samples, it was assumed that FDP training would increase the performance of students. Therefore, the following hypotheses were tested (where μ_{FDP} and μ_{NOFDP} represent the values of the sample of FDP trained and not trained instructors, respectively):

- H0: $\mu_{\text{FDP}} = \mu_{\text{NOFDP}}$ (null hypothesis). There is not a significant difference related to number of students that passed the exam and average grade obtained at the first attempt by students who attended courses of trained instructors compared with students who attended courses of instructors who did not participate in the training.
- H1: $\mu_{\text{FDP}} > \mu_{\text{NOFDP}}$ (alternative hypothesis). There is a change for the better related to number of students that passed the exam and average grade obtained at the first attempt by students who attended courses of trained instructors compared with students who attended courses of instructors who did not participate in the training.
- H1: $\mu_{\text{FDP}} < \mu_{\text{NOFDP}}$ (alternative hypothesis). There is no change related to number of students that passed the exam and average grade obtained at the first attempt by students who attended courses of trained instructors compared with students who attended courses of instructors who did not participate in the training.

For the analysis of exam pass rate at the first attempt, the Pearson chi square test was used, while for the analysis of average grade earned at the first attempt, the comparison was based on student's t-test. Also, at this level, the data were divided into the six FoRD areas of scientific fields. The data presented below are intended to answer the two research questions of this study. The results of analysis about satisfaction and effectiveness are discussed below.

III.1. Overall student satisfaction

There are three tables about students' perceptions of satisfaction. They are organized by three indicators of satisfaction: overall course satisfaction (Table 3), teaching methods (Table 4), and organization of teaching (Table 5). Each table is organized according to a) six FoRD areas b) teaching face-to-face and teaching online, and c) three hypotheses based on student's t-test for independent samples. The study found that among the university's courses there is no difference in overall course satisfaction among students

(Table 3). However, analyzing the individual six FoRD areas: students enrolled in medical and health sciences and humanities and the arts expressed an overall higher satisfaction of teaching delivered by trained faculty in face-to-face settings. The area of humanities and the arts maintained the same higher satisfaction also for the online teaching settings. The satisfaction was the same for the other areas except for social sciences delivered by trained faculty which students expressed lower satisfaction in the face-to-face settings.

Table 3
Overall course satisfaction

Area FoRD	Teaching - face-to-face			Teaching - online		
	Indicator Overall course satisfaction			Indicator Overall satisfaction		
	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$
01 - Natural sciences			X			X
02 - Engineering and technology			X			X
03 - Medical and health sciences	X					X
04 - Agricultural – veterinary sciences			X			X
05 - Social sciences		X				X
06 - Humanities and the arts	X			X		
All university's courses			X			X

This pattern of no significant difference in satisfaction was also found concerning teaching methods among students (Table 4). The only exception is for social sciences. There is not a significant difference in term of satisfaction related to students who attended courses of trained instructors compared with students who attended courses of instructors who did not participate in the training in the online setting.

Table 4
Teaching methods

Area FoRD	Teaching - face-to-face			Teaching - online		
	Indicator Teaching methods			Indicator Teaching methods		
	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$
01 - Natural sciences			X			X
02 - Engineering and technology			X			X
03 - Medical and health sciences	X					X
04 - Agricultural – veterinary sciences			X			X
05 - Social sciences		X				X
06 - Humanities and the arts	X			X		
All university's courses			X			X

However, when analyzing the individual six FoRD areas, medical and health sciences, humanities, and the arts students expressed a higher satisfaction of teaching organization delivered by trained faculty in face-to-face settings. The area of agricultural-veterinary sciences, humanities, and the arts also expressed higher satisfaction for teaching organization in online settings. In conclusion, satisfaction in teaching organization (Table 5) both face-to-face and online has increased compared to the past although in a different way, depending on the setting.

Table 5
Teaching organization

Area FoRD	Teaching - face-to-face			Teaching - online		
	Indicator Teaching organization			Indicator Online teaching organization		
	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$
01 - Natural sciences			X			X
02 - Engineering and technology			X			X
03 - Medical and health sciences	X					X
04 – Agricultural-veterinary sciences			X	X		
05 - Social sciences			X			X
06 - Humanities and the arts	X			X		
All university's courses			X			X

III.2. Effectiveness of the FDP

Recognizing that satisfaction can be a weak indicator, even if significant, two additional indicators were included in the data collection to address program effectiveness: a) the examination pass rate at the first attempt and the average grade obtained in the academic year 2019/2020. The students were divided into two samples: those who attended courses led by faculty who participated in the FDP and those who attended courses led by faculty who did not participate. The following indicators were calculated for both (independent) samples: examination pass rate at the first attempt (Table 6) and average grade obtained at the first attempt (Table 7).

Table 6
Examination pass rate

Area FoRD	Teaching - face-to-face			Teaching - online		
	Examination pass rate First attempt			Examination pass rate First attempt		
	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$
01 - Natural sciences	X					X
02 - Engineering and technology	X			X		
03 - Medical and health sciences		X		X		
04 - Agricultural and veterinary sciences		X				X
05 - Social sciences			X	X		
06 - Humanities and the arts	X			X		
All university's courses	X					X

There are three hypotheses illustrated in Table 6 about the effectiveness of the FDP in terms of students' examination pass rate. Findings indicated that in all the university's courses there is a difference in the pass rate among students in the course settings. The face-to-face setting had a higher pass rate than the online setting among the courses taught by faculty that participated in the FDP. In fact, when COVID broke out, instructors were not prepared to teach online, much less for using active learning methods online. The abrupt transformation of teaching and learning scenarios did not lead to a rapid change in methods and in teaching online. In addition, there was a difference found in the FoRD areas. Engineering and technology, humanities and arts had a higher pass rate in both settings. Natural sciences had a higher pass rate in face-to-face and medical and health sciences and social sciences also had higher pass rate in online settings. Similar to the higher pass rate there was no difference in all university's courses in the average grade obtained in the first attempt among students (of trained and not trained faculty) with regards to both course settings.

Table 7
The average grade obtained in the first attempt

Area FoRD	Teaching - face-to-face			Teaching - online		
	The average grade obtained at the first attempt			The average grade obtained at the first attempt		
	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$	$\mu_{FDP} > \mu_{NOFDP}$	$\mu_{FDP} < \mu_{NOFDP}$	$\mu_{FDP} = \mu_{NOFDP}$
01 - Natural sciences		X		X		
02 - Engineering and technology	X					X
03 - Medical and health sciences	X				X	
04 - Agricultural and veterinary sciences	X				X	
05 - Social sciences		X			X	
06 - Humanities and the arts	X				X	
All university's courses			X			X

However, when analyzing the individual six FoRD areas in relationship to online and face to face settings the engineering and technology, medical and health sciences, agricultural and veterinary sciences, humanities, and the arts of trained faculty had a higher examination pass rate at the first attempt in the face-to-face setting. Turning to the online setting: medical and health sciences, agricultural and veterinary sciences, social sciences, humanities, and the arts all had a lower grade among students at the first attempt. The natural sciences had a higher grade in the online setting, and in engineering and technology, there was no difference between face to face and online setting.

IV. Discussion and conclusion

Investigating the impact of faculty development is certainly a challenge for the scholars of the field. In this study, different aspects related to the outcomes are discussed along with the role of the Italian higher education and the impact of COVID followed by a section on the limitations of the study.

Several programs demonstrated significance in terms of satisfaction and effectiveness in relationship to courses taught by trained faculty, while at the same time some programs in different settings reflected no significance. A possible explanation is related to the application of active learning in specific programs by trained instructors. The hypothesis that students who took courses taught by trained instructors are more satisfied than others was demonstrated in several disciplines: medical and humanities and the arts in face-to-face teaching. Humanities and the arts area had the same higher satisfaction also in the online teaching and agricultural and veterinary medicine, only for one indicator which is teaching organization. These results are consistent with the literature on active learning and its impact on students' satisfaction (Hyun et. al. 2017, Prince 2004). Satisfaction likely increases among students if the conditions for collaboration and knowledge sharing exist.

However, despite these outcomes, the impact of the FDP was not significant in all six FoRD areas, where single area differences emerged. A possible explanation is recognizing that some of these discipline areas have stronger faculty learning communities that encourage reciprocal supportive relationships among faculty members (e.g., Angehrn and Maxwell 2010; Corcoran and Duane 2019; Kagwesage 2014). These disciplines likely provide faculty support to “reinvent themselves as educators” in concert with their peers in “experimenting, reflecting, discussing, and assessing” about their teaching and learning perspectives (Sturko and Gregson 2009, 36). The “community structure creates a social fabric for learning with the development of trust and energy to encourage risk-taking...to share the specific knowledge and products that the community develops” (Cox 2013, 19). Faculty learning communities play an important role in the adoption of active learning particularly by new and younger instructors who are making changes in their teaching practice. Also, few studies related to the impact of active learning have been carried out in some disciplines, such as humanities, arts, and the social sciences, particularly studies that compare the impact of faculty development across different disciplines. These findings encourage further research based on the distinction between the humanities and STEM, which traditionally has always been given more attention by scholars in relationship to active learning (Borda et al. 2020; Wheeler and Bach 2021).

Another point of discussion is the context of where the study took place (Italian higher education) and its impact on the findings. Some factors are unique and non-generalizable beyond Italian higher education. For example, the possibility of taking a course examination (generally the only form of student evaluation) at the end of a course as well as pre-established

appointments (five per year) during the year. In most courses students can freely enroll and decide when to take and retake the examination during the entire academic year. These findings support the position that effective educational development processes are designed for a particular university system (Henderson et al. 2011). Despite this unique form of evaluation, this study for the Italian system is significant for several reasons. It offers initial understandings of the challenges and opportunities for capturing the impact of active learning in the classroom within a particular higher education system. Also, this study highlights shortcomings in the system (e.g., few points of student evaluation and feedback and the over-reliance on final exams) when educating students. Further, it offers support for the importance of engaging teaching innovation within a higher education system that has experienced little instructional innovation in hundreds of years.

A second contextual factor is the Italian students' possible resistance to active learning (Scheyvens et al. 2008; Tharayil et al. 2018). It's important to recognize the FDP was the first systemic university wide educational intervention (change an approach to teaching) ever introduced in the Italian higher education. The teaching approach was significantly different to what students had traditionally experienced, where they are expected to be in a passive role in the classroom. Also, students who had no prior knowledge of this educational intervention was being introduced by some faculty in classrooms. Along with students' resistance, similar research has shown that faculty can also (Tharayil et al. 2018) resist educational innovation. Even though faculty of this study participated in a FDP, it cannot be assumed that they all engaged in AL with the same degree of depth, consistency, and assuredness. Research has identified a host of factors and perceived barriers to active learning, such as teaching competence, confidence, degree of comfort with learner-centered practices, and preoccupation with student evaluations (particularly for pre-tenured faculty), to mention a few (Karcher, et al. 2022). Therefore, it is likely that students experienced a range of depth and quality of active learning methods in their courses of faculty that participated in FDP.

Finally, a further contextual factor is the outbreak of the COVID-19 and having to move the courses online, which likely had an impact on the results. This exceptional event pushed instructors to teach online, without significant professional development, and left them little time to reflect and implement teaching strategies for this new setting. Despite this experience the results were very similar in both settings. This is not meant to equate the pandemic with promoting innovation, further research needed about this relationship. It is important to recognize what was experienced was due to an unexpected

and unpredictable situation which institutions are often forced to react and be able to meet their institutional and social tasks (Bertoni and Fedeli 2021). Not only do institutions have to be flexible to respond effectively, but also researchers, recognizing that educational settings are complex and ever shifting, posing both challenges and opportunities for new insights. Furthermore, it reinforces the idea that faculty development is not only a question of promoting instructional innovation but also a learning process overtime that requires questioning of deeply held beliefs and values (Hativa 2000) by instructors who try to translate this approach into practice in face-to-face and/or online settings.

V. Limitations of the study

In closing, it is important to reflect on the limitations this study raised, with the intent to help future scholars in both Italy and other countries as they explore the impact of active learning in the classroom. Beginning with satisfaction as a category to measure, possibly it is too broad whereby it lacks the nuance to capture what it means from the varied students' perspectives in relationship to active learning. Students may not remember the various methods and possibly considered other factors (e.g., relationship with instructor, classroom climate) when considering their rating of satisfaction. This indicates a high degree of subjectivity when using satisfaction as a measure (Hyun, Ediger and Lee 2017). Recognizing this shortcoming would encourage researchers to explore satisfaction across several criteria better identifying what students consider as most significant when assessing active learning.

Secondly, it is also important to recognize that the study identified faculty who applied active learning based only on their participation in the faculty development program. There was not a means to accurately determine if these faculty were using active learning methods in their classrooms. There could have been faculty who did not participate in the faculty development program that could also be using active learning. To strengthen future research, it would be helpful to develop criteria along with participation in training, that allows faculty to self-evaluate or be evaluated by others if they are using active learning in their classrooms.

Third, using the exam attempt as a construct to measure the impact of active learning offered a new means, particularly for Italian universities. However, like the construct satisfaction it would have strengthened the study to identify other measures (e.g, exam scores, evaluation mid-course) to better understand the application of active learning in the classroom.

In conclusion this study investigated the impact of faculty development programs (FDPs) focusing on active learning within Italian higher education, considering various outcomes, contextual elements, and unique factors of the Italian educational system. The findings indicated that trained faculty increased student satisfaction in specific disciplines, especially in face-to-face settings, consistent with existing literature relating to active learning and student satisfaction. The unique characteristics and inherent resistance to new teaching methodologies within the Italian educational system and among students and faculty posed additional challenges. The rapid shift to online learning due to the pandemic underscored the necessity for adaptability in instructional methods. Finally, it highlighted the importance of faculty learning communities and suggested a more multifaceted approach for future research to deepen the understanding of the impact of active learning in the classroom.

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An exploration of the role of transformational leadership in times of institutionalization of change

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Abstract: In order to adapt to an increasingly competitive world, organizations need to continuously change, yet the success of the change is conditioned by its institutionalization. The institutionalization of change is the key factor to perpetuate sustainable changes. Based on the exploration of the role of transformational leadership in times of (institutionalization of) change, the objective of this study is to analyze the contribution of the components of transformational leadership on the institutionalization of change within a Lebanese private university Redundancy, engaged in an accreditation process. Through a qualitative method on a single case study, based on semi-structured interviews conducted with 15 senior executives occupying key positions in the studied university and through 15 focus groups with 85 faculty members from four disciplinary fields, we explored the role of each of the four dimensions of transformational leadership in times of institutionalization of change. Our findings highlight the essential role of intellectual stimulation and inspirational motivation of transformational leadership, while the two other dimensions, idealized influence and individualized consideration, play a limited role in the university context of institutionalization of change. Moreover, individual recognition and idealized influence are essential to convince all members of the need for change and involve them in the accreditation process. This study allows us to understand the role of each of the transformational leadership dimensions in

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order to promote and escort institutionalization of change within high education sector.

Keywords: Transformational leadership; higher education; university accreditation; institutionalization of change; planned change.

I. Introduction

In order to adapt to an increasingly competitive world, organizations require change, yet the success of the change is conditioned by its institutionalization (Stirman et al. 2012). Whereas a lot of researches have been done related to organizational change and transformational leadership (TL), these two concepts studied in tandem are the subject of permanent interest for scholars. Literature about organizational change emphasizes the role of the transformational leader as a change leader. Yet, exploring the influence of transformational leadership on change institutionalization finds all its relevance in an academic context, marked by the race of universities towards accreditation. In this study, we adopted the Steckler and Goodman (1989, 34) definition of institutionalization as *“long-term viability and integration of a new program within an organization”*. Through a review of the literature on institutionalization of change and transformational leadership, we offer a conceptual framework to explore and understand the role of TL on the institutionalization of change.

Thus, by referring to leadership theories, particularly the one developed by Bass (1985), we are interested in understanding how can the transformational leadership be an enabling factor in the institutionalization of change, in particular, how university accreditation can be institutionalized through transformational leadership?

The objective is to verify the extent to which the theory transformational leadership is valid in the context of institutionalization of change. As a first step, we will explain the transformational leadership and institutionalization of change, and conclude by drawing the connection between institutionalization of change and the transformational leadership.

As a second step, we expose the empirical study. We adopted a qualitative method through a case study (Pettigrew, Woodman, and Cameron 2001; Pettigrew 1985). We will expose the results of the 15 interviews carried out with the senior leaders of the university, in order to understand and highlight the role and the contribution of each of the four dimensions of transformational leadership that might shape organizational change and influence its institutionalization.

Finally, we will answer the research question and present the contributions of this research to the theory and the practice. This research fills an important

gap in the literature and adds new insights to our understanding of how to achieve more performance in the higher education sector through institutionalization of change.

II. Literature review

II.1. *Organizational change and the institutionalization of change*

II.1.1. Organizational change

“Organizational change can be defined as an alteration of a core aspect of an organization’s operation. Core aspects include the structure, technology, culture, leadership, goal or personnel of an organization” (Helms-Mills, Dye, and Mills 2008, 4).

This study is an in-depth case study. It explores the role of the leader in the change process (Kezar and Eckel 2002a; Rajagopalan and Spreitzer 1996). In higher education, Kezar (2009) mentions changes resulting from the accreditation process. We understand organization change as an intentional process with defined actions that would change the state of an organization from a current to a desired one (Harigopal 2007; Kezar and Eckel 2002b). Even though there are many universities that are adopting change, very few are able to institutionalize it. In their study of 26 universities that went through a transformation, Eckel and Kezar (2003) showed that only 6 universities were able to maintain in time.

Many authors (Burnes 2017; Cummings, Bridgman, and Brown 2016) show in their researches that planned change need to be more developed as it does not proceed as planned or as anticipated. Planned change is sometimes met with lack of support and sometime with reluctance from members. From that point of view, based on Van de Ven (1986) analysis, institutional leadership could be a key factor in managing change in higher education.

II.1.2. Strategies for institutionalization of change

Various authors assess change through the results it achieves compared with the planned objectives (Judson 1991; Kanter, Stein, and Jick 1992). These objectives and results might include different types of indicators including performance and satisfaction (Beer 1984). Various authors proposed a framework to institutionalize change, which include strategies, enablers, and results of the change institutionalization (Armenakis and Bedeian 1999; Cummings and Worley 1997; 2019; Goodman and Dean 1999). Armenakis, Harris, and Feild (2000) argue that in order to

institutionalize change, we need to meet the seven categories of change institutionalization strategies as listed by Armenakis, Harris, and Feild (2000) followed by the enablers of change institutionalization (Annex1 : Change institutionalization framework (Armenakis, Harris, and Field 2000)).

II.2. Transformational leadership theory

According to Bass (1990, 20) «*transformational leadership – occurs when leaders broaden and elevate the interests of their employees, when they generate awareness and accept a rice of the purposes and mission of the group, and when they stir their employees to look beyond their own self-interest for the good of the group*». According to Chemers (1997), leadership is the process by which the leader influences others to accomplish a common goal. This study uses these two definitions of leadership that are widely used by researchers. With the need for change stemming from increased competitiveness, transformational leadership is becoming critical to leadership literature since early 1990s (Avolio, Walumbwa, and Weber 2009).

The transformational leadership theory is based on the transformation exchanges between the leader and the follower. According to this approach, transformational leaders have the ability to promote organizational objectives beyond employees' individual interest. They focus on four dimensions: individualized consideration, intellectual stimulation, idealized influence, and inspirational motivation (Avolio, Walumbwa, and Weber 2009; Bass 1985; Judge and Piccolo 2004).

The inspirational motivation involves creating a vision, and the ability to realize that vision with optimism and confidence. It is the leader's capacity to give meaning to a followers' work (Harb and Sidani 2019), which arouses team spirit. This means that inspirational motivation pushes employees to go beyond themselves in order to realize the company's mission (Bass and Bass 2008).

The idealized influence, also called charisma, can be defined as the capacity of a leader to reinforce the behavioral identification of the collaborators through to act in an admirable and coherent way that is aligned with the organizational vision (Bass 1985). Those transformational leaders are recognized, admired, and respected by their team (Bass and Riggio 2006).

Intellectual stimulation consists of motivating the team to think about the needs and problems, suggest potential solutions, and take risk to execute them (Harb and Sidani 2019).

Lastly, the individualized consideration is defined as the capacity of the leader to empathize with each follower, understand his needs and concerns and reinforce the continuous communication with every individual (Bass 1985).

Transformational leadership helps to increase employee enthusiasm and satisfaction, and consequently improves their performance while enhancing creativity and shared vision (Wang et al. 2011). These characteristics and behaviors are essentials in a change process and each dimension of Transformational leadership could have a specific impact of the process of (institutionalization of) change.

II.3. Transformational leadership and institutionalization of change

“The transformational leaders inspire others to identify and work with them towards a shared vision of the future; they are bound together in a mutual and continuous pursuit of a higher purpose.” (Golm 2009, 4) Which means reinforcing the self-confidence of others in order to empower them. Transformational leaders act as role models for their team. They ensure a shared vision and develop teamwork and trust. Brandt, Laitinen, and Laitinen (2016) compared the transactional and transformation leadership as an enabler for change, and found that transformational leadership is more effective. Transformational leaders reinforce the confidence and pride of their team, and give them support through training and development in order to be ready and capable to manage change (Oreg, Vakola, and Armenakis 2011).

Considering that the capacity of an organization to change and transform is critical in order to maintain the competitive advantage of an organization (Vandangeon-Derumez 1998) and that there is a tendency in institutions to abandon a practice after some time, described as improvement evaporation effect (Buchanan et al. 2005), it is necessary to understand the mechanisms of the institutionalization of change. Based on Armenakis, Harris, and Feild (2000) studies, we will focus on the 3 main strategies used by management for institutionalization: active participation - persuasive communication - rites and ceremonies and the enablers in the context, the people, in order to analyze the relationship of these 4 strategies tools of the institutionalization of changes with each dimension of transformational leadership.

II.3.1. Intellectual stimulation

In their study Beer, Eisenstat, and Spector (1990) found that employees that are involved in the change-decision-making process tend to identify more with the change (Beer, Eisenstat, and Spector 1990). Participation also increases the view of fairness of the process because employees are given a voice. Consequently, it is important to include people from the start of the change process, while formulating the vision. Kotter (2014) advises

to include people from all levels and from every department in the process. People should also participate through identifying strategies and executing them. Change leaders have a critical role in encouraging teamwork, giving support and demonstrating commitment (Dale et al. 1999; Reisner 2002), and showing credibility and persistence (Kotter 2014; Pettigrew 1985). At this stage, the transformational leader has a stimulating intellectual influence on its colleagues by encouraging them to give suggestions and ideas, and to take risks. Employees that participate in a decision making process have an increased sense of self-efficacy and are able to relate the change goals with their personal interest (Latham, Winters, and Locke 1994). In a change process, management can consider creating moments and spaces for exchanging ideas among peers. In their research, Paper and Paper (2001) argue that successful change require people empowerment and ownership.

II.3.2. Idealized influence

As a change leader, the transformational leader performs the role of shaping the change vision, communicating and sharing the new vision with his team in order to implement and institutionalize new practices in the organization (Sayli and Tufekci 2008).

The importance of communication might take an increased importance depending on the change, for example in a study on restructure and downsizing, Nelissen and van Selm (2008) found that internal communication is the most important enabler for employees' commitment with change.

The change message should be clear and structured and should include the reason for change, the aim, the potential advantages, and the time and resources required (Judson 1991). Roberto and Levesque (2005) identified in their study that storytelling, metaphors, and other visual and symbolic tools can increment the motivation and support to change. Additionally, face-to-face meetings promote discussion and interpretation to generate a group view of change (Clark et al. 2010; Kotter 1995). Communication should be continuous in order to maintain and reinforce the believe in the change (Higgins, Weiner, and Young 2012; Kotter 2014).

II.3.3. Idealized influence

Rites, ceremonies, and symbolic public practices impact the cultural values of an organization. They improve recognize change leaders and promote innovation. This recognition motivates people and creates change

champions (Jacobs 2002). The leadership team that is promoting change should clearly recognize the positive results of change and show in a ceremony or symbolic event the progress toward the vision (Hiatt 2006; Kotter 1995). These ceremonies have three different objectives, first to motivate people, second to recognize the effort of the change leaders, and third to show external stakeholders that change is occurring (Jansen 2004; Kotter 2014).

II.3.4. Inspirational motivation

For Kezar (2009) management are the ones who identify the need for change and transfer it to the team. Authors agree that management have a role in identifying a clear vision, especially new managers that should take over their predecessors' change (Kezar 2014; Kotter 2014; Senge 2006). They should understand, adopt, recommunicate, and institutionalize change. In their study, Armenakis, Harris, and Feild (2000) focused on the change agent attributes and the organizational member attributes as the main two factors affecting institutionalization. Yet, communication is not enough for employees to adopt change. It is important to inspire people and have them participate in the vision design phase so they would commit to the change (Cooperrider et al. 1987; Judson 1991).

III. Research methodology

III.1. Context of the study

Previous studies have associated transformational leadership style with organizational change (Brandt, Laitinen, and Laitinen 2016). Yet, the role of the transformational leader in the institutionalization of change has received little attention in the literature. Thus, to understand the associations between transformational leadership and the institutionalization of change, we will adopt an exploratory approach based on a case study (Pettigrew, Woodman, and Cameron 2001; Pettigrew 1985).

Our methodology is based on the collection and analysis of qualitative data. These data were collected through a series of focused semi-structured interviews with 15 senior managers and heads of departments, working in the four disciplinary fields of the university and through 15 focus groups with 85 faculty members from the four disciplinary fields. Universities are actually under pressure to accreditation process, which constitutes a key factor in international rankings and choices criteria of students' enrollment policy. In order to cope with these multiple challenges, the university focuses on

organizational change due to accreditation process and need to institute changes. In our case, the university implemented the quality assurance process in all the faculties, our research question is: Is transformational leadership an enabler for change institutionalization? Considering that the change is the quality assurance process.

Because of the COVID-19, we did the interviews and the focus groups over zoom. The interviews were conducted in a semi-structured manner consisting of three parts:

- (1) The perception of the faculty members of change, its results, and challenges
- (2) The strategies used by the leader to institutionalize change
- (3) The enablers of change institutionalization in their faculty

During the interviews, we asked about the strategies used by the leaders as well as the leadership style as an enabler for change

Interview Guide

The university is actually under pressure to accreditation process, which constitute a key factor in international rankings and choices criteria of students 'enrollment policy. In order to cope with these multiple challenges, the university focus on organizational change due to accreditation process and need to institute changes.

The objective of our interview is to understand and analyze your individual perception of the strategies used by the leaders as well as the leadership style as an enabler for change in the context of the accreditation process.

1. What are the challenges of the accreditation process?
2. What is your perception of change?
3. What about the results of these changes?
4. What are the strategies used by the leader to institutionalize change?
5. Who are the enablers of change institutionalization?
6. Is transformational leadership an enabler for change institutionalization?
7. What do you from/ How do you perceive the role of the transformational leader in this context of change?

Each interview took between 45 minutes and one hour. These interviews were spread over 3 months. On the 15th interview we noticed saturation in the information, which shows that the data collected is accurate and shows comprehension of the phenomenon under study. For the discourse analysis, we have adopted the content analysis approach by counting the number of times each transformational characteristic was related to institutionalization of change.

III.2. Coding matrix

Annex 2. Table of coding matrix

TL	Change	Verbatim	Literature
<p>Intellectual stimulation:</p> <ul style="list-style-type: none"> - participation in the decision and ideation - involve in change 	<p>Active participation</p>	<p>The dean made sure that everyone participated in the decision so that everyone takes responsibility for the implementation and the performance. We set the indicators and we became bearers of the project.</p>	<p>(Beer, Eisenstat, and Spector 1990)</p>
	<p>Active participation (missing)</p>	<p>All the head of departments participated in the decision-making process in our faculty. The whole council meets to make decision and insure the adhesion of all the faculty's members. Professors also participate in assessments and propose ideas since they are close to the students and they know their needs.</p>	<p>(Waytz and Mason 2013)</p>
		<p>There is a small group highly involved. Internally we need more communication and meetings to involve all the faculty members in the change.</p>	<p>(Paper and J. 2001)</p>
		<p>The dean has the intentions to involve everyone. Yet, and even though we are invited to vote for the projects, I don't feel we actually participated, there wasn't any group reflection.</p>	<p>(Dale et al. 1999; Reisner 2002)</p>

TL	Change	Verbatim	Literature
<p>Individual consideration: – organize training and coaching as per the individual need – recognition of the individual effort</p>	Human resource management	<p>After several workshops for faculty members, the dean chose a project coordinator who was there to carry on with the trainings and give recommendations to the faculty members.</p>	<p>(Jansen 2004; Kotter 2014)</p>
		<p>Trainings and workshops were good but individual coaching is more important. Whenever a faculty member had a gap they knew there is someone to call for help.</p>	<p>(Jansen 2004; Kotter 2014)</p>
		<p>We had various trainings, we also found some great people in our institution that helped us. These meetings boosted us up</p>	<p>(Jacobs 2002)</p>
		<p>We do little continuous training; we prefer to exchange good practices in informal meetings. The dean involves people and give responsibility to the ones that are interested in participating.</p>	<p>(Jansen 2004; Kotter 2014)</p>
	Human resource management (Missing)	<p>The leader expects us to do a lot of work, but the pay remains as it is. There are a lot of acknowledgements that can be shown in many ways but they are not implemented</p>	<p>(Jansen 2004; Kotter 2014)</p>
		<p>We would have liked a word of encouragement for the teachers, the fact that the leader tells us that they see what we are going through is very important. There were messages sent but they were not personal. They were not really recognition.</p>	<p>(Jansen 2004; Kotter 2014)</p>

TL	Change	Verbatim	Literature
<p>Idealized influence: communicating and showing dynamism and desire for change</p>	<p>Persuasive communication</p>	<p>First thing the dean did was to bring everyone together and to explain clearly, where we are, where we want to arrive and why we want to go there. He explained the problem and made sure that the change is beneficial for everyone, the students, the faculty members, and the faculty</p> <p>The dean continuously communicated and showed dynamism and desire for change. He inspired us to continue to navigate in these uncertain moments</p>	<p>(Sayli and Tufekci 2008)</p> <p>(Sayli and Tufekci 2008)</p>
	<p>Persuasive communication (Missing)</p>	<p>The dean has sent emails about the quality assurance process, but because there are too many emails, the faculty members are no longer reading. We also think that quality is the work of management. We don't see the importance for us</p>	<p>(Judson 1991)</p>
<p>Inspirational motivation: – feedback for strategic orientation – inspirational vision</p>	<p>Rites, ceremonies, and formalization activities</p> <p>Rites, ceremonies, and formalization activities (Missing)</p>	<p>The dean put in place an international strategic committee, with whom we met systematically to discuss the strategic orientation of the faculty and the QAP action plan. Their feedback is very important, they also suggested new direction. Their motivation boosts us.</p> <p>Quality appears in its mission to harmonize and dynamize. Everything will depend on the seriousness of this process. We need to see a clear vision in order to aim for it.</p>	<p>(Kezar 2014)</p> <p>(Cooperrider et al. 1987; Judson 1991)</p>

Source: The author based on field interviews and focus group.

IV. Results

In the last decades, governments around the globe considered higher education as a key component of their national strategy. They considered reinforcing education as an enabler to prepare the future workforce and empower economic growth (Alexander 2000). Higher education institutions are facing an increased demand for accountability and they started accrediting various aspects of their programs and services (Harvey and Williams 2010). While many benefits came from accreditation for the university, faculty members felt that all the accreditation requirements hindered their work (Twidale and Nichols 2013). Consequently, universities focused on faculty engagement in order to gain and maintain their accreditation (Calegari, Sibley, and Turner 2015). Various authors agree that leadership is one of the major enablers for change (Beer, Eisenstat, and Foote 2009; Buchanan et al. 2005; Kotter 2014).

After the analysis, we noticed that the transformational leadership characteristics influenced the change institutionalization strategies through four strategies: persuasive communication, active participation, learning and growth, formalization and integration.

IV.1. Idealized influence

Management and faculty members were keen at distinguishing between various ways of communicating change. There was the idealized charismatic leader that used persuasion techniques to explain and convince team members in the accreditation, and the leader that sent informative emails. Standard communication and email did not go through. Faculty members who felt that communication was not persuasive did not commit to change. Only leaders with idealized influence were able to use persuasion and not just communication to promote and involve the team.

IV.2. Assess the opportunity or problem motivating the change

Intellectual stimulation affected how faculty members perceived their engagement in the accreditation process, explaining that they appreciated the reflection. Faculty members that did not feel intellectual stimulation, even though they were involved through voting and execution, did not commit to the accreditation. Faculty members that felt intellectually stimulated felt an increased sense of ownership of the accreditation and their role in it

IV.3. Assess the opportunity or problem motivating the change

Faculty members, that were convinced with the importance of accreditation and committed to the process, considered that this commitment

should payoff and be recognized for their contribution. Being part of an accreditation process meant extra effort sometimes outside of the scope of teaching and resource. Most of the faculty members that committed to the accreditation appreciated the training and support received, nevertheless, they considered that there was not individual consideration and recognition for the effort deployed in the process.

IV.4. Assess the opportunity or problem motivating the change

Faculty members expressed the important role of being inspired by the accreditation vision, especially the reason behind implementing the accreditation and what would the expected result be. In various cases faculty members considered that the objective of the accreditation did not align with the current strategic priority of the faculty.

Faculty members who saw that the change was related to the faculty strategic priorities were inspired to make the change a reality and to execute the vision. It is known that the vision is a key component of change, yet this vision needs to be motivational for people to maintain the work on it.

IV.5. Challenges related to institutionalization of change of accreditation process in a Lebanese private university

Considering the Lebanese unstable environment and the various crisis created a continuous shift in the universities' strategic priorities, this led to a continuous shift away from the accreditation in various cases. Only transformational leaders that were able to continuously motivate their people to the importance of accreditation despite all the crisis were able to maintain the change.

V. Conclusion

Based on Bass's theory of leadership (1985), the purpose of this study is to examine how each of the dimensions of transformational leadership could make a significant contribution to (institutionalization of) change of the university accreditation process. We adopted an exploratory approach based on a case study (Pettigrew, Woodman, and Cameron 2001; Pettigrew 1985), consisting of focused semi-structured interviews conducted with 15 senior leaders and 15 focus group with 85 faculty in a private university in Lebanon.

The findings of this study highlight the role of transformational leadership theory in implementing change through the dimension related to intellectual stimulation and inspirational motivation. As for the other two components of transformational leadership, namely idealized influence and

individualized consideration (Bass 1985), we have noticed that they play a limited role in the institutionalization of change of the university accreditation process. It would be relevant, at this stage, to set up all the material and human resources in terms of intellectual stimulation and inspirational motivation in order to enhance institutionalization of change. Collaborators emphasize the intellectual participation in decision making as they appreciate to take part and be involved in the process change through reflection committees.

Given that today, the accreditation of universities is a positioning factor in an increasingly demanding market in terms of knowledge, skills and training, the accreditation process to which the university is subject implies a change in managerial practices, management methods, procedures as well as the vision in a more global way. This change requires transformational leadership. Our study context highlights certain components of this transformational leadership as more accentuated, more valued and possibly better perceived than others to lead this change.

However, the university suffers from many factors that limit the role of transformational leadership in the institutionalization of change. Human resources practices in terms of trainings and workshops are considered responding to their personal needs, and collaborators will appreciate more individual recognition (Jansen 2004; Kotter 2014). Moreover, regarding the instability of Lebanese socio-political environment, leaders should show charisma and inspirational motivation in their communication to inspire change (Sayli and Tufekci 2008). This component of transformational leadership - inspiration - aims to motivate the entire team involved in the process of accreditation, and therefore of change, for the achievement of the organizational objective (Chemers 1997; Harb and Sidani 2019).

In order for all members to take ownership of the change, the transformational leader must involve them in this process by motivating them, through intellectual stimulation, enhancing creativity and shared vision (Wang et al. 2011; Harb and Sidani 2019), thus consequently improving their performance and their satisfaction.

The results of the study show that leaders and those in charge of the human resources should encourage the development of all the dimensions of transformational behaviors among the leaders of the university.

V.1. Theoretical implication

The findings confirm the role of transformational leadership in the accreditation process as an organizational change and institutionalization

change (Kezar 2009). Our research adds insights to the concept of change institutionalization of higher education going through an accreditation process and contribute to enrich literature related the relation between change institutionalization and transformational leadership. Moreover, our approach provides some thoughtful insights related to the contribution of each dimension of transformational leadership to the institutionalization of change a higher education institution.

V.2. Practical implication

The findings related to the association between transformational leadership and change institutionalization have several implications. Human resources management needs to emphasize on the leaders' characteristics as an inspirational motivation in order to inspire and motivate their collaborators in order to convince them of the need of change. Regarding human resources practices, emphasizing individual recognition to appreciate collaborators efforts would create a favorable environment to change.

Moreover, participation in decision-making is not enough. Leaders would encourage active participation (Dale et al. 1999; Reisner 2002) in order to motivate collaborators and generate change.

The study's findings contribute to the literature on transformational leadership and organizational change in two ways. First, the study provides empirical evidence that intellectual stimulation and inspirational motivation are the two most important dimensions of transformational leadership for institutionalizing change in a university context. Second, the study provides insights into how transformational leaders can use their skills and abilities to overcome resistance to change and to institutionalize change in a university setting. The study adds to the understanding of how to achieve more performance in the higher education sector through institutionalization of change.

This study contributes to the literature on transformational leadership and organizational change. It provides new insights into how transformational leaders can use their skills and abilities to overcome resistance to change and to institutionalize change in a university setting.

V.3. Limitation and future research

We are aware of the limitations that a case study offers in term of result generalization and the validity of the conclusions is limited to the university and the studied organizational environment. Despite these limitations and other limitations pertaining to the external validity of the qualitative studies,

this study could be a starting point for future researches that would be conducted in other higher education institutions.

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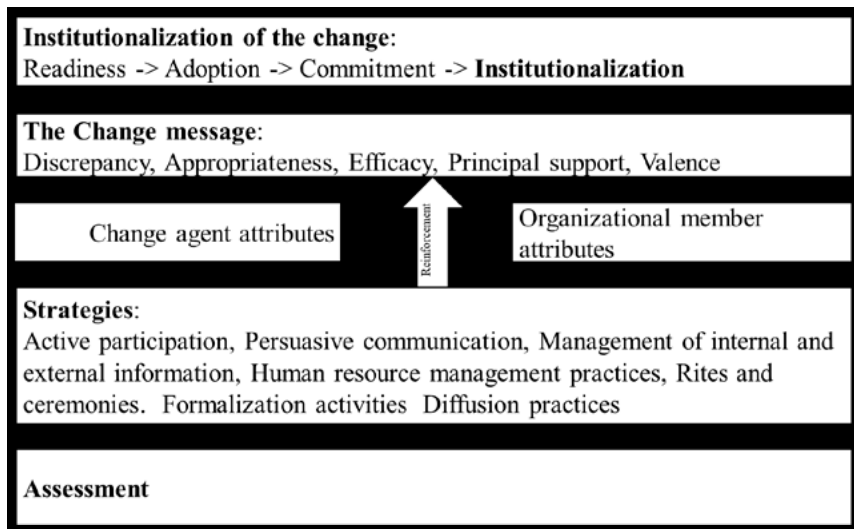
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Annex 1. Change institutionalization framework



Source: Armenakis et al. 2000, 102.

The effects of online learning self-efficacy and attitude toward online learning in predicting academic performance: The case of online prospective mathematics teachers

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Abstract: This study aims to discover if Online Learning Self-Efficacy (OLSE) and attitude toward online learning (AOL) significantly predict the academic performance (AP) among Turkish prospective mathematics teachers. Unlike the studies conducted in the literature, online learning self-efficacy and attitude towards online learning as predictor variables were included in the study and both quantitative and qualitative data were collected. The study included 1075 prospective mathematics teachers' responses in the analysis. The Pearson correlation was employed to determine how strongly OLSE, AOL, and AP are related. Results indicated that OLSE and AOL influenced the level of AP. Also, the multiple regression aimed to predict AP based on OLSE and AOL, and this model explained 44.6% of the variance in AP. The beta weights demonstrated that OLSE and AOL (OLSE $\beta = .36$, $t(1072) = 9.705$, $p < .001$, and AOL $\beta = .34$, $t(1072) = 9.176$, $p < .001$) significantly contributed to the model. The results showed that the level of academic performance can be predicted by online learning self-efficacy and attitude toward online learning. In addition, this study revealed the factors that have favorable and adverse effects on the academic performance of prospective mathematics teachers to gain more extensive information. Under the theme of negative factors, there were 7 codes. The results obtained from the study can be a guide for practitioners, policy makers and

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teachers to take the necessary precautions for the effective execution of the distance education process.

Keywords: Online learning; self-efficacy; attitude; academic performance; online prospective mathematics teachers.

I. Introduction

The 2019–2020 Coronavirus (COVID-19) pandemic, which emerged in the city of Wuhan, the capital of the Hubei province of China, caused vital changes and effects, especially on health at the global level, along with social life, economy, and educational practices. Furthermore, on March 11, 2020, the World Health Organization declared the Coronavirus (COVID-19) pandemic as a global pandemic. The resulting crisis's effects, particularly on health and also the economy, social life, psychology, and education have still continued.¹ As in, all countries of the world, education and training activities were suspended in Türkiye according to the progression of the case numbers. Exams were postponed, distance education started, lessons continued synchronously or asynchronously, and teachers used homework, online exams, and forum discussions for student evaluation.

Distance education is students' web-based access to education by means of developing internet technologies and computers.² Thanks to communication technologies, distance education is a bridge between teachers and students.³ With the synchronous and asynchronous model used in the 21st century owing to computer technologies, students and teachers can carry out education regardless of time and place.^{4,5,6,7} Universities took immediate steps to ease crisis caused by the coronavirus pandemic and Universities

¹ World Health Organization, "Advice for the public: Coronavirus disease (COVID-19)," accessed July 3, 2021, <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.

² Timothy, J Newby, Donald Stepich, James Lehman, James D Russell, and Anne Todd Leftwich, *Educational Technology for Teaching and Learning* (New Jersey: Pearson Merrill Prentice Hall, 2006).

³ Michael, G Moore and William G. Anderson, *Handbook of Distance Education* (London: Lawrence Erlbaum Associates, 2003).

⁴ Margaret Driscoll, *Web-based training: Creating E-learning Experiences* (San Francisco: JosseyBass/Pfeiffer, 2002).

⁵ Allan J Henderson, *The E-learning Question and Answer Book: A Survival Guide for Trainers and Business Managers* (New York: Amacom Press, 2003).

⁶ Dongsong Zhang and Jay F. Nunamaker, "Powering E-learning in the New Millennium: An Overview of E-learning and Enabling Technology," *Information Systems Frontiers* 5, no. 2 (2003): 207-218. <https://doi.org/10.1023/A:1022609809036>.

⁷ Anita Rosen, *E-Learning 2.0: Proven Practices and Emerging Technologies to Achieve Real Results* (New York: Amacom, 2009).

switched from formal to distance education.⁸ Like the rest of the world, Türkiye was unprepared for educational activities amid the COVID-19 pandemic and tried to improve the education and training processes by switching to emergency distance education.

There are different forms of application of distance education, and among these, it is seen that mostly online learning types are applied frequently. In this direction, courses can be conducted as synchronous (simultaneous) and asynchronous (asynchronous) courses within the scope of distance education. In simultaneous education, students and teachers meet at a predetermined time (usually online) and live lessons.⁹ In this process, it is tried to create a more active environment for teachers and learners such as in-class interaction and discussion, asking questions instantly and expressing parts that are not understood, and an environment close to face-to-face education is tried to be provided. In asynchronous education, on the other hand, it is the type of education in which teachers and students do not have the opportunity to work simultaneously and students can access the course content (presentation, video, audio recording, etc.) over the internet whenever they want or need it. Communication between participants takes place mainly through e-mail and online forums and is usually moderated by trainers.¹⁰

Universities in Türkiye used software that provides an online environment during the pandemic process. In this direction, some universities have preferred to use online synchronous methods as distance education methods, some have preferred to use offline asynchronous methods and some have chosen to use mixed methods.¹¹ In many universities, courses in distance education have been processed through methods such as creating presentation files and sharing course content (articles, ppt, Word, pdf, etc.), uploading lessons to the system with live lectures and video recording, asking instant questions and giving feedback, and sharing homework. In addition, it has been observed that universities use different online methods such as

⁸ Virginia Gewin, "Five Tips for Moving Teaching Online as COVID-19 Takes Hold," *Nature* 580, (2020): 295-296. doi: <https://doi.org/10.1038/d41586-020-00896-7>.

⁹ Patricia Fidalgo et al., "Students' Perceptions on Distance Education: A Multinational Study," *International Journal of Educational Technology in Higher Education* 17, (2020): 1-18. <https://doi.org/10.1186/s41239-020-00194-2>.

¹⁰ Lynette Watts, "Synchronous and Asynchronous Communication in Distance Learning: A Review of the Literature," *Quarterly Review of Distance Education* 17, no 1 (2016): 23-32.

¹¹ Ersin Kurnaz and Murat Serçemeli, "A Research on Academicians' Perspectives on Distance Education and Distance Accounting Education in the COVID-19 Pandemia Period," *International Journal of Social Sciences Academy* 2, no 3 (2020): 262-288.

homework, projects, online exams and quizzes within the scope of measurement and evaluation regarding the courses offered.¹²

Educators tried to determine student performance in education and training through assessment and evaluation tools such as homework, online exams, and forum discussions. However, due to the rapid transition to distance education, researchers could not evaluate the adaptation processes of students toward distance education.¹³ There may be many variables (perceptions and attitude toward online learning, self-efficacy, readiness for online learning, thought processes toward distance education, and individual innovation) that have an impact on students' academic performance in this process. Students' self-efficacy and attitude toward online learning are two of the variables that may affect student performance.

Accordingly, this study investigated to what extent these two variables predict academic performance through multiple regression analysis. In addition, the researcher tried to identify the factors that have favorable and adverse effects on the academic performance of teacher candidates to gain deeper knowledge.

1.1. Self-efficacy toward online learning

Considering that humans are emotional beings, it may not be enough to prepare the physical environment and its factors alone to direct them to the target. Being competent in tasks demands both skills and self-beliefs concerning how well these tasks can be accomplished.¹⁴ Therefore, students' high self-efficacy for online learning is a significant component in the successful execution of this process. Self-efficacy is people's belief in their own competence to learn and develop behaviors.^{15,16} Schunk¹⁷

¹² Council of Higher Education, "COVID-19 Information Note: 1," accessed April 5, 2020, <https://www.yok.gov.tr/Sayfalar/Haberler/2020/>.

¹³ Parvati Iyer, Kalid Aziz, and David M. Ojcius, "Impact of COVID-19 on Dental Education in the United States," *Journal of Dental Education* 84, no. 6 (2020): 718-22. <https://doi.org/10.1002/jdd.12163>.

¹⁴ Albert Bandura, "Organizational Application of Social Cognitive Theory," *Australian Journal of Management* 13, no. 2 (1988): 275-302. <https://doi.org/10.1177/031289628801300210>.

¹⁵ Albert Bandura, "Social Cognitive Theory: An Agentic Perspective," *Asian Journal of Social Psychology* 2, no. 1 (1999): 21-41. <http://doi.org/10.1146/annurev.psych.52.1.1>.

¹⁶ Jerry L. Jinks and Morgan L. Vicky, "Students' sense of academic efficacy and achievement in science: A useful new direction for research regarding scientific literacy?," *The Electronic Journal of Science Education* 1, no. 2 (1996): accessed May 1, 2020. <http://unr.edu/homepage/jcannon/jinksmor.htm>.

¹⁷ Dale H Schunk, *Learning Theories: An Educational Perspective* (Boston: Pearson, 2009).

defined self-efficacy as individuals' evaluation of their own skills and capabilities and their ability to transform them into behaviors. Gallagher¹⁸ expressed self-efficacy as evaluating whether people believe that they can carry out their behaviors when necessary. On the other hand, when it comes to the aspects of learning taking place in rather non-traditional environments like online learning, self-efficacy seems to gain more authentic features. In such platforms, self-efficacy consists of five dimensions: These are self-efficacy concerning finishing an online course, using tools in a course management system, establishing interactions with lecturers as well as classmates for social and academic purposes in an online course.¹⁹ Self-efficacy might also be considered as a major factor that determines the readiness of teachers for distance education.^{19,20} One of the essential factors affecting prospective teachers' online learning-teaching competencies is their self-efficacy regarding distance education environments.^{21,22} When learners believe they have the capacity to do a task, they may be much keener and more determined for fulfilling this task and exhibit behaviors accordingly.²³ Learners having a substantial level of self-efficacy in learning a subject adapt more easily, work harder, and are more successful in coping with difficulties.^{24,25} Similarly, Pajares²⁶ observed that individuals with high self-efficacy have high success and are happier due to this

¹⁸ Matthew W Gallagher, "Self-Efficacy." In *Encyclopedia of Human Behavior*, edited by Vilayanur S. Ramachandran, 314-320. San Diego: Academic Press, 2012.

¹⁹ Demei Shen et al., "Unpacking Online Learning Experiences: Online Learning Self-efficacy and Learning Satisfaction," *The Internet and Higher Education* 19 (2013): 10-17. <https://doi.org/10.1016/j.iheduc.2013.04.001>.

²⁰ Min-Ling Hung, "Teacher Readiness for Online Learning: Scale Development and Teacher Perceptions," *Computers & Education* 94 (2016): 120-133. <https://doi.org/10.1016/j.compedu.2015.11.012>.

²¹ Chia-Lin Tsai et al., "The Self-Efficacy Questionnaire for Online Learning," *Distance Education* 41, no. 4 (2020): 472-489. <https://doi.org/10.1080/01587919.2020.1821604>.

²² Stuart Woodcock, Ashley Sisco, and Michelle J Eady, "The Learning Experience: Training Teachers Using Online Synchronous Environments," *Journal of Educational Research and Practice* 5, no. 1 (2015): 21-34. <https://doi.org/10.5590/JERAP.2015.05.1.02>.

²³ Caroline Sharp, Pocklington Keith, and Weindling Dick, "Study Support and the Development of Self-regulated Learner," *Educational Research* 44, no. 1 (2002): 29- 42.

²⁴ Journal of Physics: Conference Series. "Mathematics self efficacy and mathematics performance in online learning." accessed May 1, 2021, <https://iopscience.iop.org/article/10.1088/1742-6596/1882/1/012050>.

²⁵ Barry J Zimmerman, "Becoming a Self-Regulated Learner: An Overview," *Theory Into Practice*, 41, no. 2 (2002): 64-70. doi: 10.1207/s15430421tip4102_2.

²⁶ Frank Pajares, "Self-efficacy Beliefs and Mathematical Problem-Solving of Gifted Students," *Contemporary Educational Psychology* 21, no. 4 (1996): 325-344. <https://doi.org/10.1006/ceps.1996.0025>.

success. Bandura²⁷ stated that students having weak self-efficacy have less motivation to learn, meaning that they are less willing to learn and make less effort accordingly. Self-efficacy has a mediating role in students' academic success in distance education, and success and self-efficacy are positively related.^{28,29,30,31} Besides, Tsai, Cha, Marra, and Shen³² revealed that whoever has a favorable outlook toward online learning and high self-efficacy expects higher grades.

1.2. Attitude toward online learning

Attitudes are the positive or negative feelings of individuals toward any object, person, or subject.³³ There may be many external factors that affect the forming of attitudes. Learners can change their attitudes and acquire new ones with their experiences as a result of their interaction with their environment. Another predictor that can affect student performance in the distance education process is the attitude toward online learning.³⁴ because learners' attitude toward new technologies can affect their acceptance of these advancements. In the effective execution of distance education, beyond how advanced its technology is, Liaw, Huang, and Chen³⁵ highlighted the significance of students having a positive attitude toward online learning. They also stated that students' positive attitude levels toward online learning

²⁷ Albert Bandura, *Self-efficacy Encyclopedia of Human Behaviour* (New York: Academic Press, 1994).

²⁸ Katrin A Arens, Anne C. Frenzel, and Thomas Goetz, "Self-Concept and Self-Efficacy in Math: Longitudinal Interrelations and Reciprocal Linkages with Achievement," *The Journal of Experimental Education* 90, no. 3 (2020): 1-19. <https://doi.org/10.1080/00220973.2020.1786347>.

²⁹ Adeneye A O Awofala, "Correlates of Senior Secondary School Students' Mathematics Achievement," *Educacia* 21, no. 17 (2019): 15-25. <https://doi.org/10.24193/ed21.2019.17.02>.

³⁰ Dan Li, "A Review of Self-efficacy of Learners Through Online Learning," *Journal of Humanities and Education Development* 2, no. 6 (2020): 526-533.

³¹ Bikkar S Randhawa, James E. Beamer, and Ingvar Lundberg, "Role of Mathematics Self-efficacy in the Structural Model of Mathematics Achievement," *Journal of Educational Psychology*, 85, no. 1 (1993): 41. <https://doi.org/10.1037/0022-0663.85.1.41>.

³² Chia-Lin Tsai et al., "The Self-Efficacy," 472-489.

³³ Richard E Petty and John T. Cacioppo, *Attitudes and Persuasion: Classic and Contemporary Approaches* (New York: Westview Press, 1996).

³⁴ Diana W Sanders and Alison I. Morrison-Shetlar, "Student Attitudes Toward Web-Enhanced Instruction in an Introductory Biology Course," *Journal of Research on Computing in Education* 33, no. 3 (2001): 251-262. <https://doi.org/10.1080/08886504.2001.10782313>.

³⁵ Shu-Sheng Liaw, Hsiu-Mei Huang, and Gwo-Dong Chen, "Surveying Instructor and Learner Attitudes Toward E-learning," *Computers & Education* 49, (2007): 1066-1080. <https://doi.org/10.1016/j.compedu.2006.01.001>.

affect students' tendencies toward distance education. From this point of view, student attitude toward online learning can directly relate to their academic performance. In studies conducted on attitudes, students' attitudes and academic achievements are strongly related.^{36,37,38} In addition, the positive attitudes of students toward online learning will facilitate the teaching process of the teacher, and there will be improvements in the success of the students.³⁹ In their study, Lijie, Zongzhao, and Ying⁴⁰ revealed that mathematics attitude has a positive and direct impact on students' mathematics academic performance. Offir et al.⁴¹ stated that students' attitude toward online learning are effective in students' success. Falowo⁴² specified that individuals' negative attitudes toward online learning generally stem from their prejudices. On the other hand, Martinez et al.⁴³ stated that researchers should conduct more research on attitude toward online learning.

³⁶ Brian R Evans, "Student Attitudes, Conceptions and Achievement in Introductory Undergraduate College Statistics," *The Mathematics Educator* 17, no. 2 (2007): 22-24.

³⁷ Lawsha Mohamed and Hussain Waheed, "Secondary Students' Attitude Towards Mathematics in a Selected School of Maldives," *International Journal of Humanities and Social Science* 1, no. 15 (2011): 277-278.

³⁸ Solomon O Ogunniyi, "Resource Utilisation, Teaching Methods, Time Allocation and Attitude as Correlates of Undergraduates' Academic Achievement in Cataloguing in Library Schools in Southern Nigeria." PhD diss., University of Ibadan, 2015.

³⁹ Sanjaya Mishra and Santosh Panda, "Development and Factor Analysis of an Instrument to Measure Faculty Attitude Towards E-learning," *Asian Journal of Distance Education* 5, no. 1 (2007): 27-33.

⁴⁰ Zhang Lijie, Mo Zongzhao, Zhou Ying, "The Influence of Mathematics Attitude on Academic Achievement: Intermediary Role of Mathematics Learning Engagement," *Jurnal Cendekia: Jurnal Pendidikan Matematika* 4, no. 2 (2020): 460-467. <https://doi.org/10.31004/cendekia.v4i2.253>.

⁴¹ Baruch Offir et al., "Teacher-Student Interactions and Learning Outcomes in a Distance Learning Environment," *The Internet and Higher Education* 6, no. 1 (2003): 65-75. [https://doi.org/10.1016/S1096-7516\(02\)00162-8](https://doi.org/10.1016/S1096-7516(02)00162-8).

⁴² Rasheed Falowo, "Factors Impeding Implementation of Web-based Distance Learning," *AACE Journal* 15, no. 3 (2007): 315-338.

⁴³ Romero J Sonia Martínez et al., "Attitudes Toward Technology Among Distance Education Students: Validation of an Explanatory Model," *Online Learning*, 24, no. 2 (2020): 59-75.

In the literature, there are studies on the attitudes^{44,45,46,47} and self-efficacy^{48,49} of university students in distance education environments. However, there was no study that investigated whether these two factors are significant predictors of academic performance. It is critical to reveal the extent to which the attitudes and self-efficacy toward online learning predict academic performance and whether they are meaningful predictors in terms of evaluating the functionality of distance education activities that educators use now and will continue using in the future.

In this respect, the first two questions of this study deal with the level and direction of the relationship between the attitude and self-efficacy toward online learning and academic achievement, and the third question investigates if the attitude and self-efficacy toward online learning are significant predictors of academic success.

Apart from the attitude and self-efficacy toward online learning, there may be different variables that predict academic performance. For example, some studies indicated that technological infrastructure is a significant predictor of students' academic success in the distance

⁴⁴ Karen E Brinkley-Etzkorn, "The Effects of Training on Instructor Beliefs About and Attitudes Toward Online Teaching," *American Journal of Distance Education* 34, no. 1 (2019): 1-17. <https://doi.org/10.1080/08923647.2020.1692553>.

⁴⁵ Eleni Koustriava and Konstantinos Papadopoulos, "Attitudes of Individuals with Visual Impairments Towards Distance Education," *Universal Access in the Information Society* 13 (2014): 439-447. <https://doi.org/10.1007/s10209-013-0331-2>.

⁴⁶ Shu-Sheng Liaw, Hsiu-Mei Huang, and Gwo-Dong Chen, "Surveying Instructor," 1066-1080.

⁴⁷ David Ojo and Felix Kayode Olakulehin, "Attitudes and Perceptions of Students to Open and Distance Learning in Nigeria," *International Review of Research in Open and Distance Learning*, 7, no. 1 (2006): 1-10. <https://doi.org/10.19173/irrodl.v7i1.313>.

⁴⁸ Demei Shen et al., "Unpacking Online," 10-17.

⁴⁹ Stuart Woodcock, Ashley Sisco, and Michelle J Eady, "The Learning," 21-34. <https://doi.org/10.5590/JERAP.2015.05.1.02>.

education process.^{50,51,52,53,54,55} Also, various studies have demonstrated that solving student problems quickly and paying attention to teacher-student interaction in distance education by using a supportive language have a significant impact on success in distance education.^{56,57,58,59} Haber and Mills⁶⁰ and Bolliger and Wasilik⁶¹ stated that the lack of social interaction between students and their lecturers, the problems experienced by lecturers in the process of preparing course materials for distance education, and examining the development of the students are effective factors in the academic success of the students. In addition, Chao, Saj,

⁵⁰ Pia Ceres, "A Covid Slide' Could Widen the Digital Divide for Students," accessed May 4, 2021, <https://www.wired.com/story/schools-digital-divide-remote-learning/>.

⁵¹ Rachel Gong, "Coping with MCO: Distance learning and the digital divide," accessed October 15, 2020, <https://www.malaymail.com/news/what-you-think/2020/03/27/coping-with-mcodistance-learning-and-the-digital-divide-rachel-gong/1850758>.

⁵² Brian Hawkins and Diana G. Oblinger, "The Myth About the Digital Divide," *Educause Review* 41, no. 4 (2006): 12–13.

⁵³ Natalie Helbig, Ramón Gil-García, and Erico Ferro, "Understanding the Complexity of Electronic Government: Implications From the Digital Divide Literature," *Government Information Quarterly* 26, no. 1 (2009): 89–97. <https://doi.org/10.1016/j.giq.2008.05.004>.

⁵⁴ Thelma Obiakor and Adeniran Adedeji P, "COVID-19: Impending Situation Threatens to Deepen Nigeria's Education Crisis," accessed May 1, 2020, <https://www.africportal.org/publications/covid-19-impending-situation-threatens-deepen-nigerias-education-crisis/>.

⁵⁵ Yash Sharma, "Massive Open Online Courses (MOOCs) for School Education in India: Advantages, Challenges and Suggestions for Implementation," *Microcosmos International Journal of Research* 1, no. 2 (2015): 1–5.

⁵⁶ Jason D Baker, "An Investigation of Relationships Among Instructor Immediacy and Affective and Cognitive learning in the Online Classroom," *The Internet and Higher Education* 7, no. 1 (2004): 1-13. <https://doi.org/10.1016/j.iheduc.2003.11.006>.

⁵⁷ Stefan Hrastinski, "The Potential of Synchronous Communication to Enhance Participation in Online Discussions: A Case Study of Two E-learning Courses," *Information & Management* 45 (2008): 499–506. <https://doi.org/10.1016/j.im.2008.07.005>.

⁵⁸ Marie Huff, "A Comparison Study of Live Instruction Versus Interactive Television for Teaching MSW Students Critical Thinking Skills," *Research on Social Work Practice* 10, no. 4 (2000): 400-416. doi: 10.1177/104973150001000402.

⁵⁹ Stewe Wheeler, "Student Perceptions of Learning Support in Distance Education," *Quarterly Review of Distance Education* 3, no. 4 (2002): 419-429.

⁶⁰ Jennifer Haber and Michael Mills, "Perceptions of Barriers Concerning Effective Online Teaching and Policies: Florida Community College Faculty," *Community College Journal of Research and Practice* 32, no.4-6 (2008): 266-283. <https://doi.org/10.1080/10668920701884505>.

⁶¹ Bolliger, Doris U and Oksana Wasilik, "Factors Influencing Faculty Satisfaction With Online Teaching and Learning in Higher Education," *Distance Education* 30, no. 1 (2009): 103-16. <https://doi.org/10.1080/01587910902845949>.

and Tessier⁶² stated that another important factor affecting the success of students in the distance education process is the richness and quality of learning-teaching materials, as well as the assessment and evaluation process. Irani et al.⁶³ and Petracchi⁶⁴ revealed in their study that students' perceptions of distance education affect their academic achievement. Also, there are observations that students' motivation levels are a crucial factor on academic performance in distance education environments.^{65,66,67} Upon examining these studies, it is seen that there are variables such as teaching methods, technological infrastructure, student-teacher interaction, and assessment and evaluation processes in online learning that can predict academic performance. In this regard, the fourth problem of this study aimed to determine the factors that positively and negatively affect the academic performance of prospective mathematics teachers in the distance education process.

In a study conducted during the SARS epidemic during the pandemic period, it was determined that distance education was effective in reducing people's anxiety levels and increasing and increasing knowledge with the use of distance communication ways.⁶⁸ Other advantages of distance education can be listed as allowing students to work at their own pace, providing flexible working opportunities independent of time and space, saving time and therefore less cost. Some of the disadvantageous points of distance education are difficulties in providing motivation, lack

⁶² Tracy Chao, Tami Saj, and Felicity Tessier, "Establishing a Quality Review for Online Courses," *Educause Quarterly* 3 (2006): 32-39.

⁶³ Tracy Irani et al., "Personality Type and Its Relationship to Distance Education Students' Course Perceptions and Performance," *Quarterly Review of Distance Education* 4, no. 4 (2003): 445-453.

⁶⁴ Helen E Petracchi, "Distance Education: What do our Students Tell us?," *Research on Social Work Practice*, 10, no. 3 (2000): 362-376. <https://doi.org/10.1177/1049731500010003>.

⁶⁵ Kuan-Chung Chen and Syh-Jong Jang, "Motivation in Online Learning: Testing a Model of Self-Determination Theory," *Computer in Human Behavior* 26, no. 4 (2010): 741-752. <https://doi.org/10.1016/j.chb.2010.01.011>.

⁶⁶ Reinhard Pekrun et al., "Boredom and Academic Achievement: Testing a Model of Reciprocal Causation," *Journal of Educational Psychology* 106, no. 3 (2014): 696-710. <https://doi.org/10.1037/a0036006>.

⁶⁷ Allen Wigfield et al., "Development of Achievement Motivation and Engagement," In *Handbook of Child Psychology and Developmental Science*, edited by. M. E. Lamb, R. M. Lerner, M. E. Lamb, & R. M. Lerner, 657-700. Hoboken, NJ: Wiley, 2015.

⁶⁸ Sophia S-C Chan et al., "Improving Older Adults' Knowledge and Practice of Preventive Measures Through a Telephone Health Education During the SARS Epidemic in Hong Kong: a Pilot Study," *International Journal of Nursing Studies* 244, no. 7 (2007): 1120-1127. <https://doi.org/10.1016/j.ijnurstu.2006.04.019>.

of face-to-face interaction and social isolation, difficulty in getting instant feedback, a constant need for technology and situations related to accreditation.^{69,70,71} Although there are some advantages brought by distance education, it can be seen that not all students are successful in online classes in distance education and the failure rates in distance education courses are 10 to 20 percent higher than traditional face-to-face courses.⁷²

People believe that the use of distance education as a complement to formal education in higher education will increase. In this respect, examining whether students' attitudes and self-efficacy toward online learning are significant predictors of academic performance and determining the factors that have positive and negative effects on academic performance may provide important contributions both for future studies at the institutional level and for studies in the academic field. This can contribute to the more effective planning and execution of the distance education process. Therefore, this study seeks to address the following research questions:

- Question 1: Is there a significant correlation between Online Learning Self-Efficacy (OLSE) and academic performance (AP) among prospective mathematics teachers?
- Question 2: Is there a significant correlation between Attitude toward Online Learning (AOL) and AP among prospective mathematics teachers?
- Question 3: Which of OLSE and AOL is the most effective in predicting AP?
- Question 4: What are the factors that positively and negatively affect the academic performance of prospective mathematics teachers in the distance education process?

⁶⁹ Liesbeth De Paepe, Chang Zhu, and Koen DePryck, "Drop-out, Retention, Satisfaction and Attainment of Online Learners of Dutch in Adult Education," *International Journal on E-Learning* 17, no. 3 (2018): 303-323.

⁷⁰ Virginia Gewin, "Five Tips," 295-296.

⁷¹ Agi Horspool and Carsten Lange, "Applying the Scholarship of Teaching and Learning: Student Perceptions, Behaviours and Success Online and Face-to-Face," *Assessment & Evaluation in Higher Education*, 37, no 1 (2012): 73-88. <https://doi.org/10.1080/02602938.2010.496532>.

⁷² Papia Bawa, "Retention in Online Courses: Exploring Issues and Solutions—A Literature Review," *Sage Open* 6, no.1 (2016): 1-11. <https://doi.org/10.1177/2158244015621777>.

II. Method

II.1. Research design

This study was non-experimental correlational research and contained quantitative and qualitative data. The Pearson correlation was employed to explore any significant correlations among OLSE, AOL, and AP. A multiple regression was also conducted to analyze the impact of OLSE and AOL on AP. In addition, the researcher obtained qualitative data by asking the question “What are the factors that positively and negatively affect the academic performance of prospective mathematics teachers in the distance education process?”

II.2. Participants

In the selection of the participants of the study, primarily, the researcher determined universities with faculties of education (76 universities in total) in each of the seven regions of Türkiye. Then, two easily accessible faculties of education (14 in total) in each region were selected. For the required sample size for multiple regression, Stevens⁷³ stated that there should be 15 participants per predictor, and Tabachnick and Fidell⁷⁴ expressed that the required number of participants should be higher than 66 when there are two independent variables. These rules are very pervasive but they oversimplify the issue. In fact, the sample size required will depend on the size of effect that we’re trying to detect (i.e., how strong the relationship is that we’re trying to measure) and how much power we want to detect these effects. The simplest rule of thumb is that the bigger the sample size, the better.⁷⁵ The number of participants included in this study is above the benchmark value the literature specifies for each region of Türkiye. A total of 1106 prospective mathematics teachers responded to the web survey questionnaire. Additionally, to gain deeper knowledge within the scope of the study, the researcher obtained the written opinions of 118 volunteer prospective mathematics teachers to identify the factors that have favorable and adverse effects on the academic performance of prospective mathematics teachers in the distance education process. Table 1 contains information about

⁷³ Junko Stevens, *Applied Multivariate Statistics for the Social Sciences* (New York: Routledge Taylor Francis Group, 1996).

⁷⁴ Barbara G Tabachnick and Linda S. Fidell, *Using Multivariate Statistics* (Boston: Allyn and Bacon, 2013).

⁷⁵ Andy Field, *Discovering Statistics Using IBM SPSS Statistics: And Sex and Drugs and Rock “N” Roll* (Los Angeles, London, New Delhi: Sage, 2013).

prospective mathematics teachers who filled out the scales and provided written opinions.

Table 1
Information on prospective mathematics teachers who filled out the scales and provided written opinions

Variables	Categories	n (number of scales filled out)	n (number of written opinions received)
Region	Marmara	205	26
	Aegean	180	21
	Mediterranean	126	11
	Black Sea	129	12
	Central Anatolia	167	18
	Eastern Anatolia	135	13
	Southeast Anatolia	164	17
Gender	Male	512	53
	Female	590	65
School Level	1.	270	33
	2.	298	29
	3.	278	28
	4.	260	28
Total		1106	118

II.3. Instruments

II.3.1. The online learning self-efficacy scale (OLSES)

This study employed the Turkish adaptation of the self-efficacy scale for online learning (Appendix 1-Original Form, Appendix 2-Turkish Form) developed by Sun and Rogers. Unlike the scales used in previous studies, the fact that all items in the scale used in this study are positive will prevent the respondents from getting confused.⁷⁶ Moreover, compared to 4 and 5 Likert

⁷⁶ Richard Netemeyer, William O. Bearden, and Subhash Sharma, *Scaling Procedures Issues and Applications* (USA: Sage Publications, 2013).

type scales the 6-point Likert type scale used in the study does not have neutral or uncertainty points, hence providing better measurement properties. Literature review revealed that the scales used in previous studies are insufficient to meet one or more of the four different dimensions.⁷⁷ For the stated reasons, the Online Learning Self-Efficacy Scale developed by Sun and Rogers was adapted into Turkish and applied to elementary mathematics teacher candidates to determine their levels of self-efficacy for online learning.

In the first stage of the adaptation process, three academics who are experts in the field translated the scale into Turkish. Then, each academic examined the translations of the others and gave their suggestions on the form. In the second stage, two academicians working in the Computer and Instructional Technologies Department and three academics working in the Turkish language teaching department examined the scale items in terms of content validity and suitability for the Turkish culture and made the necessary corrections. In the third stage, the researcher applied the scale to 23 prospective mathematics teachers and asked them to write the incomprehensible and unclear items in the blank section under the scale form. In the fourth stage, both versions of the scale were applied to 128 prospective teachers studying in the English Language Teaching Department and the correlation coefficient between both forms of the scale was calculated as .92 at a high level. At the last stage, a second level confirmatory factor analysis was performed on the scale. Since the absolute value of the skewness values of the items in the scale was less than 3 and the absolute value of the kurtosis values was less than 10, the scale met the necessary normality conditions for the confirmatory factor analysis.⁷⁸ Due to the normal distribution of the data, the study used the maximum likelihood estimation method.⁷⁹ Muthén and Muthén⁸⁰ stated that a sample size of 150 is sufficient, granted that the data are normally distributed and there are no missing data. In this respect, the sample size (1,078 people) was sufficient for confirmatory

⁷⁷ Yan Sun and Reenay Rogers, "Development and Validation of the Online Learning Self-efficacy Scale (OLSS): A Structural Equation Modeling Approach," *American Journal of Distance Education* 35, no.3 (2021): 184-199. <http://doi.org/10.1080/08923647.2020.1831357>.

⁷⁸ Rex Kline, *Principles and Practice of Structural Equation Modeling* (New York: Guilford Publications, 2005).

⁷⁹ Sait Gürbüz and Faruk Şahin, *Research Methods in Social Sciences* (Ankara: Seçkin Publication, 2018).

⁸⁰ Linda Muthén and Bengt O. Muthén, "How to Use a Monte Carlo Study to Decide on Sample Size and Determine Power," *Structural Equation Modeling* 9, no. 4 (2002): 599-620. https://doi.org/10.1207/S15328007SEM0904_8.

factor analysis. The second-order factorial structure of the online learning self-efficacy scale consisting of four sub-dimensions and 31 items was tested using the AMOS 24 program. The results of the second-order confirmatory factor analysis of the scale indicated that the factor load values of the items were between .66 and .89, at the desired level. The goodness of fit values obtained as a result of the second-order confirmatory factor analysis ($\chi^2/df = 2.627$; RMSEA = .068; SRMR = .063; CFI = .929; TLI = .923; NFI = .890) indicated that the proposed four-factor model is compatible with the data and acceptable.⁸¹ These results signified that the data obtained from the study were compatible with the predicted theoretical structure (four-factor model) of the online learning self-efficacy scale. The final version of the validated OLSES has 31 items, and they load on four factors: Technology use self-efficacy (TU), online learning task self-efficacy (OLT), instructor and peer interaction and communication self-efficacy (IPIC), and self-regulation and motivation efficacy (SRM). The Cronbach's α values for these factors varied from 0.914 to 0.966 revealing high internal consistency reliability for the OLSES. The scale items were graded as "Strongly Agree" (6 points), "Agree" (5 points), "Partly agree" (4 points), "Partly Disagree" (3 points), "Disagree" (2 points), and "Strongly Disagree" (1 point). The lowest score that one could obtain from the scale was 31, and the highest score 186. All items in the scale were positive, in this regard, there was no reverse scoring, and a high score indicated that the self-efficacy level of the individual who completed the scale is more positive toward online learning. Lin⁸² also mentioned this scale in his article.

II.3.2. The attitude toward online learning scale (ATOLS)

This study used the attitude toward online learning scale, for which Kışla^{83,84} examined the validity and reliability. The exploratory factor analysis was carried out. The eigenvalues of the scale items gathered under 5

⁸¹ Barbara Byrne, *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming* (New York: Taylor Francis, 2010).

⁸² Tzung-Jin Lin, "Exploring the Differences in Taiwanese University Students' Online Learning Task Value, Goal Orientation, and Self-Efficacy Before and After the COVID-19 Outbreak," *Asia-Pacific Education Researcher* 30, no. 3 (2021): 191–203. <https://doi.org/10.1007/s40299-021-00553-1>.

⁸³ Kışla Tarık, "University Students' Attitudes Towards Distance Education," Master diss., Ege University, 2005.

⁸⁴ Kışla, Tarık, "Development of a Attitude Scale towards Distance Learning," *Ege Journal of Education* 17, no. 1 (2016): 258-271. <https://doi.org/10.12984/eed.01675>.

factors greater than 1, and these five factors explained 54% of the variance. Upon examining the factor-item loads, the factor-item loads of all items were above .30 and the exploratory factor analysis was repeated by limiting the number of factors to one. The exploratory factor analysis obtained 35 items with factor-item loadings ranging from 0.30 to 0.74. This factor explained 28% of the total variance. A confirmatory factor analysis was performed to confirm this single factor structure and produced the goodness of fit suggested that the single factor model was compatible with the data and feasible ($\chi^2/df = 2.54$; RMSEA = .021; SRMR = .07; CFI = .93; GFI = .90; AGFI = .91). The internal consistency coefficient of the single factor scale consisting of 35 items was 0.89. The scale used a 5-point Likert-type rating in the options for the statements. Accordingly, the scale items number 1, 2, 4, 5, 9, 11, 14, 15, 16, 18, 19, 22, 23, 25, 26, 28, 29, 33, and 34 were scored as “Strongly Agree” (5 points), “Agree” (4 points), “Undecided” (3 points), “Disagree” (2 points), “Strongly Disagree” (1 point), and the remaining items were scored in reverse. While the highest score that one can obtain from the scale is 175, the lowest score is 35. A high score indicates that the individual who completed has a more positive attitude toward online learning. Fidan⁸⁵ also used this scale in his study.

II.3.3. Academic performance (AP)

The researcher requested a document (a transcript) showing the courses taken by the participants of this study during the pandemic and their grades received from these courses. The grade point average of the courses each student took during the pandemic period (2019–2020 spring and 2020–2021 fall terms) was included in the analysis as the prospective mathematics teachers’ academic performance. Since the grading format in universities in Türkiye is in the 4 and 100 point system, participants were requested to write the 4-point equivalents of their average scores in the 100 system in the data collection form by using the grade conversion table created by the Council of Higher Education and published on its website.⁸⁶ The grade point averages of the prospective teachers were recorded in SPSS as a value between [0–4]. Figure 1 presents an example of the transcript requested from the students.

⁸⁵ Mustafa Fidan, “Distance Education Students’ Attitudes Towards Distance Education and Their Epistemological Beliefs,” *Hacettepe University Journal of Education* 31, no. 3 (2016): 536-550. <https://doi.org/10.16986/HUJE.2016016666>.

⁸⁶ Council of Higher Education, “Correspondence of Grades in the 4-Point System in the 100-Point System,” accessed April 26, 2021, https://www.yok.gov.tr/Documents/Kurumsal/personel_dairesi/4_luk_sistem_100.pdf.

TC Kimlik No	:	Fakülte / Yüksekokul	:	EĞİTİM FAKÜLTESİ
Öğrenci No	:	Bölüm / Program	:	İLKÖĞRETİM MATEMATİK ÖĞRETMENLİĞİ
Adı	:	Uzlanımı	:	
Soyadı	:	Eğitim Düzeyi	:	Lisans
Kayıt Tarihi	:			17/08/2019
Mezuniyet Tarihi	:			-

1.Yarıyıl: Güz					2.Yarıyıl: Bahar						
Ders Kodu	Ders Adı	Kredi ECTS	Harfli Başarı Notu	Açıklama	Ders Kodu	Ders Adı	Kredi ECTS	Harfli Başarı Notu	Açıklama		
GK1012	ATATÜRK İLKELERİ VE İNKILAP TARİHİ I	2 3	CB		GK1022	ATATÜRK İLKELERİ VE İNKILAP TARİHİ II	2 3	CB			
GK1032	YABANCI DİL (İNGİLİZCE) I	2 3	BB	ET	GK1042	YABANCI DİL (İNGİLİZCE) II	2 3	BB	ET		
GK1052	TÜRK DİLİ I	3 5	BB		GK1062	TÜRK DİLİ II	3 5	AA			
GK1072	BİLİŞİM TEKNOLOJİLERİ	3 5	BB		IME102AZ	MATEMATİĞİN TEMELLERİ I	2 4	AA			
IME101A	MATEMATİĞİN TEMELLERİ I	2 2	BB		IME104AZ	ANALİZ II	2 4	AA			
IME103A	ANALİZ I	2 3	BB		IME106AZ	SOYUT MATEMATİK	2 5	AA			
IME105A	MATEMATİK TARİHİ	2 3	CC		MB003Z	EĞİTİM FELSEFESİ	2 3	AA			
MB0012	EĞİTİME GİRİŞ	2 3	BA		MB013Z	EĞİTİM PSİKOLOJİSİ	2 3	BA			
MB002Z	EĞİTİM SOSYOLOJİSİ	2 3	BA								
	Alınan Kredi	Tamamlanan Kredi	Puan	YANO	GANO		Alınan Kredi	Tamamlanan Kredi	Puan	YANO	GANO
Yarıyıl :	20 30	20 30	59,00	2,95	-	Yarıyıl :	17 30	17 30	62,00	3,65	-
Birikmiş :	20 30	20 30	59,00	-	2,95	Birikmiş :	37 60	37 60	121,00	-	3,27

Figure 1

A sample document showing the student’s grade point average

II.4. Data collection and analysis

This study used a web survey to collect data to measure OLSE and AOL. Both scales contained two control questions (“This is a control question. If you are reading this question, mark the strongly agree option”) each. Accordingly, the researcher excluded the data of 28 prospective mathematics teachers who marked the scale items without reading them from the analysis. In addition, the normality test showed that data from 3 participants had extreme values. Consequently, these data were excluded from the analysis, and this study included the data of 1075 prospective mathematics teachers in the analysis. The quantitative data were gathered between April 1st and 25th in 2021.

Basic descriptive statistics, Pearson correlation and multiple regression were used to analyze quantitative data. The level of confidence for all statistical tests in this study was assumed as an alpha level of .05. Descriptive statistics were employed to express the characteristics of the participants. Pearson correlation was conducted to explore if relations among OLSE, AOL and AP were significant. Afterwards, multiple regression analysis was used to discover if there was a significant impact of OLSE and AOL in predicting AP. The study tried to determine the factors that have favorable and adverse effects on the academic performance of prospective mathematics teachers to gain deeper knowledge. For this purpose, the prospective mathematics teachers received the prompt to “Write down the factors that positively or negatively affect your

academic performance in the distance education process.” The written answers of 118 prospective mathematics teachers were reviewed through content analysis. Two different researchers conducted the content analysis, and the consistency index between the coding was high, at 0.94. For the coding in which the researchers could not reach a consensus, a third researcher was consulted, and the majority’s opinion was accepted.

III. Results

III.1. Results for Question 1 and Question 2

A Pearson correlation was used to analyze the association between OLSE and AP. Table 2 illustrated that there was a significant positive correlation between OLSE and AP ($r(1075) = .634, p < .01$). Also, AP had significant correlation with the four subscales of OLSE (TU: $r = .586, p < .01$, OLT: $r = .545, p < .01$, IPIC: $r = .562, p < .01$, SRM: $r = .501, p < .01$). A Pearson correlation analysis was conducted between AOL and AP among prospective mathematics teachers, and a significant positive correlation between AOL and AP was found ($r(1075) = .630, p < .01$).

Table 2
The correlation between (OLSE, AOL) and AP

	N	AP	p
OLSE	1075	.634	.000**
<i>First factor (Technology use self-efficacy, TU)</i>		.586	.000**
<i>Second factor (Online learning task self-efficacy, OLT)</i>		.545	.000**
<i>Third factor (Instructor and peer interaction and communication self-efficacy, IPIC)</i>		.562	.000**
<i>Fourth factor (Self-regulation and motivation efficacy, SRM)</i>		.501	.000**
AOL		.630	.000**

** Correlation is significant at the 0.01 level (2-tailed).

III.2. Results for Question 3

The study used multiple regression enter method and stepwise method to determine the accuracy of OLSE and AOL on predicting AP. Data were scanned to determine missing data and outliers and to test assumptions. For

this, Mahalanobis and Cook's distance was taken into account. It is recommended that data above 1 for Cook's distance and data above 13.82, which is the critical value for the Mahalanobis distance, are extreme values and should be excluded from the analysis.⁸⁷ There was no Cook distance value greater than 1. However, when the Mahalanobis distances were examined, there were 3 data sets exceeding the critical value of 13.82, these were excluded from the analysis, and the analysis was carried out with 1075 data. Table 3 presents all tolerance levels which were more than .1 and all variance inflation factors (VIF) that were less than 10. Additionally, the Pearson correlation coefficient between the predictor variables $r = .693$ was found to be less than .70. Thus, it revealed that there was no problem of multicollinearity.⁸⁸ The Durbin-Watson value being 1.639, which is a value greater than 1 and less than 3, indicates that there is no autocorrelation in the model. Linearity was then analyzed by creating a scatter plot matrix (Figure 2). The scatter plot of the standardized residuals shows that most of the scores are concentrated in the center (along the 0 point). The residual plot was analyzed to evaluate homoscedasticity.⁸⁹ Figure 3 indicates that the errors have a near-normal distribution and the residual plots were not extreme. Therefore, linearity and homoscedasticity will be assumed.

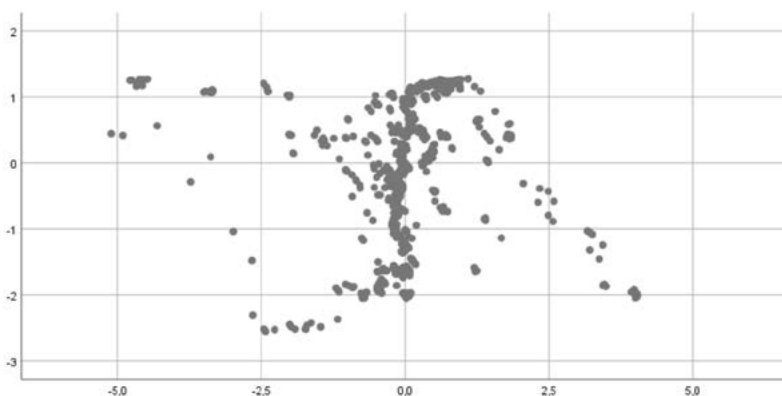


Figure 2
Scatter plot

⁸⁷ Barbara Tabachnick and Linda S. Fidell, *Using Multivariate Statistics* (Boston: Allyn and Bacon, 2013).

⁸⁸ Julie Pallant, *The SPSS Survival Manual* (London: McGraw-Hill Education, 2013).

⁸⁹ Andy Field, *Discovering Statistics Using IBM SPSS Statistics* (London: Sage, 2013).

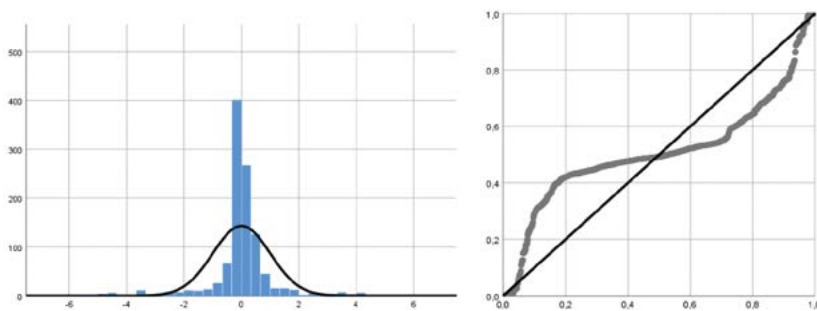


Figure 3

Histogram of regression standardized residual and Normal Probability Plot (PP) of the regression standardized residual

In Table 3, multiple regression demonstrated that the overall model significantly predicted AP ($R^2 = .446$, $R^2 \text{ adj} = .445$, $F(2,1072) = 431.246$, $p < .001$). This model explained 44.6% of the variance in AP. The beta weights in Table 3 illustrates that the contribution of OLSE and AOL to the model is significant (OLSE $\beta = .36$, $t(1072) = 9.705$, $p < .001$; and AOL $\beta = .34$, $t(1072) = 9.176$, $p < .001$).

Table 3

Multiple regression for predicting AP using the enter method

Model	Variables	B	β	t	Tolerance	VIF	Durbin-Watson	F	R^2	$R^2 \text{ adj}$
1	Constant	2.417		63.784						
	OLSE	.004	.36	9.705	.371	2.69	1.639	431.246***	.446	.445
	AOL	.003	.34	9.176	.371	2.69				

*** $p < .001$.

In Table 4, multiple regression using the stepwise method, represented that the first model with the predictor (OLSE) accounted for 40.2% of the variance in AP and was significantly influential in predicting AP. And as the second model of two predictors added 4.4% of R^2 change, which, in total, accounted for 44.6% and was significantly influential in predicting the criterion (AP). The result of this study revealed that OLSE and AOL can significantly have an effect on predicting AP.

Table 4
Multiple regression for predicting AP using the stepwise method

Model	Variables	B	β	t	Tolerance	VIF	F	R^2	R^2 change
1	Constant	2,316					722.275***	.402	.402
	OLSE	.007	.634	26.875	1.00	1.00			
2	Constant	2.417					431.246***	.446	.044
	AOL	.004	.362	9.705	.371	2.698			
	OLSE	.003	.343	9.176	.371	2.698			

*** $p < .001$.

III.3. Results for Question 4

This study also tried to determine the factors that have favorable and adverse effects on the academic performance of prospective mathematics teachers in order to gain deeper knowledge. To that end, the prospective teachers were directed to “Write down the factors that positively or negatively affect your academic performance in the distance education process.” The researcher conducted content analysis on the written answers of the prospective teachers. Table 5 presents the obtained results.

As a result of the content analysis, 4 codes were obtained under the theme of the factors that positively affect the academic performance of prospective mathematics teachers in the distance education process. These codes are, respectively, “Ease of accessing lecture notes and video recordings of the lecture ($f = 77$),” “Efficient use of time ($f = 84$),” “Using different assessment and evaluation techniques (homework, forum, quiz, and performance tasks), ($f = 33$),” and “Comfort of the working environment ($f = 18$).” On the other hand, under the theme of negative factors, there were 7 codes. These codes are, respectively, “Technological problems ($f = 38$),” “The teaching method and teaching tools used ($f = 87$),” “Instruction time ($f = 88$),” “Teacher-student interaction ($f = 97$),” “Assessment and evaluation related problems ($f = 91$),” “Distractibility ($f = 23$),” and “Belief in the efficacy of face-to-face education over distance education ($f = 32$).”

In summary, this study determined that attitude toward online learning and self-efficacy toward online learning are significant predictors of academic performance ($R^2 = .446$; $p < .001$; OLSE $\beta = .36$, $t(1072) = 9.705$, $p < .001$; and AOL $\beta = .34$, $t(1072) = 9.176$, $p < .001$), and found that there are other factors that have positive and negative effects on academic performance.

Table 5
Factors that positively and negatively affect the general academic performance of prospective mathematics teachers in the distance education process

Theme	Codes	Supporting Statement	f
The Positive Factors	Ease of accessing lecture notes and video recordings of the lecture	P3. Since the lessons we took online were recorded, we were able to watch the lessons we missed or could not understand again later, allowing us to understand the points that we were not able to comprehend. P34. Since the lectures are recorded, I can listen to them repeatedly, which contributes to my learning.	77
	Efficient use of time	P95. Since we were always at home, I did not have any problems allocating time for the lessons. P99. Being at home during this process allowed us to make better use of our day and spend our time more productively. P101. Since I was at home during online education, I spent my time more efficiently. This situation contributed to my academic success, and I found time for the aspects I wanted to develop individually.	84
	Using different assessment and evaluation techniques (homework, forum, quiz, and performance tasks)	P55. Since the exams in the form of homework, I learned more about the course. P59. The positive side of the distance education process is the assignments, because when the exams are in the form of homework, I learn the subjects better and do not forget them easily because I have to study the subjects more comprehensively. P88. Taking regular quizzes every week or receiving our exam grades based on homework prevented us from disconnecting from the class. Thus, assessments and evaluations were not only result-oriented, but process-oriented.	33
	Comfort of the working environment	P70. The fact I could study more comfortably at home and spare time for myself had a positive effect. P80. I had the comfort of taking exams at home.	18

Theme	Codes	Supporting Statement	f
The Negative Factors	Technological problems	<p>P41. Due to problems in internet access, my participation in classes was interrupted from time to time. Unfortunately, I felt disconnected when I could not attend a few classes.</p> <p>P66. Since I live in the village, my internet was cut off during some classes and I could not attend the classes.</p> <p>P79. Losing connecting to the internet or the constant freezing of the audio and video while I was listening to the lectures, prevented me from having motivation for some lessons.</p> <p>P85. I had concerns that the electricity would go out or the phone-computer would present errors.</p> <p>P95. In some cases, problems would occur in the exams during the distance education process. In the exams on the system, sometimes the system could remove us from the exam, and sometimes we experienced a loss of time due to the slowness of the internet. Therefore, it was inevitable to be in a constant state of stress during the exam.</p> <p>P102. I had concerns that the electricity would go out or the phone-computer would present errors.</p>	38
	The teaching method and teaching tools used	<p>P29. Some lecturers conducted their lectures using the direct instruction method, which caused the lecture to be monotone. I lost interest in the lesson.</p> <p>P71. The instructor's constant self-explanatory state and the fact that they did not use sufficient and compelling teaching tools reduced my active participation and interest in the lesson.</p> <p>P93. Most lessons were taught through presentations, causing them to be boring after a certain period.</p> <p>P111. Most of our teachers only used power point presentations. I wish they had used other engaging teaching tools. Then I could have been more motivated toward the lesson.</p>	87

Theme	Codes	Supporting Statement	f
The Negative Factors	Instruction Time	<p>P32. Since the lessons are conducted through technological tools such as the phone and computer, I can get distracted after a certain period of time in front of the screen. Therefore, there is not as much activity in the course as in face-to-face education.</p> <p>P49. Some lessons lasted too long. Thus, we were in front of the screen for a long time and this reduced our interest in the lesson.</p> <p>P61. The long instructing hours and the fact that we lost connection to the course after a certain period of time adversely affected our academic performance.</p>	88
	Teacher-Student Interaction	<p>P13. Interactive learning in lessons decreased to a minimum. This situation had a negative impact on our grades.</p> <p>P25. Since the student-teacher interaction was inadequate compared to the face-to-face classroom environment, this had a negative impact on my academic performance.</p> <p>P45. Both our and our teacher's cameras were closed, so there was no proper teacher-student interaction. This situation made us feel as if we were listening to the radio.</p> <p>P82. Since I am not in the same environment with the lecturer, I have difficulty understanding the lessons, and this is reflected in my exams.</p> <p>P101. Trying to listen to the teachers without even seeing their faces prevented me from being highly motivated for the lesson.</p> <p>P103. I did not have the opportunity to do intensive question-and-answer sessions with our teachers for facts that I was curious about or when I had questions left in my mind.</p>	97

Theme	Codes	Supporting Statement	f
<p>The Negative Factors</p>	<p>Assessment and evaluation related problems</p>	<p>P23. The limited exam times and the problem of the inability to return to a question when one made a wrong marking caused stress. P56. In distance education, I think there was too much homework in each course at the same time. The fact that it took a lot of time and sometimes the homework being unproductive reduced my motivation. P59. In the simultaneous multiple-choice exams, which are rarely used for certain courses, the students were not allowed to return to the items, and the allocated time was insufficient. P87. Some courses had a very short exam duration (like 20 questions 19 minutes). This situation caused me to be unable to answer all of the questions. P99. We had to be in front of the computer all the time because we were given a lot of homework. This situation caused me to take a dislike to the lesson and reduced my interest. P104. Excessive homework and exams alienated us from the lessons. Even though we reached the finals week, we continued to do our midterm homework and we were doing them reluctantly.</p>	<p>91</p>
	<p>Distractibility</p>	<p>P39. Since I did not have a room of my own at home, my siblings' noise and my parents' conversations distracted me during lessons. P77. The small size and crowded nature of our house negatively affected my focus in lessons.</p>	<p>23</p>
	<p>Belief in the efficacy of face-to-face education over distance education</p>	<p>P22. I think that face-to-face education is more efficient and effective than distance education. Until now, I always had face-to-face training and people cannot easily give up their habits. P44. Distance education definitely cannot replace face-to-face education, because you can clearly feel the authority of the teacher in face-to-face education. P90. In face-to-face education, one can establish teacher-student communication in a healthier manner compared to distance education. Students can participate more actively in the lesson. Therefore, I cannot say that distance education has positively affected my academic performance.</p>	<p>32</p>

IV. Conclusion and discussion

In this study, it was first investigated whether Online Learning Self-Efficacy (OLSE) and attitude towards online learning (AOL) significantly predicted the academic performance (AP) of Turkish pre-service mathematics teachers. In the next stage, 118 volunteer teacher candidates were asked what factors they thought had a positive or negative effect on their academic success during distance education and were asked to explain these factors. In this study, unlike the studies conducted in the literature,^{90,91,92,93,94} online learning self-efficacy and attitude towards online learning as predictor variables were included in the study and both quantitative and qualitative data were collected. The results obtained from the study are important because they reveal the positive and negative factors that affect the academic performance of students in the online learning process, as well as showing whether the variables of online self-efficacy and attitude towards online learning are significant predictors of academic performance. The results obtained from the study can be a guide for practitioners, policy makers and teachers to take the necessary precautions for the effective execution of the distance education process.

This study revealed several critical conclusions with the findings from four research questions. A significant positive relationship between prospective mathematics teachers' online learning self-efficacy and level of academic performance was found. Therefore, as the prospective mathematics teachers' self-efficacy toward online learning improves, their academic performance will also improve positively. This result is similar to other

⁹⁰ Judy Drennan, Jessica Kennedy, and Anne Pisarski, "Factors Affecting Student Attitudes Toward Flexible Online Learning in Management Education," *Journal of Educational Research* 98, no. 6 (2005): 331-338. <https://doi.org/10.3200/JOER.98.6.331-338>.

⁹¹ Maria Puzziferro, "Online Technologies Self-efficacy, Self-regulated Learning, and Experimental Variables as Predictors of Final Grade and Satisfaction in College-Level Online Courses," *American Journal of Distance Education* 22, no 2 (2006): 72-89. <https://doi.org/10.1080/08923640802039024>.

⁹² Mariia Rizun and Artur Strzelecki, "Students' Acceptance of the COVID-19 Impact on Shifting Higher Education to Distance Learning in Poland," *International Journal of Environmental Research and Public Health* 17, no 18 (2020): 1-19. <https://doi.org/10.3390/ijerph17186468>.

⁹³ Chia-Lin Tsai et al., "The Self-Efficacy," 472-489.

⁹⁴ Shem Unger and William Meiran, "Student Attitudes Towards Online Education During the COVID-19 Viral Outbreak of 2020: Distance Learning in a Time of Social Distance," *International Journal of Technology in Education and Science* 4, no 4 2020: 256-266. <https://doi.org/10.46328/ijtes.v4i4.107>.

studies in the literature.^{95,96,97,98,99,100,101} It is concluded that students with low self-efficacy are less likely to make an effort and be successful in subjects they have difficulty with than students with high self-efficacy, and drew attention to the relevance of self-efficacy in student success.¹⁰²

This study showed that there was a significantly positive relationship between prospective mathematics teachers' attitude toward online learning and level of academic performance. Therefore, as prospective mathematics teachers' attitudes toward online learning develop positively, their academic performance will also improve. This result is similar to the studies in the literature.^{103,104,105} For example, Martinez et al.¹⁰⁶ concluded that student attitude in the distance education process affects academic success. Mohamed and Waheed¹⁰⁷ concluded that if students' attitudes toward lessons are

⁹⁵ Katrin Arens, Anne C. Frenzel, and Thomas Goetz, "Self-Concept and Self-Efficacy in Math: Longitudinal Interrelations and Reciprocal Linkages with Achievement," *The Journal of Experimental Education* 90, no. 3 (2020): 1-19. <https://doi.org/10.1080/00220973.2020.1786347>.

⁹⁶ Adeneye Awofala, "Correlates of Senior," 15-25.

⁹⁷ Toni Honicke and Jaelyn Broadbent, "The Influence of Academic Self-efficacy on Academic Performance: A Systematic Review," *Educational Research Review* 17, (2016): 63-84. <https://doi.org/10.1016/j.edurev.2015.11.002>.

⁹⁸ Dan Li, "A Review of Self-efficacy," 526-533.

⁹⁹ Journal of Physics: Conference Series, "Mathematics self efficacy and mathematics performance in online learning," accessed May 1, 2021. <https://iopscience.iop.org/article/10.1088/1742-6596/1882/1/012050>

¹⁰⁰ Chia-Lin Tsai et al., "The Self-Efficacy," 472-489.

¹⁰¹ Ya-Ling Wang, Jyh-Chong Liang, and Chin-Chung Tsai, "Cross-Cultural Comparisons of University Students' Science Learning Self-efficacy: Structural Relationships Among Factors within Science Learning Self-efficacy," *International Journal of Science Education* 40, no. 6 (2018): 579-594. <https://doi.org/10.1080/09500693.2017.1315780>.

¹⁰² Dale H. Schunk, "Self-efficacy and Education and Instruction," In *Self-Efficacy, Adaptation, and Adjustment: Theory, Research, and Application*, edited by James E. Maddux, 281-303. Plenum Press, 1995.

¹⁰³ Gwo-Jen Hwang, Po-Han Wu, and Chi-Chang Chen, "An Online Game Approach for Improving Students' Learning Performance in Web-based Problem-Solving Activities," *Computers & Education* 59, no. 4 (2012): 1246-1256. <https://doi.org/10.1016/j.compedu.2012.05.009>.

¹⁰⁴ Linda Khateeb, Sameer Aowad Kassab Shdaifat, and Nidal A. K. Shdaifa, "Effectiveness of communication techniques in distance education and its impact on learning outcomes at Jordanian Universities (Northern Province)," *International Journal of Higher Education* 10, no. 2 (2021): 74-82. <https://doi.org/10.5430/ijhe.v10n2p74>.

¹⁰⁵ Mengping Tsuei, "Using Synchronous Peer Tutoring System to Promote Elementary Students' Learning in Mathematics," *Computers & Education* 58, no. 4 (2012): 1171-1182. <https://doi.org/10.1016/j.compedu.2011.11.025>.

¹⁰⁶ Romero J. Sonia Martínez et al., "Attitudes Toward," 59-75.

¹⁰⁷ Lawsha Mohamed and Hussain Waheed, "Secondary Students' Attitude," 277-278.

positive, there is a significant increase in their performance and academic achievement in the learning process.

This study revealed that prospective mathematics teachers' online learning self-efficacy and attitude toward online learning had a significant influence on their academic performance. The R^2 and R^2 change values in Table 4 show that Online Learning Self-Efficacy is more effective in predicting academic performance. The results showed that the level of academic performance can be predicted by online learning self-efficacy and attitude toward online learning. When the studies are examined, it is seen that self-efficacy is one of the most important predictors of academic success.^{108,109,110} On the other hand, there were results revealing that another predictor of academic success is attitude.^{111,112} However, there were no studies on whether the attitude and self-efficacy toward online learning are significant predictors of academic success. Yet, some studies have revealed the significant effects of motivation and self-efficacy on academic achievement.^{113,114}

Therefore, academics should first determine the self-efficacy and attitude levels of prospective mathematics teachers toward online learning. For students who do not have sufficient self-efficacy and attitude, educators can concretize abstract concepts that are difficult to understand. Computer software can assist the concretization process. The distance education

¹⁰⁸ David B Feldman and Maximilian Kubota, "Hope, Self-efficacy, Optimism, and Academic Achievement: Distinguishing Constructs and Levels of Specificity in Predicting College Grade-point Average," *Learning and Individual Differences* 37 (2015): 210-216. <https://doi.org/10.1016/j.lindif.2014.11.022>.

¹⁰⁹ Meera Komarraju and Dustin Nadler, "Self-Efficacy and Academic Achievement: Why Do Implicit Beliefs, Goals, and Effort Regulation Matter?," *Learning and Individual Differences* 25, (2013): 67-72. <https://doi.org/10.1016/j.lindif.2013.01.005>.

¹¹⁰ Antonio Zuffianò et al., "Academic Achievement: The Unique Contribution of Self-efficacy Beliefs in Self-regulated Learning Beyond Intelligence, Personality Traits, and Self-esteem," *Learning and Individual Differences* 23 (2013): 158-162. <https://doi.org/10.1016/j.lindif.2012.07.010>.

¹¹¹ Peter Kpolovie, Andy Igbo Joe, and Tracy Okoto, "Academic Achievement Prediction: Role of Interest in Learning and Attitude Towards School," *International Journal of Humanities Social Sciences and Education* 1, no. 11 (2014): 73-100.

¹¹² Wisdom Owo and Emmanuel F. Ikwut, "Relationship Between Metacognition, Attitude and Academic Achievement of Secondary School Chemistry Students in Port Harcourt, Rivers State," *IOSR Journal of Research & Method in Education* 5, no. 6 (2015): 6-12. <https://doi.org/10.9790/7388-05630612>.

¹¹³ Edward L Deci and Richard M. Ryan, "Facilitating Optimal Motivation and Psychological Wellbeing Across Life's Domains," *Canadian Psychology* 49, no. 1 (2008): 14-23. <https://doi.org/10.1037/0708-5591.49.1.14>.

¹¹⁴ Meera Komarraju and Dustin Nadler, "Self-Efficacy," 67-72.

process can utilize learner-interface interaction to make learners active in their own learning processes and to participate in the lesson productively. For this, one can obtain support from software that can help share content created by learners and benefit from cooperation.¹¹⁵ On the other hand, various discussions can be conducted in relation to social media applications (WhatsApp-Telegram-Facebook-Twitter) to ensure learner-instructor and learner-learner interaction. In addition, online educators can increase the motivation of their students by using communication tools such as email, chat room, social networking services, and bulletin boards for online learning.

The findings of the study determined that there are factors that have favorable and adverse effects on the academic performance of prospective mathematics teachers in the distance education process. As a result of the written opinions received from teacher candidates, the factors that have a positive effect on academic performance were coded as “Ease of accessing lecture notes and video recordings of the lecture,” “Efficient use of time,” “Use of different assessment and evaluation techniques (homework, forum, quiz, and performance task),” and “Comfort of the working environment.” The factors that have a negative impact on academic performance were; “Technological problems,” “The teaching method and teaching tools used,” “Instruction time,” “Teacher-student interaction,” “Assessment and evaluation related problems,” “Distractibility,” and “Belief in the efficacy of face-to-face education over distance education.” In addition to these factors, existing studies have highlighted other factors such as technological infrastructure,^{116,117,118,119} teacher-student interaction,^{120,121} assessment and

¹¹⁵ Neelu Sinha, Laila Khreisat, and Kiron Sharma, “Learner-Interface Interaction for Technology-Enhanced Active Learning,” *Innovate: Journal of Online Education* 5, no. 3 (2009): 1-9.

¹¹⁶ Pia Ceres, “A Covid Slide’ Could Widen the Digital Divide for Students,” accessed May 4, 2021, <https://www.wired.com/story/schools-digital-divide-remote-learning/>.

¹¹⁷ Thelma Obiakor and Adeniran Adedeji P, “COVID-19: Impending Situation Threatens to Deepen Nigeria’s Education Crisis,” accessed May 1, 2020, <https://www.africaportal.org/publications/covid-19-impending-situation-threatens-deepen-nigerias-education-crisis/>.

¹¹⁸ Rachel Gong, “Coping with MCO: Distance learning and the digital divide,” accessed October 15, 2020, <https://www.malaymail.com/news/what-you-think/2020/03/27/coping-with-mco-distance-learning-and-the-digital-divide-rachel-gong/1850758>.

¹¹⁹ Yash Sharma, “Massive Open,” 1–5.

¹²⁰ Doris U Bolliger and Oksana, Wasilik, “Factors Influencing Faculty Satisfaction With Online Teaching and Learning in Higher Education,” *Distance Education* 30, no. 1 (2009): 103-116. <https://doi.org/10.1080/01587910902845949>.

¹²¹ Jennifer Haber and Michael Mills, “Perceptions of Barriers,” 266-283.

evaluation processes,¹²² and time management and motivation^{123,124,125} also affect the academic performance of the students in the distance education process. Reasons such as technical failures in the distance education system, lack of content and material, communication breakdowns, and the emotional reluctance of students negatively affect students' attitudes toward distance education.¹²⁶ According to Fidalgo et al.,¹²⁷ many students believe that time management and lack of motivation are major concerns about distance education. Especially after the earthquakes that took place in Türkiye on February 6, 2023 and negatively affected 10 provinces, the decision of distance education was taken again in the universities in Türkiye. It should also be emphasized that students living in the earthquake area are likely to have a lack of concentration, loss of motivation and a source of mental depression.

V. Suggestions and implications

According to the results obtained from the study, when prospective mathematics teachers' self-efficacy and attitudes toward online learning are positive and high, their academic performance will be congruent. It can be said that the learning-teaching process in distance education requires interactive, rich content practices and course tools that increase the quality of the time they spend. In distance education, the duration of the lessons is shorter than in normal education, but the intense content plays an important role in the individual participation of the students, their following the lesson, their interaction with each other and with the lecturer. For this reason, it is important to organize the course contents, course design, questions, examples and assignments in the course in a way that attracts students' attention and motivates them. If the learning environments are organized in a student-centered manner in line with the expectations of the teacher candidates, it can be said that the attitudes and self-efficacy of the prospective mathematics teachers towards distance learning can be improved in a positive way.

Additionally, when there are no technological disruptions in the distance education process, when educators use appropriate teaching methods and tools that will make students active in the teaching process and enable them

¹²² Tracy Chao, Tami Saj, and Felicity Tessier, "Establishing a Quality," 32-39.

¹²³ Patricia Fidalgo et al., "Students' Perceptions," 1-18.

¹²⁴ Reinhard Pekrun et al., "Boredom and Academic," 696-710.

¹²⁵ Allen Wigfield et al., "Development of achievement," 657-700.

¹²⁶ Rasheed Falowo, "Factors Impeding," 315-338.

¹²⁷ Patricia Fidalgo et al., "Students' Perceptions," 1-18.

to access information themselves, when they keep interactions such as educator-student, student-student, student-interface at a high level, and when they use process-based appropriate assessment and evaluation tools, educators can contribute to the improvement of students' academic performance. If the instructors involved in the distance education process take into account the factors that have positive and negative effects on the academic performance of the students and plan their lessons accordingly, this situation can contribute to the effective and efficient execution of the distance education process. In the distance education process, apart from the positive and negative factors revealed in this study, it may be beneficial for the instructors to have regular online meetings with their students and consider the opinions of the students to identify the different factors that may arise and to take the necessary precautions in this direction.

The results obtained from this study are limited to the answers from 1075 and 118 prospective mathematics teachers. In addition, the study reviewed two predictor variables (self-efficacy toward online learning and attitude toward online learning). The research tried to overcome this limitation with the prompt, "Write down the positive and negative factors that affect your academic performance in the distance education process" directed at the prospective mathematics teachers. In the light of the results, it is necessary to reconsider the roles and competencies of distance educators in traditional education according to distance education environments,¹²⁸ because educators becoming effective instructors in distance education applications depend on whether they have multidimensional roles and various competencies.¹²⁹

Caution needs to be paid to the generalizability of the results obtained in this study. Students in different countries have different access to technological tools. Self-efficacy levels and attitudes towards online learning of students who do not have their own devices such as computers and tablets at home may differ from those who have these tools. In addition, whether universities in different countries are familiar with the distance education process and their technological infrastructures and the experiences of academicians in this process may differ. Since the participants in this study are prospective mathematics teachers, similar studies can be conducted on prospective teachers from different branches in future research. Future studies can also investigate whether variables other than self-efficacy toward online learning and attitude toward online learning

¹²⁸ Michael Beaudoin, "The Instructor's Changing Role in Distance Education," *The American Journal of Distance Education* 4, no. 2 (1990): <https://doi.org/10.1080/08923649009526701>.

¹²⁹ Nada Dabbagh and Brenda Bannan-Ritland, *Online learning: Concepts, Strategies, and Application* (Prentice Hall, 2005).

(motivation, satisfaction, academic stress, etc.) are significant predictors of academic performance. Additionally, studies can investigate direct and indirect effects between predictor (motivation, satisfaction, academic stress, self-efficacy, and attitude) and predicted (academic performance) variables through path analysis or structural equation modeling.

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Appendix 1. Factors and items of the Online Learning Self-efficacy Scale (Sun and Rogers, 2020)

Factor	Items
Technology use self- efficacy	1) I feel confident in downloading and installing a software or application from a website.
	2) I feel confident in printing a website.
	3) I feel confident in downloading (saving) an image from a website.
	4) I feel confident in bookmarking a website.
	5) I feel confident in copying a block of text from a web site and pasting it to a document in a word processor.
	6) I feel confident in accessing links to web resources.
	7) I feel confident in conducting an Internet search using one or more keywords

Factor	Items
Online learning task self-efficacy	8) I feel confident in taking an online quiz/test.
	9) I feel confident in viewing my grades in the grade book of the Learning Management System (e.g., BlackBoard).
	10) I feel confident in viewing my online course materials in the Learning Management System (e.g., BlackBoard).
	11) I feel confident in submitting course assignments through the Learning Management System (e.g., BlackBoard).
Instructor and peer interaction and communication self-efficacy	12) I can develop a sense of community through interactions with other online course participants.
	13) I can feel connected to others in my online courses.
	14) I can develop a sense of community through interactions with my online instructors.
	15) I can share my problems with my online classmates so we know what we are struggling with and how to solve our problems.
	16) I can communicate with my online classmates to find out how I am doing in my online classes.
	17) I can develop a sense of collaboration through team work/projects in my online
Self-regulation and motivation efficacy	19) I can make myself feel the need to do an outstanding job in an online course.
	20) I can encourage myself to understand the most difficult materials presented in an online course
	21) I can motivate myself to persist in my online courses when facing difficulties or setbacks
	22) I can motivate myself to explore content related questions in my online courses
	23) Even in the face of technical difficulties, I can motivate myself to learn the materials presented in an online course.

Factor	Items
Self-regulation and motivation efficacy	24) I can motivate myself to learn online through the belief that my online courses can broaden my knowledge about subjects which appeal to me.
	25) I can motivate myself to perform well in my online courses by seeing how these courses can move me closer to my career goals.
	26) I can motivate myself to learn in my online courses without the presence of instructors to assist me.
	27) I can manage study time for my online courses by setting goals.
	28) I can find where I am able to study most efficiently for my online courses.
	29) I can make myself feel the need to utilize a variety of information sources to explore problems posed in my online courses.
	30) I can work extra problems in my online courses in addition to the assigned ones in order to master the course content.
	31) I can motivate myself to work hard in my online courses through the belief that my online courses can help me get a degree allowing me to get a better salary later

1 point: strongly disagree, 2 point: disagree, 3 point: somewhat disagree, 4 point: somewhat agree, 5 point: agree, 6 point: strongly agree

Appendix 2. Çevrimiçi öğrenme öz yeterlik ölçeği (Online Learning Self-efficacy Scale-Turkish Form)

Faktör	Madde
Teknoloji Kullanımı öz yeterliği	1) Bir web sitesinden bir yazılım veya uygulama indirip yüklerken kendime güvenirim.
	2) Bir web sitesinden çıktı alırken kendime güvenirim.
	3) Bir web sitesinden bir görsel indirirken (kaydederken) kendime güvenirim.
	4) Bir web sitesini sık kullanılanlara eklerken kendime güvenirim.
	5) Bir web sitesinden bir metni kopyalayıp, bu metni word belgesine yapıştırmada kendime güvenirim.
	6) Web sayfalarının bağlantılarına erişimde kendime güvenirim.
	7) Bir ya da birden fazla anahtar kelime kullanarak internette arama yapmada kendime güvenirim.
Çevrimiçi öğrenme görevi öz-yeterliği	8) Çevrimiçi bir sınava (test, quiz vb.) girmede kendime güvenirim.
	9) Öğrenme Yönetim Sisteminin (örn. Boysis, Moodle, AYDEP, Proliz vb) notlar kısmından notuma bakmada kendime güvenirim.
	10) Öğrenme Yönetim Sisteminde (örn. Boysis, Moodle, AYDEP, Proliz vb.) çevrim içi ders materyallerini görüntülemde kendime güvenirim.
	11) Öğrenme Yönetim Sistemi (örn. Boysis, Moodle, AYDEP, Proliz vb.) aracılığıyla dersin ödevlerini teslim etmede kendime güvenirim.
Eğitici ve akran etkileşimi ve iletişimi öz-yeterliği	12) Çevrim içi derslerimde sınıf arkadaşlarımla etkileşimler yoluyla bir topluluk duygusu geliştirebilirim.
	13) Diğer çevrim içi ders katılımcılarıyla iletişim kurabilirim.
	14) Çevrim içi derslerimde öğretim elemanlarıyla etkileşimler yoluyla bir topluluk duygusu geliştirebilirim.
	15) Çevrim içi derslerimde sınıf arkadaşlarımla eğitim-öğretimle ilgili (öğrenme güçlüğü yaşadığım konular, kavramlar vb) problemlerimi paylaşabilirim.

Faktör	Madde
Eğitici ve akran etkileşimi ve iletişimi öz-yeterliği	16) Çevrim içi derslerimde ekip çalışması/projeler aracılığıyla bir işbirlikli öğrenme ortamı oluşturabilirim.
	17) Çevrim içi derslerimde eğitim öğretim ile ilgili (öğrenme eksiklikleri vb.) ne durumda olduğumu öğrenmek için sınıf arkadaşlarımla iletişim kurabilirim
	18) Çevrim içi derslerimde diğer katılımcıları tanıyarak, çevrimiçi derslerime aidiyet duygusu (bir gruba ait olma, mensup olma) kazanabilirim.
Öz düzenleme ve motivasyon öz-yeterliği	19) Çevrim içi derslerde başarılı olmak için gayretli bir şekilde çalışmam gerektiği hususunda kendimi motive edebilirim.
	20) Çevrim içi bir derste sunulan en zor materyalleri bile anlamak için kendimi cesaretlendirebilirim.
	21) Zorluklar veya aksaklıklarla karşılaştığımda çevrim içi derslerime devam etmede kendimi motive edebilirim.
	22) Çevrim içi derslerimde öğretim elemanları tarafından sorulan soruların cevaplarını bulmak için ilgili kaynaklara ulaşmada kendimi motive edebilirim.
	23) Çevrim içi derslerimde teknik zorluklar ile karşılaşsam bile, derste sunulan ders içeriklerini öğrenmek için kendimi motive edebilirim.
	24) Çevrim içi derslerimin, ilgimi çeken konular hakkında bilgimi arttıracığına inandığım için kendimi çevrim içi öğrenmeye motive edebilirim.
	25) Çevrim içi derslerin beni kariyer hedeflerime nasıl yaklaştırabileceğini görerek, çevrim içi derslerimde iyi performans gösterme konusunda kendimi motive edebilirim.
	26) Çevrim içi derslerde hiçbir destek almadan ilgili konuları öğrenmek için kendimi motive edebilirim.
	27) Çevrim içi derslerim için çalışma süresini, kendime hedefler belirleyerek yönetebilirim.
	28) Çevrim içi derslerime verimli şekilde çalışmam konusunda kendimi motive edebilirim.

Faktör	Madde
Öz düzenleme ve motivasyon öz-yeterliği	29) Çevrim içi derslerimde ortaya çıkan sorunları (ders ile ilgili veya teknik sorunlar vb.) çözmek için çeşitli bilgi kaynaklarını kullanma konusunda kendimi motive edebilirim.
	30) Ders içeriğine hâkim olmak için verilen ödevlere ek olarak çevrim içi derslerimde ekstra problemler üzerine çalışabilirim.
	31) Çevrim içi derslerimin, daha iyi bir maaş almamı sağlayacak bir kariyere ulaşmamda bana yardımcı olabileceği inancıyla, çevrimiçi derslerimde çok çalışmak için kendimi motive edebilirim.

1 puan: Kesinlikle Katılmıyorum, 2 puan: Katılmıyorum, 3 puan: Kısmen Katılmıyorum, 4 puan: Kısmen Katılıyorum, 5 puan: Katılıyorum, 6 puan: Kesinlikle Katılıyorum

Emerging strategies and challenges faced by professors during Emergency Remote Teaching (ERT) at a Colombian university

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Abstract: This paper analyzed the relationship between emergent teaching strategies and the challenges professors at Universidad Icesi (Cali, Colombia) faced when transitioning to Emergency Remote Teaching (ERT) during the COVID-19 pandemic. A survey with open-ended questions was used to conduct a content analysis, followed by a correspondence analysis. The main findings were that most professors described submitting information and interaction as the most common teaching strategies. The challenges were primarily emotional and technical in nature. There were differences in discipline, gender, and age. Furthermore, there was no

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alignment between the challenges and the proposed strategies. Finally, this research has significant implications for future teacher training programs that emphasize faculty diversity.

Keywords: Faculty; emergency remote teaching; teaching challenges; teaching strategies; Colombia.

I. Introduction

COVID-19 has posed a challenge to education institutions' teaching efforts. The World Economic Forum (2020) estimates that approximately 1.5 billion students from universities, colleges, and schools could not physically attend classes in 2020. Universities have had to make sudden changes to stay afloat despite the challenges occasioned by the pandemic (Smalley 2021). The sudden need for change, and face-to-face teaching strategies had to be replaced with virtual classes, which adopted an Emergency Remote Teaching (ERT) approach (Hodges et al. 2020). This shift was abrupt and particularly challenging in developing countries, where only 47% of the population has access to the Internet (International Telecommunication Union 2019).

At Icesi University in Cali, Colombia, this unprecedented phenomenon occurred in the second half of March 2020, when course processes were in the middle of the first semester. The change was abrupt and sudden. Over 7500 undergraduate and graduate students transitioned from "face-to-face" to ERT within a week. The University has a pedagogical model based on active learning methodology and constructivist principles. It also maintains a social inclusion policy, with more than 60% of its students coming from households with low-income levels. This condition presents a more significant challenge with the abrupt shift to remote education, where access to transmission networks and computer equipment is necessary.

Furthermore, it is important to identify the professors' strategies and challenges during this time of abrupt and necessary changes to improve the quality of the teacher training programs, considering the differences found regarding discipline, gender, and age. This means improving the training and support received by faculty, understanding the diversity of professors and the need for flexibility.

This study explores the challenges faced and the strategies adopted by faculty during ERT. It presents professors' descriptions of the challenges they experienced and their strategies to counter them. The research question is as follows: What relationship exists between emergent strategies and challenges identified by faculty during ERT implementation considering demographic variables?

This question will be answered by categorizing the professors' responses depending on the challenges and strategies after the first week of an abrupt change from face-to-face teaching to remote teaching. The categorization was based on the existing literature regarding strategies and challenges experienced during ERT. In addition, a correspondence analysis was conducted to establish how emerging strategies and challenges were associated. The main contribution of this study is to identify differences in discipline and age in the emergent strategies used and the challenges faced by faculty. The findings contribute to identifying needs—in terms of faculty training—that could be used to design training curricula that consider the heterogeneity of a faculty member in terms of emergent strategies and challenges compared by demographic variables such as discipline and age.

II. Literature review

Teaching online usually comes along with the implementation of new teaching strategies. The existing literature shows that the strategies adopted for online teaching depend on the aim or objective pursued, such as enhancing student interactivity (Durrington, Berryhill, and Swafford 2006), achieving or fostering student engagement (Angelino, Williams, and Natvig 2007; Heilporn, Lakhali, and Bélisle 2021), improving time management (Shi, Bonk, and Magjuka 2006) or creating a collaborative online learning environment (Duncan and Young 2009).

Additionally, transitioning to online teaching poses several challenges. Various authors have identified online teaching issues, concerns, and challenges (Bower and Hardy 2004; Duncan and Young 2009; Xu and Mahenthiran 2016). These challenges are often related to technical or support problems (Bower and Hardy 2004; Xu and Mahenthiran 2016), concerns regarding student engagement and enhanced learning (Duncan and Young 2009; Xu and Mahenthiran 2016) and changes in the interaction dynamics and roles inside virtual classrooms (Xu and Mahenthiran 2016).

However, the emerging teaching strategies used and challenges faced during remote or online teaching might differ during times of crisis, such as the COVID-19 pandemic.

II.1. *Strategies and challenges during ERT*

As a result of this situation, a new concept emerged in education called ERT. According to Hodges et al. (2020), this concept refers to a temporary

shift of instructional delivery to a different one due to emergencies. It involves using remote teaching solutions that would have otherwise been delivered through face-to-face teaching (Hodges et al. 2020). It is important to note that ERT, by its nature, faces various challenges, such as a lack of adequate support resources and insufficient teacher training.

Moreover, a growing number of studies have used the concept of ERT to explain or understand the new common ground in education—a form of educational delivery that removes face-to-face interaction by incorporating remote solutions and various virtual resources (Al-Marouf et al. 2020; Ferri, Grifoni, and Guzzo 2020; Greenhow and Galvin 2020; Mishra, Gupta, and Shree 2020; Mohammed et al. 2020; Rahim 2020; Ramlo 2021; Safi, Wenzel, and Spalding 2020; van der Spoel et al. 2020).

According to some authors, one of the most recommended strategies to use during ERT is the implementation of asynchronous activities (such as discussion forums and document creation through notetaking) as an opportunity for students who could not attend the synchronous session (Greenhow and Galvin 2020; Mohammed et al. 2020), including the integration of social media into ERT (Greenhow and Galvin 2020). Other strategies include the flexibilization of assignments and due dates and development institutional policies (Mohammed et al. 2020). In addition, various authors recommend a smooth and monitored transition to ERT. For instance, Rahim (2020) compiled some guidelines for online assessment strategies and discussed them, considering the ERT concept. In summary, the main strategies proposed or recommended by the authors reviewed were I) incorporating asynchronous activities along with synchronous activities, II) being flexible with the demands of students, III) ensuring that the statement of learning objectives is aligned with the evaluations, IV) addressing students' diverse and challenging situations and V) establishing clear communication with students while giving quality feedback.

The most frequent challenges highlighted by professors during ERT were related to technical or support problems and difficulties experienced in the use of tools or resources (Ahmed and Opoku 2021; Dorfsman and Horenczyk 2021; Ferri, Grifoni, and Guzzo 2020; Jung et al. 2021; Kovacs, Pulfrey, and Monnier 2021; Mishra, Gupta, and Shree 2020; Safi, Wenzel, and Spalding 2020; Talidong 2020; Whalen 2020). Other concerns were regarding students' engagement and participation (Ferri, Grifoni, and Guzzo 2020; Heilporn, Lakhali, and Bélisle 2021; Safi, Wenzel, and Spalding 2020; Talidong 2020) and social problems related to community building and lack of spaces to learn and teach from home (Ferri, Grifoni, and Guzzo 2020; Safi, Wenzel, and Spalding 2020). As described by Ferri, Grifoni, and Guzzo

(2020), these challenges can be classified as I) technological challenges, II) pedagogical challenges, and III) social challenges.

Last, according to some authors, the adoption and acceptance of this new form of instruction delivery are influenced by the personal or demographic characteristics of faculty (Ramlo 2021; van der Spoel et al. 2020) and students (Aristovnik et al. 2020).

II.2. Professors' technology adoption and usage by disciplines

Various authors have found differences in adopting instructional technologies in classrooms during well-planned online education (Anderson, Varnhagen, and Campbell 1998). The authors used Roger's Diffusion theory (Rogers 2010). They described the "early adopters" as more likely to be from the School of Sciences and Engineering and less likely to be from the faculty of Arts (Anderson, Varnhagen, and Campbell 1998). Moreover, according to an investigation of technology adoption among medical school faculty members, one significant barrier to developing technology-based applications is carrier-related. This barrier discourages young medical faculty from spending time and effort implementing new technology, although they are more familiar with it than senior faculty (Zayim, Yildirim, and Saka 2006).

II.3. Professors' technology adoption and usage by age

Some studies have stated that age is important in understanding behaviors and attitudes toward technology usage and adoption (Chung et al. 2010; Gibson, Harris, and Colaric 2008; McFarland 2001; Tarhini, Hone, and Liu 2014). Furthermore, Tarhini, Hone, and Liu (2014), using the Technology Acceptance Model (TAM), found that age moderates the effect of perceived ease of use and perceived usefulness, among other components of TAM. Moreover, Chung et al. (2010) found a negative relationship between age and internet self-efficacy, which could discourage technology usage in older participants.

III. Research methodology

III.1. Participants

The present study used secondary data from a private university in Colombia, South America. The authors received authorization from the university to use the data in an aggregate way, so individuals cannot be identified. An online survey was conducted involving 725 university

professors. These professors belonged to five different schools. The directors from each department invited the professors to answer questions about their ERT teaching experience. There were 935 answers, out of which 178 were repeated, 78 were partially repeated, 349 were incomplete, 28 were incoherent responses, and 302 were complete, representing 295 professors (some professors responded to questions from more than one course, and they provided different responses to each course). Table 1 presents the demographic characteristics of the professors in terms of age and years of experience at the university by faculty and gender.

Table 1
Demographic characteristics

School	Number of Professors			Experience at Icesi University (years)			Average Age (years)		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Law & Social Sciences	19	35	54	3,6	2,9	3,1	43	40	41,1
Economics & Business Administration Sciences	47	41	88	4,5	4,5	4,5	48	50	48,9
Natural Sciences & Medicine	31	43	74	2,1	2,2	2,2	38	43	40,9
Education Sciences	17	29	46	2,1	2,8	2,5	43	47	45,5
Engineering	3	30	33	9,1	5	5,4	36	45	44,2
Total	117	178	295	3,5	3,4	3,4	44	45	44,6

III.2. Instrument

The questionnaire inquired about the teaching strategies used and the challenges faced: technical, academic, emotional, or affective (see annex 1). The teaching strategies were described as the professors' planning and evaluation for the online classes. However, this definition was not in the questionnaire. As a result, each professor responded depending on how they understood the questions and what they interpreted as teaching strategies and challenges. Professors were free to write any strategies that they believed could be effective.

III.3. Content analysis

Data analysis was performed following the qualitative research model Creswell (2009) and Lee and Lee (1999) proposed. This analysis presented an opportunity to examine the narratives (Lee and Lee 1999) written by the professors regarding their specific experiences with ERT. First, the raw data was organized. Then, the professors who responded several times to the same questions (evaluating the same course) were identified. Finally, the completed entries and those that had missing responses were also identified. Only the responses with complete and non-repetitive answers were used for subsequent analyses.

A senior author then reviewed all the data to obtain a general sense of information and emerging topics. First, the responses underlying topics were recorded, and similar topics were clustered and abbreviated. Next, the topics were labelled with categories. Finally, the senior researcher tested the categories on the data back and forth until most responses could be coded into one or more categories. The researcher corroborated or changed the categories during this process without coding the responses.

Next, the coding process continued with two researchers assigning all the responses to the categories. Tables 2 and 3 show the qualitative code tables used for coding the data with the description of each category and some examples from the coding process that the researchers identified. One response could have one or more categories, so the different categories were coded in each response. For example, the first category was assigned to the first theme, and the second category to the second theme. An intercoder agreement was achieved by cross-checking by two researchers. The responses with coding differences were re-evaluated until an agreement was achieved, and the responses that did not fit into any categories were coded as others. At this point, the researchers developed the hypotheses to be tested.

Table 2
Strategies code table

Strategies		
Category	Category Description	Examples
Content Submit	The content exchange between professor and student before/after class (asynchronous).	Videos, PowerPoint presentations, blogs, audios, lectures, workshops, photos, quizzes, exams, evaluations, conceptual maps, homework, deliverables, infographics, flowcharts, podcasts.

Strategies		
Category	Category Description	Examples
Interaction	Real time interaction (synchronous) or in "quasi-real-time" (delayed synchronous) between the professor and student.	Zoom, Teams, Google Meet, virtual whiteboard, virtual session, Kahoot, discussions, in-class workshops, discussion forums, Skype, debates, Go To Meeting, seminars, chat, WhatsApp, email, Discord, Slack, feedback, pedagogical support, permanent communication with students, answering questions, personalized advice, follow-up, guidance.
Planning and Groups	Planning the redesign of the course to adjust it to Emergency Remote Teaching.	Redesign classes, planning, defining the agenda, detailed schedule, design per week, activity scheduling, class route, weekly work, digital guides, course restructuring, specific objectives, guidelines, datasheet, group workshop, practical workshop, divide the group and assign roles, organization of small groups, virtual round tables.
Other	Strategies that are unique to a few professors.	Collaboration between professors, collaborative work to motivate the students, opening other communication channels, strengthening student autonomy, visual thinking, project-based learning.

Table 3
Challenges code table

Challenges		
Category	Category Description	Examples
Emotional	Perception of the professor in terms of workload, emotions, and problems he faces or perceived on the students.	Strong increase in workload, greater effort, and dedication for the preparation of classes, increase in the time dedicated to students, virtual classes generate anxiety, virtual shyness, work takes much time, which was previously used for other activities, conditioning the workplace at home, efficient communication, difficulty interacting with students, change in the relationship with students. In addition, students have expressed feeling overwhelmed by the number of academic tasks to which they must respond; this causes an environment of stress, many students seem distracted, some students are discouraged by their process, financial problems, sharing resources with the family, some must collaborate with other activities in addition to their burden.

Challenges		
Category	Category Description	Examples
Technical	Technical problems perceived by the professor related to ICT knowledge or connectivity.	Learning new tools, technology usage, searching for ICT to meet specific needs, use of Moodle, failures with the internet, unavailability of resources, connection problems.
Academic	Challenges related to the evaluation, feedback, activities, or course quality.	Evaluation, avoiding fraud, follow-up and feedback, control over who participates, developing compelling content that promotes skills development, maintaining quality, redesigning the course and its content to the remote environment.
Group Work	Challenges related to the timing for classes and the course size in the virtual environment.	Working synchronously with large groups, difficulties for teamwork for the students, problems to coordinate sessions, class time is not enough to address the concerns of the students, some students do not connect to the zoom sessions.
Other	Challenges that are unique to a few professors.	No challenges, sabotage by students, time management, being more efficient.

III.4. Analysis method

The data were analyzed using correspondence analysis. The purpose of data analysis was to identify the emergent teaching strategies used by the professors of Icesi University and the challenges each faculty experienced when transitioning into ERT while considering the demographic characteristics to obtain comparative results.

Correspondence analysis is a multivariate statistical method used to analyze categorical data summarized in a contingency table (Greenacre 2017). A contingency table, called cross-tabulation, presents non-negative entries and shows the frequency distribution of one variable in rows and another variable in columns (Greenacre 2000). This technique allows the transformation and interpretation of numerical data into a graphical display, generally in a two-dimensional space (Greenacre 2017).

The number of dimensions for a correspondence analysis is defined using two critical measures: inertia and mass values. Inertia statistics measure the level of explained variance for the dimensions involved, while mass value is a proportion value that indicates the importance of a particular dimension (Greenacre 2000).

IV. Findings

IV.1. Strategies used

The professors were asked to describe the teaching strategies implemented to adjust the teaching-learning process. Table 4 presents a summary of the frequencies for the four strategies identified.

Table 4
Strategies

ID Strategy	Description	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5
Content Submit	Frequency	232	102	12		
	Participation (%)	76,8%	41,0%	6,9%		
Interaction	Frequency	42	109	114	51	34
	Participation (%)	13,9%	43,8%	65,5%	55,4%	85,0%
Planning and Groups	Frequency	10	23	32	37	5
	Participation (%)	3,3%	9,2%	18,4%	40,2%	12,5%
Other	Frequency	18	15	16	4	1
	Participation (%)	6,0%	6,0%	9,2%	4,3%	2,5%
Total		302	249	174	92	40

In 76,8% of the courses, professors' teaching strategies focused on submitting information ("content submit"), either by the professor or the student. These activities were related to professors sending content to the students, such as videos, and students delivering content to the professors, such as developing a workshop and uploading it to the corresponding platform. The second teaching strategy with the highest frequency was the interaction between professors and students, either in real-time or quasi-real-time, by 13,9% of the professors. The teaching strategies with the lowest frequency were "planning and groups" and "other".

In 82.5% of the courses, the professors used a second teaching strategy to complement the first. On average, in 84,7% of the courses, professors' strategies focused on submitting content and interacting with professors and students.

In 57.6% of courses, the professors used a third teaching strategy to complement the first and second strategies. On average, in 65.5% of the courses, the strategies were related to the interaction between professors and students. On the other hand, professors used the "planning and groups" strategy in 18,4% of the courses. The "planning and groups" strategy focused

on redesigning class activities, particularly those related to group conformation. In 30.5% of the courses, the professors employed a fourth teaching strategy focused on “interaction” and “planning and groups”. Finally, on average, the professors used a fifth teaching strategy in only 13.2% of the courses. These results imply that professors focused on interactions with students in 85% of the courses.

IV.2. Identified challenges

The professors were asked to highlight the challenges (emotional, technical, and academic) that they encountered in developing their academic activities. Table 5 presents the professors’ responses regarding the challenges faced.

Table 5
Challenges

ID Challenge	Description	Challenge 1	Challenge 2	Challenge 3	Challenge 4	Challenge 5
Emotional	Frequency	137	48	7	8	6
	Participation (%)	45,4%	30,0%	10,3%	25,0%	46,15%
Technical	Frequency	73	53	28	2	
	Participation (%)	24,2%	33,1%	41,2%	6,3%	
Academic	Frequency	51	33	24	11	2
	Participation (%)	16,9%	20,6%	35,3%	34,4%	15,4%
Group Work	Frequency	17	16	6	9	3
	Participation (%)	5,6%	10,0%	8,8%	28,1%	23,1%
Other	Frequency	24	10		2	2
	Participation (%)	7,9%	6,3%		6,3%	15,4%
Total		302	160	68	32	13

Professors identified emotional challenges in 45,5% of the courses. These challenges were related to feelings or emotions that the teachers identified in the students or within themselves and the perception of a more significant workload from both ends. Contrastingly, professors identified technical challenges in 24.2% of the courses, related to connectivity problems on behalf of the professors or the students and the professors’ ICT skills. Academic challenges, which refer to the professors’ evaluation, monitoring and feedback processes and the new activities they propose in classrooms, were recorded in 16.9% of

the courses. Finally, the professors identified “group work”-related challenges in 5.6% of the courses and “other” kinds of challenges in 7.9% of the courses.

On average, in 52,9% of the courses, the professors identified a second challenge. In this second challenge professors mainly identified four aspects: “technical” (33,1%), “emotional” (30,0%), “academic” (20,6%) and “group work” (10,0%). The central aspect identified as a technical challenge is connectivity problems, while academic challenges are mainly related to developing strategic planning in search of quality.

The professors identified the third challenge in 22.5% of the courses. On average, 95.6% of professors focused mainly on four challenges: “emotional” (10.3%), “technical” (41.2%), “academic” (35.3%) and “group work” (8.8%). The central aspect of the technical challenges was related to connectivity problems. Emotional challenges were associated with problems outside the academic field, while academic challenges were associated with developing of strategic planning in search of quality. Finally, on average, the professors identified the fourth and fifth challenges in 10.6% and 4.3% of the courses, respectively.

IV.3. Correspondence analysis

The professors’ first two strategies in 82.5% of the courses and the two first challenges that 52,9% of the professors faced were incorporated in the correspondence analysis. Table 6 presents the proportion of inertia for each dimension.

Table 6
The dimensionality of correspondence analysis

Dimension	Principal Inertia	Percentage	Cumulative Percentage
dim 1	0.06	33.61	33.61
dim 2	0.04	22.81	56.42
dim 3	0.02	11.55	36.97
dim 4	0.00	3.67	71.64
dim 5	0.00	1.99	73. 63
Total	0.18	100	

The first and second dimensions, put together, explain 56.42% of the inertia. Therefore, the two-dimensional model is appropriate for these data.

Table 7 shows the contingency table between the first two strategies and the first two challenges.

Table 7
Contingency table of strategies and challenges

Category	Challenge 1					Challenge 2						
	Emotional	Technical	Academic	Group W	Other	Total	Emotional	Technical	Academic	Group W	Other	Total
Strategy 1												
Content Submit	114	60	30	14	14	232	40	47	27	12	9	135
Interaction	15	6	12	2	7	42	6	4	6	2	1	19
Planning and Groups	3	2	5	0	0	10	1	0	0	1	0	2
Other	5	5	4	1	3	18	1	2	0	1	0	4
Total	137	73	51	17	24	302	48	53	33	16	10	160
Strategy 2												
Content Submit	61	23	11	4	3	102	23	23	18	3	2	69
Interaction	45	31	15	6	12	109	13	23	7	7	5	55
Planning and Groups	9	6	3	4	1	23	5	1	3	2	2	13
Other	7	3	2	0	3	15	6	1	0	1	0	8
Total	122	63	31	14	19	249	47	48	28	13	9	145

According to Table 7, the 232 professors who used “content submit” as their first strategy mainly faced “emotional” (114), “technical” (60) and “academic” (30) challenges as their first challenges and “technical” (47) and “emotional” (40) as their second challenge for this same strategy. On the other hand, one hundred nine professors used “interaction” as their second strategy, complementing it with the first strategy, and they experienced “emotional” (45) and “technical” (31) challenges. In addition, 102 professors used “content submit” as their second strategy, and they equally faced “emotional” (23) and “technical” (23) challenges.

Table 8 shows the contribution of strategies 1 and 2 and challenges 1 and 2 to each dimension as explained variance and cumulative variance. Dimension 1 explains 33.61%, and dimension 2 explains 22.81% of the variance. Thus, both dimensions account for 56.42% of the total variance.

The researchers found that each dimension’s contributions presented mass values higher than 0.10. Dimension 1 can be named “faced challenges” because the categories that contribute to the existence of the challenges are centered on “emotional” and “academic” aspects in challenge 1 and “group work” and “other” in challenge 2. Dimension 2 can be named “implemented strategies” because the strategies that significantly contribute to its existence are “interaction” and “planning and groups” for strategy 1 and “other” for strategy 2.

In addition, figure 1 represents the graphical output developed by correspondence analysis from table 8 data.

The perceptual map explains the underlying structure and positioning of the courses’ strategies, the professors teaching the courses, and the challenges they face. The professors’ characteristics are also included based on their gender, age, and school. The closer the strategy and challenge categories are located on the map, the more positive the association.

The professors who used the submitting content strategy (i.e., the content was submitted by either a professor or a student before or after class) and the interaction strategy identified emotional and technical challenges as the main issues they faced. However, their responses varied depending on age and gender. For example, in the Law and Social Sciences School, male professors under 35 identified increased student workloads as the main challenge. In contrast, female professors over 50 identified technical challenges as their main concern, which made them realize that they need to acquire more knowledge in ICT. In the Economics and Business Administration Sciences School, male professors aged between 35 and 50 identified a more significant workload as the main challenge when their first strategy focused on submitting content by students. They also stressed the need to have greater knowledge in ICT. This last challenge was also identified by female professors aged over

Table 8
Contributions by dimension

	overall			dimension 1			dimension 2		
	mass	quality	%inert	coord (X)	sqcorr	contrib	coord (Y)	sqcorr	contrib
Strategy 1									
Content Submit	0.23	0.72	1.1%	0.03	0.1	0.3%	0.07	0.62	2.9%
Interaction	0.02	0.67	8.9%	-0.37	0.18	4.9%	-0.6	0.48	18.8%
Planning and Groups	0	0.67	6.0%	0.96	0.14	2.5%	-1.87	0.53	13.9%
Strategy 2									
Content Submit	0.12	0.58	3.9%	0.12	0.24	2.8%	0.15	0.34	5.8%
Interaction	0.1	0.25	2.1%	-0.1	0.22	1.4%	0.03	0.03	0.2%
Planning and Groups	0.02	0.64	6.0%	-0.44	0.38	6.8%	-0.36	0.26	6.9%
Other	0.01	0.76	8.7%	0.32	0.09	2.3%	-0.9	0.67	25.6%
Challenge 1									
Emotional	0.17	0.68	5.5%	0.2	0.66	10.9%	-0.04	0.03	0.6%
Technical	0.04	0.64	3.8%	-0.24	0.32	3.6%	0.24	0.32	5.3%
Academic	0.03	0.68	11.0%	-0.67	0.66	21.5%	-0.12	0.02	1.0%
Group Work	0.01	0.14	8.5%	-0.49	0.13	3.3%	0.11	0.01	0.2%
Challenge 2									
Emotional	0.08	0.75	5.3%	0.2	0.32	5.1%	-0.23	0.43	9.9%
Technical	0.08	0.62	5.5%	0.24	0.44	7.2%	0.15	0.18	4.4%
Academic	0.05	0.37	6.0%	-0.26	0.28	5.0%	0.15	0.09	2.4%
Group Work	0.02	0.62	6.7%	-0.57	0.58	11.5%	-0.15	0.04	1.2%
Other	0.02	0.36	11.0%	-0.68	0.34	11.1%	0.14	0.02	0.7%
Cumulative Variance			100.0%			100.2%			99.8%

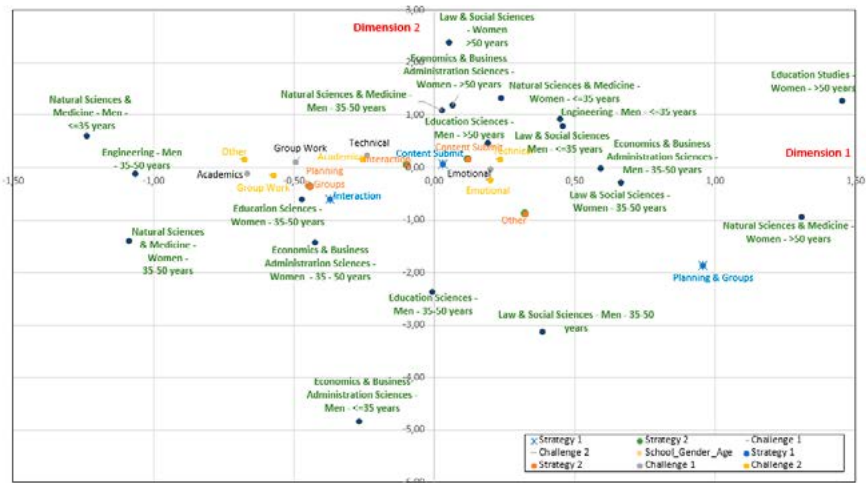


Figure 1
Perceptual map

50 years. In the Natural Sciences and Medicine Schools, male professors aged 35 and 50 identified the main affective challenge related to the feelings or emotions that emanate from within themselves. The technical challenges were related to the connectivity problems experienced by professors and students and the need to improve their ICT knowledge.

When the strategy is related to the “content submit”, the identified challenge is related to problems outside students’ academics. For example, in the Education Sciences School, male professors aged 50 years and above identified increased workload from both sides as the main challenge. They also had challenges with their feelings or emotions, experienced problems unrelated to academics and their role as professors, and endured inconveniences occasioned by their students’ inability to connect to the virtual sessions.

Regarding the strategies related to “interaction” and “planning and groups” as a second strategy, differential challenges arose depending on the gender, age, and the school to which the professors belonged. For example, in the School of Law and Social Sciences, male professors aged between 35 and 50, who decided to divide the classroom into smaller groups as an activity that is part of redesigning the class, identified challenges related to the quest to maintain the quality of the course through strategic planning. On the other hand, female professors within this age range chose the planning

course as a strategy in its new virtual modality. They identified other problems unrelated to academics as the main challenges from the students' perspective. In the Economics and Business Administration Sciences School, male professors under 35 who chose interaction in quasi-real-time or planning the course as strategies identified communication between students and professors as the main challenge.

The female professors aged between 35 and 50 who chose the classroom division strategy identified academic challenges related to the professors' evaluation, monitoring, or feedback process with students. In the Natural Sciences and Medicine Schools, while the professors chose the interaction in real-time strategy, male professors under 35 considered communication between both parties the main challenge. The female professors in this School within 35 and 50 years identified working virtually with large groups as the main challenge. In the Education School, male professors aged between 35 and 50 who chose interaction with students as a strategy, particularly resolving doubts and support for students, identified effective communication with students as the main challenge. Given the new virtual modality, these male professors also used a second strategy related to course planning. They identified an academic challenge related to the quest to maintain the quality of the course. On the other hand, the female professors at this School, who are within this same age range, identified students' inability to connect to virtual sessions as a challenge for this last strategy. Finally, in the School of Engineering, male professors under 35 who used the quasi-real-time interaction strategy as a secondary strategy identified the connectivity challenge.

V. Conclusions

This study reveals that most professors associated the teaching strategies implemented during the ERT process with the resources or tools used to submit information and exchange content with students. This assimilation can happen because only some teachers have a pedagogical background (the strategy concept needs to be clarified), and ERT adopted an unplanned ICT implementation. In addition, the exchange of content was related to audio-visual content. Although this research did not consider whether audio-visual content was widely used before ERT, the results show that ERT offers professors the opportunity to explore different resources.

Along with this first strategy, the category of "interaction" (in real-time and quasi-real-time) also emerged as a second strategy. Students' and professors' interactions are guided by clarifying doubts and monitoring students' learning processes and feedback. Communication is vital in any

teaching-learning process. It is necessary in virtual teaching since the teacher and students are not physically in one place and must maintain communication, mostly asynchronous or quasi-real time. Due to the implementation of remote learning, these changes in human interaction and the usage of different communication channels between professors and students are consistent with the literature (Khan, Kambris, and Alfalahi 2021; Kovacs, Pulfrey, and Monnier 2021). Consequently, alternative communication channels are innovative because these platforms and resources were unpopular in face-to-face teaching. Furthermore, according to Cahyadi and Widyastuti (2021), teaching under ERT must be guided by three main principles: flexibility, simplicity, and empathy.

Regarding challenges, nearly half of the professors reported concerns and issues related to their feelings and emotions and their students. This challenge can be attributed to the abrupt change to virtual classes and all the transformations that professors and students faced when they answered the questionnaire. By the time the ERT was implemented, the movement had been restricted, and the population had been directed to quarantine at home. This confinement has an impact on the educational process and life in general. The psychological implications for professors and students of ERT implementation have been studied and proven in other recent studies (Ahmed and Opoku 2021; Cahyadi and Widyastuti 2022; Meishar-Tal and Levenberg 2021). In this sense, challenges were inscribed in the professors' subjectivity (i.e., their fears, shyness, etc.), the lack of delimitations between work and personal environment (since they had to work from home) and changes in the interactions they were used.

Technical aspects, such as connectivity and ICT knowledge, were also critical challenges. Other studies have found these technological challenges (Ferri, Grifoni, and Guzzo 2020; Dorfsman and Horenczyk 2021; Khan, Kambris, and Alfalahi 2021; Ahmed and Opoku 2021; Kovacs, Pulfrey, and Monnier 2021). These challenges can be attributed to the short period within which the transition to virtual classes was affected—it was done within one week. As a result, neither the professors nor students had enough time to make the technical adjustments required to impart and receive knowledge (e.g., computer and internet). In another study, developed by Dorfsman and Horenczyk (2021), the authors found that one factor that strongly influenced the possibility of making pedagogical changes was the digital literacy of the professors.

An important finding is how the strategies and challenges could be more congruent because the professors who described the strategy of submitting information faced affective and emotional challenges. This strategy is defined as short-term solutions for delivering and receiving content. In

contrast, the challenges related to emotions require strategies for planning how to engage students. Differences emerged among professors from different schools based on their genders and age.

The fact that the two most frequent strategies present among faculty were content delivery and real-time interaction implies that the continuation of classes was prioritized because of the ERT modality's abrupt change. The latter means substituting physical media with digital media without necessarily implementing significant changes at didactic or pedagogical levels. In addition, the planning strategy had a low frequency of implementation. This situation triggers the need to implement a more substantial teacher training curriculum for a pedagogic-technical knowledge component. This way, moving from a substitution model to redesigning learning activities that take advantage of digital technologies' potential will be possible. According to Svrcek et al. (2021), educators must move to remote instruction beyond enhancing learning and redefining and creating transformative teaching experiences for students by purposely incorporating technological tools.

Notably, the feeling of increased workload, acknowledged by some teachers (primarily young women and men over 50), can be attributed to a need for prior knowledge and training in ICT use. This feeling meant that these teachers had to consult about technological tools, choose the most effective tools for the learning objectives, and learn how to use them. Consistent with these findings, the challenge identified by (older) female teachers relates to greater ICT literacy. Most professors who presented this challenge belong to social sciences, administrative and economic sciences, medicine, and natural sciences. This challenge was presented to a lesser extent in engineering areas.

Furthermore, the concern for increased work overload was stronger in women, which informs the recommendation for future studies to analyze the balance between household chores and professional work in female professors. Although ICT tool implementation is not the main challenge, it is still necessary for both men and women. This fact can help to eliminate the prejudice that women have more difficulties than men in this aspect. However, age is a factor to consider in teacher training programs for digital skill development.

Moreover, from the correspondence analysis, it can be established that the emotional challenge was identified in most of the strategies used, specifically in content delivery and real-time interactions. Therefore, teacher training courses should include developing skills to manage emotions and facilitate time management to harmonize work and daily life. This finding suggests that future studies should explore emotional skills and comprehensive and harmonious teacher professional development.

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Annexes

A) *Open-ended questions of the study*

Open-ended questions about strategies and challenges during ERT	
1. What teaching strategies have been defined and implemented to adjust the teaching and learning process?	
2. What challenges have you encountered, (technical, academic, emotional, and affective), in the development of your academic activities?	

Teaching in a COVID-19 pandemic: perceptions and practices of university faculty in Spain

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Abstract: The full impact of the COVID-19 crisis on higher education remains unclear, with some topics still under-researched. This research explores the challenges faced by Spanish academics during emergency remote teaching and is a pioneering study in this context due to the number of participating universities and variety of profiles of university faculty. Three focus groups were conducted to gain a deeper understanding on two dimensions: academic (methodology, materials, assessment, workload and institutional response) and personal (socio-emotional dimension,

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work–life balance and learnings). The main findings revealed the extensive adaptation of university faculty to the new situation and collected a series of teaching strategies. The conclusions reflect on the role that universities should play in the coming years, not only in the Spanish context but also at an international level. Most importantly, our findings can be taken into consideration for further research and teacher education policy in higher education.

Keywords: Higher education; qualitative research; teaching practice; university faculty; COVID-19 pandemic.

I. Introduction

In March 2020, the World Health Organisation declared COVID-19 a global pandemic. At the end of academic year 2019/2020 (in Spain), the pandemic forced physical closures of universities and other higher educational institutions, resulting in the sudden migration of the teaching–learning process to online platforms in Spain and the rest of the world to ensure continuity of education. On March 14, 2020, the Spanish Government cancelled in-person teaching at all educational institutions, including universities (Royal Decree of 14 March, 2020), and introduced hybrid or blended learning for the 2020/2021 academic year.¹

These urgent and unexpected changes came with unprecedented challenges for higher education institutions, teaching staff and students, the most visible impact falling on teaching–learning processes.^{2,3,4} Universities had to improvise training, infrastructural and technical support for faculty and students, confront problems relating to the technology and tools available for online classes, and focus on ensuring equity of participation. Students faced an increased workload, a decrease in their academic performance, difficulties accessing online tools and the internet, and an impact on their

¹ Cristina Pulido-Montes and Santiago Mengual Andrés, “The teaching modalities in the new normal for the 2020-21 academic year in Spanish public universities,” *International Journal of Educational Research and Innovation (IJERI)* 15 (2021): 277, <https://doi.org/10.46661/ijeri.5291>.

² Thomas Farnell, Ana Skledar Matijevic, and Ninoslav Šćukanec Schmidt, *The impact of COVID-19 on higher education: A review of emerging evidence. NESET report* (Luxembourg: Publications Office of the European Union, 2021), 6, <https://doi.org/10.2766/069216>.

³ Anca Greere, “Shaping Proactive Higher Education: Pandemic Research and Its Value for Future-Proofing,” *Tuning Journal for Higher Education* 9, no. 1(2021): 202, [https://doi.org/10.18543/tjhe-9\(1\)-2021pp201-206](https://doi.org/10.18543/tjhe-9(1)-2021pp201-206).

⁴ IESALC, UNESCO, “COVID-19 y educación superior: De los efectos inmediatos al día después,” (2020), 9, <https://www.iesalc.unesco.org/wp-content/uploads/2020/05/COVID-19-ES-130520.pdf>.

psychological and emotional well-being. Faculty had to move courses online, improvising quick solutions without proper planning.^{5,6}

The term used to describe this transition is ‘emergency remote teaching’,⁷ which is different from planned and prepared online instruction. As a consequence of the COVID-19 pandemic, teaching staff had been asked to shift to this alternative delivery mode in haste with minimum resources and in some cases with little knowledge. In fact, some authors sustain that it is not enough to simply move courses to online platforms and equate online education with online teaching.⁸ In this context, several studies have analysed the academic and personal challenges of emergency remote teaching for faculty.

On the academic dimension, studies reported challenges with digital transformation and the lack of pedagogical training⁹ or the need to adapt assessment.^{7,10,11} The digital transformation challenges took the form of digital competence, accessibility issues, interruptions by family members or pets, heavy workload or compatibility with hands-on practical disciplines. Not all faculty members were ready to deliver high-quality instruction remotely, yet they were required to teach their courses, transforming their course content in a few days or weeks. Moreover, with little knowledge of how to provide virtual instruction, faculty faced the problem of designing the

⁵ Olasile Babatunde Adedoyin and Soykan Emrah, “Covid-19 pandemic and online learning: the challenges and opportunities,” *Interactive Learning Environments*: (2020):4, <https://doi.org/10.1080/10494820.2020.1813180>.

⁶ Chrysi Rapanta et al., “Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity,” *Postdigital Science and Education* 2, no.3 (2020): 924, <https://doi.org/10.1007/s42438-020-00155-y>.

⁷ Charles Hodges et al., “The difference between emergency remote teaching and online learning,” *Educause review* 27, no.1(2020): 1, <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>.

⁸ Bin Yang and Huang Cheng, “Turn crisis into opportunity in response to COVID-19: experience from a Chinese University and future prospects,” *Studies in Higher Education* 46, no. 1(2021): 125, <https://doi.org/10.1080/03075079.2020.1859687>.

⁹ Olasile Babatunde Adedoyin and Soykan Emrah, “Covid-19 pandemic and online learning: the challenges and opportunities,” *Interactive Learning Environments*: (2020):4, <https://doi.org/10.1080/10494820.2020.1813180>.

¹⁰ Jose Maria del Castillo Olivares and Antonio del Castillo Olivares, “The impact of CoVid-19 on higher education teachers and its conceptions on assessment,” *Campus virtuales* 10, no.1(2021): 90, <http://hdl.handle.net/10272/19339>.

¹¹ Ramona Maile Cutri, Juanjo Mena, and Erin Feinauer Whiting, “Faculty readiness for online crisis teaching: transitioning to online teaching during the COVID-19 pandemic,” *European Journal of Teacher Education* 43, no.4 (2020): 523, <https://doi.org/10.1080/02619768.2020.1815702>.

best conditions in which their students could learn, having to adapt their methodology and materials to online formats. Finally, another significant challenge for faculty was the need to adapt assessment to the new learning requirement, while struggling with equity issues, as well as develop alternative assessment approaches to prevent cheating and plagiarism.

On the personal dimension, studies show that teaching staff faced an increased workload, together with their own new family obligations (i.e., home-schooling their children), which hindered their work–life balance and impacted on their levels of stress and anxiety.^{12,13} However, there are differences in how faculty experienced and handled online teaching and learning. Motivational factors, such as achievement goals, played an important role.¹⁴ While on the one hand the transition to online teaching was a challenge for some teachers who struggled to cope with keeping up the required teaching practices, on the other, it provided an opportunity, and some managed to cope well. In fact, from the faculty perspective, there were certain opportunities or advantages: a more flexible schedule, the capacity to be stimulating and inclusive, and the benefits of bringing teachers into partnership with their students.

Several studies have been conducted in the Spanish context and efforts have been made to examine the views of university faculty. The main difficulties faced by Spanish teachers were their perceptions of their inexperience in teaching in the new virtual scenario, and the physical and psychological overload.¹⁵ Faculty perceived a worsening of both didactic communication and teacher–student social communication during distance learning compared to in-person education.¹⁶ The main disadvantages pointed

¹² Felice J. Levine et al., *Voices from the Field: The Impact of COVID-19 on Early Career Scholars and Doctoral Students* [Focus group study report] (American Educational Research Association; Spencer Foundation, 2021):7, <https://doi.org/10.3102/aera20211>.

¹³ Naiara Ozamiz-Etxebarria et al., “Estado emocional del profesorado de colegios y universidades en el norte de España ante la COVID-19,” *Revista Española de Salud Pública* 95, no.1 (2021): 2, https://www.sanidad.gob.es/biblioPublic/publicaciones/recursos_propios/resp/revista_cdrom/VOL95/O_BREVES/RS95C_202102030.pdf.

¹⁴ Martin Daumiller et al., “Shifting from face-to-face to online teaching during COVID-19: The role of university faculty achievement goals for attitudes towards this sudden change, and their relevance for burnout/engagement and student evaluations of teaching quality,” *Computers in Human Behavior* 118 (2021): 1, <https://doi.org/10.1016/j.chb.2020.106677>.

¹⁵ Miguel Ángel Fernández Jiménez, Esther Mena Rodríguez, and María Inmaculada Jiménez Perona, “Transformación de la Universidad pública como consecuencia del COVID19. Perspectiva del profesorado a través del método Delphi,” *Revista Complutense de Educación* 32, no. 3 (2021): 443, <https://doi.org/10.5209/rced.70477>.

¹⁶ María Jesús Fernández Torres, Rocío Chamizo Sánchez, and Rocío Sánchez Villarrubia, “Universidad y pandemia: la comunicación en la educación a distancia,” *Ámbitos. Revista*

out by teaching staff were the lack of student motivation and the difficulty in involving the students and connecting emotionally with them. Other studies report that Spanish teachers made the most adaptations during lockdown by incorporating technological platforms and resources used far less in their previous teaching environment.¹⁷ These studies also argue that information should be triangulated through qualitative methodologies for a deeper understanding of the phenomenon at Spanish universities.

However, the full impact of the COVID-19 pandemic on higher education remains unclear, with some topics still under-researched,¹⁸ especially in the Spanish context. In a previous study by the authors, Spanish higher education students rated the experience of emergency remote teaching as negative, mainly due to the academic dimension. This study extends these results to the teaching staff's point of view, gathering information about scholars' experiences during the pandemic through a focus group methodology. Our main objective is to explore the challenges and reactions faced by Spanish academics during emergency remote teaching and later on, in the discussion section, to triangulate these results to the answers provided by students.

II. Materials and methods

II.1. Study design

The global research responds to a methodological combination, whereby the quantitative data were a subsidiary of the qualitative information,¹⁹ developed in three parts. The first was a quantitative approach to Spanish university students' perceptions and academic experience in lockdown.²⁰ This quantitative approach allowed us to clarify and organise these experiences in order to develop the second part in which we delved deeper

Internacional de Comunicación 52, (2021): 170, <https://doi.org/10.12795/Ambitos.2021.i52.10>.

¹⁷ Maria Penado Abilleira et al., "Technostress in Spanish University Teachers During the COVID-19 Pandemic," *Frontiers in Psychology* 12 (2021):9, <https://doi.org/10.3389/fpsyg.2021.617650>.

¹⁸ UNESCO, *COVID-19: reopening and reimagining universities, survey on higher education through the UNESCO National Commissions* (2021):28, <https://unesdoc.unesco.org/ark:/48223/pf0000378174>.

¹⁹ Eduardo Bericat, *La integración de los métodos cuantitativo y cualitativo en investigación social* (Barcelona: Ariel, 1998), 39.

²⁰ Reina Ferrández-Berruoco and Patricia Arroyo. "Percepción del alumnado universitario sobre su experiencia educativa en tiempos de pandemia," in *Investigacions transversals i integradores en Ciències Humanes i Socials*, ed. María Pallarés-Renau et al. (Castellón: Publicacions de la Universitat Jaume I, 2022), 29-45.

into the students' comments, conducting a qualitative inductive content analysis.^{21,22} The present study introduces the third part of the research through a triangulation methodology.²³ Thus, we integrate the perspective of Spanish university lecturers by means of several focus groups, to gain a deeper understanding of this topic. Focus groups have become increasingly popular within qualitative research in the social sciences²⁴ as an approach for exploring and understanding the meaning individuals or groups ascribe to a social problem.²⁵ This methodological approach can also be considered an approximation to the characteristic of internal validity, as it involves contrasting information and providing greater depth to the research.²⁶

II.2. Participants

Twenty university lecturers participated in research from five Spanish universities (to protect each participant's identity, their names are not included in the sample description).²⁷ A non-probabilistic intentional sampling of academic staff was used,²⁸ with a group size ranging from six to ten lecturers,²⁹ aiming to balance between the different professional categories and areas of knowledge.³⁰ The inclusion criteria for participant selection were 1) teaching during the university lockdown in Spain (March–July

²¹ Reina Ferrández-Berrueto et al., "Bologna y la COVID-19. Evidencias sobre la autonomía del estudiantado," *Revista de Docencia Universitaria (REDU)* 20, no 1 (2022): 91-107, <https://doi.org/10.4995/redu.2022.16848>.

²² Reina Ferrández-Berrueto et al., "Universidad en tiempo de pandemia. Experiencia de estudiantes universitarios en España," *Utopía y praxis latinoamericana: revista internacional de filosofía iberoamericana y teoría social*, 27, no 96 (2022): 1-23, <http://doi.org/10.5281/zenodo.5790264>.

²³ Uwe Flick, *Doing Triangulation and Mixed Methods* (London: Sage, 2018), 13, <https://dx.doi.org/10.4135/9781529716634>.

²⁴ Julius Sim and Jackie Waterfield, "Focus group methodology: some ethical challenges," *Qual Quant* 53 (2019): 3004, <https://doi.org/10.1007/s11135-019-00914-5>.

²⁵ John W. Creswell, *Research Design. Qualitative & Quantitative Approaches* (USA: Sage Publications, 2009), 32.

²⁶ Louis Cohen and Lawrence Manion, *Métodos de investigación educativa*. (Madrid: La Muralla, 2002), 450.

²⁷ Anne Ryen, "Research ethics and qualitative research," in *Qualitative Research*, edited by David Silverman (Los Angeles: Sage Publications, 2016), 32.

²⁸ Graham Kalton, *Introduction to survey sampling*. (California: Sage Publications, 1983): 90.

²⁹ David L. Morgan, *Focus groups as qualitative research*. (California: Sage Publications, 1988):42.

³⁰ Linda Costigan Lederman, "Assessing Educational effectiveness: the focus group interview as a technique for data collection," *Communication Education*, 39, no.2 (1990): 121.

2020), 2) belonging to an on-site public university and 3) teaching on undergraduate and master's degree courses.

We conducted three focus groups with a total of 20 faculty members. Each focus consisted of six to eight faculty teachers from the Basque Country, Valencia, Andalusia and Catalonia. The participating teachers had an average of 14.7 (SD=8.2) years' teaching experience and included 12 female (60%) and 8 male lecturers (40%). Regarding professional rank, the group was composed of 8 early-career faculty (up to 10 years' teaching experience), 7 mid-career (up to 20 years) and 5 later-career (more than 20 years) teachers, encompassing the 5 university domains: 3 from Arts and Humanities, 7 from Social Sciences and Law, 7 from Engineering and Architecture, 2 from Health and 1 from the Sciences³¹ (see Table 1).

Table 1
Participants in the focus group

Code	Rank	Area	Gender	University	Location	Focus Group
P1	Lecturer	Pedagogy	Male	Euskal Herriko Unibertsitatea	Basque Country	1
P2	Lecturer	Engineering	Female	Universidad Politécnica de Valencia	Valencia	1
P3	Senior lecturer	Pedagogy	Female	Universitat de València	Valencia	1
P4	Professor	Communication	Female	Universitat Jaume I	Castellón	1
P5	Senior lecturer	Chemistry	Female	Universitat Jaume I	Castellón	1
P6	Associate lecturer	IT	Female	Universitat de València	Valencia	1
P7	Lecturer	Health	Male	Universitat Jaume I	Castellón	2
P8	Lecturer	Health	Female	Universitat Jaume I	Castellón	2

³¹ Spanish Royal Decree RD1393/2007.

Code	Rank	Area	Gender	University	Location	Focus Group
P9	Associate lecturer	IT	Male	Universitat de València	Valencia	2
P10	Senior lecturer	Engineering	Female	Universitat Jaume I	Castellón	2
P11	Lecturer	Translation and interpreting	Female	Universitat Jaume I	Castellón	2
P12	Lecturer	Economy	Male	Universitat de València	Valencia	2
P13	Professor	Pedagogy	Male	Universidad de Córdoba	Andalusia	3
P14	Professor	Communication	Female	Universitat Jaume I	Castellón	3
P15	Senior lecturer	Engineering	Male	Universitat Jaume I	Castellón	3
P16	Lecturer	Engineering	Female	Universitat Jaume I	Castellón	3
P17	Lecturer	English Language	Male	Universitat Jaume I	Castellón	3
P18	Senior lecturer	French Language	Female	Universitat Jaume I	Castellón	3
P19	Professor	Law	Female	Universitat Jaume I	Castellón	3
P20	Senior lecturer	IT	Male	Universitat Jaume I	Castellón	3

II.3. Data collection and analysis

Focus groups were held via Google Meet in May 2021 to comply with public health restrictions due to the COVID-19 pandemic. The questions included related to the categories emerging from a previous study with the students³² (see the full instrument in Annex 1):

³² Reina Ferrández-Berruero et al., “Universidad en tiempo de pandemia. Experiencia de estudiantes universitarios en España,” *Utopía y praxis latinoamericana: revista internacional de filosofía iberoamericana y teoría social* 27, no 96 (2022): 1-23, <http://doi.org/10.5281/zenodo.5790264>.

1. Academic dimension
 - 1.1. Methodology and materials
 - 1.2. Assessment
 - 1.3. Workload
 - 1.4. Institutional response and training
2. Personal dimension
 - 2.1. Socio-emotional work with students
 - 2.2. Work–life balance
 - 2.3. Learnings

The meetings were recorded by video and the transcription was made using AMBERSRIPT. This transcription was used for content analysis coding through ATLAS.ti software (8.4.5 version).

To maintain participant anonymity, a code was established following the information included in Table 1: focus group (FG1, 2 or 3) and participant (followed by an identifying number from 1 to 20). To confirm the accuracy of the research process, two verification strategies were followed.³³ Part of the research group reviewed and discussed the preliminary results to reach a consensus separately. The rest of the research group checked the outputs and contributed to improving the interpretations and conclusions of this study.

II.4. Ethical considerations

Lecturers were informed about the contents and purposes of the research, in compliance with the ethical requirements³⁴ and the recommendations of the Declaration of Helsinki (2016/679) approved by the European Parliament of the European Union. Prior to the focus group meeting, all participants signed the informed consent sent by email, thereby agreeing to participate and to be recorded. Participation was on a voluntary basis. Data usage and anonymity were guaranteed for all.

III. Results

The results are presented through the categories in the Focus guidelines outlined in section II.3, in order to explore faculty experiences during

³³ John W. Creswell and Cheryl N. Poth, *Qualitative inquiry and research design: Choosing among five approaches* (Los Angeles, CA: Sage, 2017), 260.

³⁴ Julius Sim and Jackie Waterfield, “Focus group methodology: some ethical challenges,” *Qual Quant* 53 (2019): 3004, 3008, <https://doi.org/10.1007/s11135-019-00914-5>.

lockdown. This will facilitate triangulating students and faculty perspectives in the Discussion section. The most outstanding fragments have been chosen to illustrate the various constructs. Figure 1 shows a semantic network developed with Cmap Tools software.

The semantic network summarises the main elements named by the university teachers, according to their experience while teaching during lockdown. Table 2 shows the percentages of the units of analysis by categories and subcategories.

Table 2
Percentages of the units of analysis by category

Categories	n	%
1. Academic dimension	207	75.8
1.1. Methodology and materials	78	28.6
1.2. Assessment	38	13.9
1.3. Workload	30	11
1.4. Institutional response and training	29	10.6
2. Personal dimension	66	24.2
2.1. Socio-emotional work with students	17	6.2
2.2. Work–life balance	16	5.9
2.3. Learnings	33	12.1
Total	273	100

A total of 273 statements were detected. Of the fragments, 75.8% correspond to the academic dimension and 24.2% to the personal dimension of the teacher.

III.1. Academic dimension

III.1.1. Methodology and materials

The main category in this dimension corresponds to the *methodology and materials* (28.6%) used for online teaching in lockdown. University lecturers emphasise their efforts and the need to adapt in a short time: ‘I was scared; it was a very sudden change’ [FG1_P1], ‘The problem was that we had to adapt quickly’ [FG2_P3], ‘[...] ability to adapt to circumstances’ [FG3_P17].

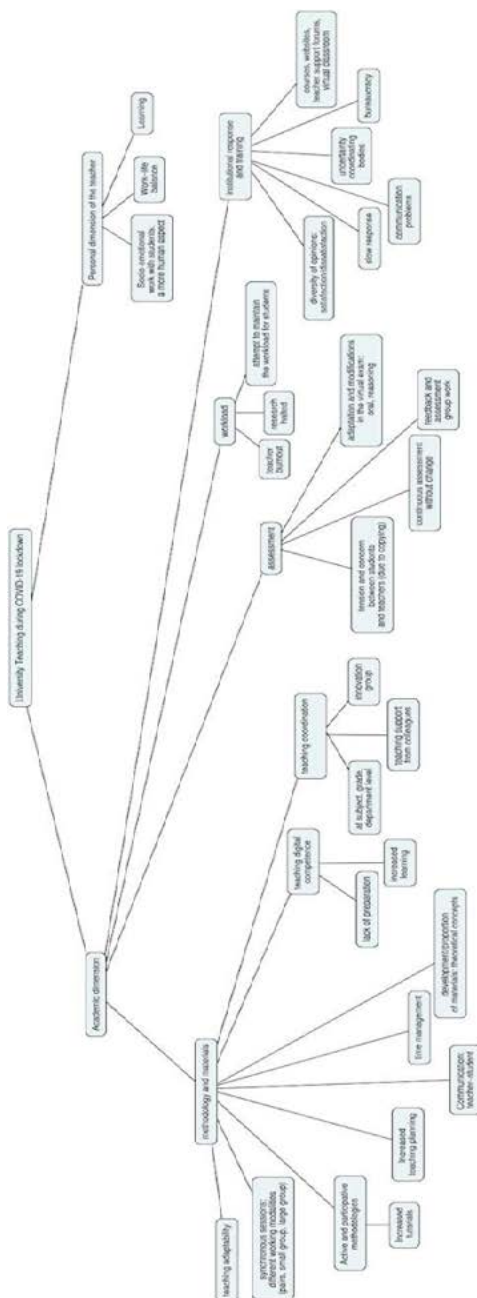


Figure 1
Semantic network

In general terms, the participants in this study held synchronous sessions with the students: ‘We kept synchronous sessions within the official timetable, even if it was to work on activities’ [FG3_P14].

The increase in participation in virtual classes due to lockdown and mobility restrictions is worth highlighting: ‘More people connected to the virtual class than to the in-person classes; we managed to get more students to “attend” class’ [FG2_P12].

Teaching in lockdown required more communication between the academic staff and the students: ‘I was permanently connected by email with the students’ [FG2_P10], and greater teaching planning: ‘This situation “forced” us to programme all our work in detail. We rethought the subject’ [FG3_P13]. Many participants sent their students a weekly timetable of the main tasks or structuring of the synchronous sessions: ‘The first thing we did among all the teaching staff was to draw up an outline of the different parts of the subject. This document was given to the students so that they knew what was going to be done’ [FG2_P9].

The academic staff agreed to attempt to make the classes much more dynamic, because many hours were spent in front of the computer: ‘We have to offer students active methodologies’ [FG2_P7]. Thus, the synchronous sessions were moments for meeting, debate, resolving doubts and so forth, using active and participative methodologies such as project-based learning or flipped classroom: ‘The students had to design a bridge through the project-based learning methodology. I rethought the practice, made it more guided, designed tasks [...]’ [FG1_P2]. ‘The flipped classroom has been fundamental. [...] Escape rooms through Genially or Instagram.... Effective learning was much more enjoyable’ [FG3_P14].

The use of tutoring time to solve doubts or problems also increased: ‘Every day I went online at the time of the subject; I had individual or group tutoring of about 15 minutes’ [FG1_P2]. To work on theoretical concepts, teachers developed or provided materials already available online: ‘We had to develop a lot of materials: micro video pills, interactive online activities, interactive reinforcement videos, etc.’ [FG3_P14]. Or they explained them through expository lectures:

In the lab sessions I logged on at the scheduled time and taught the class. I recorded the sessions and uploaded the videos, so the students could watch them. I would work on the problems using the virtual classroom and set a deadline for them [FG1_P6].

Participants used different platforms for synchronous classes, e.g., Google Meet, CISCO, Microsoft Teams, Zoom, Blackboard and so forth, according to the platform provided by their university. From these platforms,

different working modalities were promoted: in pairs, and in small or large groups. ‘I subdivided the class into pairs, and I connected to the different rooms’ [FG1_P6]. ‘The way of working was collaborative’ [FG2_P9]. Another element that facilitated cooperative learning highlighted by the teachers was Google Drive.

In terms of time management, one teacher said: ‘Less is more. The timings are very different. You have to take breaks and more breaks. We started every class by dancing’ [FG3_P14]. Likewise, differentiated classes were offered in terms of variety of activities: ‘I adapted my class; I reduced the time; I tried to make my explanation last no longer than 50 minutes; I asked them questions, practical issues’ [FG3_P19].

Ratio is another important element to highlight, as the participants included teachers who taught subjects with small classes, while others had large classes. However, the participants maintained that there was more support and monitoring of their students compared with in-person teaching. ‘Follow-up was much more individualised than in class’ [FG1_P3].

III.1.1.1. *Teachers’ digital competence*

The methodology and materials used in lockdown classes were directly linked to *teachers’ digital competence* (5.9%). Some participants admitted to not feeling prepared: ‘Digital competence was lower than I thought. We were not prepared for 100% online teaching. There was a lot of urgency and we didn’t have time; we did the best we could’ [FG3_P13].

The same participant explains that they had to be self-taught: ‘We had to be self-taught—it came from one day to the next’ [FG3_P13]. Therefore, in most cases, giving virtual classes has entailed learning and discovering ICT: ‘For many people, it has involved discovering technologies’ [FG2_P12]. For others, it has entailed improving this competence: ‘Improving our digital skills. I think that at that time my digital skills were quite basic, but the university has made our training much easier’ [FG3_P16].

III.1.1.2. *Teacher coordination and the support received from other colleagues*

University teachers also refer to the importance of *teacher coordination* (2.6%) and to the *support received from other colleagues* (3.3%). In some cases, coordination was already in place before teaching in lockdown: ‘Teaching coordination was positive; we have been working together for many years. It was very easy, despite the technical problems’ [FG3_P13]. One informant states that the coordination extended beyond the academics

teaching the same subject: ‘Not only within the same subject. The grades and the department were also coordinated. They did some sessions. We also received support from an innovation research group’ [FG3_P16].

Thus, the help or support offered by colleagues was highlighted: ‘Peer support worked a lot’ [GF1_P4]. ‘I spoke to another teacher, and he told me that private channels could be enabled on the platform. It was just by chance, while we were talking about other things, that he told me about it’ [GF1_P2]. ‘Helping colleagues. I have a new technologies education team in my department’ [FG3_P13].

III.1.2. Assessment

Assessment (13.9%) is another element of the teaching–learning process that concerned both teachers and students: ‘We had different points of view. One colleague said that the students would cheat, that many students would fail, that the Internet might crash, etc. The number of passes and fails was similar to other academic years’ [FG3_P20]. ‘Students had always taken the exam in class. At home it generated uncertainty; it was awkward for them’ [FG3_P16].

Participants that had previously used a continuous assessment system experienced very few changes or modifications:

I didn’t change the assessment system; it is unorthodox. At the end of the course each student draws up a rubric. They carry out self-assessment and do an entrepreneurial challenge as future educators. I give them Monopoly money and they have to give money to their classmates. So 40% of the grade is already there and the other percent is up to them. I talk to them and we negotiate it. Compared to other years there was no significant difference; it didn’t affect the assessment system [FG1_P1].

One participant explains how she assessed group work: ‘Students had to distribute 100 points among the different members of the group. It could be proportional or not. Students who had not worked as hard were penalised’ [FG1_P2].

Students rated the feedback given on assignments very positively: ‘Students did highlight the fact that they were given feedback on a piece of work. It takes time to correct; the work is worthwhile because they really appreciated it. They said it was something exceptional’ [FG2_P8].

Other teachers state that they made some changes or modifications. Most aimed to lower or replace the percentage allocated to the exam: ‘At first, it was 50% portfolio and 50% exam. [...] When we were given the opportunity to eliminate the exam, I did, because I could assess them perfectly well. The assessment was 100% learning portfolio’ [FG3_P18].

We eliminated content. [...] Students received an assignment that they had a week to do. Though it was longer, we didn't observe any big differences. Those who didn't know how to do a dubbing script didn't hand it in. The questionnaires were synchronous [...]. The instruments were varied and the deadlines were made more flexible [FG2_P11].

The exam part was a point of apprehension for students and teachers alike: 'We had to do mock exams beforehand to reduce their stress level' [FG3_P14]. The virtual classroom was used for the virtual exams.

The virtual classroom surprised me by how robust it is. We had no problem with 300 students taking the exam—nobody's connection crashed. The students were very worried, so we told them that if anybody had problems, they would take an oral exam. We were able to count on the university's resources. The final pass rate was the same as in other years [FG2_P10].

The university teachers were worried about students copying during the exam. 'Other types of questions were asked where students had to reflect rather than memorise' [FG2_P8]. Other teachers went straight to an oral exam: 'It was an oral exam. We adapted it so that they could not copy' [FG3_P19].

III.1.3. Workload

The *workload* (11%) intensified for teachers: 'Intense experience and long working hours' [GF1_P4]. 'The teacher's work tripled. Preparation, correction, feedback and scheduling of virtual classrooms (quizzes!), etc. [...] I think we must take note of teaching staff burnout. Despite the satisfaction, burnout was brutal' [GF3_P14].

One participant, who held the position of external placements coordinator, states that 'The heavy load was the external placements. Contacting all the companies, who can or can't do the internship online' [GF1_P4].

As a result of all of the above, research came to a standstill: 'Research has been put on hold and is having a hard time getting started' [GF1_P3]. 'I became a teacher rather than a researcher and the price was taking time away from research' [GF1_P6].

In addition, teachers tried not to overload students. 'We tried not to overload them, although the students believed they were overloaded' [FG2_P7].

III.1.4. Institutional response and training

In relation to *institutional response and training* (10.6%), opinions are varied. One group of participants expressed their satisfaction with the

institutional response: ‘At institutional level, University N (omitted) was very good–fast’ [GF1_P1]. ‘In our case the university’s response was very good. They suggested we use Teams and they programmed everything. They gave us a guide with basic instructions’ [FG1_P2]. However, other teachers expressed their dissatisfaction: ‘I am not happy with the response from University N’ [GF1_P3]. ‘I am critical of the institution–more could have been done’ [GF2_P8].

The instruction was to take care of the students. But who takes care of me? I am also part of the institution; the student leaves and I stay. Why do we have to make it easier for the students? Who helps me? Who prepared me? I had a negative experience [GF3_P13].

One participant stated that the responses from the institution were slower: ‘We were ahead of institutional instructions. Institutional responses are slower’ [GF3_P14].

Another informant described the problems in communicating instructions: ‘At the centre’s board meetings, they told us one thing and then the government changed it. The university didn’t know how to communicate. There were delays’ [GF3_P20].

For the teachers who held management positions, this situation generated concern and uncertainty: ‘It was a stopgap solution. Every day something different came from above. I didn’t know what to tell the teachers and the vice-dean didn’t know what to tell me’ [GF3_P17]. ‘A complex part was coordinating and ending uncertainties. As a degree programme director, it was a bit frustrating. The guidelines had changed or there were none. [...] I didn’t know what to tell them; I didn’t know how to do it’ [GF3_P15].

In addition, teaching staff reported an overload of bureaucratic work: ‘A lot of work managing addenda to the syllabus’ [GF3_P13].

With regard to the training offered by the universities, some teaching staff say that it came too late: ‘The university devised a detailed action plan; they made changes and modifications. Training plans are necessary’ [GF2_P9]. ‘[...] training: the university made an effort. It created web pages for guidance, manuals and so on, but the communication of all that was complex—a web page with a lot of information. That response was very successful’ [GF3_P15].

One participant highlights the use of virtual classroom forums for teacher support: ‘The virtual classroom forum was very good for me: we had support; we could ask questions’ [GF2_P15].

III.2. Personal dimension

III.2.1. Socio-emotional work with students

Teaching in lockdown brought out the more human side of the teaching staff and the need to provide *socio-emotional support for students* (6.2%): ‘There were people who had a hard time, and we were supportive and attentive. [...] It was hard, but interesting. We learned a lot of things about ourselves as well’ [GF1_P3]. ‘I felt like I was acting as a psychologist with the students, sending emails, tutoring, chatting a bit with them. I was acting as a psychologist. I don’t know how to do that’ [GF1_P4].

To go back to our origins, to go back to ourselves, to think about ourselves, our people, our family, our support. It was an opportunity to find ourselves again, even though we were suffering—to meet people. We are reinventing ourselves in a resilient way [GF3_P13].

Some participants explain that in the first few minutes of class they took the opportunity to ask the students how they felt or how they were feeling: ‘Those 2–3 minutes beforehand, when they were connecting (to the online platform), I would ask them how they were, is everything OK?’ [FG3_P18].

III.2.2. Work–life balance

Work–life balance (5.9%) was another of the topics discussed with university teaching staff. The situations and experiences of the participants in this study varied widely: ‘On a personal level, I had it easy; I live with a cat. I can’t imagine what it’s like for people who have gone through this with children at home’ [FG2_P10]. ‘It was unexpected. I couldn’t consider making big changes. I had a child and I had to take turns with my partner. I worked after hours, most days’ [FG2_P11].

A very abrupt change in the way I worked. On a human level I learned a lot. At home we were three adults working with the computer. I saw my son or my partner in a different role, a professional role. [...] I learned that we have to take care of ourselves—many hours of very high saturation [FG1_P1].

A teacher describes the lack of empathy on the part of some students. ‘We were suffering the same as them’ [FG3_P13].

III.2.3. Learnings

The last construct refers to *learning* (12.1%). Not only did academic staff learn what has already been outlined in the academic dimension about their

teaching practice and mostly linked to digital competence, they also learned on a personal level: ‘We have improved our skills and also our teaching; there are many ways to connect with students online and in person’ [FG3_P16].

You can learn even from adversity. From all this not very positive pandemic, you can learn aspects, human aspects. You get the good and the bad from each of us. [...] We have seen our colleagues in healthcare, and the physical and psychological toll it has taken on them [FG2_P8].

Teachers have also learned to manage failure or frustration and to reinvent themselves: ‘Failure management. I have an activity in mind and it fails. I look for a plan B, C or even a D. [...] I take this management of failure with me, adapting to the environment, redirecting the circumstances’ [FG3_P18].

The participants feel that this situation has strengthened them both professionally and personally: ‘We are better teachers’ [FG1_P5]. It has brought to light their teaching vocation: ‘Lockdown has shown us the degree of vocation we have for teaching and for being a teacher’ [FG1_P1]. And their goodwill: ‘It went well thanks to the goodwill and professional ethics of most of the teachers’ [FG2_P10].

IV. Conclusions and discussion

The unexpected changes in the teaching process provoked by lockdown came with unprecedented challenges for higher education. This raises many questions about how the university community has experienced the situation. One of the main contributions of this research is to provide evidence on university education during the COVID-19 pandemic. We have explored the challenges and reactions faced by Spanish university lecturers during lockdown and have triangulated them to the students point of view. Previous research in the Spanish university context reported this topic as under-researched, especially from the perspective of qualitative approaches³⁵. For this reason, we chose the focus group methodology, which allows participants to discuss perceptions, opinions and thoughts.³⁶ Data collection is limited to teaching staff at public universities in Spain. Results must therefore be taken into account in the context of this country.

³⁵ Maria Penado Abilleira et al., “Technostress in Spanish University Teachers During the COVID-19 Pandemic,” *Frontiers in Psychology* 12 (2021):10, <https://doi.org/10.3389/fpsyg.2021.617650>.

³⁶ Richard A. Krueger and Mary A. Casey, *Focus Groups: A Practical Guide for Applied Research* (Los Angeles: Sage Publications, 2009), 5.

The main findings reveal that faculty have had to develop alternative methodological strategies and enhance those mediated by technology (see III.1.1). This situation has allowed them to feel more digitally competent, thanks to peer support and some of their university's training proposals. This point concurs with Collie and Martin³⁷ who concluded that university faculty adapted extensively to the new situation. However, the Spanish students' perception is that, though digital competence was not a major problem, most of the teaching staff did not adapt to the new situation. Students perceived a lack of dialogue and expected greater concern for their needs,^{38,39} especially in the first years and in larger classes.

Our results contrast with other international studies which reported that most teaching staff adapted teaching materials without changing the curriculum or the methodology and without applying or reflecting on effective online education theories and models.⁴⁰ That the participants in this research were highly responsive in dealing with this situation may imply a certain bias in the sample and could be taken as a limitation of the study. The strategies they reported indicate that they have a significant pedagogical background and that, despite the uncertainty and unexpectedness, the impact on their teaching effectiveness was probably lower than for other teachers with fewer pedagogical skills.

On the other hand, assessment was challenging (see III.1.2). Although there was considerable formative assessment among participants, concerns about students copying in exams were common, as many other studies have already confirmed.^{41,42} In fact, this issue is one of the most recurring and one

³⁷ Rebecca J. Collie and Andrew Martin, "Teacher wellbeing during COVID-19," *ACER Teacher Magazine* (2020): 2.

³⁸ Reina Ferrández-Berruoco et al., "Bologna y la COVID-19. Evidencias sobre la autonomía del estudiantado," *Revista de Docencia Universitaria (REDU)* 20, no 1 (2022): 91-107, <https://doi.org/10.4995/redu.2022.16848>.

³⁹ Reina Ferrández-Berruoco et al., "Universidad en tiempo de pandemia. Experiencia de estudiantes universitarios en España," *Utopía y praxis latinoamericana: revista internacional de filosofía iberoamericana y teoría social*, 27, no 96 (2022): 1-23, <http://doi.org/10.5281/zenodo.5790264>.

⁴⁰ Chrysi Rapanta et al., "Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity," *Postdigital Science and Education* 2, no.3 (2020): 928, <https://doi.org/10.1007/s42438-020-00155-y>.

⁴¹ Meital Amzalag, Noa Shapira, and Niva Dolev, "Two Sides of the Coin: Lack of Academic Integrity in Exams During the Corona Pandemic, Students' and Lecturers' Perceptions," *Journal of Academic Ethics* (2021): 2, <https://doi.org/10.1007/s10805-021-09413-5>.

⁴² Jose Maria del Castillo Olivares and Antonio del Castillo Olivares, "The impact of CoVid-19 on higher education teachers and its conceptions on assessment," *Campus virtuales* 10, no.1(2021): 90, <http://hdl.handle.net/10272/19339>.

of the worst handled by students, who felt that teachers were more concerned about them not copying than learning.^{43,44}

With regard to personal aspects, in line with other research, teachers' workloads were perceived as high and, in many cases, involved certain difficulties in work–life balance.^{45,46} Although it seems obvious (see III.1.3 and III.2.2), teachers consider that the students were unable to perceive that and accuse them of a lack of understanding. Interestingly, the students also felt misunderstood and complained about a large increase in workload, which did not take into account their personal situation at home.⁴¹ Nevertheless, the learning outcome of the experience is positive overall because it has helped teachers to rethink teaching and incorporate improvements in future courses.

Dealing with the results in section III.1.4 about institutional response and training, it seems that different institutions provide different answers to the same problems, and faculty reactions reflected this variety. Students' concerns were mostly addressed in terms of the work placement management. It would be interesting to conduct another focus group involving academic managers to further explore this issue.

The last group of responses were related to the socio-emotional work with students (III.2.1). Here, academic staff described themselves as psychologists because, in many cases, they are required to support students through stress and a lack of personal resources. This statement concurs fully with students' perceptions: they often felt alone and thought that online lessons were not enough.

These main results allow us to compile a series of teaching strategies that can be extended beyond the pandemic period and encourage student autonomy and self-regulation, which has emerged as one of the main issues

⁴³ Reina Ferrández-Berruero et al., “Bologna y la COVID-19. Evidencias sobre la autonomía del estudiantado,” *Revista de Docencia Universitaria (REDU)* 20, no 1 (2022): 91-107, <https://doi.org/10.4995/redu.2022.16848>.

⁴⁴ Reina Ferrández-Berruero et al., “Universidad en tiempo de pandemia. Experiencia de estudiantes universitarios en España,” *Utopía y praxis latinoamericana: revista internacional de filosofía iberoamericana y teoría social*, 27, no 96 (2022): 1-23, <http://doi.org/10.5281/zenodo.5790264>.

⁴⁵ Felice J. Levine et al., *Voices from the Field: The Impact of COVID-19 on Early Career Scholars and Doctoral Students* [Focus group study report] (American Educational Research Association; Spencer Foundation, 2021):15, <https://doi.org/10.3102/aera20211>

⁴⁶ Naiara Ozamiz-Etxebarria et al., “Estado emocional del profesorado de colegios y universidades en el norte de España ante la COVID-19,” *Revista Española de Salud Pública* 95, no.1 (2021): 6, https://www.sanidad.gob.es/biblioPublic/publicaciones/recursos_propios/resp/revista_cdrom/VOL95/O_BREVES/RS95C_202102030.pdf.

in lockdown. These can be summarised as follows: 1) the use of active and participatory methodologies; 2) improved teaching coordination through cross-curricular innovation projects allowing for the design, implementation and monitoring of actions; 3) evaluation through different strategies, focusing on formative assessment and feedback, and student participation (peer assessment) and 4) mechanisms to explicitly work on students' socio-emotional skills (instead of focusing only on delivering cognitive skills), all supported by digital resources, which allow for better pedagogical practices and the development of students' digital competence. These proposals are aligned with those of other experts^{47,48} calling for reinvention so that universities can meet this challenge.

The conclusions of the study allow us to reflect on the role that universities should play in the coming years, especially in Spain, but which can be taken into consideration for further research and policy in an international context.

The situation caused by the pandemic has accelerated the digital transformation of universities,⁴⁹ which have been forced to invest in more digital resources to continue teaching. However, the main limitation is that these digital resources have not been integrated into the teaching resources of Spanish teaching staff.⁵⁰ Teachers have been forced to survive, at best, with new technology-based methodological strategies,^{51,52} through peer support or as self-learners. The role of teachers' digital competence in the coming years will be decisive, a competence that has evolved even further with the pandemic. Not only must teachers be knowledgeable users of digital

⁴⁷ Fernando M. Reimers and Francisco Marmolejo, "University and School Collaborations during a Pandemic: Sustaining Educational Opportunity and Reinventing Education," *Knowledge Studies in Higher Education* 8 (2022), 31, https://doi.org/10.1007/978-3-030-82159-3_1.

⁴⁸ Thomas Farnell, Ana Skledar Matijevic, and Ninoslav Šukanec Schmidt, *The impact of COVID-19 on higher education: A review of emerging evidence. NESET report* (Luxembourg: Publications Office of the European Union, 2021), 59, <https://doi.org/10.2766/069216>.

⁴⁹ Francisco J. García-Peñalvo et al., "La evaluación online en la educación superior en tiempos de la COVID-19," *Education in the Knowledge Society*, 21 (2020): 20-21, <https://doi.org/10.14201/eks.23013>.

⁵⁰ Celia Torrecillas, "El reto de la docencia online para las universidades públicas españolas ante la pandemia del Covid-19," *Instituto Complutense de Estudios Internacionales*, 16 (2020): 3, <https://www.ucm.es/icei/file/iceipapercovid16>.

⁵¹ Olasile Babatunde Adedoyin and Soykan Emrah, "Covid-19 pandemic and online learning: the challenges and opportunities," *Interactive Learning Environments* (2020):4, <https://doi.org/10.1080/10494820.2020.1813180>.

⁵² José Antonio M. Román, "Higher Education in Times of Pandemic: A View from within the Training Process," *Revista Latinoamericana de Estudios Educativos* 50 (2020): 37-38, <https://doi.org/10.48102/rlee.2020.50.ESPECIAL.95>.

environments and tools, they must also be able to integrate them into the entire teaching and learning process,^{53,54} and know how to develop this ability in their students.

COVID-19 created an educational innovation context⁵⁵ that could serve as a trigger for universities to pay more attention to the continued long-term development of online education⁵⁶. Some authors wonder whether such a transition will truly transform digital institutions in the absence of a post-pandemic strategic vision.⁵⁷ It is still too early to know the impact, but it will be necessary to prioritise material resources and adequate teacher training, especially if some universities evolve towards hybrid models. Future research could include empirical analyses to evaluate the impact of these hybrid teaching models—more specifically, how this model is perceived by university faculty and students and how it impacts on student learning. However, the Achilles’ heel of universities is not training, but a lack of professional development in teaching careers. Universities must strive to create their own system that acknowledges and encourages quality teaching to meet the challenges of today’s society. This situation can also be an opportunity to create more resilient education systems that mobilise the learning achieved as a result, along with institutional resources. Universities must therefore play an active role in serving society, engaging with the community, and helping their teaching staff to create educational situations through collaborations with other educational institutions and organisations in their environment, to respond to complex societal needs.⁵⁸ The support of

⁵³ Francesca Caena, “Bridge over Troubled Water: Induction pointers for Teacher leadership,” *Profesorado. Revista de Currículum y Formación del Profesorado* 25, no. 2 (2021): 18, <https://doi.org/10.30827/profesorado.v25i2.18534>.

⁵⁴ Riina Vuorikari, Yves Punie, and Marcelino Cabrera Giraldez, *Emerging technologies and the teaching profession: Ethical and pedagogical considerations based on near-future scenarios* (Publications Office of the European Union, 2020), 12, <https://doi.org/10.2760/46933>.

⁵⁵ Viv Ellis, Sarah Steadman, and Qiming Mao, “‘Come to a screeching halt’: Can change in teacher education during the COVID-19 pandemic be seen as innovation?,” *European Journal of Teacher Education* 43, no. 4 (2020): 560, <https://doi.org/10.1080/02619768.2020.1821186>.

⁵⁶ Bin Yang and Huang Cheng, “Turn crisis into opportunity in response to COVID-19: experience from a Chinese University and future prospects,” *Studies in Higher Education* 46, no. 1(2021): 129-130, <https://doi.org/10.1080/03075079.2020.1859687>.

⁵⁷ Manuel Area-Moreira et al., “Análisis de las políticas de enseñanza universitaria en España en tiempos de Covid-19. La presencialidad adaptada,” *Revista Educación a Distancia* 21, no.65 (2020):14-16, <https://doi.org/10.6018/red.450461>.

⁵⁸ Fernando M. Reimers and Francisco Marmolejo. University and School Collaborations during a Pandemic: Sustaining Educational Opportunity and Reinventing Education. *Knowledge Studies in Higher Education* 8 (2022): 5, https://doi.org/10.1007/978-3-030-82159-3_1.

the institution is key in creating a sense of belonging when delivering a public service to the community.⁵⁹ It remains to be seen whether these proposals will gain strength through the requirements of the European Education Area approved by the Council of the European Union.⁶⁰ This framework acknowledges the actions of higher education institutions and their teaching staff, along with the development of their competences, as strategic pillars for teaching in a diverse and digital context.

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⁵⁹ Tommaso Agasisti, and Mara Soncin. “Higher education in troubled times: on the impact of COVID-19 in Italy.” *Studies in Higher Education* 46, no.1 (2021): 94, <https://doi.org/10.1080/03075079.2020.1859689>

⁶⁰ Council of European Union. *Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030)* (2021/C 66/01), 2021, 66/7, [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32021G0226\(01\)&qid=1647347890863&from=ES](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32021G0226(01)&qid=1647347890863&from=ES)

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Annexes

A) Focus group questionnaire

Academic dimension

(1) Methodology: What methodology did you use during this period? Briefly describe. Did you use different methodological strategies? Did you make any adaptations? If so, which ones? How prepared to use new technologies for your teaching (creating resources, teaching-learning with ICT) did you feel?

(2) Materials: What materials did you use? Did you have to make new/different materials?

(3) Assessment: How did you assess your students? What type of strategies and assessment tools did you put into practice?

(4) Workload: How has this situation affected you in terms of your workload? To what extent did you take into account the students' workload?

(5) Institutional response and training: How do you see your university's response to this situation? How do you consider the training you received?

Personal dimension

(1) Emotional issues: How did you feel in terms of work-life balance? Did you explicitly work on socio-emotional aspects with your students?

(2) Learnings: Have you introduced any new aspects into your teaching as a result of this experience?

Immediate and long-term impact of the COVID-19 pandemic on South African higher education

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Abstract: The COVID-19 pandemic has impacted the higher education sector significantly. It forced the stakeholders to do new things and brought many innovations to educational activities. As the pandemic hit the shores of many countries, among other things and sectors, education activities were disrupted. Many, not well-advanced universities in terms of technology and learning management systems (LMS) embarked on a forced recess, using the period to put online education platforms in place. The advanced universities immediately migrated contact teaching and learning to online platforms. This paper aimed to investigate the immediate effects that the pandemic has on South Africa's higher education systems in terms of how both lecturers and students were made to use new technologies/tools, how the tools enhanced teaching and learning, how assessments transformed due to the pandemic, and if some of the interventions employed during the pandemic will find usefulness when the pandemic has finally retreated. In this study, universities that are offering engineering degrees in South Africa are used as a case study, and data were obtained from both engineering students and engineering lecturers at these universities through qualitative (survey with open-ended questions) together with quantitative

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(surveys with closed-ended questions) research methods. The study shows that higher education activities cannot go back to the way they were before the pandemic. The study brings to light that some old techniques will be combined with some innovations employed during the pandemic to ensure effectiveness and greater throughputs in the higher education systems going forward.

Keywords: Higher education; COVID-19; teaching and learning; assessment; learning management system; university education.

I. Introduction

In early 2020, unexpectedly, the COVID-19 pandemic distorted the normal way of living for the generality of humanity. Most countries all over the world imposed hard lockdowns which, in turn, imposed unmatched challenges on social-economic activities. This sudden public health crisis occasioned by COVID-19 magnified the important role of digital infrastructure and wireless networks in ensuring that society continues to run and that members of families are connected. The effect of the pandemic did not spare the education sector from primary level to tertiary institution. Most of the sectors and parastatals were caught unprepared. As a result, in the educational sector, most of the educational activities were initially suspended, and residential students were asked to vacate the school premises. This time allowed for re-strategizing by the stakeholders in the educational sectors.

Different interventions were deployed in different sectors to mitigate the effect of the pandemic on the economy and humans. In the education sector, many countries employed diverse measures in their education systems. In China, where the pandemic was first reported, over 180 million children in primary and secondary schools were made to stay at home. Though the schools were temporarily closed for quarantine, schooling continued, however in a different format: the mode of educating the student was moved online with the aid of technology. The mitigation methods in all sectors, and the education sector soon spread to most of the countries in Europe, Central Asia, South America, North America, the Middle East, Oceania, and Africa. At the center of these mitigating interventions is technology. There was spread use and availability of technology through which online teachings were delivered. The smooth running of this deployment was based on the availability of relevant electronic devices and the availability of an internet connection at home. However, from North America to South America, Asia to Africa, different countries have diverse economic strengths and levels of development. Consequently, the equity issue cuts across different countries and strata of society. The students from the well-to-do families can be able to

afford computers and other electronic devices. However, students from poor families will hardly be able to afford any basic electronic device, and internet access could be out of their reach.

This paper seeks to contribute to the understanding of both the immediate and long-term effects of the COVID-19 pandemic on educational systems, especially at higher institutions. This understanding will assist the stakeholders in the higher education sector and relevant policymakers in planning for the future or evolving higher education system that is beneficial to all.

II. Related works

A recent work presented a short review of some papers that focused on the effect of the COVID-19 pandemic on education. The conclusion from the presented overview was that, though various studies have been carried out in this area, suitable pedagogy and platform must be further explored, especially in developing countries.¹ Most of the works that were reviewed focused on the effect of the pandemic on the pre-university schools' education systems. Another work published in 2020 focused on "the impact of COVID-19 on education in India and the measures taken by the government to provide seamless education in the country". The data employed were obtained from secondary sources. The author concluded that though the pandemic imposed some challenges, various opportunities also evolved.² These include the exploration of Open and Distance learning (ODL) with the aid of diverse digital technologies that were not in use before the health crisis descended in India. Still, on the effect of the pandemic on Indian education, another work delved into the impact on education activities in the country. Specifically, the various challenges that attended to teaching and learning in the new normal, such as "learning style and cultural challenges", "pedagogical e-learning challenges", "technological challenges", "technical training challenges", and "time management challenges" were reviewed.³ The effects of various

¹ Sumitra Pokhrel and Roshan Chhetri, "A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning," *Higher Education for the Future* 8, no.1 (2021): 133-141, <https://doi.org/10.1177/2347631120983481>.

² Pravat K. Jena, "Impact of Pandemic COVID-19 on Education in India," *International Journal of Current Research (IJCR)* 2, no.7 (2020): 12582-12586, <http://journalcra.com/article/impact-pandemic-COVID-19-education-india>, available at SSRN: <https://ssrn.com/abstract=3691506>.

³ Priyanka P. Koul and Omkar J. Bapat, "Impact of COVID-19 On Education Sector In India," *Journal of Critical Review* 7, no.11 (2020): 3919-3930, doi:10.31838/jcr.07.19.535 535.

COVID-19 restrictions on the students' performance were the focus of another research article published in 2020.⁴

The authors used a field experiment with some students from three different subjects, with a university in Spain as a case study. The authors concluded that due to COVID-19 confinement, students' learning strategies changed to a more continuous habit which in turn improved their efficiency. Implications of the COVID-19 pandemic for international higher education are highlighted in another work. The work also presented some potential opportunities (such as “the development of enabling policies and regulations to promote internationalization, offering of incentives to attract students from a wide range of countries, and ensuring that more of the home students have opportunities for studying and working abroad”) for the stakeholders to redesign their methods for the new normal.⁵ Another recently published work aimed at presenting a systematic literature review on “the transition, due to the COVID-19 pandemic, from traditional education that involves face-to-face interaction in physical classrooms to online distance education”. The study examined how this transition has impacted academia and students and then looked at the potential long-term consequences it may have caused. The authors found out that there is “a range of difficulties in switching from offline to online learning modes” for both the learners and the educators and concluded that “it is necessary to continue investigating online education and that policymakers should take the findings of researches on higher education pedagogy seriously to bridge whatever gaps may be present”.⁶ The “impact of the COVID-19 crisis on the academic performance of veterinary medical students and researchers during the lockdown” was considered in another work. Since the subjects of these students are practical, it was discovered that it was not easy for them to learn such on an online platform. Hence, students who participated in the survey thought that “it is difficult to fulfill the veterinary competencies only with the online education system”. The authors, therefore, concluded that “online education should be improved by making it more interactive, showing medical

⁴ Teresa Gonzalez et al., “Influence of COVID-19 confinement on students' performance in higher education,” *PLoS ONE* 15, no. 10 (2020): 1-23, doi:10.1371/journal.pone.0239490.

⁵ Kanwar Asha, and Carr Alexis, “The Impact of COVID-19 on International Higher Education: New Models for the New Normal,” *Journal of Learning for Development* 7, no. 3 (2020): 326-333, <https://jl4d.org/index.php/ejl4d/article/view/467>.

⁶ Manar A. Talib., Anissa M. Bettayeb, and Razan I. Omer, “Analytical study on the impact of technology in higher education during the age of COVID-19: Systematic literature review,” *Education and Information Technologies* 26, (2021): 6719-6746, <https://doi.org/10.1007/s10639-021-10507-1>.

procedures in real situations, giving concise information, and providing 3D virtual tools to mimic the real situation”.⁷ Another paper in the literature focused on reviewing the “impact of the COVID-19 pandemic on the education system in developing countries”. The authors established that online education is challenging in poor countries because most of the parents are uneducated.⁸ Another drawback is the lack of electronic devices and ICT infrastructures in these countries. The authors then concluded that “the poor and digitally illiterate families, with lower educational levels children, with poor learning motivation in the developing countries, are likely to be left behind” and disadvantaged when adopting online education. Evaluation of the effect of school closures, because of the pandemic, “on primary school performance using exceptionally rich data from the Netherlands” was discussed in another work.⁹ The authors found that “students made little or no progress while learning from home and these suggested losses, even larger in countries with weaker infrastructure or longer school closures”. How the pandemic shook the education activities in South Africa is briefly described by other authors. The work beamed light into how “contact universities faced push-back from students who have argued that universities cannot expect them to continue with online learning without providing the necessary resources”.¹⁰ This was because a higher percentage of students rely on government financial assistance for their costs of living. The “negative impact of the COVID-19 pandemic on education financing” was reported by another author in 2020. The report suggests that “in low- and middle-income countries, the pandemic is expected to reduce planned increases in education spending in 2020” and beyond due to the overall negative impact the pandemic exacted on the various countries’ economies.¹¹ The effect of the COVID-19 pandemic on

⁷ Mohamed A A Mahdy, “The Impact of COVID-19 Pandemic on the Academic Performance of Veterinary Medical Students,” *Frontiers in Veterinary Science* 7, (2020):1-8, <https://doi.org/10.3389/fvets.2020.594261>.

⁸ Seble T. Mekonnen and Worku Muluye, “The Impact of COVID-19 Pandemic on Education System in Developing Countries: A Review,” *Open Journal of Social Sciences* 8, no.10 (2020): 159-170, doi: 10.4236/jss.2020.810011.

⁹ Per Engzell, Arun Frey, and Mark D. Verhagen, “Learning loss due to school closures during the COVID-19 pandemic,” *Proc Natl Acad Sci U S A* 17, (2021 Apr 27): 118, <https://doi.org/10.1073/pnas.2022376118>.

¹⁰ David W. Hedding et.al, “COVID-19 and the academe in South Africa: Not business as usual,” *South Africa Journal of Science* 116, no. 7/8 (2020): 1-3, <http://dx.doi.org/10.17159/sajs.2020/8298>.

¹¹ Samer Al-Samarrai, Maulshree Gangwar, and Priyal Gala, “The Impact of the COVID-19 Pandemic on Education Financing,” *Economic Impact of COVID-19, World Bank*,

the usage of digital tools in educational institutions in South Africa was the focus of another paper. The authors attempted to monitor the rate at which the 4IR-related technologies were employed in the education sector during the lockdown. The finding of the authors, based on the secondary data obtained from sources such as literature, was that “a variety of fourth industrial revolution related tools were employed from primary education to higher and tertiary education when the pandemic forced all educational sectors to shut their doors and ask the students to leave the campus environment”.¹²As it was suggested in one of the above-presented works, there is a need for further investigations on the impact of the pandemic to have a better understanding of the immediate and long-term effects of the COVID-19 pandemic on the education sector. This is necessary since the pandemic seems to be evolving from one variant to the other (Alpha, Beta, Gamma, Delta, Omicron, etc.), including the variant of interest, as indicated by the World Health Organization (WHO)- Eta, Iota, Kappa, and Lambda. The introduction of lockdowns continues to be on and off in many countries. Hence, it is imperative to understand the long-term effect of the pandemic on education to guide the education policymakers in what needs to be changed or incorporated into the education systems to ensure future crises will have little or no negative effect on education systems and to also take advantage of the various mitigating methods to improve the educational activities. Consequently, this paper attempts to answer the research questions detailed as follows:

RQ1: How did the COVID-19 pandemic expose both the students and lecturers to new technologies or make them use new tools that are relevant to education activities?

RQ2: How have the various innovations introduced, and the new technologies used due to the pandemic, enhanced teaching and learning activities?

RQ3: In what ways has the pandemic affected education assessments and students' performances?

RQ4: Is it possible to return to the status quo of teaching and learning, and the types of assessments in existence before the pandemic, once COVID-19 has finally retreated?

Washington, DC. © World Bank, (2020): 1-12, <https://openknowledge.worldbank.org/handle/10986/33739> License: CC BY 3.0 IGO.

¹² David Mhlanga and Tankiso Moloi, “COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa?” *Education Sciences Journal* 10, no.7 (2020): 180, <https://doi.org/10.3390/educsci10070180>.

III. Methodology

This study was approved by the Engineering Council of South Africa (ECSA)'s Research Ethics Committee (RES_FOR_001) dated 16th July 2020. To answer the above-listed questions, primary data were obtained from students and lecturers who are based in the Engineering Faculties in some universities that are offering engineering degrees in South Africa. This is with the aim that the corresponding findings could be applied in other faculties and be generalized for higher education systems at large. The findings presented in some of the works presented earlier that were based on secondary data motivated the efforts in this paper to employ both qualitative method (open-ended survey questions) and quantitative method (closed-ended survey questions) to gather the views of the targeted stakeholders on the effect of COVID-19 on engineering education and higher education in general. The engineering academics and students focused on were from the universities that are offering BSc Engineering degrees in South Africa. These universities include the University of the Witwatersrand (WITS), the University of Cape Town (UCT), the University of Pretoria (UP), Stellenbosch University (SU), the University of KwaZulu-Natal (UKZN), North West University (NWU), Nelson Mandela University (NMU), and the University of Johannesburg (UJ).

According to U.S. News & World Report,¹³ these Universities based on their reputation and research in the field of Engineering in 2022 have the following rankings nationally and globally. The University of Pretoria ranked as number one and number 353 in best Universities for Engineering both nationally and globally respectively, while the University of Johannesburg ranked number two and number 415 in best Universities for Engineering both nationally and globally respectively. The University of KwaZulu-Natal is placed number four and number 597 both nationally and globally respectively, whereas Stellenbosch University ranked number five and number 643 both nationally and globally respectively. For the North West University, the University ranked number six and number 652 both nationally and globally respectively, while the University of the Witwatersrand was ranked number seven and number 763 at both national and global levels respectively. In the same Engineering discipline, the University of Cape Town was ranked number eight and number 798 at both national and global levels respectively, while the last University, Nelson Mandela University was not placed on the ranking

¹³ Robert Morse and Sam Wellington, "Top Engineering Universities in South Africa," *US News Best Global Universities*, <https://www.usnews.com/education/best-global-universities/south-africa/engineering>.

scale at the time but can be presumed to come behind all the other Universities with rankings.

III.1. Quantitative method: closed-ended questionnaires

The closed-ended survey questions were designed to obtain the stakeholders' perceptions on the impacts or foreseen impacts of the COVID-19 pandemic on the commitment of the students in terms of revisiting online course material, asking questions, getting personal support, and how the deployed technologies were of help or otherwise to the second-language English-speaking students and those with disabilities. Perceptions of the learners were also sought regarding their preferences for the continuation of the new normal mode of teaching and learning as brought about in the education system by the pandemic. The lines of questions posted to the educators range from their teaching and delivery experiences (based on the various interventions suddenly introduced because of the pandemic), and how the various changes had influenced them in using new technologies, to how those changes affected assessment processes.

III.2. Qualitative method: Open-ended questionnaires

To have unrestricted views of the stakeholders, open-ended questionnaire surveys that focused on the impacts or the foreseeable impacts of the COVID-19 pandemic on engineering education, and higher education at large in South Africa were designed. The engineering students' perspectives were sought through the open-ended questions that focused on new tools/technologies applicable to teaching and learning that they have used due to the pandemic and those that will be applicable in the future, how the use of those technologies has impacted teaching and learning, and assessments.

Both types of questionnaires were made available between November 2020 and January 2021. About 280 undergraduate students completed the survey from UP, UKZN, NWU, WITS, and UJ. Out of the 281 student participants, 26 students did not specify their universities. In terms of engineering lecturer participants, only 44 lecturers participated in the survey from WITS, UCT, UKZN, NWU, NMU, and UJ

IV. Results of the survey

All the responses from the targeted groups on the impact of the COVID-19 pandemic on engineering education are presented in this section.

IV.1. Closed-ended questionnaires’ results

For the analysis of the close-ended responses, because of the use of the five-point Likert scale (developed by Likert),¹⁴ the Relative Important Index (RII), a non-parametric technique, widely used for such data¹⁵ is employed. The RII ranks the criteria according to their relative importance. The reasoning behind the Likert item is that attitude (opinion) will change on a bi-polar continuum (the scaled stem), from “negative” (i.e. “strongly disagree”), to “positive” (i.e. “strongly agree”). The RII is expressed as

$$RII = \sum_{a=1}^A \frac{P_a U_a}{AN}, \tag{1}$$

where

P_a = Weighting that given to each factor by the respondent, $a: 1, 2, \dots A$

U_a = Number of respondents that select P_a

N = Total number of respondents.

For the open-ended questionnaire in this paper, $= 5, P_5 = 5; P_4 = 4, P_3 = 3, P_2 = 2, P_1 = 1$. Also, U_a are defined as follows.

U_5 = Number of respondents that opted for the option “strongly agree”.

U_4 = Number of respondents that opted for the option “agree”.

U_3 = Number of respondents that opted for the option “neither agree nor disagree”.

U_2 = Number of respondents that opted for the option “disagree”.

U_1 = Number of respondents that opted for the option “strongly disagree”.

Thus, (2) can be expressed as

$$RII = \frac{P_5 U_5 + P_4 U_4 + P_3 U_3 + P_2 U_2 + P_1 U_1}{AN}, \tag{2}$$

Consequently, as an example, the RII for the first row in Table 1 is obtained as:

¹⁴ Rensis, Likert, “A technique for the measurement of attitudes,” Archives of Psychology 22, no. 140 (1932): 55.

¹⁵ Vishal, Sakhare, and Chougule Mahesh, “Construction Equipment Monitoring: By using Relative Important Indices (RII) Analysis,” International Journal of Trend in Scientific Research and Development (IJTSRD) 6, no. 4 (2020): 501-503.

$$\begin{aligned}
 RII &= \frac{P_5U_5 + P_4U_4 + P_3U_3 + P_2U_2 + P_1U_1}{AN} \\
 &= \frac{5 \times 55 + 4 \times 90 + 3 \times 75 + 2 \times 44 + 1 \times 90}{5 \times 281} = 0.7388.
 \end{aligned}
 \tag{3}$$

The RII varies from 0 to 1, and has the following levels.¹⁶

- High (H): $0.8 < RII < 1.0$
- High-Medium (H-M): $0.6 < RII < 0.8$
- Medium (M): $0.4 < RII < 0.6$
- Medium-Low (M-L): $0.0 < RII < 0.2$

IV.1.1. Students’ perceptions of the closed-ended questionnaires

The first line of the question posed to the students aimed at understanding if they have used some new technologies (automated tools) during the pandemic and if such have enhanced their learning experiences. The results of their responses are shown in Table 1 with a corresponding RII value of 0.7388, which falls within the High-Medium level. Hence, it can be inferred that a relatively higher number of 281 engineering students who participated in the survey across all the universities covered responded that they employed such tools and believed these enhanced their online learning experiences as imposed by the pandemic. The next line of questions attempted to understand how the move to online teaching and learning due to the pandemic influenced individual learning culture and enhanced support systems for the students. The responses obtained result in an RII value of 0.7388, which equally falls within the High-Medium level. This value suggests that a high number of the participating students, out of 281 students who responded, believed that the migration to the online mode of teaching and learning, occasioned by the COVID-19 pandemic, positively steered the students to revisit online course materials, made them ask further questions, and received personal support both within and off teaching hours. These experiences are perceived to be better than what they were used to before the pandemic. Since the English language is not the first language of most of the students in South Africa, and some students have physical disabilities, the next line of the question was posed to see how migration to the online offering of courses due to the pandemic has affected these students. As shown in Table 1, the responses suggest that a slightly high number of the participating students believed that using some of the new technologies, made

¹⁶ K.N. Le, and V.W.Y.Tam, “A survey on effective assessment methods to enhance student learning,” *Australasian Journal of Engineering Education* 13, no. 2 (2007): 13–20.

available as a means of ameliorating the problems brought by the pandemic to university education, was of great benefit to the students whose first language is not English, including those with some disabilities. The relatively low RII value of 0.6683 in comparison with the first two questions, though still falls within the High-Medium level, could be attributed to the fact that a small number of the students have some disabilities and many students with English as a second language could still manage with the English language.

The experiences of the students in terms of the mode of assessment (open-book assessment) hurriedly introduced to ensure that assessments still took place remotely were sought. The students were asked if they would prefer the new mode of assessments, different from what they were used to before the pandemic, to be adopted after the pandemic has retreated. The responses obtained are shown in Table 1 with an RII value of 0.7388 which falls within the High-Medium level. This suggests that a whole lot of the students would prefer the adoption of open-book assessments after the pandemic. It was understood that most Universities could not wait till the pandemic finally disappears so that the students can be received in the campus environment at full capacity as it was before the pandemic. To this end, the students were asked if they would prefer the status-quo of teaching (face-to-face teaching) to be resumed after the pandemic or if they would prefer this be combined with the new mode of teaching and learning they experienced during the pandemic (the online mode of teaching and learning). The responses obtained, shown in Table 1 with a higher RII value of 0.7794 which falls within the High-Medium level, suggest that most of the students would prefer the adoption of the blended teaching and learning model after the COVID-19 pandemic had disappeared, and normalcy returned to the university environment.

Table 1
Students' Responses to the Close-ended Questionnaires (281 students)

Questions	Strongly Agree (5)	Agree (4)	Neither agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)	RII	Importance Level
"I used some automated tools for online teaching/ learning, due to COVID-19, which allowed me to achieve more than I did in the past"	55	90	75	44	90	0.7388	H-M

Questions	Strongly Agree (5)	Agree (4)	Neither agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)	RII	Importance Level
“The COVID-19 effect of driving the education system in general to online mode of teaching, using some of the new technologies, allowed students to revisit online course material, ask questions and get personal support, in and out-of-normal teaching hours”	68	127	38	28	20	0.7388	H-M
“The COVID-19’s effect of driving the education system in general to online mode, using some of the new technologies, was especially helpful to students who are second-language English speakers or who have a disability”	40	81	117	23	18	0.6683	H-M
“Based on my assessment’s experience during COVID-19, Open-book mode of assessments should be adopted for students going forward”	95	75	63	26	22	0.7388	H-M
“After the COVID-19 pandemic, as a student, I would prefer that my lecturers adopt blended teaching and learning model (combination of face-to-face and online models) as against face-to-face mode of teaching and learning that was being used before the pandemic disrupted academic activities”	118	89	25	26	22	0.7794	H-M

IV.1.2. Lecturers' perceptions of closed-ended questionnaires

The lecturers were first asked if the use of evolving technologies deployed for online education as a means of intervention when the pandemic struck various shores was of any benefit. A total of 44 lecturers responded to the posed question with an RII value of 0.6727, which is slightly high and falls within the High-Medium level. The responses, as shown in Table 2, suggest that most of the lecturers believed that the various technologies made available for online education in their various universities assisted them to design good teaching and delivery experiences and reconsider methods of assessment that were best suited for their various subjects without compromising the academic standard. A not-too-high number of the lecturers, as shown in Table 2 with an RII value of 0.6500 which still falls within the High-Medium level, also believed the use of new technologies/tools, consequent upon the COVID-19 pandemic, in teaching activities allowed them to achieve more than they used to before the pandemic. Still in Table 2, with an RII value of 0.6318 that equally falls within the High-Medium level, slightly above the cut-off value for the positive perception level of H-M, a slightly high number of the lecturers believed that they could determine both the location of teaching and learning, as well as their pace of learning using the various introduced technologies and interventions to keep education activities ongoing on the online platform due to the disruption in education activities by the pandemic.

There have been many talks about overworking remotely during the pandemic due to the inability to make a balance between administrative obligations, teaching duties, and community services. However, a relatively high percentage of the lecturers as shown in Table 2 with an RII value of 0.6727, within the High-Medium level, indicated that they were able to balance time allocation between logistics and subject contents during the online lecture delivery than they could do during the face-to-face interactions they had before the pandemic. The inability to assess students' assimilations and emotions is associated with the online delivery of course content. In line with this, as shown in Table 2 with a very high value of RII = 0.8000 which falls at the beginning of the High level, most of the lecturers believed that the online mode of learning presents the challenges of accurately evaluating the students' emotions when compared with the physical mode of teaching and learning. In terms of the mode of assessment for online education, according to the experiences had as the pandemic was ravaging the nation, the majority of the lecturers, as shown in Table 2 with also a very high RII value of 0.8000, agreed that the new mode of assessment or "what it means to be successful in an academic environment" must be designed with the aid of the evolving technologies available for use in an education program.

Table 2
Lecturers' Responses to the Close-ended Questionnaires (44 lecturers)

Questions	Strongly Agree (5)	Agree (4)	Neither agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)	RII	Importance Level
"The COVID-19's effect of driving the education system to the online mode of teaching using some of the evolving technologies due to COVID-19 helped me as a lecturer to design good teaching and delivery experiences and reconsider methods of assessment"	6	17	11	7	3	0.6727	H-M
"The use of new technologies/tools consequent upon the COVID-19 pandemic in engineering education teaching activities allows lecturers to achieve more than they did in the past"	7	16	6	11	4	0.6500	H-M
"Based on the use of new technologies (tools), I can determine my own pace and location of teaching and learning"	6	13	10	12	3	0.6318	H-M
"I am more conscious of the importance of balancing time allocation between logistics and subject content during online lecture delivery than face-to-face interactions"	4	18	14	6	2	0.6727	H-M

Questions	Strongly Agree (5)	Agree (4)	Neither agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)	RII	Importance Level
“Online teaching and learning presents limitations to accurately evaluate students’ emotions compared to face-to-face interactions in class”	15	19	6	3	1	0.8000	H
“New mode of assessments or what it means to be successful in an academic environment must be formulated while deploying the use of evolving technologies for Engineering Education”	14	22	5	2	1	0.8091	H

IV.2. Open-ended questionnaires’ results

The open-ended questions were designed to obtain broad views of both students and lecturers from the targeted universities on the effect of the COVID-19 together with various solutions deployed in higher education. Word clustering analysis is applied to all the responses of both the students and lecturers to categorize the most common responses from these stakeholders in tertiary education.

IV.2.1. Students’ responses to the open-ended questionnaires

The first question directed to students was to establish the specific technologies/tools employed by them as the pandemic forced teaching and learning to the online platform. The responses from all the students that answered this question are illustrated in Fig. 1, where about 62 students indicated that they did not use any, and about 24 students indicated that they used Blackboard. 20, 13, and 10 students mentioned Zoom, Microsoft Teams, and Google Meet as the tools they used respectively. Microsoft Excel Spreadsheet and Discord are mentioned by nine and seven students to have been used respectively. Six students each indicated that they used programming and Python. Four students each suggested they used cloud computing, Solidworks, Tinkercad, and Microsoft Word. Between one student and three

students indicated that they used some other tools such as Autocad, Internet of Things (IoT), ITspice, MATLAB, and Moodle among others. The responses of the students to this question suggest that the available technologies in different Universities considered for the survey differ. While some of the Universities have made available to their students relatively more advanced technologies and tools, some of these Universities were not so lucky, and the students had to use relatively common or open-source resources.

The next questions posed to the students aimed at understanding the impacts of using these technologies/tools (some of which were newly used by the students) on teaching and learning in tertiary education due to the COVID-19 pandemic. The responses of the students who answered the question are shown in Fig.2. Most of the respondents use the term “lectures”. Examples of such responses include the following:

- *A student can access live **lectures** recorded and access it at any time.*
- *It makes it easier to revisit **lectures** and catch up when you missed **lectures** for some reason.*
- *Online learning is more helpful in the sense that I can rewatch and learn the material until I understand and it's easier to keep up with the work than in a traditional **lecture**.*
- *The ability to re-watch **lectures**' videos where the lecturer may have been progressing too quickly for notetaking, greatly aids in the understanding of concepts on, or close to the day they were presented.*
- *Personally, the online mode of education is much better and more effective and wastes less time. Also, if you miss something a lecturer said you can watch the **lectures** again.*
- *Good impact since students had more time to recap or listen to the **lectures** again even after the lecture had ended.*

The next most used keyword is “**Concepts**”, while the impact phrases include the following:

- *Allows a deeper understanding of **concepts** and gives you ample time for research. Being in control of the pace of the lectures allows me to grasp **concepts** once off and spend more time practicing the **concepts** in calculations.*
- *The ability for students to revise work helps solidify concepts.*

The other uses of the term are in the same line of articulation. The next most used keyword is “**skills**”, with statements such as follows made by the students:

- *For me the technologies employed allow a lot more time for exploring and developing own **skills** to be used in engineering applications.*
- *I would say it has been a positive experience thus far, as I have learned to teach myself, which is one of the most valuable **skills**.*

Another most used keyword is “**solving**” with an example of statements in which it was used given as:

- *I have also been able to use far more tools and online technologies available to me now and having full access to a computer and books when learning and doing assessments makes me a lot lazier, but also better at **problem-solving**.*

From the responses of the students, it is very clear that the migration to online teaching and learning mode gives some flexibility for most of the students because of the ease of accessing online materials, and pre-recorded lectures at any time. The opportunity to repeatedly listen to the pre-recorded lectures accompanied by the lecture notes/slides also enhanced their understanding of various concepts. Some of these students also applied themselves to the usage of tools they would not ordinarily have used should the teaching and learning not move online.

The last question posed to the students focused on understanding what the effects of taking tertiary education to the online platform with the aid of the available technologies will have on the assessments in tertiary education. Fig. 3 illustrates the responses from the students. The most used keyword which also appears in the question asked is “**assessment(s)**”, with the following being examples of statements from the students.

- ***Assessments** are harder to regulate as it becomes much easier to **cheat**.*
- *The criteria of **assessments** should be changed. Instead of being **traditionally** knowledge-based, they should assess the student’s **ability** to complete tasks.*
- *(Even though the integrity of online **assessments** is highly questionable depending on the type of LMS a university uses, and the skill sets of individual lecturers on how to create smart and intuitive online*

assessments, Online assessments can open a wide variety of testing students, test scenarios can be very practical, and students may be able to provide tangible solutions.

- *Assessments are made more efficient).*
- *This will greatly increase efficiency for engineering students, more knowledge about the online tools, in general, is needed and assessments will be more applicable in real-world situations.*
- *It makes assessments more focused on the technical concepts and understanding the content.*
- *Engineering education would develop into a much more automated environment with auto-graded assessments and a virtual classroom/ learning platform.*
- *The old paper and pen mode of assessment is still the best in my opinion as it minimizes the possibility of cheating and fully tests if the student is capable of answering the questions without any external help.*
- *I still believe that some kind of in-person assessment is required, probably semester tests but definitely exams.*
- *Assessment will have to involve a critical thinking approach rather than a memory exercise.*
- *The online tools and technology employed simplify the assessment and speed up the process of getting feedback in a faster and more intuitive way.*

The next most used keyword is “**changing**”, with the following statements being examples of where it appears.

- *Preparing students for a rapidly changing world.*
- *Online tools and technologies are changing how assessments can be completed by showing that it is possible to move away from traditional paper-based assessments to online formats.*
- *Changing of mindsets to engineering education.*

Some other keywords are used within the statements used for the earlier presented keywords, and some other used words include “**faster**”, and “**results**”, etc. as illustrated in Fig.3. From the feedback of the students, it is obvious that the online technologies deployed brought about automated

marking which increased the rate at which feedbacks were provided to students, but it widened the massive gate of exam malpractices. Some students also complained of being stressed out which could be attributed to not being used to those tools which might affect such students in an online timed-out assessment.

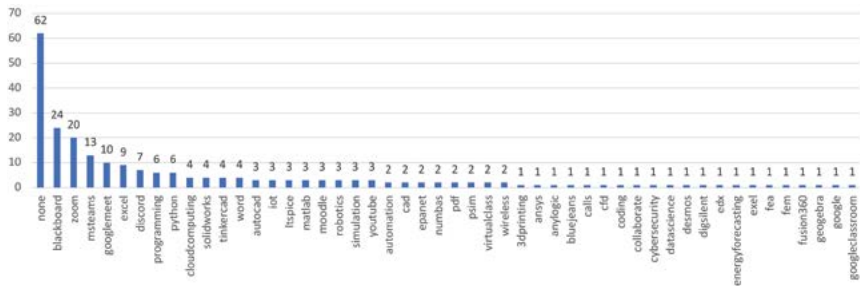


Figure 1

Students’ responses to “Name some of the new technologies/ tools you have learned to use for online teaching/learning due to COVID-19”

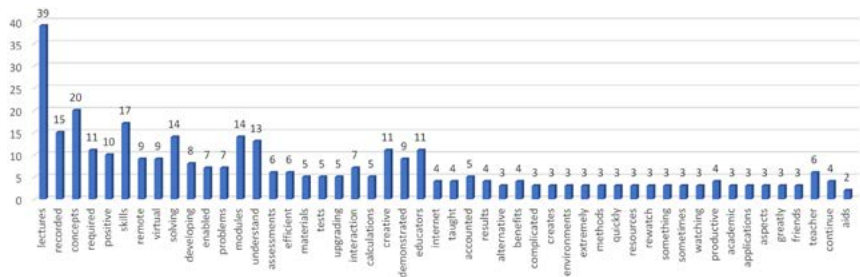


Figure 2

Students’ responses to “According to you kindly state the main impacts of new technologies/ tools that have been used due to the COVID-19 pandemic on teaching and learning in tertiary education (mode of teaching deliveries)”

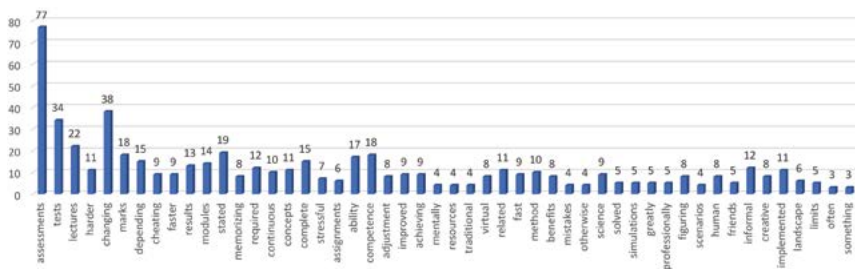


Figure 3

Students’ responses to “According to you kindly state the main impacts of new technologies/ tools that have been used due to the COVID-19 pandemic on assessments in tertiary education”

IV.2.2. Lecturers’ responses to the open-ended questionnaires

To confirm the responses of the students to the above three questions, the engineering lecturers were also asked similar questions. Some of the responses of the engineering lecturer to the questions asked to know the types of specific technologies/tools employed when teaching and learning were migrated to the online mode are illustrated in Fig. 4. The most used tools stated by them include the “Moodle”, “Microsoft Streams” “Zoom”, “Sakai”, a type of Canva, “Katura” (within Moodle), “BBB-BigBlueButton”, “OBS” Studio Bash scripting, “SPICE”, “Proteus” Design Suite for Microcontroller-based Simulation, “Droid” cam, “Vula” -a type of Canva, “Discord”, “Jupyter”, “Scorm” among others. Though a few numbers of engineering lecturers participated in the survey, significant numbers of them tend to use the most recent Learning Management Systems (LMS), and other technologies and tools.

Most of the keywords in the responses of the engineering lecturers to the second question that seek to establish the impacts on the migration of tertiary education to the online platform with the aid of the available technologies on Teaching and Learning are included in Fig. 5. The most prominent keywords from the list include “**educator**”, “**knowledge**”, “**students**”, “**processing**”, “**learning**”, “**incorporating**”, “**quality**”, “**structured**”, and “**assessment**”, where the statements in which some of these keywords were used include the following.

- *The **assessment** of a student’s **knowledge** is almost impossible because of the dishonesty of the students.*

- *Both the teacher and the students will have enhanced **skill sets and knowledge**.*
- ***Educators** are not Trained fast enough to train **students**.*
- *Online **educators** are overburdened with **student** mental health wellness aspects that could be solved by more qualified people.*
- ***Promotes individual learning**.*
- *Develop student **learning abilities**.*
- *Online education and related **technologies** are now allowing for more effective asynchronous teaching and **learning** which improves the flexibility of engineering education and **students'** access to it.*
- *Much greater flexibility, e.g., flipped classroom and blended **learning**.*
- *Due to the lack of **computer** literacy, **students** are **forced** to learn **computer skills**.*
- *Teaching and **learning** must be **structured**, concise, and well-planned to ensure a balanced approach with technology.*
- ***Students** have greater access to their lecturers.*

The last question posed to the engineering lecturers similarly seeks to understand the effects of taking tertiary education to the online platform with the aid of the available technologies on the assessments in tertiary education. The keywords from the lecturers' responses are illustrated in Fig. 6, and some of these include “**assessments**”, “**students**”, “**testing**”, “**application**”, “**cheating**”, “**marking**”, “**book**”, “**good**”, “**internet**”, “**staff**”, “**academic**”, “**benefits**”, “**evaluated**”, “**problems**”, “**assignments**”, etc. The following are some statements in which some of the keywords were used by the engineering lecturers.

- ***Assessments** must be re-engineered to reflect the new needs.*
- ***Assessments** have to be very specific. **Marking assignments** easily becomes automated.*
- *The main **benefits** from my perspective are that learning platforms such as Moodle, enable often more personalized self-paced content delivery.*

- **Randomized** questions, with **randomized** numbers for calculations, enable a large range of **questions** to be made available for evaluation which can partly assist in preventing copying from other **students**.
- Rethinking your **assessments** is key to success while still allowing learning to take place.
- Assess them with an open **book**, and open **internet** and make them solve real-life **problems** with time constraints. Just like they will do it when they are in the workplace. Online **marking** is automated.
- Attempting to do a high-stakes **assessment** (e.g., writing exams remotely) has been fraught with problems, particularly **cheating**, and **plagiarism**.
- This has added a burden to the teaching staff, in addition to having to perform **re-testing** due to concerns of too many **students** who have cheated, etc.
- Transfer to open book **assessments**, very similar to professional practice at the workplace where design is off manual.
- New types of **assessment** open up. Lecturers can use the technologies to give quality feedback while spending less time on **assessment**.
- Move towards **open-book** evaluations. Closer to real-world practice.
- There is no way to assess a large class online in a manner that is fair and free of **cheating**).
- No monitoring of **students** whether they are **cheating** or sharing knowledge during assessments.
- Requires a greater **application** of knowledge approach when setting **assessments**. Allows for **application** of case study and **application assessments**.
- **Marking assignments** easily becomes automated.
- The main **benefits** from my perspective are that **learning** platforms such as Moodle, enable often more personalized self-paced content delivery.

In all the responses of the lecturers, it could be inferred that most of them believe that the new technologies/tools employed for online teaching and learning will have positive impacts on assessments-these range from easy to reshuffling questions used in online assessments, automated marking (less work for lecturers), higher rate of releasing assessments' feedbacks to

students, and the possibility of re-engineering of assessment to meet the evolving needs of our generation. However, some of the lecturers were concerned that the online assessment would open floodgates of cheating and examination malpractices to students.

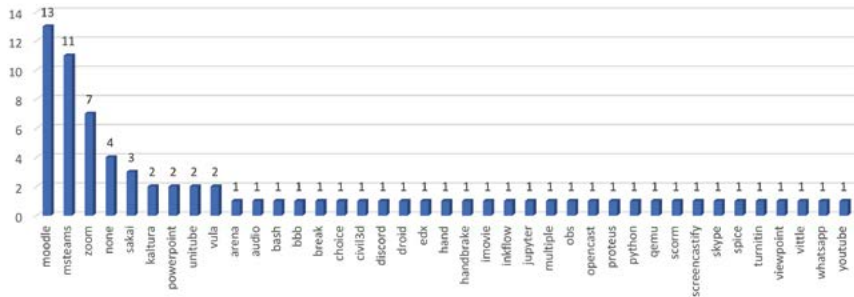


Figure 4

Lecturers’ responses to “Name some of the new technologies/tools or/and platforms you have learned to teach your class due to the COVID-19 pandemic”

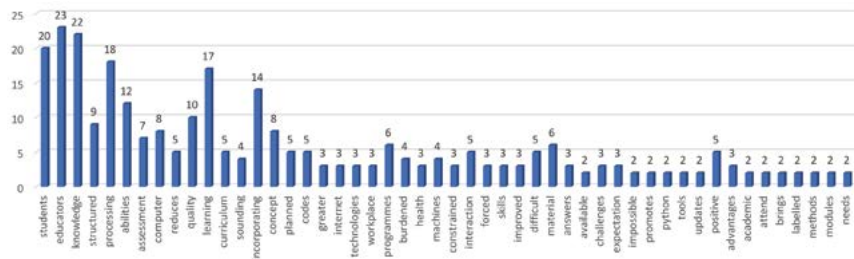


Figure 5

Lecturers’ responses to “In your opinion, kindly state the main impacts of new technologies/ tools that have been used due to the COVID-19 pandemic on Teaching and Learning”

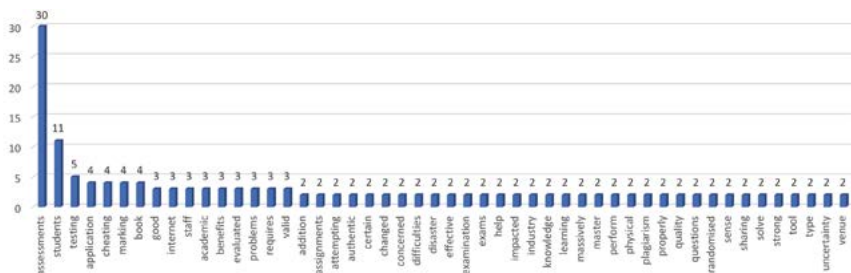


Figure 6

Lecturers’ responses to “In your opinion, kindly state the main impacts of new technologies/ tools that have been used due to the COVID-19 pandemic on assessments in tertiary education”

V. General discussion of the survey results

With an in-depth look at all the survey results, it could be inferred that most of the changes and interventions deployed to rescue the academic sessions in most universities due to the COVID-19 pandemic will outlive the pandemic. As the pandemic hit different shores, many universities deployed their existing Learning Management Systems (LMS) in a way that had never been used before, and they used them as a means of intervention to ensure that teaching and learning continued remotely. Some universities had to upgrade these platforms with the incorporation of new technologies, while others had to delay the resumption of online education activities to install the LMS where they were not in existence. Though the various technologies associated with the LMS enhanced the teaching and learning experiences of students and aided content delivery by the lecturers, however, some of the tools were new to both students and lecturers where the LMS had never been actively used as a means of distance learning platforms. In some of the universities targeted in South Africa, the universities had to set some weeks aside to train both the students and lecturers on how to use some of the features that were both old and new on the LMS employed by these universities. It was after the students and the lecturers were trained that the remote lectures commenced. Another country-wide challenge that emerged with deploying the remote teaching and learning platforms as a means of intervention to the disruption in the tertiary education system by the pandemic was that a large number of students from poor families were without devices that could be used for this purpose. Most of these universities had to place an

order for large quantities of the needed devices (laptops and tablets). These were mailed to these students after some essential software had been installed in them. The devices were made available to these groups of students as loans (with the condition that if they were returned in good form the students will not incur any financial debt, however, if it is returned with defects, the cost will be debited to the individual student's account). The government also re-purposed some funding to make these devices available to the students who were under government funding. Another challenge that propped up with most of the students was the cost of accessing internet facilities to be connected to the various LMSs of the universities. This forced all universities under the umbrella of the "Universities South Africa (USAf)" to negotiate with two major network service providers in South Africa to make some educational websites zero-rated when their networks were used to access these websites. Most of these universities also planned with some of the network service providers to make monthly "network data" available for both the students and lecturers to be used to access the non-zero-rated websites for educational purposes. As indicated in the responses by the students, the migration of educational activities to online platforms made teaching and learning flexible, allowing students to work and learn at their own pace, most of these students preferred attending to their work after working hours, some worked until midnight. Hence, special network data were provided for the period after midnight through which some of these students who could not join synchronous sessions accessed the uploaded recorded online lectures. The flexibility provided by the remote teaching approach worked well for some of the students who reside in rural areas where there are weak networks or no network coverage at all. This also benefited some lecturers who provided pre-recorded lectures audio/video, some of these were prepared during the late hours of the day and uploaded, while day times were used to attend to some other academic obligations. Some of these students had to go to nearby community facilities, such as community libraries where such networks are available.

Another obvious advantage of the migration of higher education activities to online platforms because of the pandemic was associated with some students who speak English as a second language and those with disabilities (especially partial hearing challenges). Some of the educators, based on their different backgrounds, exhibit different accents/intonations which the students found difficult to follow during face-to-face teaching and learning. The opportunities to go over the pre-recorded lectures and recorded synchronous sessions took care of these challenges for both students with English as a second language and those with disabilities. The problems of

large lecture halls with poor audio systems whereby the students at the back of the lecture room hardly gained much in the lecture were also solved by the deployment of online platforms for higher education during the pandemic. Further, some students have “anxiety” problems with public speaking in a large class. Such are afraid of speaking wrongly; hence they keep quiet in class during face-to-face sessions. However, as teaching and learning moved online such students could easily express themselves using the “live chat”, “Forum”, and “Discussion” features in LMSs such as Moodle, Canvas, and others. Another advantage derived from the migration of the higher education programs to online mode was the prompt provision of feedback on assessments to students by the lecturers. This was made possible because some or most of the assessments were graded using automation systems incorporated into the LMS employed by the universities.

In terms of assessments of the students using the LMS for remote teaching and learning, some of the students and lecturers believed that the integrity of these online assessments is highly questionable. These became evident in the volume of plagiarism cases attended to by the university’s committees responsible for these tasks. Collusion, impersonation, and contract cheating became the order of the day. It was found that some online websites provided solutions to some of the exam/test questions in exchange for money. Some other students were also found to copy from each other or pass answers through some social platforms’ groups for their classes since these assessments were not invigilated. However, it must be emphasized that cheating is a common problem in the invigilated examination as well. Based on the responses received from both the students and lecturers, it is evident that the mode of assessment should change from the traditional closed-book examination to an open-book assessment. This made some lecturers to employ other modes of examination, such as boot camps, continuous assessment, and projects-based exams. It is worth stating that there is some online technology with software configurations that can be used to reduce cheating to the barest minimum. Examples of these include the reshuffling of questions, the reshuffling of multiple-choice answers, timed-out questions, and the detection of IP addresses. Some platforms also have an “Honor Pledge”, where students are required to digitally confirm that they “will neither give nor receive aid on the assessment”. However, all these still depend on the students’ integrity and honesty. By employing open book assessment, examinations that focus on a novel application of course contents to arrive at a correct solution will be created. Such assessment will encourage skills of critical thinking rather than the types of questions that seek to assess mere memorization of information and as against understanding of these.

When employed, the open-book mode of assessment exhibits the following characteristics: assessment of the student's ability to digest the information learned, and the evaluation of the ability of the individual student to apply the information learned. Consequently, this mode of assessment will force students to have a good grasp of the course material at a deeper level than they would on an assessment that is based exclusively on the recollection of information. However, the application of closed-book assessment should not be generalized to all subjects and all fields of study. For instance, some areas of study demand that the students should have sufficient knowledge of and be able to memorize a broad area of the subject to perform excellently. In such subjects, close book assessment will still be necessary to evaluate students' skills and comprehension of such subjects. This is because such examines the ability of the student to succinctly remember and fuse information from different modules to come up with an accurate solution. In such instances, understanding the subject matter includes memorization. Specifically, those who are in the Law discipline might find it difficult to use an online platform to assess verbal skills that used to be assessed through physical "moots" or class presentations and discussions. Such assessments might seem strange to be migrated online because giving a presentation online where one lacks a sense of the room is not the same as doing so in person. In the "Law" subject there is no direct "right answer" to most of the posed legal questions. Hence, law students need to have basic knowledge of the "case law", the "terms of the legislation", and the "legal principles". Therefore, it is essential for the students in a field such as Law, to be assessed based on their clear argumentative communication skills, and their understanding of how the law functions the way it does. In such a case, the students might be asked to execute "research essays" and "research memoranda", as it happens in real-time scenarios in a court of law. But when subjects in physical sciences and engineering are considered, in which answers to problems are not easily found in the lecture notes, an open-book assessment evaluates the student's comprehension of concepts. In these fields, applications of students' knowledge, and analytical skills (including "problem-solving" abilities) are evaluated rather than the student's ability to remember details.

The probing question that comes to mind is, can formal assessment be done away with as reassessing the "student's assessment" is considered? There is one main reason why assessment is needed, which is to ensure that students study. This is in line with the "foundational first principle of management theory" that says, "what gets measured gets done". Hence, whichever mode of assessment will be adopted for the different subjects after the pandemic, the integrity of the online assessment could be maintained by

adopting remote proctoring. Hence, tools for monitoring online education assessments must be incorporated into the LMS of each university as it is obvious that online assessments will become more popular and widely adopted going forward, after the COVID-19 pandemic. Though, some people have the feeling that using “proctoring software” or “remote invigilation” will be encroaching on the student’s privacy and could affect the student psychologically, however, its use can still be applied to introduce some form of online invigilation to mitigate the issue of cheating.

One notable problem associated with online/remote teaching and learning is the lack of social interactions experienced when teaching and learning are performed face-to-face. These made it impossible for the lecturers to assess both students’ emotions and instant comprehension of the course content. To circumvent this to some extent, some features are provided in the LMS that make room for some forms of interaction in terms of chat, discussions, etc. Some of these can be activated to function in a real-time scenario. Another challenge with online teaching is associated with the remote learning environments of some of the students. The environments where some of these students reside are not conducive to learning due to noise, and distractions from family members and neighbors. The immediate solution employed by some of these students was to go to nearby community centers and vacant religious buildings like church buildings (when not in use for religion programs). As previously mentioned, some other students used nighttime to study when family members and neighbors were sleeping.

In terms of the quality of teaching and learning, when the outcomes of the online mode of learning imposed upon the universities by COVID-19 are compared with that of pre-COVID-19, one can be tempted to conclude that the quality of teaching and learning is excellent during COVID-19 than what it used to be in pre-COVID-19 era due to sudden surge of pass rates witnessed in most of the Universities. The students’ performances were largely associated with good Wi-Fi access, relative to using mobile internet data as claimed by some other authors.¹⁷ Interestingly, multiple cases of cheating and plagiarism handled by the legal offices in most of these Universities also increased astronomically and widely reported in the media. This led to the belief that the pass rate during the COVID-19 online mode of teaching cannot be used to conclude that the quality of teaching and learning during the period is better than what it used to be in the pre-COVID-19 eras. On this

¹⁷ Carolyn Chisadza et al., “Online and face-to-face learning: Evidence from students’ performance during the COVID-19 pandemic,” *African Development Review* 33, (2021): S114-S125, <https://doi.org/10.1111/1467-8268.12520>

point, it was noted in another paper¹⁸ that it seems some students were indeed more likely to fall behind during the online mode of teaching and learning as compared to face-to-face teaching and learning. The proof that the surge in the pass rate during the online mode of teaching-learning cannot be attributed to the good quality of the mode of teaching and learning employed became obvious in the subsequent year. When most of the COVID-19 lockdown rules were relaxed and the opportunities to conduct face-to-face invigilated assessments were made possible, especially for the students who had been on remote learning/assessment for the past one/two year(s). The failure rate was abysmal. It was such that had never been witnessed in ages. This lends credence to the fact that most of the students indeed did fall behind during the online mode of teaching and learning in accumulating the expected knowledge.

When both the advantages and disadvantages of the online mode of teaching and learning are juxtaposed together, it then goes without saying that the blended teaching and learning model is the optimum method that will magnify the various advantages associated with the two modes of teaching and learning and do away with their shortcomings with the consequential result of bringing about the desired enhancement in the quality of teaching and learning.

VI. Conclusion

The pandemic has certainly had great effects on engineering education, and higher education in general. It made both the lecturers and students do new things. As the pandemic seems to be in retreat with the high level of vaccinations across the globe, the question that is up in the mind of everyone is, should we now revert to the pre-COVID-19 pandemic status quo in higher education institutions? The reality is sinking deep into our minds that the teaching and learning activities in engineering education and the broader higher education systems cannot go back to the way they were before the emergence of the COVID-19 pandemic. This paper has shown that most of the interventions deployed to ensure the continuity of higher education activities in the universities will continue to be relevant after the pandemic has been long forgotten. These interventions will bring some changes to the tertiary education pedagogy. Without a doubt, some subjects may still

¹⁸ Anet Knoetze and Yadah du Toit, "Emergency Remote Teaching and Learning vs Face-to-Face: When are Students More Likely to Fall Behind?" *South African Journal of Higher Education* 36, no. 5 (2022): 157-178, https://hdl.handle.net/10520/ejchigh_v36_n5_a8.

require on-campus sessions, especially those that require practical sessions such as Engineering, Medicine, Law, Dramatic Art, etc. Hence, the blended teaching and learning model (a combination of face-to-face and online models) will most likely be the new normal in most universities. By this, advantages from both modes of teaching and learning will be fully exploited towards robust experiences of the learners, while ameliorating their shortcomings. The lecturers would need to ensure that they keep abreast of the new technologies for content deliveries by undergoing continuing training. Both new and returning students must undergo regular training on the new technologies for teaching and learning that are incorporated into the existing LMS. In terms of assessment, there is no one-way approach that is optimal; both open-book and closed-book modes of assessment will be relevant based on discipline and subject. However, to maintain assessment integrity, electronic devices for invigilation of online education assessment will be needed for tertiary education, while this mode of assessment is gaining wider acceptance. Consequently, remote proctoring that enables students to be assessed at a remote location while maintaining the integrity of the assessment will be critical to be incorporated into the university's LMS. This new normal in higher education programs might reduce spending on physical infrastructures, however, the universities' managements should redirect funding into new technologies and incorporate such into the LMS. COVID-19 though caused devastating effects on the health sector, and disruption in economic activities did not spare the education programs in the higher institutions of learning but has become the force to accelerate the needed changes that have been overdue for a long time in the higher education sector. New spectrums have been opened for higher education to navigate through for effectiveness and greater throughputs, the onus rests on the stakeholders to strike the iron when it is hot.

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Areas and dimensions of universities response to COVID-19: Diversity, trends, and evidence from the University Social Responsibility Network

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Abstract: The University Social Responsibility Network (USRN) promotes civic engagement in higher education and awareness of the nature of University Social Responsibility (USR), how it functions, and what it means depending on its context. In 2019 the USRN started a collaborative Massive Open Online Course (MOOC) called *Introduction to University Social Responsibility*. The outbreak of COVID-19 affected the production of the course, however this also led to the addition of a *Special Session on Universities' Response* to the MOOC showing how members addressed the challenges of the pandemic. Based on the experiences from 13 universities and the USRN, this article portrays flagship responses of how

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universities in the network tackled some of the challenges presented by the pandemic in range of academic and non-academic initiatives categorized as University Social Responsibility (USR) Areas of Engagement, namely research, education, advisory role, outreach, information management, provision of support, institutional reforms, and extended services. The article discusses broader questions referring to how COVID-19 impacted the understanding of what USR is; therefore, looking into both policy and theoretical implications of how the concept of USR and universities responses can be understood and applied in different contexts and universities.

Keywords: University Social Responsibility; university response; civic engagement; COVID-19; disaster and mitigation; higher education; universities.

I. Introduction: Responses to COVID-19 in the University Social Responsibility Network

University Social Responsibility (USR) denotes universities' contributions to society, communities, and the environment. Traditional views of USR emphasize academic work -teaching and research- but these limited perspectives face increasing criticism as new forms of engagement continue to emerge, challenging the definition of traditional social roles of universities. Higher education reform has also broadened the concept of USR to include more multi-sectoral and multi-layered kinds of engagements that align with universities' identities and aspirations.

Universities played a key role in addressing the challenges brought by COVID-19, in issues like risk management, and avoiding the danger of becoming themselves a source of infection spread (Wang et al 2020, 3). They fostered social innovation through initiatives with far reaching impacts, for example as they promoted diversity and inclusion addressing the absence of legislation in poorly regulated contexts (Palalar Alkan, Ozbilgin, and Kamasak 2022, 719), or as they provided technologies and research on digitalization (Chesbrough and Crowther 2006, 232).

Based on the role universities have as drivers of change and on the strategies they implemented during the COVID-19 pandemic, this article explored how the pandemic influenced the understanding of what USR is and how it is implemented, while looking into policy and theoretical implications of how universities responses related to their contexts and institutional priorities.

The article focused on the accounts from 13 universities on their journeys to address different challenges brought about by the pandemic, shedding light on the diverse approaches they designed and employed to engage socially within and beyond their campuses, through both academic and non-academic activities that refer to research, education, advisory role, outreach,

information management, provision of support, institutional reforms, and extended services.

Stemming from the distinctions above, the article proposed a transversal scheme of analysis to facilitate the categorization of USR activities into areas of engagement. In so doing, the following pages not only describe the role universities had as catalysts of change, but more importantly, they highlight how universities applied creativity, scalability, responsiveness, glocality, and circularity to their USR strategies and how they brought to life their own institutional priorities.

The article adheres to the USR model established by the Talloires Network, which advocates for principles that promote equitable access to higher education, student engagement, and social responsibility integration in the curriculum. These principles emphasize collaboration among different sectors, policy development for community benefit, fostering a culture of community service and transparency. These guidelines or recommendations aim to guide universities to utilize their resources and knowledge to tackle social, economic, and environmental challenges.

Established in 2015 and inspired by the spirit of the Talloires Network, the University Social Responsibility Network (USRN) promotes understanding of University Social Responsibility (USR) and diversity in civic engagement practices. During the 4th Executive Committee Meeting in 2018 the USRN decided to create a joint Massive Open Online Course (MOOC) to introduce and demonstrate how the concept of USR is put into action among its member universities.

Kyoto University and The Hong Kong Polytechnic University as members of edX took the lead producing the MOOC titled *Introduction to University Social Responsibility* (from here on the MOOC), which was structured as a four-module course covering theory and practice of universities social engagement. As the impacts of the pandemic expanded, in July of 2020 the USRN decided to add a module showcasing the response of universities to address COVID-19. Designed as a stand-alone unit, this module sprouted from a mini site created by the USRN Secretariat featuring members' response and was later added to the MOOC. The *Special Session on University Response to COVID-19* (from here on the Special Session) portrays a spectrum of engagements from 13 universities located in Australia, Brazil, Canada, China, Israel, Japan, Kazakhstan, South Africa, the UK, and the USA (Palacio and Sadehvandi 2022, 81).

Based on the experience of the MOOC, the article presents a fresh contribution in several ways: a) showcasing initiatives through which universities responded to the pandemic, b) offering an approach to map

initiatives organized in Areas of Engagement, c) proposing an integrated scheme to better understand the meaning and diversity of USR, and d) addressing general questions about how COVID-19 changed the understanding of social responsibility of universities and the policy as well as theoretical implications spurring from it.

Given that this article focuses on the contributions from universities in the context of the USRN, the authors adhere to the definition of USR, as set by the USRN, which refers to a wide-ranging and evolving concept described as the responsibility shared by universities to contribute to social betterment through the integration of social responsibility policies into institutional management, teaching, research, services and public activities (Shek and Hollister 2017, 13).

II. Literature review: The evolving concept of University Social Responsibility

Corporate Social Responsibility (CSR) and USR refer to the added utilitarian value these organizations offer to society; for corporations, for instance, this refers to contributions spilling over for-profit activities such as creating jobs and opportunities, but also ensuring humane conditions of those jobs; while for universities this added value refers to contributions, they can make that exceed their traditional roles (Huang and Manh-Hoang 2021, 550).

Both concepts, CSR and USR, are evolving and new guiding principles are being revised and created, for example, notions like *creativity*, *scalability*, *responsiveness*, *glocality*, and *circularity* are increasingly embedded in these organizations' management and culture (Sitnikov, Bocean, and Tudor 2017, 251-273). These advancements have deep implications for USR, as universities are called to bring and enact those principles as they implement reforms and policy to address emerging social challenges. Emphasis has typically fallen on academic roles; however, these reforms integrate social responsibility into other functions and result in a new social contract that calls for an education that connects with real world problems, ethically ensured science, and responsible administration (Larrán and Andrades Peña 2017, 302-319).

It is generally accepted that universities act responsibly through how they govern themselves, through the quality of their services, as they apply ethical rules and corruption control, or as they do philanthropic work, as employers when they strive for work balance, when they ensure safety, equality and human rights (Tetřevová and Sabolova 2010, 229). USR relates to how universities put social responsibility into practice, which implies that

a variety of perspectives coexist and depend on their contexts. Thus, USR can be defined as the capacity of a university to implement principles in management, teaching, research, and engagement to address social needs (Garde Sánchez, Rodríguez Bolívar, and López-Hernández 2013, 709-746). USR can also refer to the voluntary commitment of universities to incorporate social, labor, ethical, and social concerns into their functions, resulting from the external impacts of their activities (Larrán and Andrades Peña 2017, 302-319). Universities implement policies and programs beyond academia, demonstrating the existence of different understandings of what USR is, and that its interpretations are relative to the context and vision of each university, and how they to go the extra mile (Palacio and Choy 2019, n.p.).

Despite the scale of the calamity, academic contributions have shown a significant increase since 2020 to the global COVID-19 research base (Cai, Fry, and Wagner 2021, 3687), which serves in itself as an indicator of higher education's commitment to social responsibility. The pandemic reaffirmed the importance of universities' social commitment through academic work and by leveraging coalitions to coordinate responses, and to ensure safety and continuity in the provision of their services (Cutter, Nelson, and Abir 2021, 4). However, systematic approaches to how these policies and practices contributed to wider social innovation are still missing in the literature, and that is one of the gaps this article aims to cover.

As governments sought to reduce spread of the virus through social distance and lockdowns (Hale et al 2020, 4), universities responded in ways that were both innovative and socially responsible. Areas of interest where the literature on USR grew rapidly focus, for example, on curricular development and reforms to foster online education to ensure safe educational delivery (Yang and Huang 2021, 121-132), the need for universities to secure continuity and quality of their services by coordinating leadership and management, prioritizing safety, information sharing, and by providing training and support (Samarasekera et al 2020, 3).

An integrative overview that brings together the variety of approaches universities took and what they mean in terms of policy and decision making also seems to be missing in the literature, and to address this point this article proposes a framework that can systematically organize USR Areas of Engagement.

The magnitude of the disruptions caused by COVID-19 left the world with a sense of astray, as pressures continued to mount due to the prolonged uncertainty. Before this scenario, universities had to rethink their strategies, preparedness, response, and recovery (Regehr and Goel 2020, 523-539). And they also needed to cope with different attitudes and public moods, medical

and non-medical college students, for example, tended to show positive mindset towards preventing COVID-19 through wearing masks (Amin et al 2020, 2). However, perceptions and attitudes towards government measures and protocols were significantly different, associated with people's own beliefs of what social responsibilities are and should be (Singkun 2020, 6).

The pandemic put universities before new threats, but also opportunities for new research, education, approaches to management and engagement (Beech and Anseel 2020). The higher education sector has lived an unprecedented momentum to expand and deepen existing scientific knowledge to understand and respond to the current pandemic but also in the future to address similar crisis, and to improve disaster management (Marinoni, Van't Land, and Jensen 2020, 2). In fact, a new global agenda for the sector has been shaped by the pressing demand for action in areas like support and inclusion, pedagogical advancements, new models in management, and approaches to crisis management (Greere 2021, 202).

And yet, broad surveys about the role higher education played during the pandemic remain imperative to better understand the impact of USR on general crisis management, thus, this article aims to shed light on how universities contributed to a wider social change of mind, for example by bridging research output and dissemination with public awareness of the implications of that research.

The literature suggests that universities with USR drive tend to have higher sustainable competitive advantages, stronger strategies for social innovation, and produce creative ideas with social value. COVID-19 created the conditions for universities to carry out research on the disease, to provide affordable or free infrastructure in their facilities, and to foster philanthropism including outreach programs. Thus, allowing universities to demonstrate their will and capacity to enhance their sense of social responsibility and to foster wider social innovations (Adel, Zeinhom, and Younis 2022, 425). However, the relative impact and magnitude of academic and non-academic initiatives remains unexplored. This article intends to provide insight into the significance of various USR initiatives. Often, these initiatives are not given due recognition as they do not fit into the conventional academic contributions made by universities. Therefore, the article seeks to highlight the importance of such initiatives.

In recent years USR has gained relevance as a quantitative approach to the reputation of universities according to their position in various national and international rankings (Baraibar Diez, and Luna Sotorrío 2012, 24). This is evident in the growth of universities' participation in the Quality Standards World University Rankings on Sustainability, or the Times Higher Education

Impact Ranking portraying universities' performance against the United Nations' Sustainable Development Goals (SDGs). Which, from the viewpoint of the Institutional Theory, would explain the interest of managers to participate in these rankings not only because of the universities' commitment to real world problems, but also as they seek to make external stakeholders know what contributions from their institutions are, to fulfill the expectations of their communities and to gain and maintain legitimacy.

In line with this, it seems that factors that stimulate universities' interest for USR include open communications with society, creativity of their staff, access to training for students, and the level to which managers care for rankings and funding (Rababah et al 2021, 7). Interestingly, research on the effects the pandemic had on USR motivations suggest that universities with more sense of social responsibility attract motivated students who engage more with e-learning (Ali et al 2021, 4223). On the other hand, it is unknown how social engagement of the universities may influence staff ownership regarding social engagement programming; thus, this article explores issues of this kind by looking at how non classic approaches to USR were implemented.

Existing research on universities responses has already shown that USR exceeds academia, in the spectrum of wider contributions examples include the role libraries had in enhancing online education (Ifijeh and Yusuf 2020, 2), or the role universities had in boosting inclusion and equity and how COVID-19 affected work conditions for women (Nash and Churchill 2020, 833-846), or how universities advanced human rights, addressing stigmatization, and the negative role local governments, social and mass media played in disclosing personal information of patients (Yoshioka and Maeda 2020, 372).

Research has also emerged on a range of other related areas such as whether universities addressed COVID-related concerns among students, and whether there was a correlation between the level of media exposure, associated stress, functional difficulties, and the concerns related to COVID-19 (Schiff et al 2021, 673), or about experiences in virtual environments, highlighting good practices and pitfalls (Telles-Langdon 2020, 108-119). Much research has been done on the effects of the pandemic on teaching strategies and how it became a catalyst for innovation as education became completely remote, leveraging new skills, knowledge, forms of engagement, and level of readiness to use digital means and other technological tools from all stakeholders involved in the learning process (Moorhouse and Wong 2022).

Most of the literature on how the pandemic impacted on the concept of USR, portrays initiatives by universities as palliative or ad hoc activities rather than as the result of previously established USR plans. With this in

mind, this article covers the gap in relation to how programming may have not only been diversified because of the pandemic, but more importantly, looking at ways to solidify this new menu of options into more systematic USR strategies for the future.

To achieve this goal, the article proposes a model of analysis that covers some of the literature gaps identified above by offering a transversal approach to USR, presented as Areas of Engagement. In doing so, the following pages help understand the universities’ role as catalysts of change, and how they applied creativity, scalability, responsiveness, glocality, and circularity to their USR strategies.

III. Approach and method

III.1. Data: Collection process, source, and kinds

Data describes policies and initiatives implemented since the start of the pandemic until December 2020, when the MOOC entered its production phase. Data collection for the Special Session happened in two phases: first, USRN Secretariat requested members to share information on their responses to the pandemic to showcase good practices in a mini site at the portal of the network. Universities were free to submit data they considered most relevant to portray their flagship initiatives in any format. The second stage was a by-product of the MOOC that was under production, as it was decided that the Special Session would be added to it, the production team reached out to USRN members asking for their responses to the pandemic in more detail, and again, emphasizing on the idea that universities shared what they considered their best practices and USR forte.

Original data came from qualitative accounts of responses from the following 13 universities.

Table 1
Contributing universities and their acronyms for this study

Contributing university	Acronym	Country
Al-Farabi Kazakh National University	AFKNU	Kazakhstan
Beijing Normal University	BNU	China
Kyoto University	KU	Japan
Sichuan University	SU	China
Simon Fraser University	SFU	Canada

Contributing university	Acronym	Country
The Hong Kong Polytechnic University	HKPU	China
The University of Manchester	UoM	United Kingdom
Tufts University	TU	United States of America
University of Haifa	UoH	Israel
University of New South Wales	UNSW	Australia
University of Pretoria	UoP	South Africa
University of São Paulo	USP	Brazil
Washington University in St. Louis	WUSL	United States of America

Actual data consisted of reports and materials (videos, websites, fliers, texts) describing measures to address the pandemic, gathered and organized by resource persons in each university, who functioned as contact points as they were in charge of the promotion of the activities in university social responsibility. Data from each institution constituted a stand-alone unit in the Special Session, however when tabulated transversally, the responses from all institutions became a quilt of diverse work; and together these responses formed a comprehensive depiction of all policies and initiatives involved.

Collectively, these responses formed a comprehensive depiction of all the policies involved.

The responses represent a non-probability sample, as all information was based on voluntary contributions presented in the MOOC. The syllabus and all information shared for the Special Session are open to public and available in the MOOC's site in edX.

III.2. Data analysis

The Special Session of the MOOC contains all the information universities provided about the policies and initiatives they implemented to respond to the pandemic presented as narratives. These narratives constituted the starting point of the article, which were first approached through qualitative analysis and using thematic analysis to sort the kinds of initiatives described based on their nature and scope.

Then the narratives were divided into blocks of text, and later into items that were quantified to obtain observable trends. Given the novel nature of the kind of data, an original method of analysis was created to interpret and quantify the original data provided by the universities. To quantify the data,

narrations from the universities were first consolidated as independent case studies. Then, narratives were divided into blocks of text depending on the nature of the policy or initiative described. Pieces of text with similar information were grouped into what was defined as Areas of Engagement (namely, Research, Education, Advisory Role, Civic Engagement, Information Management, Provision of Support, Structural Reforms, and Extended Services). Each Area was then divided into dimensions and sub dimensions providing more details.

The blocks of text were further divided into individual items that identified key elements of each initiative, e.g., goals or targeted audience. These items were then assigned one point each and re-distributed into the Areas of Engagement and their dimensions to observe trends.

Briefly, the methodology can be explained as follows:

1. Narratives → broke into blocks → blocks grouped together as Areas of Engagement
2. Blocks → broke into items → items grouped helped identify dimensions in each Area
3. Items → quantified as points → items assigned to Areas and dimensions to show trends
4. Trends → analyzed and explained by Area of Engagement

The following example demonstrates how this was done, showing: source, narrative, points assigned according to Area of Engagement, dimension or sub dimensions between brackets.

HKPU. Researchers designed general use face shields to provide enhanced protection (Research, health, new product → 1 point) for the public in their daily lives and working environment (Support. For external communities → 1 point).

From the analysis of the data, Areas of Engagement were first identified; then items were quantified and assigned to their respective Areas of Engagement to show the relative magnitude of their impact based on the findings in each Area; and lastly, policy and theoretical implications in relation to the concept of USR were introduced.

III.3. Limitations and ethical concerns

The trends described in this article have limited potential for generalization because 1) the constant changing nature of policies and initiatives in any university makes it difficult to provide a definite answer on what their

responses to other crises might be, and 2) interpretation of the trends found in this article is limited by the fact that the data provided by resource persons in each contributing university represented *examples of flagship initiatives to address the pandemic*, not holistic inventories of projects based on universities' USR priorities or strategies.

Ethical concerns about the data referring to its use and dissemination in this article, were agreed and cleared between the authors and the USRN Secretariat based on the open nature of the data, which is accessible to the public as it is contained in a MOOC.

IV. Findings: Defining areas of engagement and their dimensions

The article analyzed how universities responded to the challenges posed by COVID-19 and how the pandemic impacted in the ways they enacted their USR strategies; thus, demonstrating that USR is relative to each university's vision, priorities, and context, and that universities implemented similar and different initiatives depending on their own priorities and willingness to exceed expectation.

To make sense of the universe of policies and initiatives shared in the Special Session of the MOOC, they were sorted based on similar nature first into eight Areas of Engagement that were subdivided in dimensions that offer deeper understanding of each area as follows:

1. Research*: Health impact, and Socio-economic-environmental impact
2. Education: Class format, New contents, Training, and Technical aspects
3. Advisory role: Risk management in universities, Partnerships, and Inclusion
4. Outreach**: Institutional engagement, and Alternative resources
5. Information management: Internal sharing, and Communication outside campus
6. Support: For students, For staff, and For external communities
7. Reforms: New bodies, Risk management, Channel support, and Administration
8. Extended services: Library, Museums, Research centers, and Other facilities

Due to the diversity in Research and Outreach, sub dimensions were created as follows:

***1. Research:**

Health impact: Development of new products, Mathematical modeling, New technologies, and Mental health

Socio-economic and environmental impact: Contention of spread, and Economic, social and environmental impacts

**4. Outreach

Institutional engagement and partnerships: Production and distribution of medical goods, and Strategic networking, dispatching health and other professionals

Tapping on alternative resources: Promotion/organization of volunteer activities, and Fundraising efforts

Next, the blocks were split by core segments of information, or items, with details of policy or initiative according to their nature, goals, or audience. Each item was assigned a single point, that was in turn allocated to one or more dimensions in their respective Areas of Engagement. The identification of these items allowed for a quantitative approach to all the responses shared resulting in a total of 751 individual items.

Based on the quantification of the narratives an analysis of trends was applied, providing relative insights and meanings to the data in relation to the universe of responses, in the Areas of Engagement and their dimensions. Spotting trends in the overall responses in turn, helped interpret the narratives by each university in the context of all contributions.

Although with limitations -because the data consists of a list of example responses, not a comprehensive list of policies and initiatives-, a key contribution from this article lies on its original approach to the qualitative data provided as narratives -responses to the pandemic-, that was quantified by analyzing blocks of texts and breaking them into quantifiable items.

This approach can help university managers in any institution to identify where their priorities lie and reconsider the implications for policy and programming they may wish to include as part of their own USR strategies in the future. Additionally, each Area of Engagement identified can foster theoretical development of concepts used to define USR, for example in theories like Human Capital or Social Capital, Institutional or Institutional Entrepreneurship, Resource Dependence, Stakeholder, Resource-based and Knowledge-based views, or the Critical Theory, which will be further explained in the following sections.

The Special Session showed these universities' social drive as a constant, underscoring the role universities have as social nodes in times of crises, serving as catalysts for social change. The data evidenced that the diversity of approaches universities took resulted from their unique visions and contexts, showing that USR-related policy implications too are relative to each institution and are determined by these factors.



Figure 1

Areas of engagement and dimensions: USR facing the COVID-19 pandemic

Figure 1) offers an integrated framework of Areas of Engagement identified and notes the transverse nature of contributions by university hospitals. The scheme highlights four features of USR: 1) policies and initiatives spring from a common source: a university, 2) they materialize the university’s institutional vision and mission, 3) social engagements are intrinsically connected and influence each other, and 4) Areas of Engagement offer further in-depth and specialized forms of response. Data from the universities revealed something unusual about how they engage with society through initiatives that exceed traditional academic work and spill as non-academic contributions. The number of non-academic contributions was very telling from the eight Areas of Engagement identified two were academic -research and education-, combined they made up to 31% of the items identified, while the remaining six Areas describing non-academic contributions accounted for the remaining 69% of all items.

A note of caution must be placed here regarding the quantification rule used in this article, as it relied on narratives from university administrative personnel, which could have introduced biases. The 69% figure is only

applicable to this article due to the methodology used to obtain information, and because in the MOOC universities selected and shared flagship initiatives not a comprehensive inventory, as outlined in the method. It should also be emphasized that the universities' accounts in Special Session naturally focused on health-related initiatives due to the pandemic's health nature. The fact that 69% of identified items were non-academic is unprecedented and has significant implications for the understanding and practice of USR. Possible explanations for this trend include the traditional under-representation of non-academic staff in the reporting of USR, institutional motivations to improve university rankings, and the need to consider the appropriate balance of civic efforts in response to disasters like COVID-19. This raises important questions about how resources should be allocated and distributed for maximum impact in future crises. Detailed result on each of the areas of engagement are individually presented below along with their dimensions.

V. In-depth analysis of responses by areas of engagement

To identify trends in the Areas of Engagement in the responses from universities, narratives were divided into blocks and then into items distributed as shown in Table 1: Estimation of Trends by Areas of Engagement and their dimensions.

Table 2
Estimation of trends by areas and dimensions of engagement

Areas of engagement / total items	Dimensions of engagement	Items per dimension	Trends
1. Research / 182	1.1 Health impact	86	11.5%
	1.2 Socio-economic-environmental impact	96	12.8%
2. Education / 52	2.1 Online class formats (safety and access)	7	0.9%
	2.2 New, and in-focus contents	26	3.5%
	2.3 Training for teachers	10	1.3%
	2.4 Technical aspects of moving online	9	1.2%
3. Advisory role / 91	3.1 Risk management internally in the universities	26	3.5%
	3.2 Partnerships with other organizations	48	6.4%
	3.3 Inclusion of minorities and communities at risk	17	2.3%

Areas of engagement / total items	Dimensions of engagement	Items per dimension	Trends
4. Outreach / 138	4.1 Institutional engagement and partnerships	82	10.9%
	4.2 Alternative resources: volunteers and fundraising	56	7.5%
5. Information management / 81	5.1 Internal mechanisms for information sharing	34	4.5%
	5.2 Communication with partners outside university	47	6.3%
6. Support / 104	6.1 Alternative relief for students	25	3.3%
	6.2 Alternative relief for staff	21	2.8%
	6.3 Support for external communities	58	7.7%
7. Structural reforms / 69	7.1 New bodies and mechanisms	28	3.7%
	7.2 Risk prevention and crisis management	17	2.3%
	7.3 Channeling support	9	1.2%
	7.4 Administrative bodies to channel external support	15	2.0%
8. Extended services / 34	8.1 Library and academic resources	7	0.9%
	8.2 Museums and cultural facilities	4	0.5%
	8.3 Research centers and related facilities	8	1.1%
	8.4 Other facilities	15	2.0%
Total		751	100.0%

Trends referred to the tendency of universities to produce USR oriented policy or initiatives in an Area of Engagement or related Dimensions in comparison to efforts allocated in other Areas. The analysis of trends highlighted the Areas of Engagement universities were inclined to involve based on how they allocated resources. By identifying the USR areas of interest in each university one can also identify that university's priorities. This explains the complexity of the implications of USR, rendering each approach unique, however when analyzed transversely, as in this article, the data allowed for grouping based on similar criteria of each initiative.

From the items identified, largest contributions took place as Research with 182 items out of the total 751 entries, followed by Outreach (138), Support (104), Advisory role (91), Information management (81), Structural reforms (69), Education (52), and last Extended services (34).

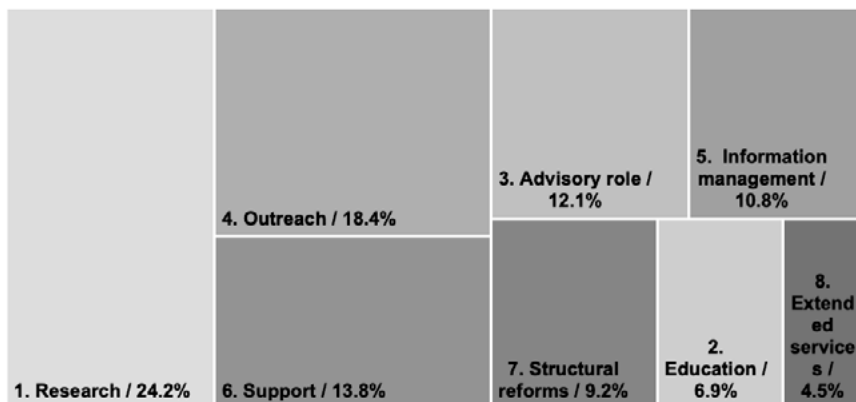


Figure 2

Trends in universities responses to COVID-19 per area of engagement

Next, the analysis of trends moved to the dimensions identified in each Area that resulted from sorting blocks of text in the narratives into individual items. These dimensions provided an insight to the contents of the areas, and thus about the institutional priorities.

Research in its dimensions -Health impact, and Socio-economic, environmental impact- scored the highest (24%) related to the research oriented nature of these universities and the priority they attach to research as a form of social contribution.

The next score among Areas of Engagement was Outreach, with 18%, which showed the priority universities attached to cooperating with stakeholders within and outside campus. The following was Support (14%), indicating the wide engagement universities had toward internal and external communities through alternative forms of assistance.

Education and its dimensions (Class formats, New contents, Training, and Technical aspects) represented less of a priority as a response with 6.9% of all items, as compared to Outreach with 18.4% in its dimensions (Institutional partnerships, and Volunteers and fundraising), or to Information management with 10.8% in its dimensions (Information sharing - internal, Communication - external).

Trends suggested that responses to COVID-19 by the universities happened quantitatively more often in non-academic areas as compared to education or research.

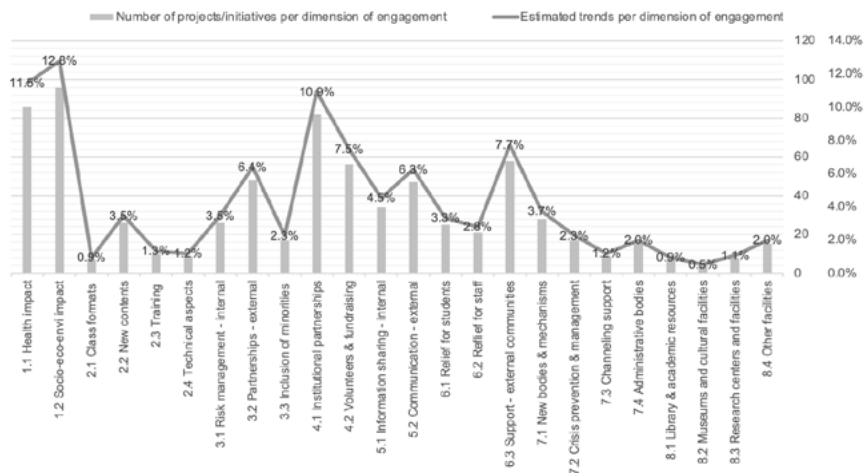


Figure 3
Trends in the responses to the pandemic as dimensions in areas of engagement

V.1. University hospitals and other health-related facilities

From the 13 universities in the Special Session, 11 mentioned contributions from their hospitals or other health facilities. These narratives described policies and initiatives embedded in other Areas of Engagement, reflecting the transversal nature of the contributions university hospitals made. In Figure 1) this is presented as the belt inside the graph reading: **University Hospitals**.

Areas of Engagement as responses by university hospitals in terms of items identified were distributed as shown in Table 2: *University Hospitals as a Transversal Dimensions of Engagement*.

The items referring to activities by hospitals amounted to 12%, whereby Research accounted for 12% of them, Education 13%, Advisory role 13%, Outreach 12%, Information management 9%, Support 12%, Structural reforms 4%, Extended services 9%. Items here also reflected new dimensions related to Treatment Facilities 10%, and Mental Health 6%.

Table 3
University hospitals as a transversal dimension of engagement

USR engagement areas in university hospitals	Items related to hospitals	Total items per area of engagement
1. Research	11	182
2. Education	12	52
3. Advisory role	12	91
4. Outreach	11	138
5. Information management	8	81
6. Support	11	104
7. Structural reforms	4	69
8. Extended services	8	34
*Treatment facilities	9	-
**Mental Health	5	-
Total	91	751

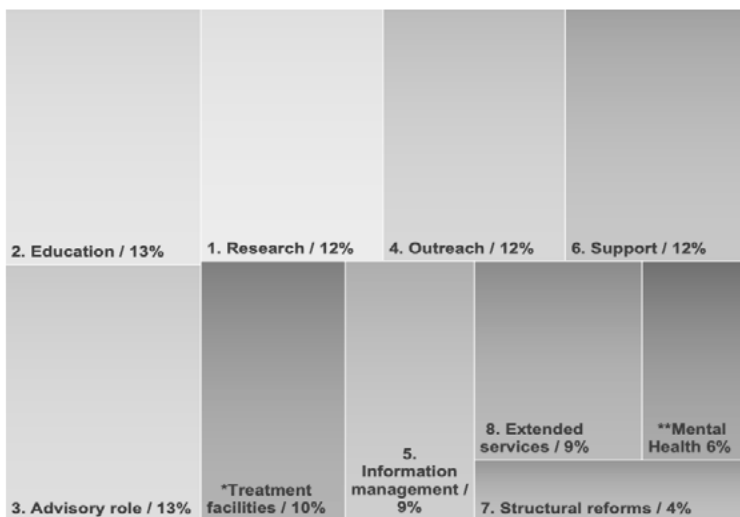


Figure 4
Transversal situation of university hospitals

Hospitals made important contributions as USR in the form of research and education, however combined they represented only 25% of all the items identified. While their non-academic contributions accounted for the remaining 75% of their responses to COVID-19.

Six universities in this article offer regular services through hospitals or other health facilities that function as educational departments, they provide services like prevention and treatment. In the Special Session of the MOOC, they also shared evidence of alternative social contributions.

These institutions responded to growing numbers of patients with COVID-19, the demand for extra services and ways to alleviate pressures posed by the pandemic and offering support to local healthcare systems and frontline workers. They also shared capabilities and know-how with communities and local hospitals, while continuing regular services.

Responses: 1) new, renovated and functionalized infrastructure like clinics or labs, 2) increased hospital beds and relocation of patients, 3) donating equipment and facilities, 4) coordinating or sharing assets, 5) testing, treating, and researching, 6) coordinating registrations, computing, and sharing data on count of cases and other matters, 7) extending working periods of medical staff, students, and workers, 8) recruiting and dispatching specialists to the frontlines, 9) setting hotlines to assist the distressed, 11) offering virtual training for workers, and 12) developing educational videos on preventative measures. (Source: KU, TU, UoM, UoP, USP. See Table 1 on pages 334-5.)

Policy implications relate to ways to connect academic activities of these institutions with initiatives beyond academia. While research and teaching are likely to remain essential, integrating them with policy related to other forms of engagement are evident, for example, scaling public information management and dissemination, developing partnerships and community outreach, or fostering volunteering with increasing opportunities for service learning.

Data showed that these institutions had a key role in building trust and social networks leading to better strategies to control the pandemic, which, from the perspective of the Social Capital Theory, highlights the role university hospitals and health facilities have in advancing relationships with their local and regional communities.

V.2. Area of engagement: Research

One of the Areas of Engagement is research. The collected data showed that universities engaged in research to tackle the challenges of the Covid-19 pandemic. Universities made major contributions through innovative

research in several fields; while the growth of cooperative research on the virus and different aspects of the pandemic worldwide has been outstanding as evidenced by these universities connecting among themselves and with external partners to produce new research and effectively disseminate it. As mentioned above Research obtained almost one fourth of all items identified in the data (24%); an aspect that closely relates to the fact that most of these universities are comprehensive and research oriented. Given the complexity of data in this Area of Engagement, two dimensions and several subdimensions were identified.

Research on health impact

Although COVID-19 brought about a truly global debacle, with devastating impacts in most areas of life, the detonating factor laid in the impacts the virus had on both the health of millions of individuals and its catastrophic effects on national and local public health systems in all corners of the world. This directly explains why universities with a strong sense of social commitment, such as the members of the USRN, implemented initiatives that could produce the most efficient solutions and positive changes. Fostering research in health-related aspects of the pandemic can be understood as a natural decision by these institutions, particularly in the search for solutions typically materializing as action or applied research.

Research here addressed the need to ensure long-term safety and protection in hospitals, public settings and households, to offer rapid and low-cost supply of protective equipment, while reinforcing the relevance of often neglected aspects such as mental health.

University hospitals boosted their work in terms of estimating transmission and fatality rates, prevalence of viral diseases, risk factors for severity, or disparities in severity of COVID-19 related diseases. As that information continued to mount, these institutions made critical inputs for decision making at the political level through informed policy and coordination to minimize impact on health care systems, as they continued to develop ways to improve diagnosis, treatment, and vaccines. Contributions in research identified in the sub-dimensions refer to:

- 1) Development of new products, where research focused on 1.1) new treatments, diagnostics systems, prevention mechanisms, and vaccines, 1.2) antiseptics, decontamination, sterilization, and reusable equipment, 1.3) cost-effective testing kits, and using RNA imaging technology,

- 1.4) designing and producing 3D-printed shields, and large-scale, fast, and low-cost ventilators. (Source: AFKNU, HKPU, UNSW, USP. See Table 1 on pages 334-5.)
- 2) Mathematical modeling and statistical analysis played a key role in understanding the pandemic. Universities researched on 2.1) modeling trends through applied mathematics to assess risk and forecast virus spread, 2.2) researching on personal and social conditions created through simulators and algorithms, and 2.3) research on public health prevention devices like geospatial maps linking socio economic indicators. (Source: BNU, HKPU. See Table 1 on pages 334-5.)
- 3) Development of technologies: 3.1) artificial intelligence systems for rapid diagnosis of pathogens and computed imaging, 3.2) human genomics research, combining clinical research in biology, medicine, 3.3) epidemiology research on interactions of viruses and hosts, 3.4) research on metabolomics in plasma to reveal infection and indicators of infection, and 3.5) new drugs and related supply chain for distribution. (Source: HKPU, USP, WUSL. See Table 1 on pages 334-5.)
- 4) Boosting the role of mental health and emotional support was a key contribution as a service and as a source of research.

Responses: 4.1) setting hotlines for distressed people, 4.2) creating organisms for emotional support, and 4.3.) dispatching mental health specialists to support staff in the frontlines. (Source: BNU, SFU, SU, UoM. See Table 1 on pages 334-5.)

Research on broader areas of impact

Universities also researched social, economic, political and environmental impacts of the pandemic. Research in this dimension focused on ensuring that public response was respectful of human rights, on the impacts social distance had on the political, socio-economic, and environmental realms. Two sub-dimensions were identified: 1) Mechanisms to contain spread (from a social viewpoint), and 2) Economic, social and environmental impacts.

Responses and contributions identified in the sub-dimension of contention of spread include 1.1) developing and implementing cost-effective, rapid scale-up testing in vulnerable or isolated populations, 1.2) frequent and rapid testing in schools, 1.3) new apps to track spread of virus in real-time, 1.4) research on impacts of social distance (Source: KU, SFU, UoM, UNSW. See Table 1 on pages 334-5.)

In the sub-dimension of Economic, social and environmental impacts, responses focused on: 2.1) impacts on local and regional economies, 2.2) correlations between pollutants and the spread of the virus, 2.3) political implications of the pandemic, civic duty, and 2.4) socio economic impacts: effects of policy based on demographic differences (Source: SFU, USP, WUSL. See Table 1 on pages 334-5.)

As mentioned in the literature review, much research was done on educational developments, especially on the impacts and challenges of online and remote education due to the social distance aspects of the pandemic. Of interest for this article was the fact that within the information provided by resource persons in the universities in the MOOC there were no direct mentions to research in this area. The data suggest that when choosing and sharing information in this area of research, resource persons focused more on the actionable side and the changes produced by this research, resulting more in educational or administrative reforms, and other major pedagogical innovations that materialized in staff development projects, technical empowering, and effective communication, rather than focusing merely on the number and kinds of publications.

Policy implications from the USR perspective call for stronger engagement among researchers with real world problems and needs, which in turn urges universities to reconsider *what* is researched and *how*, by fostering more inclusive and engaged research methodologies.

Engaged and inclusive research shared by these universities in the Special Session contributed to new pandemic-related knowledge and raised awareness at a societal scale of the need to better coordinate efforts. From the viewpoint of the Resource Dependence Theory, it would be legitimate to argue that because these universities have a strong USR drive, they were able secure more external resources by partnering with government agencies, NGOs, and other organizations. Similarly, from the perspective of the Knowledge-based Theory the USR strategy these universities applied during the pandemic helped motivating and focusing universities' efforts to generate and disseminate knowledge related to social and environmental issues in ways that tend to be less politically charged.

V.3. Area of engagement: Education

Education is a fundamental aspect of any university's mandate, including in the USR domain. During the pandemic, universities made efforts to ensure

the continuity and quality of their programs, primarily through online programs. Before the start of the pandemic some universities had begun their transitions and introduced online opportunities to their curricula, however in 2020 and 2021 the great majority of universities all around the world were forced to move almost completely to online platforms. Although this meant an overwhelming challenge, universities found new opportunities to reinvent themselves as socially engaged entities. For this Area of Engagement four dimensions were identified.

Online formats to ensure safe access to class for all students

Universities faced a significant challenge in ensuring rapid, universal, and safe access to quality education for all students while also enhancing the use of Learning Management Systems (LMS). To address this initial burden, universities adopted an online strategy and implemented measures such as providing students with internet access and promoting the use of flexible approaches to teaching and learning to ensure academic success. They also focused on fostering curricular development and encouraging their communities to engage with LMS through training and effective use of digital tools. (Sources: KU, UoH, UoP. See Table 1 on pages 334-5.)

New and in-focus contents

During the pandemic, universities adopted innovative approaches to education, utilizing COVID-19 as a basis to develop new teaching methods and contents. These approaches included addressing the needs of vulnerable communities and providing service-learning opportunities to sensitize students about real-life problems. Education departments also focused on creating new teaching methods for online education, curricular development, class engagement, and alternative forms of evaluation. As a result, new courses were added to existing programs, such as in Public Health, where traditionally excluded subjects like economics and management were now deemed relevant and integrated into the curricula.

Responses: 1) renewed curricula with COVID-19 related approaches and contents, 2) new materials and resources, 3) learning opportunities to conduct and share research on the pandemic, 4) webinars to share knowledge and experiences, and 5) requesting students to use technical skills, for example by retooling equipment such as 3D printing to manufacture shields or engineering students developing touchless door handles. (Source: AFKNU, SFU, UoH. See Table 1 on pages 334-5.)

Training for teachers

Alongside the mass transition to online education, universities offered pedagogical support and helped teachers better plan and implement their classes.

Responses: 1) staff development on new technologies, for example as online training, 2) supporting national policy to ensure consistency in education for entire countries, and 3) rapid growth of publications describing strategies implemented for online learning at all levels. (Source: BNU, KU, UoP. See Table 1 on pages 334-5.)

Technical aspects of moving online

The sudden shift to online education presented a significant challenge, as universities had to organize teaching activities and prepare teachers, students, and non-academic staff for this new approach. This shift also led to a leap in general information literacy, as stakeholders had to learn how to use digital tools and communication platforms, as well as new ways of teaching, learning, and interacting. Universities have played a crucial role in facilitating this transition and imparting these new skills and knowledge not just to their communities, but to society at large.

Responses: 1) online literacy training for students, staff, and communities outside campus 2) generalized use of LMS and other tools, and 3) contracts with private providers of online services. (Source: KU, UoP. See Table 1 on pages 334-5.)

Universities provision of Learning Management Services (LMS)

Some universities were well-prepared in the use of LMS, having already owned such services and familiarized their staff and students with them the transition for these institutions was not so traumatic. However, many others were caught off guard and had to acquire contracts with private services at the last minute to meet the demand for communication and information technology literacy, which was a sudden shock for them.

Responses: 1) online support for students and staff, 2) training them to utilize LMS while ensuring quality of teaching and processes, 3) spread of LMS and other tools, and 4) services acquired through new contracts with private providers. (Sources: KU, UoH, UoP. See Table 1 on pages 334-5.)

Policy implications in education resulting from COVID-19 are among the most explored issues in the literature, however data from this article revealed great untapped potential for university managers and academics to improve curricular development. The use of technology for learning purposes

raised general concerns about central issues such as ways to ensure accessibility and equity, highlighting the need for strategies to foster general technological literacy, and boosting preparedness for quick changes in pedagogical approaches.

One of the most important theoretical implications the pandemic had in relation to education and USR relates to the advancement of Human Capital in situations of crisis. As shown by the data in this article, universities with a strong drive for USR provided evidence of how service learning has not only helped develop the skills and competencies of their students, faculty, and staff, but also contributed to a stronger sense of ownership in the learning process.

V.4. Area of engagement: Advisory role

Due to their position in the social fabric, universities are usually perceived as politically neutral bodies that can create social synergies and facilitate interactions by sharing accumulated knowledge and know-how, without getting entangled or caught up in thorny and polarizing debates. Three dimensions were identified for this area.

Risk management internally in the universities

It is unclear from the data whether all universities had pre-existing frameworks for risk prevention and crisis management before the pandemic started. However, for those who had such schemes in place, their strategic responses showed a marked difference, enabling them to react and organize their response effectively. In contrast, universities without such mechanisms had to create them on the spot and develop their strategies from there. Overall, universities played a crucial role in concerted policy for prevention and safety on campus and beyond.

Responses: 1) frameworks for risk prevention and crisis management, 2) tools to collect and distribute information, 3) comprehensive and easy to update communication platforms, and 4) concerted policy for prevention and safety on campuses and beyond. (Source: KU, SFU, UoH. See Table 1 on pages 334-5.)

Partnerships with other organizations

Despite the challenges posed by dispersion and lack of centralized knowledge, universities can maximize their resources by cooperating internally and with other organizations. To do so, they must recognize this potential and proactively enact policies to strengthen existing or form new

partnerships. The narratives in the Special Session were very telling about how these universities enhanced their networks through partnerships with governments, health and education institutions, UN agencies like WHO, non-profit organizations, and more.

Responses: 1) partnerships with organizations advising policy based on research, 2) academic staff supporting ministries and strategies for public health, 3) scientists conducting and supporting global coordination, or tracking cross-border measures, and 4) identifying biases on effects and gaps in policy and social interventions. (Source: AFKNU, SFU, TU, UNSW. See Table 1 on pages 334-5.)

Inclusion of minorities and communities at risk

As the pandemic hit, universities promoted policies to enhance inclusion. Narratives in the Special Session mentioned ensuring access to support for minorities and vulnerable groups in and outside campus, including individuals and groups with limited access to information due to language barriers, or to alternative services to which they are entitled but are unaware of.

Responses: 1) campaigns to include international students in all forms of support, 2) mobilizing students to provide food in public schools, 3) internships and training opportunities for staff in local governments, 4) interviews on living conditions of marginalized residents, 5) language support as translations and other forms of consultancies of legal issues. (Source: KU, SFU, UNSW, USP. See Table 1 on pages 334-5.)

Policy implications for universities in relation to their role as public advisers relate to ensuring transparency in their communications and deep understanding of their own role as knowledge hubs, so as to ensure an institutional mindset of accountability and civic duty, and the readiness to engage with partners outside campus, the media and other information outlets.

The lens of the Institutional Entrepreneurship theory provides rich insights about how the advisory role universities took during the pandemic can be explored and developed as effective ways to enhance their USR strategies. This article found evidence that some universities challenged existing institutional norms and procedures. Acting as institutional entrepreneurs, universities introduced new practices and ideas that promote social responsibility and contribute to social change and innovation.

V.5. Area of engagement: Outreach

University outreach refers to the activities and programs that universities and their staff, faculty, and students engage in to extend their resources,

expertise, and knowledge beyond campus and to share them with the broader community. Universities in the Special Session shared different types of outreach responses to the pandemic and had the highest number of items as non-academic responses, resulting in two dimensions for this Area of Engagement.

Institutional engagement and partnerships

The narratives in the Special Session proved that different types of outreach and institutional interactions are possible and necessary, particularly non-academic engagements, for instance when universities addressed logistic needs in the production and distribution of goods or services or by mobilizing alternative resources through fund raising activities.

Production and distribution of medical goods

Universities played a key role in supporting overwhelmed healthcare systems and protecting frontline workers by providing supplies like masks, sanitizers, and artificial ventilators to hospitals and clinics. Moreover, they took steps to vaccinate their staff and the general public. Universities also served as channels of information and sent staff and medical support to communities that were at risk or difficult to reach.

Responses: 1) reusable masks, shields, ventilators, sanitizers, and antiseptics, 2) new technologies to improve the production of those goods, and 3) collection and distribution of personal protective equipment. (Source: AFKNU, BNU, SFU, UoM, UoP. See Table 1 on pages 334-5.)

Strategic networking and dispatching health and other professionals

Narratives mentioned addressing the rapid increase in the demand for health personnel in areas beyond the traditional technical and geographical scopes of hospitals; while also having to look at ways to reach out and support communities with limited access to medical care.

Responses: 1) University hospitals treating COVID-19 patients, 2) expanding local and regional areas these hospitals traditionally serve, 3) recruiting, organizing and dispatching medical and technical staff to areas difficult to access; and 4) engaging with local and regional partners to deploy know-how, share information, and coordinate efforts. (Source: AFKNU, KU, SU, UoH, UoM, UoP, USP. See Table 1 on pages 334-5.)

Tapping on alternative resources

Times of crisis call for creative approaches and new responses. A clear trend to address the pandemic by universities was the promotion of volunteer activities and fundraising efforts.

Promotion and organization of volunteer activities

Universities addressed the lack of trained personnel and equipment, through recruiting volunteers, professionals, academic and non-academic personnel, students, individuals, external partners or communities outside campus. Three subdimensions of outreach in relation to volunteering were identified: 1) allowing volunteers on campus, 2) promoting volunteering, and 3) proactive policy to recruit and organize volunteers in their institutional structures.

Responses: 1) mobilizing and organizing groups of students or staff as volunteers, 2) students producing videos showing home-made sanitizers, 3) organizing student sessions to foster and support one another, 4) professors engaging students with local communities in need to offer food, legal advice, and networking with government agencies, 5) students volunteering as nurses, medics, pharmacists, relief for the elderly, and 6) legal representation for marginalized communities in law clinics. (Sources: AFKNU, HKPU, KU, UoH, UoM, UoP, WUSL. See Table 1 on pages 334-5.)

Fundraising efforts

In response to the limited financial resources, universities connected with audiences and partners to raise funds and support students facing financial hardships due to job loss. In addition to helping students pay their fees and ease their living conditions, universities also lent a helping hand to their partners in their own efforts. The collaborative efforts of universities have played a significant role in synergizing existing, yet disperse, resources to tackle these challenges.

Responses: 1) fundraising campaigns, 2) solidarity funds to support students, 3) partnering with institutions and alumni associations to enhance fundraising capabilities, and 4) university leaders mobilizing their networks and using their influence for fundraising. (Source: AFKNU, BNU, UoM, UoP, UNSW. See Table 1 on pages 334-5.)

Policy implications for outreach have at least two dimensions: institutional engagement and tapping into alternative resources. The challenge lies in institutionalizing these initiatives as policies rather than solely relying on

motivated individuals. Institutional engagement can include producing and distributing medical goods or deploying health professionals on regular bases. Leveraging alternative resources can involve promoting and organizing volunteer activities, as well as fundraising efforts also on more systematic and regular bases.

The Stakeholder theory can be used to analyze the theoretical implications that arise from universities' outreach efforts. This is because the motivations that universities have for improving their USR (University Social Responsibility) strategies emphasize the importance of taking into account the interests of all stakeholders who are connected to the university, both on and off campus. By engaging with diverse partners and stakeholders, universities in this article evidenced not only a will to connect with society at large, but more importantly to better understand and address the needs and priorities of communities outside campus, and to tailor their own activities accordingly.

V.6. Area of engagements: Information management

All universities had internal mechanisms for communication in place prior to the pandemic, however the strike of COVID-19 brought new challenges due to the fluidity and scope of the situation. As the pandemic unfolded universities faced the complexity and constantly changing loads of information they had to handle. Universities in the Special Session described how they addressed these challenges through information management as a multilayer response; and how they created mechanisms to produce, collect and disseminate information, as well as to communicate with external partners and stakeholders. Responses were classified into two dimensions for this Area of Engagement.

Internal mechanisms for information sharing

The pandemic surfaced the need of universities to rely on efficient information management systems to handle large and constantly changing volumes of data and materials, while making that information accessible and understandable to their audiences, and sometimes in various languages. Challenges included the capability of staff to understand the nature of the information, how to sort it, and disseminate it through the most effective channels.

Responses: 1) new or updated websites with information on COVID-19, 2) dissemination tools, like newsletters, magazines, mailing lists, blogs,

hotlines, 3) information about and during events, 4) public requests for donations and support, and 5) training for staff on information management strategies and technical aspects. (Sources: BNU, KU, UoH, UNSW, USP. See Table 1 on pages 334-5.)

Communication with partners outside the university

Due to their position in the social tissue, universities can bring together different stakeholders and promote consensus in regard to what needs to be done and how. The pandemic made universities re-evaluate their communication strategies and interactions with external entities such as governments, the media, and broader society. The use of SNS as a strategy for information management by university administrators, for example, received a clear new interest from managers and users alike.

Responses: 1) partnerships outside campus to share vital research, medical information, delivering educational programs, and providing expert commentary to the media, 2) online hubs to support and build partnerships to enhance recovery, 3) providing information on funding for academic and non-academic work, and 4) organizing events, like conferences to disseminate information and research, while enhancing synergies outside campus. (Source: SFU, UoM, UoP, USP, WUSL. See Table 1 on pages 334-5.)

Policy implications in relation to information management can be developed in at least two broad dimensions: 1) improving internal mechanisms for information sharing, and 2) communication with external partners. Internally, policies can involve systematic approaches to updating websites, social media, and providing staff training. For effective communication with external partners, universities can establish regular and comprehensive partnership frameworks to share research, medical information, educational programs, and more.

The Stakeholder theory can be used to explain the theoretical implications of Information Management as a type of USR, as universities have reviewed and improved their methods of communication. Data used for this article demonstrated that universities in the USRN were able to produce, gather, simplify, and disseminate large volumes of crucial information related to the pandemic to broad audiences in their communities and beyond through the revision of their communication strategies.

V.7. Area of engagement: Support

Support is an essential part of the life of any university, abundant literature showcases the support universities offer to communities within and

outside campuses. COVID-19 brought new issues universities had to consider as necessary assistance, new audiences, or alternative ways to deliver that support. Forms of support can be classified using different criteria, however for this article, the following three dimensions were identified based on the audiences they target.

Support for students

The pandemic had a significant impact on students, and the Special Session revealed that universities developed new forms of support, which included, for example, finding ways to assist students in accessing online education and supporting them in other aspects of their daily lives.

Responses: 1) setting or expanding scholarships, 2) creating or enlarging support funds through donations, 3) reducing fees and expenses, 4) extended permissions to stay in dorms, 5) services in health, mental health, and emotional support, 6) encouraging student participation in class and activities to avoid dropouts, 7) helping international students return to countries where universities are located, 8) addressing flight bans and lockdowns, and 9) offering flexible arrangements for students to take leave of absence and to pay fees. (Source: UoP, KU, UoH. See Table 1 on pages 334-5.)

Support for staff

To prevent disruptions in their normal functions, universities addressed the new needs of their staff, ensuring their safety and protection while maintaining operations despite restrictions.

Responses: 1) flexible working rules and time distribution, 2) work-from-home conditions, access and devices, 3) technology infrastructure to ensure continuity, 4) staff development opportunities in communication technology literacy, and 5) alternative means of transportation to avoid crowded places, by offering bicycles or promoting walking-to-work. (Source: KU, UoP. See Table 1 on pages 334-5.)

Support for external communities

This is a key dimension for managers to overcome the perception of universities as socially disengaged ivory towers. Universities in the Special Session mentioned a myriad of ways to extend their support to society. Responses examples include: 1) recruiting volunteers, 2) producing goods and offering services to external partners, 3) dispatching personnel to support

minorities, and 4) organizing awareness campaigns on issues related prevention and vaccination.

Policy implications from Support as an Area of Engagement call for regular and systematic schemes to furnish institutional assistance to internal and external communities. Examples include programming as preparedness, in the case of support for students this refers to regular plans for financial assistance in crisis, wider and more accessible mental health support, and flexible arrangements for life and education in periods of distress. For staff, examples include flexible work rules, telecommuting, and accessible infrastructure. For external communities, universities may offer support through policy, such as organizing volunteers, offering affordable goods and services to partners, and creating awareness campaigns as forms of preparedness and risk prevention.

Universities in the USRN embodied Critical Theory by providing non-academic support to vulnerable groups, challenging power imbalances, addressing inclusion of marginalized groups, and promoting social justice. They demonstrated how higher education can advance protection of minorities' interests and challenge traditional structures, offering new safety layers to those overlooked by governments, such as immigrants or international students.

V.8. Area of engagement: Structural reforms

In the Special Session, universities shared experiences of implementing structural reforms to improve existing or new procedures, which vary in many ways. Three dimensions were identified in this Area of Engagement based on their permanence, with some being merely ad hoc initiatives, and others being set as regular parts of well consolidated programs and policy.

New bodies and mechanisms

The urgency and volume of new tasks prompted universities to revise their institutional structures and create mechanisms like working groups or think tanks to address these challenges. For instance, they shared major developments on new student recruitment and enrollment.

Responses: 1) new administrative procedures and academic evaluations to allow new students to enroll in place of traditional entrance exams, 2) working groups connecting with high schools teachers to identify prospective students and facilitate procedures for recommended students, 3) relying on entrance examinations for students close to passing, rather than strict face to

face evaluations, 4) exams with limited percentage of students on campus, splitting into groups, and 5) new mechanisms for pedagogic support. (Source: KY, UoH, UoM. See Table 1 on pages 334-5.)

Risk prevention and crisis management

As the pandemic unfolded, the urgency for informed decisions on risk prevention and crisis management led universities to establish new and more effective systems. Teams consisting of experts, academic and administrative staff were organized as in-focus committees to foster danger mitigation and disaster control. Some universities formed these bodies on an ad hoc basis, while others made them a permanent part of their organizational structure.

Responses: 1) ad hoc or permanent risk-related bodies, 2) schemes of action and standard guidelines, as easily accessible references, and 3) publishing of leaflets, special sites, newsletters, mailing lists. (Source: KU, TU, UNSW. See Table 1 on pages 334-5.)

Administrative bodies to channel external support

As governments created financial aid schemes for students, universities established administrative mechanisms to ensure effective and accountable distribution. Some universities created special administrative bodies to channel government support and enhance universities' fundraising capabilities, they also organized donation campaigns to support students.

Responses: 1) supporting the delivery of subsidies and financial aid through databases and administration, 2) ensuring access to information to all students on requirements and procedures. (Source: UK, UoP. See Table 1 on pages 334-5.)

Narratives in the Special Section suggest that these reforms were implemented more as provisional arrangements, rather than as the result of programmatic approaches, that however may remain in place beyond the pandemic. From the reforms observed, policy implications referred to setting new bodies and mechanisms like in-focus committees or think tanks, creating risk prevention and crisis management frameworks, and administrative bodies to channel external support and ensure effective and accountable distribution of aid and donations.

Universities in the Special Session demonstrated resilience and a willingness to adapt by reforming their management and administration. They acted as social entrepreneurs, introducing new practices and procedures that promote socially responsible behaviors. Data in the Structural Reform as

an Area of Engagement have significant theoretical implications for the concept of USR, for example, as it can be approached and analyzed through the glasses of the Institutional Theory or Institutional Entrepreneurship Theory to further develop the understanding of how universities give back to society and enhance more circular interactions with their communities.

V.9. Area of engagement: Extended services

During the Special Session, universities presented alternative ways in which they contribute to their local communities and society as a whole. This was done by highlighting the provision of valuable extended services that may not always be visible or accounted for as USR.

Library and other resources

With social distance protocols and deadlocks in place, most facilities on campus were closed or saw their functions limited, hence universities had to find ways to ensure that access to those resources remained possible and safe.

Responses: 1) alternative ways to provide traditional services, 2) systematic and open online access to collections, archives, journals, and resources, and 3) extended periods of services, or virtual access. (Source: KU. See Table 1 on pages 334-5.)

Museums and cultural facilities

Facility managers had to innovate to keep their doors open and identify solutions to continue offering cultural services while ensuring easy and safe access through new reservations systems or alternative ways to access to cultural venues, such as museums, and art or science galleries.

Responses: 1) making collections and resources available through virtual tours, 2) attractive online visits, 3) webinars to bring insights from university experts to people's homes, and 4) more efficient reservations systems for those facilities. (Source: KU, UoM. See Table 1 on pages 334-5.)

Research centers and related facilities

Because of the pandemic, cooperative and international research was halted or fully canceled. Despite these disruptions, researchers remained accountable for their use of resources to their institutions and funding organizations. Universities responded by maintaining ongoing and new

research projects while respecting social distancing guidelines, avoiding closure of labs and other research facilities, and minimizing logistical delays.

Research labs and facilities adapted mainly by going online, and by boosting more open policies and mechanisms to promote wider access to their research, their archives and academic resources and facilities through a rapid increase of online joint research, or virtual joint research.

Responses: 1) online services for communication and participation, 2) proactive support from research administrators, and 3) alternative ways to carry out research, for example through virtual fieldwork. (Source: KU. See Table 1 on pages 334-5.)

Other facilities

Universities offered regular access to other facilities that normally make up for the quality of life on campus and beyond while respecting protocols and social distance. Universities developed new ways to ensure living conditions for students and researchers, for example through alternative housing options.

Responses: 1) reservation systems, time allotments to gyms and facilities, 2) flexible use of dorms, 3) expanding parking spaces to allow for more people to commute by car, 4) sharing facilities for alternative use such as venues for testing or vaccination, 5) identifying residential units to serve as self-quarantine, and 6) assigning places -gyms or parking lots- as venues for drive-through testing centers or field hospitals. (Source: KU, TU, UoH. See Table 1 on pages 334-5.)

The findings of this article indicate that policies related to universities' involvement in extended services call for a more systematic approach from university managers when considering preparedness for crises. Although universities were able to adapt and ensure the provision of their extended services, programmatic approaches and a stronger sense of readiness appears as a necessity when looking into the future of these services.

The Area of Engagement of Extended Services as has profound theoretical implications for the concept of USR and provides fertile ground for research. Institutional Entrepreneurship theory may explain how USR can catalyze universities to adapt institutional rules, procedures, and practices to enhance the social impact of these services. Despite of the pandemic-related challenges, or maybe because of them, universities acted as entrepreneurs, implementing new procedures to promote responsible programming and services. The Resource-based theory can be applied to demonstrate how USR strategies enhanced visibility and competitiveness, allowing universities to differentiate themselves and attract students, faculty, and funding.

VI. Addressing gaps in the literature and contributions from the article

Organized as an inductive analysis, the article addressed both concrete examples of how universities responded to the pandemic and general questions referring to how COVID-19 impacted the understanding and implications of USR. Observations in the previous pages represent an invitation for action for university managers, academics and staff to reconsider the civic role of their institutions, and more importantly the kind of policy and programming required for USR to become a palpable reality.

The article contributes to the literature by enhancing understanding of USR and its practical applications. It provides a comprehensive overview of university policies and projects, highlighting innovative ways universities responded to the challenges presented by the pandemic, particularly beyond traditional academic work. It demonstrates how through USR related policy making, universities functioned as nodes and triggers for social change; for example, as they fostered awareness of the importance of COVID-19 protocols and vaccination.

The article shows that USR -when envisioned as an institutional strategy- works as a driving force for initiatives of this sort, and how social engagement of universities boosts students' and staff's sense of belonging in relation to their institutions, and their commitment to civil practices. In order to facilitate understanding and programming the article proposed a model of analysis as a transversal approach to USR that encourages future developments in the literature.

Through policymaking for USR, universities become key players as social nodes for public attitude change. Examples sprouting from the article refer to how higher education fostered the development and wider social awareness of COVID-19 protective protocols, vaccination procedures and distribution, and how that boosted understanding affected decision making as a more informed mechanism not only for this pandemic but for other emergencies too.

From the methodological point of view and based on universities' responses to the pandemic, the article offered an original framework of analysis that helps classify USR related initiatives in situations of crises or social distress; at the same time, it proposed an original approach to analyze qualitative data -universities' responses to the pandemic presented as narratives- and to quantify such data -policies and initiatives- to determine trends that reveal universities' priorities.

VII. Conclusions

COVID-19 served as a new window for universities to revise their social engagements and to be a part of the solutions in the great picture of the calamity of the pandemic. The article offered instances of responses universities in the USRN implemented to address different challenges brought about by this global health emergency. Data confirms that even if USR is relative to each university's mission and priorities, there is also a shared sense of social responsibility among them; and it also corroborates that civic values permeate all aspects in the life of universities.

Although traditional views of USR limit its concept to education and research, the article demonstrates that non-academic responses largely surpassed academic ones in the context of the Special Session on Responses to COVID-19. Combined Education and Research represented 31.1% of all items reported, while remaining responses to the pandemic were classified as non-academic contributions. It is evident that all contributions were the result of a purposely made decisions from university managers and staff in the context of this crisis, they are also indicative of the need for a renewed and expanded understanding of the concept of USR.

The article highlighted the relation between kinds of responses to broaden the implications for universities to allow and cultivate alternative forms of engagement, particularly in areas that transcend academia. The fact that 69% of responses identified were non-academic challenges the traditional role of universities as *solely* giving back to society through education and research. Determining an ideal balance of academic and non-academic contributions is difficult, but the article demonstrates that universities should recognize the value and impact of non-academic engagements and encourage them as an essential part of their USR.

The information shared by universities in the MOOC provided examples of how the concept of USR is continually evolving, as they adapted their policies and responses to comply with principles such as creativity, scalability, responsiveness, glocality, and circularity. These principles are not just theoretical concepts, but are embedded within universities' practices, decision-making processes, management, and institutional culture geared to give back to society.

The article introduced a new framework of analysis to identify universities' Areas of Engagement before disasters. Visually presented as a pie chart, the framework indicated that 1) USR policies and initiatives sprang from every university as a common source; 2) these policies and initiatives were the result from rational decisions of managers to achieve their institutional vision; 3) Areas of Engagement were intrinsically connected

and mutually influenced each other; and 4) each Area of Engagement offered possibilities for specialized forms of response.

Given the diversity of Areas of Engagement identified, the article serves as a platform from which to approach the potentials and the complexity of USR; offering valuable insights to managers and practitioners in the higher education sector to re-think ways to foster creativity, scalability, responsiveness, glocality, and circularity to their USR strategies. The article can also be a starting point to apply and further develop theoretical paradigms like the Human and Social Capital theories, the Institutional Entrepreneurship theories, or the Critical theory, among many.

The responses by these universities, interpreted as quantified efforts, provided an approach to understand how those efforts were decided, indicating the institutional priorities behind them. A clear trend in their responses to COVID-19 was the value attached to Research, which obtained the highest score as Area of Engagement (24%), followed by Outreach (18%) highlighting the level of priority given to cooperation with external stakeholders. The third noteworthy Area of Engagement was Support (14%), indicating the high level and wide engagement these universities had toward their internal and external communities and partners.

An important observation from the data was the fact that Areas of Engagement, such as Education, Support, Structural reform, and Extended services, were generated from a relatively small number of narratives, as compared to other areas such as Research, Outreach or Support. This piece of information should be understood in the context of both, the nature of the COVID-19 pandemic, and the kind of responses universities deemed more representative of their social engagements and USR strategies in this particular context.

VIII. Future research

Further research may cover but is not limited to areas where USR related approaches can produce social advancements. For example: 1) Development of new frameworks to assess measures to contain the pandemic or other disruptions related to risk management; 2) New responses and approaches from other universities or contexts may bring alternative areas of engagement or dimensions in the future; 3) Development of other frameworks to approach disaster mitigation based on the experience of universities beyond the USRN; and 4) Continue developing deeper and broader insights of the meaning and implications of USR not only as a policy, but also as a form of being.

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Analysis of Engineering students' errors and misunderstandings of integration methods during the COVID-19

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Abstract: The prevalence of the COVID-19 pandemic and its consequences, such as the closure of educational centers and the requirement to use virtual education, have all challenged students' learning. Students' mathematical misunderstandings can be regarded as one such challenge. While such problems may also occur in face-to-face training, where teachers and educators are involved, it seems that this problem is more serious in virtual education. The purpose of the present study was to investigate students' misunderstandings in regard to integration methods. More specifically, the statistical population of this study consisted of engineering students from Islamic Azad University. The sample members included 40 students from the faculty of engineering who had been taught Mathematics1 by virtual education in the first semester of the academic year 2021-2022. To conduct this research, students were taught different methods of integration in cyberspace for six consecutive weeks. During these six stages, tests were conducted online to assess students. The results showed that most of the students' errors were conceptual and computational in nature; they were rooted in no suitable understanding of the basic concepts of mathematics and the lack of good education in high school.

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Keywords: Misunderstanding; mathematical misunderstanding; conceptual error; computational error; factual error; procedure error; integral.

I. Introduction

The global prevalence of COVID-19 has had consequences for various aspects of daily life, including education. This complicated situation has persisted in recent years, affecting teaching and methods (Tadesse and Muluye 2020), especially in areas such as mathematics. As a result, serious challenges have arisen.

In today's world, mathematics plays a vital role in explaining different phenomena; therefore, understanding mathematical concepts, along with knowledge of facts and procedural skills, is an important part of mathematics education. Teachers often try to enhance learners' understanding of various mathematical topics through various mathematical activities. Paying attention to learners' misunderstandings is one of the methods recommended in this direction. Errors due to misconceptions, unlike errors attributed to carelessness, which are often cross-sectional, can lead to the formation of hidden perceptions and mistakes; they are even institutionalized in learners.

Most of these mistakes are repetitive; they are the result of learning some basic concepts and skills over the years. Repetition of such mistakes can disrupt their learning, ultimately discouraging them from learning (Iyer, Aziz, and Ojcius 2020; Voon, Julaihi, and Tang 2017; Dane, Çetin, Bas, and Sagirli 2016; Hashemi et al. 2015).

Therefore, identifying and correcting learners' mistakes and misconceptions can increase their learning. This happens when good teaching can be provided by an experienced instructor, and misunderstandings can be clarified and emphasized during teaching (Smith, DiSessa, and Roschelle 1994). Their learning progress can be improved by correcting misconceptions, thus guaranteeing the strengthening of basic math skills. Most learners first make mistakes without understanding these misconceptions and then learn to correct them through open discussion (Askew and Wiliam 1995, as cited in Voon, Julaihi, and Tang 2017).

Misunderstandings can occur in all math subjects and at all levels of education. Differential and integral calculus can be regarded as one of the most important comprehensive programs of universities (Tall 2011). This subject, which is presented in Iranian universities as a unit Mathematics 1 for students, is one of the main basic courses in technical-engineering fields. Differential and integral calculus have a complex nature consisting of abstract ideas and concepts; therefore, many first-year students fail this

course (Şahin, Yenmez, and Erbas 2015). The conceptual errors often confuse students with integral problems. The reason for this failure can be a lack of mastery of concepts, weakness in applying the rules, problems in communicating the concepts, and no good knowledge of calculus skills (Sofronas et al. 2011). Poor understanding of the basic concepts can influence the choice of strategy and the way integral problems should be addressed (Shamsuddin, Mahlan, Umer, and Alias 2015). In addition, the knowledge gap in basic algebra leads to some mistakes and misconceptions among students when solving integral problems; so, understanding advanced arithmetic topics can be difficult for them (Muzangwa and Chifamba 2012). In particular, educational approaches often emphasize procedural aspects, neglecting theoretical dimensions added to students' problems and misconceptions (Bezuidenhout 2001). Therefore, examining students' misconceptions and errors can be an effective way to help address such errors in the techniques used for differential and integral calculus problems (Tall 2011; Pepper, Chasteen, Pollock, and Perkins 2012).

Error analysis should be based on sufficient evidence obtained from the observation and assessment of learners. Therefore, in this study, researchers attempted to observe the performance of engineering students in one of the Islamic Azad Universities, in Iran, to analyze their errors and misunderstandings of integration methods in the course of differential and integral calculus.

II. Theoretical and research background

Skill in the teaching profession lies in pursuing how learners learn and rooting out students' mistakes. One of the existing classifications for student errors is dividing them into systematic and computational errors. Newman can be considered as one of the activists and pioneers of learning error analysis, especially in learning and solving mathematical problems (Newman 1977, as cited in Aghazadeh and Naghizadeh 2010). He examined students' errors in solving problems, dividing them into systematic and computational errors. Systematic errors are known as misunderstandings. A misunderstanding is a wrong idea or theory resulting from misunderstanding something (Haghkhah and Davoudi 2021).

Awareness of students' perceived concepts and misunderstandings is one of the basic elements of content pedagogical knowledge. This awareness helps the teacher in the educational design process and implementation; teachers can be prepared to prevent or correct misunderstandings (Bakhshalizadeh and Broojerdian 2018). Students bring their prior knowledge

of math concepts to the classroom; then some of the relationships between concepts are created. They may be inaccurate or inappropriate in certain contexts. As these relationships are part of a network of related concepts, misunderstandings do not exist independently, depending on the conceptual framework and the network in mind. Therefore, informational (lecture) re-teaching is not effective in this regard. However, it is the change and correction of this framework that may lead to the correction of misunderstandings.

Changing the cognitive structure and conceptual frameworks to correct and eliminate misunderstandings can be regarded as one of the main goals; misunderstandings should be corrected through the cognitive and belief systems of the individual (Bakhshalizadeh and Broojerdian 2018). Newman can be considered one of the activists and pioneers of learning error analysis, especially in learning and solving mathematical problems (Aghazadeh and Naghizadeh 2010).

A learning error is a systematic or organized error that has a pattern, and the organization should be more concerned about it. Newman (1977, as cited in Aghazadeh and Naghizadeh 2010) studied students' errors in solving fiction and non-fiction problems. His studies led to a model including five components for classifying learning errors. These include reading errors, comprehension errors, conversion errors, procedure errors, and decoding errors.

Since the focus of this study was integration and non-fiction content and its audience was also university students, not school ones, the proposed framework basis of Aghazadeh and Naghizadeh (2010) was used for the classification of learning errors. They have modified Newman's framework and classified different types of errors in mental and written calculations. These two authors believe that learning errors in various fields can be due to misunderstanding, no understanding, lack of understanding, or misplaced understanding of facts from the four categories of facts, concepts, strategies, and procedures. In learning error analysis, it should be possible to attribute learning error to one of these variables based on the evidence collected. In fact-finding error, a person makes one or more fact-finding errors in operating.

In the case of a fact-finding error, a person makes one or more errors in operating. Operation error includes incorrect operations and incorrect algorithms. In the wrong operation, the learner selects the wrong operation to solve the problem or answer the question. For example, he/she uses multiplication or subtraction instead of addition; however, in the wrong algorithm for certain operations, the wrong steps are taken to solve the problem and answer the question. In the error related to concepts, one does

not understand the meaning and intention of the problem or the data related to it. The third category, strategy error, occurs when the student's answer does not conform to the correct algorithm.

Finally, there is the fourth category of procedure-related errors, which includes three models of errors. The first category is positioning errors. For example, the peripheral incorrectly uses the sequence of digits or, in the process of applying the algorithm, erroneously clears the components of the operation process. The second category consists of incorrect steps, where the student takes some steps that have nothing to do with the requested operation. The last category is the forgetting error step in which the student omits or confuses the steps needed to solve the problem. Numerous studies have been conducted on mathematical misunderstandings in different parts of the world and at different levels of education. For example, the correction of some misunderstandings related to the knowledge and beliefs of third-grade elementary students based on Schonfeld and Ganieh's problem-solving framework in elementary school. Also, another study investigated the misunderstandings of primary school students in Turkey in the sixth grade when learning multiplication and multipliers and factors, providing some suggestions for solving learning problems and misunderstandings among students (Dogrucan, Soybas, and Sevgi 2020).

It is identified that misunderstandings in high school; acted as barriers to learning negative integers in seventh graders at an Indonesian middle school. Based on this, they designed a plan to overcome students' misunderstandings in the educational program (Fuadiah, Suryadi, and Turmudi 2019). Another study in Iran, studied the misunderstanding in one of the mathematical concepts taught to high school students (Mohammadzadeh 2018, as cited in Haghkhalah and Davoudi 2021). In this study, a mathematical instrument, with the aim of preventing and correcting students' misunderstandings related to the concept of radians, was introduced. A mathematical instrument was introduced to prevent and correct students' misunderstandings related to the concept of radians. Also, the role of animation in reducing conceptual errors in the field of trigonometric angles has been considered in high school trigonometry (Saffari 2017).

An active teaching method can reduce geometric misunderstandings in secondary school (Ebrahimi Sadrabadi and Mohammadnia 2018). A study in Iran has also discussed the role of teachers in correcting students' math misunderstandings by examining, analyzing, and rooting out students' conceptual errors in math lessons in order to find out why they were created and how they could be eliminated (Karimzadeh and Abbasloo 2017). In another study, the researchers concluded that in the field of mathematics and

science, misunderstandings and errors were not made by chance (Smith, diSessa, and Roschelle 1994). In general, it seems that most of the studies conducted on mathematical misunderstandings have considered this issue from the perspective of teachers or students in school mathematics. So, the present study targeted the community of university students in the technical branch of engineering to study their misconceptions and mathematical errors in Mathematics 1 on the subject of integration methods.

III. Method

The present research was done based on the qualitative paradigm. Participants in this study included 40 male and female undergraduate students from the engineering fields of Azad University who had passed the Mathematics 1 course in the first semester of the 2021-2022 academic year. The study method was such that in six consecutive weeks, integration methods were taught through virtual training. In each session, their learning was evaluated during a test including three questions. Thus, the tests were answered by students in six three-question steps and during six stages. The questions of these tests, which were compiled with the cooperation of several academic experts, were confirmed in regard to content validity.

The exams were held virtually due to the COVID-19 pandemic, and students were required to send their answers via email to the professor during the exam. The tests, which were corrected with the help of two proofreaders, were analyzed and categorized using the framework of Aghazadeh and Naghizadeh (2010).

III.1. Research findings

This study aimed to analyze the errors of engineering students in one of the Islamic Azad universities, Iran, to answer the questions in relation to integration methods in the course 'differential and integral calculus'. The proposed framework was used to analyze the data. Table 1 represents the findings obtained from data analysis.

Table 1
The average error of students in answering integral questions

Total number of students	Percentage error of facts	Concept error percentage	Strategic error percentage	Percentage error
40	79.89	68.42	82.23	95.89

As can be seen, the most and the least errors of students were related to procedure and concepts, respectively. It should also be noted that sometimes the exact demarcation between errors cannot be determined; in fact, a set of mistakes shared by students may be a non-empty set, and the mistakes may overlap in many places.

Facts error: According to the framework used in the classification of students' errors, the first category was dedicated to the facts error. In such errors, the student makes a mistake in operating and uses the wrong operation or the wrong algorithm to respond. The following is an example of each:

According to Table 1, about 80% of students made this mistake when answering integral questions. For example, a student's handwriting in Figure 1 indicates an incorrect operation error.

$$\begin{aligned}
 & \int e^x \cos 2x \, dx = \\
 & u = e^x \Rightarrow du = e^x dx \\
 & \cos 2x \, dx = dv \Rightarrow -\sin 2x = v \\
 & \int e^x \cos 2x \, dx = e^x \sin 2x - \int e^x \sin 2x \, dx \\
 & u = e^x \Rightarrow du = e^x dx \\
 & \sin 2x \, dx = dv \Rightarrow -\cos 2x = v \\
 & \int e^x \cos 2x \, dx = e^x \sin 2x - e^x \cos 2x - \int e^x \cos 2x \, dx \\
 & \int e^x \cos 2x \, dx + \int e^x \cos 2x \, dx = e^x \sin 2x + e^x \cos 2x
 \end{aligned}$$

Figure 1

Indicates an incorrect operation error

As shown in the picture, the student has decided to use the fractional method in responding to question $\int e^{-x} \cos 2x \, dx$. In the formula,

$$\int u \, dv = uv - \int v \, du,$$

although u and dv are chosen correctly,

$$u = e^{-x}, \quad dv = \cos 2x \, dx.$$

But in $\int \cos 2x \, dx$, he made a mistake in the calculation. Thus, the result was not correct.

In other words, the student has chosen the right strategy, but there is a miscalculation of the wrong operation, which could be due to the error of facts. Figure 2 is another example of such an error.

$$\int \frac{dx}{x\sqrt{9-4x^2}}$$

$$x = 3 \sec \theta$$

$$dx = 3 \sec \theta \tan \theta d\theta$$

$$\sqrt{9-4x^2} = 3\sqrt{\sec^2 \theta - 1} \cdot 3 \tan \theta$$

$$\int \frac{3 \sec \theta \tan \theta d\theta}{3 \sec \theta \cdot 3 \tan \theta} = \int \frac{d\theta}{3} = \frac{1}{3} \int d\theta = \frac{1}{3} \theta$$

Figure 2

Another example of a factual error related to an incorrect algorithm

As can be seen in the image above, the student used the wrong strategy in response $\int \frac{dx}{x\sqrt{9-4x^2}}$.

That is, instead of using the variable change $u = a \sin \theta$, the student has used variable change $u = a \sec \theta$.

Most students are confused or forget these two alternative variables. Students can factor the number 4 first and then use the change of the mentioned variable or first use the change of the following variable,

$$2x = u \stackrel{a}{\Rightarrow} 2dx = du \Rightarrow dx = \frac{1}{2} du,$$

then apply the change of the trigonometric substitution variable $u = a \sin \theta$.

Regardless of the two methods proposed above, $x = 3 \sec \theta$, $dx = 3 \sec \theta \tan \theta d\theta$ is considered; based on this variable change, the problem is solved.

$$\int \frac{3 \sec \theta \tan \theta d\theta}{3 \sec \theta \sqrt{\sec^2 \theta - 1}} = \int \frac{3 \sec \theta \tan \theta d\theta}{3 \sec \theta \tan \theta} = \int \frac{d\theta}{3}$$

Conceptual error: In this type of error, students suffer from conceptual errors in problems. That is, they do not understand the meaning and intention of the problem or the data of the problem. Table 1 shows that 68.42% of students in concept calculations have error concepts. Figure 3 represents an example of this error.

$$\int \frac{x+1}{x(x-3)^2} dx \Rightarrow \frac{x+1}{(x^2-3)(x^2-3)} = \frac{A}{(x^2-3)} + \frac{B}{(x^2-3)} \Rightarrow$$

$$(x^2-3x)^2 \Rightarrow x^4 - 6x^2 + 9x^2$$

$$\frac{\sqrt{3}+1}{x^2-3} = \frac{\sqrt{3}+1}{(\sqrt{3})^2-3} \Rightarrow \sqrt{3}+1$$

$$\frac{\sqrt{3}+1}{x^2-3} \Rightarrow \sqrt{3}+1$$

$$\textcircled{1} \sqrt{3}+1 \int \frac{1}{x+\sqrt{3}} \Rightarrow \frac{dx}{x+\sqrt{3}}$$

$$\textcircled{2} \sqrt{3}+1 \ln|x+\sqrt{3}|$$

Figure 3

An example of students' error related to the concept error

As shown in Figure 3, students made a mistake in answering $\int \frac{x+1}{x(x-3)^2} dx$ and recognizing algebraic alliances (first binomial union and conjugate union). This means the following,

$$\int \frac{x+1}{x(x-3)^2} dx$$

$$x(x-3)^2 = x(x+3)(x-3) = (x^2+3)(x^2-3)$$

$$\frac{x+1}{x(x-3)^2} = \frac{A}{(x^2+3)} + \frac{B}{(x^2-3)}$$

Strategic error: In this type of error, the person makes a strategic mistake; in other words, he/she makes a mistake in using the appropriate strategy. Table 1 shows that a significant number of students, i.e., 82.23%, made a strategic error in calculating the integral. Figure 4 shows an example of this error.

$$\begin{aligned}
 & 3) \int \sin^2 x \cos^3 x \, dx \rightarrow \cos x \int (\cos x^2 x \sin x^2) \, dx \\
 & \int \cos (\cos x^2 (\cos \sin x^2) \cos x \, dx) \\
 & \cos \left(\frac{1+\cos 2x}{2} \left(\frac{\sin x^3}{3} (x) \right) \right) \\
 & \cos \left(\frac{1}{2} \sin 2x \right) \int \frac{\sin x^3}{3} (x)
 \end{aligned}$$

Figure 4

An example of a student's error related to a strategic error

In such questions, where there are even and odd powers of trigonometric functions, students often make strategic and algebraic errors or errors in the procedure. This means that in solving the problems of trigonometric, even powers from the formulas are considered $\sin^2 \theta = \frac{1-\cos 2\theta}{2}$, $\cos^2 \theta = \frac{1+\cos 2\theta}{2}$.

In solving the problems of trigonometric, odd powers of the formulas are considered $\sin^2 \theta = 1 - \sin^2 \theta$, $\cos^2 \theta = 1 - \sin^2 \theta$.

They make mistakes in solving problems of even and odd abilities.

For example, a student wrote:

$$\int \sin^2 x \cos^3 x \, dx = \int \sin^2 x \cos^2 x \cos x \, dx = \int \sin x \sin^2 x \left(\frac{1+\cos x}{2} \right) dx$$

As a result, his/her response led to erroneous results and complex solutions.

$$51 \int \frac{x}{x^2-1} \, dx = \int \left(\frac{\frac{dx}{2x}}{\frac{1}{2}} \right) = \int \frac{d(x^2)}{2x^2-1} = \frac{1}{4} \int \frac{d(x^2)}{x^2-1} = \frac{1}{4} \int \frac{u^{-2-1}}{u^2-1}$$

$$= \frac{1}{4} \cdot \frac{x^{-1}}{-1} \qquad x^2 = 2 - 1 \rightarrow \frac{2-x^2}{4x^2} \rightarrow x \, dx = \frac{d(x^2)}{4x^2}$$

Figure 5

An example of a student's error related to a procedure error (Placement error)

Operation error: Table 1 shows that most students' errors in integral calculations were due to procedure errors. In fact, 95.85% of them had such errors. As mentioned earlier, this category includes three types of location error: incorrect step error and step forgetting error. Figures 5 to 7 refer to the examples of this error in students' manuscripts.

As shown in Figure 5, the student should have used the change of variable method mentioned below to calculate $\int \frac{x}{x^4+1} dx$.

$$x^2 = u \Rightarrow 2x dx = du \Rightarrow x dx = \frac{du}{2}.$$

But he used the following variable change:

$$x^4 + 1 = u \Rightarrow 4x^3 dx = du \Rightarrow x^3 dx = \frac{du}{4}$$

Due to this change of the wrong variable, the wrong answer was obtained.

Figure 6 refers to another type of operating error.

$$\int \frac{dx}{4 - 5 \sin x} = \int \frac{2 dt}{t^2 - 10t + 4} = \int \frac{2 dt}{2(2t^2 - 5t + 2)}$$

Figure 6

An example of a student's error related to a procedure error (step forgetting error)

The student for collection:

$$\int \frac{dx}{4 - 5 \sin x}$$

She/he should use the following variables:

$$\sin x = \frac{2t}{1+t^2}$$

$$\cos x = \frac{1-t^2}{1+t^2}$$

$$dx = \frac{2dt}{1+t^2}$$

Regarding this question, students make procedural or algebraic errors. Sometimes, they confuse the placement of the variables mentioned above.

This means that they make a mistake and put the formulas of $\sin x$, $\cos x$, and even dx in the wrong place.

Sometimes, they make mistakes in solving algebra and continue to feel exhausted and cannot finish the problem. For example, a student did the following in a question:

$$\int \frac{dx}{4-5\sin x} = \int \frac{\frac{2dt}{1+t^2}}{4-\frac{10t}{1+t^2}} = \int \frac{\frac{2dt}{1+t^2}}{\frac{4-10t+4t^2}{1+t^2}} = \int \frac{2dt}{4-10t+4t^2} =$$

So, from this point on, he/she was not able to solve the problem and left it. This is because solving the integral is a method of trigonometric substitution. It must be first converted into an alliance; then a trigonometric substitute is used. In other words, as the next step, the student replaced trigonometry, thus forgetting this step and leaving the problem.

The last type of error, which is related to the procedure, is known as an incorrect step error; one example is shown in Figure 7.

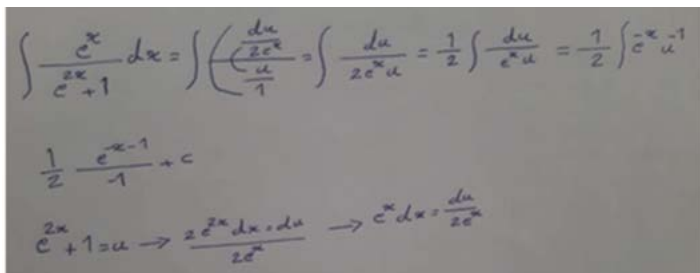


Figure 7

An example of a student's error related to a procedure error (incorrect steps)

In calculating $\int \frac{e^x}{e^{2x}+1} dx$, the student must use the variable change method.

In fact, we have $u = e^x$, where $du = e^x dx$; we will have $\int \frac{du}{u^2+1} = tgu$. While the student has taken the whole denominator u :

$$e^{2x} + 1 = u \Rightarrow 2e^{2x} dx = du \Rightarrow e^{2x} dx = \frac{du}{2} \Rightarrow \frac{1}{2} \int \frac{du}{e^x u}$$

The student knows that he must use the variable change method. However, he has taken the wrong step in the phrase that should be used as a variable.

IV. Discussion

The goal of this study was to examine the common mistakes made by engineering students at Iranian universities when applying integral methods to solve calculus-based problems.

University-wide, all engineering students are required to take Mathematics 1, a prerequisite for more advanced courses including Mathematics 2, Differential Equations, Engineering Mathematics, and Statistics.

This study focuses on the investigation of student performance failures in integration because of the significance of the inherent character of this course in impacting a student's capacity to pass other related courses. Since this course is being delivered online, especially during the COVID-19 epidemic, it is more important than ever to ensure that students are making progress through the material.

The purpose of this study was to identify mathematical misunderstandings held by students majoring in technical and engineering fields by administering a test with six difficulty levels. In terms of integration methods, analyses of these assessments indicate that behavioral and algebraic errors account for the vast majority of student mistakes, while conceptual mistakes account for the smallest proportion.

Because of this, most students' difficulties in replying are not due to fundamental misconceptions of the subject or its data. Students are less likely to make fundamental mistakes in their answers since integration approaches are habitual and methodical. Of course, it is important to keep in mind that the focus of this research was on how students fared in a distance learning environment. As there are fewer possibilities for conceptual evaluation in this form of education, it has a chilling effect on the growth of scientific work by stifling the encouragement of original thought and reducing exposure to

difficult class problem areas. And this is one of the most obvious drawbacks of online learning.

The majority of students' errors in this study were traced back to problems with the response process or the implementation of the algorithm due to a lack of familiarity with its components, according to an analysis of the data (Agustyaningrum et al. 2018).

Some have begun to do things that have nothing to do with the requested action. The procedures necessary to complete the task are lost on some students, or they become confused along the way. The lack of opportunity to practice solving algebraic equations appears to be a major contributor to students' difficulties in this area of mathematics. When pupils make a significant error, they tend to keep making the same mistakes in subsequent identical scenarios. In most cases, pupils have not had much experience with problem solving (Perkins and Simmons 1988). Furthermore, without a solid mathematical background and comprehension, students are less likely to be motivated to work through math issues, which in turn increases the likelihood of carelessness and failure when attempting to solve integrals.

The fact that mathematical ideas are organized in a hierarchy means that mastery of one idea requires familiarity with its predecessors; this is especially true in algebra. This allows educators to anticipate and analyze the types of errors their students may make as well as their students' underlying thought processes (Son 2013). In high school, most students' difficulties may be traced back to their inability to learn and retain mathematical information and their lack of grasp of algebraic relationships (Perkins and Simmons 1988). The classroom becomes a repository for the students' prior mathematical knowledge. It is possible that the associations you make between ideas won't hold up under closer scrutiny. This web of interconnected ideas means that misunderstandings cannot just pop up out of nowhere; rather, they're the product of a particular set of preexisting assumptions and ways of thinking. Therefore, re-education through information (language) is ineffective in this regard, and errors in this framework can be remedied by altering it. Correcting and resolving misconceptions in this scenario entails altering an individual's cognitive structures, conceptual frameworks, and indeed belief systems (same sources) (Smith, diSessa, and Roschelle 1994).

V. Conclusion

Understanding the contexts in which students are most likely to make mistakes is crucial when instructing them in the application of mathematical

concepts. For the simple reason that where there is discussion of education there is also the possibility of certain lessons being half-learned or poorly taught. Having your expectations not met is a natural and necessary element of growing as an individual and learning something new. They typically make systematic mistakes due to their inflexible mental frameworks (Haghkhalah and Davoudi 2021). However, the causes must be eliminated before they can be identified and used as a tool to test and correct a student's prior learning (Holmes et al. 2013).

One of the cornerstones of content understanding is the ability to identify and address student misconceptions through careful lesson planning and delivery (Marks 1990) which has the potential to improve education. This is due to the fact that misunderstandings are intertwined with the mind's underlying conceptual framework and contribute to how we interpret and apply novel ideas. These misunderstandings can be resolved or mitigated by the use of effective teaching methods, whether in-person or online (Shahvarani, Behzadi, and Moradi 2013). Student learning can be improved by providing a pedagogical framework that accounts for these common blunders. Making pupils self-aware and providing them with an environment in which they can learn from their mistakes are two further strategies for improving student performance. "It's like, "Wow, look at what you've accomplished. Just how did you end yourself in this location?" Helpful The next move for the educator could be to introduce inconsistencies, make comparisons, or provide concrete examples of noncompliance. If the student does not fix the problem on their own, the teacher will ask for volunteers from the class (Alamolhodaei 2015).

If students make mistakes while doing math problems, they will not be able to figure out why their answers are wrong, recognize when they are encountering conceptual difficulties, or work to find solutions. Therefore, it is not enough to just have the ability to think; we also need metacognition; or the awareness that comes with knowing how to learn and think. Compared to cognitive processes and their regulation, metacognitive processes reveal more. Methods like asking and self-inquiry, providing a step-by-step explanation of solutions and proofs to problems and theorems, and analyzing mathematical difficulties in the context of group and community activities can help students strengthen their metacognitive skills (Legutko 2008).

The authors of this study claim that the necessity of taking online classes owing to the spread of the COVID-19 virus has led to widespread misunderstandings amongst the student population. This is due to the fact that the responsible educator is unable to swiftly and readily review the student's draught in order to provide timely comments. However, without the teacher's

charisma, students in online classes are less likely to accomplish their homework or follow the rules and regulations established for the classroom.

Importantly, virtual evaluations lack the same degree of objectivity and precision as their in-person counterparts. Therefore, it is possible that if this study were repeated in traditional classroom settings, different findings would emerge.

The findings of this research may serve as a starting point for developing seminars and other forms of training for high school and college academics on the topic of integration methods and the mathematical misconceptions that surround them. It is also recommended that the content of the chapter titled "Mathematics Lesson 1" be revised with the goal of eliminating confusion and developing useful instructional resources. However, comparable inquiries are needed to explore the factors that contribute to confusion in other components of the major and in other academic disciplines and to develop effective strategies for preventing and rectifying confusion.

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Corrigendum

Corrigendum

Maria Cinque

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CORRECTION TO THE FOLLOWING ARTICLE CONTENT:

Cinque, Maria. 2016. "'Lost in translation'. Soft Skills Development in European Countries." *Tuning Journal for Higher Education* 3, no. 2 (May): 389-427. doi: [https://doi.org/10.18543/tjhe-3\(2\)-2016pp389-427](https://doi.org/10.18543/tjhe-3(2)-2016pp389-427).

The correction consists of clarification and appropriate attribution of some of the material used in the above-mentioned article.

MATERIAL CONCERNED:

Page 169, section II.3, 2nd paragraph:

[...] are skills that are applicable and useful in various contexts, and thus they can be supposedly transferred among different work occupations. They include soft skills and additional abilities, such as literacy, numeracy, technology use etc. Soft skills are considered a subset of generic skills.

This text is now attributed to: Kechagias 2011, 33.¹

Page 169, section II.3, 3rd paragraph:

The expression "key competencies" refers to those generic skills that warrant special recognition for their outstanding importance and applicability to the various areas of human life (educational and occupational, personal and social). Indeed, the adjectives 'generic' and 'key' are sometimes used as synonyms. In one of its papers, the Information Network on Education in Europe, Eurydice, outlines its position as follows.

This text is now attributed to: Kechagias 2011, 32.

Pages 169 (section II.3, 4th paragraph)-170:

"Basic skills" are not the same as "key competencies". Most experts usually talk about "basic skills" when referring to the sub-group of generic or key competencies that

¹ Kechagias, Konstantinos, ed. 2011. *Teaching and Assessing Soft Skills*. Thessaloniki: 1st Second Chance School of Thessaloniki (Neapolis).

are instrumentally essential in a given culture for every person and job, and particularly as we use 'basic' skills to communicate with one another and for continuous learning. Classic examples of basic skills are: carrying out basic arithmetical calculations (adding, subtracting, multiplying and dividing), and reading and writing in one's mother tongue. Since the 1990s, at least two more basic skills, the outcomes of both economic globalisation and accelerated technical progress, have come to the fore: speaking foreign languages and using electronic Information and Communication Technologies (ICT).

This text is now attributed to: Kechagias 2011, 33.

Page 170, 1st and 2nd paragraphs:

Different generic/key/basic skills schemes have been developed in many countries. In some countries, more than one scheme has been developed, either sponsored by different organizations or because the original scheme has been modified as a result of experience. These schemes represent taxonomies of skills, to varying levels of complexity, and as taxonomies, they are informative about the theoretical bases (most of which are tacit) that formed the foundations for the development of these schemes.

As far as the identification of the skills is concerned, three approaches can be identified in the delineation of them. First, skills have been identified by employer organizations through interviews with and focus groups of employer representatives and reviews of other schemes. Second, skills have been identified through analyses of the skills enacted by practitioners in workplaces. Third, a discipline-based approach has been taken in the DeSeCo Project in which academics from six discipline groups were commissioned to propose lists of generic skills.

These paragraphs (pages 169-170) are attributed to: Kechagias 2011, 36.

Pages 170 (3rd paragraph)-171 (1st paragraph):

There is no one definitive list of generic skills; instead, there are a number of lists. Each list has been compiled under the influence of both global and local factors and reflects a particular situation. Some common elements are the following:

- *Basic/fundamental skills*, such as literacy, using numbers, using technology
- *People-related skills*, such as communication, interpersonal, teamwork, customer-service skills
- *Conceptual/thinking skills*, such as collecting and organizing information, problem-solving, planning and organizing, learning-to-learn skills, thinking innovatively and creatively, systems thinking
- *Personal skills and attributes*, such as being responsible, resourceful, flexible, able to manage own time, having self-esteem
- *Skills related to the business world*, such as innovation skills, enterprise skills
- *Skills related to the community*, such as civic or citizenship knowledge and skills

It might be discussed which of these skills belong to the category of "soft skills". Nevertheless, all the discussion reveals the importance that the modern approaches give to the development and assessment of soft skills.

These paragraphs are attributed to: NCVER 2003.²

Pages 180 (1st paragraph, lines 7-13):

The importance of soft skills for enhancing employability, personal fulfilment and social participation is widely accepted. [...] the educational institutions have accepted that they should prepare their students for a complex and uncertain society and labour market. While they appear to have accepted their new vocational role, there is considerable confusion over how [...] generic competencies, soft skills, attributes or capabilities [...] should be defined and implemented.

This text is attributed to: Kechagias 2011, 55, 56.

² NCVER. 2003. "Defining generic skills." https://www.ncver.edu.au/__data/assets/file/0020/4457/nr2102b.pdf.

Guidelines for Authors

Guidelines for Authors

VERSION 1ST NOVEMBER 2023

General Information

Tuning Journal for Higher Education, TJHE, is a joint academic publication of the University of Deusto (Spain) and the University of Groningen (Netherlands). It is published by the University of Deusto on behalf of the two institutions. It appears twice a year, in May and November, in both digital and print formats. Its first Issue was published in November 2013.

It is an international peer-reviewed, open access journal publishing in English original research studies and reviews in all aspects of competence-based, student-centred, and outcome-oriented education reforms at university level across the globe.

The Journal publishes both thematic and unsolicited contributions on pressing educational needs of contemporary societies.

At any time of the year, the Journal welcomes submissions related to its scope and focus.

The submitted manuscript should not have been previously copyrighted or published in any form, including electronic media and databases, and must not be currently under consideration for publication elsewhere.

The editorial staff uses the TURNITIN software (<http://www.turnitin.com/>) to verify the originality of manuscripts submitted to the Journal.

Manuscripts under consideration for publication in *Tuning Journal* cannot be submitted elsewhere without formal withdrawal approved by the Editor.

The submitted material and its eventual publication shall not be in violation of any codes of conduct, privacy and confidentiality agreements, laws or any rights of any third parties.

Authors are solely responsible for seeking and obtaining permission from the copyright owner to cover the reproduction in their manuscripts of any copyright literary or artistic material from other publications or sources. All tables, maps, photographs, diagrams, figures, and illustrations shall be captioned, with information concerning the source.

Authors are solely liable for the consequences that may arise from third parties' complaints about the submitted material and its publication in TJHE.

Authors should clarify whether their research study involved ethical considerations, how these have been taken into account (including evidence of approval by the competent ethical/research committee) and, if not, explain why not. For reference material, authors can use the BERA's Ethical Guidelines for Educational Research (<https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018>).

Authors shall sign a copyright transfer agreement (to the Publisher) after the acceptance but before the publication of their manuscripts in TJHE.

These Guidelines should be used with reference to the TJHE Ethical Guidelines for Publication, Peer Review policy, and Copyright Notice; all of which are available at the web page of the Journal (<http://www.tuningjournal.org/>).

Manuscript Preparation

To expedite the review process, please format your manuscript as follows:

1. Prepare your manuscript as a single editable Microsoft Word or Open Office document with line numbering, using the template downloadable from the web page of the Journal (<http://www.tuningjournal.org/about/submissions#authorGuidelines>). The file should include the complete text, references, tables and figures. All revised manuscripts should again be sent as a single editable document.
2. Manuscripts must be written in either UK English or U.S. English consistently and include a 100-300 word abstract. The title page should include authors' affiliations plus the email address of a single corresponding author. The Chicago Manual of Style (CMOS), 16th or later edition, should be used as a reference for manuscript preparation (www.chicagomanualofstyle.org/).
3. Format of references, notes, and bibliography or reference list.
 - a) Authors can format their citations and references in either of the two referencing systems of the Chicago Manual of Style (16th or later edition): **Notes and Bibliography** and **Author-Date** systems (https://www.chicagomanualofstyle.org/tools_citationguide.html). They however are required to use either system consistently.¹
 - b) Note references must be numbered in superscript format in the text and arranged numerically (in the order they appear in the text) at the bottom of each page, in line with the CMOS 'Footnotes' system.
 - c) 'Notes' include complete bibliographic information when cited for the first time. For subsequent citations of the same source, shortened versions are preferred.
 - d) The Bibliography or Reference list includes **all and only** sources cited in the 'Notes' or text, and provides complete reference information.
 - e) Bibliography or Reference list entries are to be arranged alphabetically by (first) author's last name following the CMOS guidelines. Note that for works of two or more authors, only the name of the first-listed author is inverted in a Bibliography or Reference list entry. This rule does not apply to 'Notes'.
 - f) Microsoft Word (2010 and later edition) can be used with such software as "EndNote", "RefWorks", "Reference Manager", RefME, and "Zotero", to simplify the task of managing citations and references according to the recommended CMOS.
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¹ Before 1st January 2022, only the **Notes and Bibliography** system had to be used.

6. Please ensure that all the characters and special characters in the text, tables, figure legends, footnotes and references are in a single typeface and point size – such as 12 pt Times New Roman. Once a manuscript is accepted, a copy editor will decide the typeface and size of the different elements of the article.
7. Please submit all figures or photographs as separate jpg or tif files with distinct characters and symbols at 500 dpi (dots per inch). Tables and equations should be in an editable rather than an image version. Tables must be edited either with Microsoft Word or Open Office. Equations must be edited with the appropriate Equation Editor. Tables, table captions, figures and figure captions should be appended after the 'Bibliography' or 'References' section, as indicated on the standard template for manuscript preparation (<https://tuningjournal.org/about/submissions#authorGuidelines>).
8. Type your manuscript single-spaced and indent the first line of each paragraph. This will conserve paper and makes it easier for reviewers to handle.
9. Manuscripts should normally be between 5,000 and 12,000 words excluding notes and references. Diagrams should be reckoned at the equivalent of 500 words if they occupy a full page and proportionately less if smaller. Longer articles require editorial approval.
10. Authors of manuscripts should each submit a biographical note of 150-200 words. The note should be a continuous text containing the author's full name, email address, affiliation, current post, relevant experience, main research area(s), and highest academic qualification.

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Manuscripts should be submitted online via the *Tuning Journal for Higher Education* online manuscript submission and review system at <http://www.tuningjournal.org/>.

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In OJS, editorial correspondence related to a manuscript is reserved for the person who actually submits the manuscript in question. In cases of various authors, the submitting author is the sole co-author with access to the manuscript and related files and correspondence. It is therefore important that the corresponding author, referred to as "Principal contact for editorial correspondence" in OJS terminology, be the actual submitter of the manuscript. Exceptionally and at the sole and exclusive discretion of the Editor and/or Managing Editor, can an additional co-author be allowed to act as "Principal contact for editorial correspondence".

Review Process

The Editor, with the assistance of the Managing Editor and or any other member of the editorial team, makes a first assessment of conformity of submitted manuscripts against the Journal editorial and publication policies and submission guidelines.

Currently, *Tuning Journal for Higher Education* uses a double-blind peer review system: mandatory anonymity for both the reviewer and reviewed author throughout the review process.

Manuscripts not conforming to the Journal guidelines will be returned to authors without evaluation.

The Editor hands each manuscript accepted for review to an advisory editor (generally from the Journal's Panel of Advisory Editors), who will control the review and revision process of that manuscript.

The Editor will prepare a decision letter based on the comments of the reviewers and the recommendation of the Advisory Editor, which will be sent to the corresponding author by email.

It is our intention to notify authors of non-reviewed manuscripts within 21 days of submission acknowledgement. For manuscripts accepted for review, the process shall last 6 months. However, due to reasons beyond our control, the whole process (initial screening and peer review) can take longer time to be completed. Our editors and reviewers are indeed very busy people and they carry out their review tasks voluntarily. We therefore invite authors to be patient. If you have not heard from the Editor after 4 months following the submission acknowledgement, please send an inquiry to the Editor (Professor Mary Gobbi, PhD, mary.gobbi@deusto.es) and or Managing Editor (Ladislas Bizimana, PhD, ladislas.bizimana@deusto.es, tuningjournal@deusto.es). We understand that these deadlines may be too long for some authors. We therefore would respect, though regrettably, their decision to withdraw from the process, preferably prior to the peer review stage.

Production, Publication, and Distribution

Under the coordination of the Managing Editor (ME), accepted manuscripts are copyedited for publication. For each copyediting round, authors normally have up to three (3) working days to act upon suggested changes. Once copyediting is completed, the ME moves each paper to the typesetting and proofreading stage. By email attachment, authors receive PDF proofs for a final check (of basically typographical and formatting errors), altogether with the copyright transfer form (to be completed, dated, signed, and returned to the ME). Authors are expected to give their feedback within three (3) working days of receipt. Exceptionally, more than one round of proofreading by authors may take place. Substantive changes to the content and or structure of the manuscript at this stage require the approval of the Journal editor.

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TJHE
Ethical Guidelines
for Publication

TJHE Ethical Guidelines for Publication

FINAL VERSION (MARCH 2015)

Tuning Journal for Higher Education (TJHE), Tuning Journal in short, is an international journal publishing in English original research studies and reviews in all aspects of competence-based, student-centred, and outcome-oriented education reforms at university level across the globe. It is published by the University of Deusto's Publications department on behalf of the International Tuning Academy (Tuning Academy in short), a jointly managed project of the Universities of Deusto (Spain) and Groningen (The Netherlands). The Journal, essentially an open access, online and peer-reviewed publication, is committed to maintain the highest ethical standards. Hence, the involvement of any stakeholder in any function connected with TJHE, including acting as an editor, the reviewing of manuscripts, the management and production of the Journal and the authorship and submission of manuscripts implies acceptance of and adherence to **TJHE Ethical Guidelines for Publication**.

* The term *Editor(s)* as used below refers to Editors, Advisory Editors, Guest Editors, and Editorial Board members when delegated to serve in an editorial capacity.

1. Publishers, Managing Board, Editorial Board

1.1. The Editorial Board is appointed by the Tuning Academy in consultation with the Universities of Deusto and Groningen.

1.2. The Editorial Board is responsible for setting policy, appointing the Editor and Advisory Editors of the Journal.

1.3. The Editor is responsible for ensuring that publication policies set by the Editorial Board are carried out.

1.4. The Management Board is appointed by the Tuning Academy in consultation with the Universities of Deusto and Groningen.

1.5. The Managing Board is responsible for the commercial management of the Journal and appointing a Managing Editor.

1.6. The Managing Editor is responsible for ensuring that the commercial policies set by the Management Board are carried out.

1.7. Members of the Editorial or Management Boards or employees and, or members of the Tuning Academy should not intervene in or comment on editorial decisions on individual manuscripts.

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2.1. *Editors* of the Journal and Specialist Volumes are expected to carry out editorial duties in a manner consonant with policies set by the Editorial Board.

2.2. The Editor has full responsibility, which he/she may delegate to an Advisory Editor, for editorial and technical decisions on Journal and specialist volume content.

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2.4. *Editors* should process manuscripts expeditiously.

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2.7. Manuscripts submitted by an *Editor* should be delegated to another Advisory Editor or Editorial Board member.

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2.9. An *Editor* must not use information, data, theories, or interpretations of submitted manuscript in her/his own work unless that manuscript is in press, published or the author has given permission to do so.

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3.1. Manuscripts should contain original, new results, data, ideas and/or interpretations not previously published or under consideration for publication elsewhere (including electronic media and databases).

3.2. Authors should be encouraged to avoid fragmentation of their work where practical, so that the submitted manuscript is as comprehensive and authoritative as possible.

3.3. Authors should inform the Editor of related manuscripts under consideration elsewhere and provide copies if requested.

3.4. Fabrication of data, results, selective reporting of data, theft of intellectual property of others, and plagiarism are unethical practices and unacceptable.

3.5. Information obtained privately (e.g., in conversation, correspondence, or discussion with third parties) should be avoided as it is not in the public domain and is thus unverifiable. If considered necessary, it should not be used or reported in a manuscript without explicit permission from the party with whom the information originated. Information obtained in the course of confidential services (e.g., refereeing manuscripts or grant applications) should be treated similarly.

3.6. Manuscripts will contain proper citation of works by others, especially publications of the original hypotheses, ideas, and/or data upon which manuscript is based or addresses.

3.7. Authorship

- a) Authorship should be limited to those who have made significant contributions to the concept, design, execution or interpretation of the work reported in a manuscript; others who have contributed should be acknowledged;
- b) Author order should be agreed on by all authors as should any changes in authors and order that occur while the manuscript is under review or revision. Changes in authorship must be submitted to the Editor in writing and must be signed by all authors involved.
- c) Authors and co-authors should review and ensure the accuracy and validity of results prior to submission; co-authors should have opportunity to review manuscript before submission.

3.8. Authors should reveal to the Editor any potential conflict of interest (e.g., a consulting or financial interest in a company) that might be affected by publication of the results contained in a manuscript. The authors should ensure that no contractual relations or proprietary considerations exist that would affect the publication of information in a submitted manuscript.

3.9. Authors are encouraged to disclose major funding sources (e.g., government agencies, private foundations, private industry, and universities) for reported research.

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4.2. A reviewer should decline to review a manuscript if she/he feels technically unqualified, if a timely review cannot be done, or if the manuscript is from a competitor with whom the reviewer has had an acrimonious professional relationship or a conflict of interest as defined above (section 4.1).

4.3. Reviewers should be encouraged, but not required, to sign reviews. The Editor will preserve anonymity of reviewers should a reviewer elect to remain anonymous.

4.4. Reviewers must treat the manuscript as confidential.

4.5. Reviewers must ask the Editor for permission to discuss the paper with others for specific advice, giving names and reasons for such consultation.

4.6. Reviewers must not pass the manuscript to another to carry out the review without permission from the Editor.

4.7. Reviewers must not use information, data, theories, or interpretations of the manuscript in their own work unless that manuscript is in press, published or the author has given permission to do so.

4.8. Reviewers should clearly support and justify the basis for their review analysis.

4.9. Reviewers should alert the Editor to similar manuscripts published or under consideration for publication elsewhere in the event they are aware of such. However, it is the responsibility of the Editor, not the reviewer, to decide on the proper course of action once so informed.

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5.1. Citation manipulation is considered unethical. Manipulation may include adding citations not contributing to a manuscript's content or solely aiming at increasing an author's or a journal's citations.

6. Sanctions

6.1. Suspected breaches of this policy may be handled by the Editor or may be forwarded to the Editorial Board for review and recommendation.

6.2. If an *Editor* is determined to have violated the **TJHE Ethical Guidelines for Publication**, the matter will be referred to the Editorial Board.

6.3. If an author is determined to have violated the **TJHE Ethical Guidelines for Publication**, TJHE reserves the right to impose sanctions, which may include restriction from further consideration of accepting the author's work, retraction of a published paper, or withdrawal of a submitted paper.

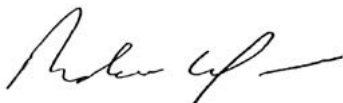
Date: 16 March 2015

Approved by the TJHE Editorial Board and signed on behalf of the Tuning Academy by:

Pablo Beneitone
Director, Tuning Academy (Deusto)



Robert Wagenaar
Director, Tuning Academy (Groningen)



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