Tuning Journal
for Higher Education

Volume 12, Issue No. 2, November 2026
DOI: https://doi.org/10.18543/tjhe1222026

Revealing the present and past to improve the future
in a different era and context

ARTICLES

A bottom-up approach for faculty development: A latent class analysis on teaching innovative practices and needs for improvement in higher education

Omar Paccagnella, Debora Aquario, Lorenza Da Re, and Anna Serbati

doi: https://doi.org/10.18543/tjhe.3267

Received: 30 March 2025
Accepted: 13 January 2026
E-published: November 2026

Copyright

Copyright for this article is retained by the Publisher. It is an Open Access material that is free for full online access, download, storage, distribution, and or reuse in any medium only for non-commercial purposes and in compliance with any applicable copyright legislation, without prior permission from the Publisher or the author(s). In any case, proper acknowledgement of the original publication source must be made and any changes to the original work must be indicated clearly and in a manner that does not suggest the author's and or Publisher's endorsement whatsoever. Any other use of its content in any medium or format, now known or developed in the future, requires prior written permission of the copyright holder.

A bottom-up approach for faculty development: A latent class analysis on teaching innovative practices and needs for improvement in higher education

Omar Paccagnella,[1] Debora Aquario,[2] Lorenza Da Re,[3] and Anna Serbati[4]

doi: https://doi.org/10.18543/tjhe.3267

Received: 30 March 2025
Accepted: 13 January 2026
E-published: November 2026

Abstract: The concept of teaching quality is multifaceted and challenging to quantify. Many researchers advocate for the use of teacher self-assessments as a valuable tool in evaluating teaching effectiveness. In 2016, a collaborative network of seven Italian universities launched the innovative *AsdUni* project, a bottom-up

[1] **Omar Paccagnella** (corresponding author, omar.paccagnella@unipd.it), PhD, is Associate Professor of Economic Statistics at the Department of Statistical Sciences, University of Padua (Italy).

[2] **Debora Aquario** (debora.aquario@unipd.it) is Associate Professor at the Department of Philosophy, Sociology, Education and Applied Psychology (FISPPA), University of Padua (Italy) in the area of Teaching and Inclusive Education.

[3] **Lorenza Da Re** (lorenza.dare@unipd.it) is Associate Professor of Experimental Pedagogy at the Department of Philosophy, Sociology, Pedagogy and Applied Psychology (FISPPA), University of Padua (Italy).

[4] **Anna Serbati** (anna.serbati@unitn.it) is Full Professor of Educational Research at University of Trento, as well as **Coordinator of the FormID – Teaching and Learning Center UniTrento** and member of the Quality Assurance Unit.

More information about the authors is available at the end of this article (after the References section.

Acknowledgements: The authors thank Ettore Felisatti (as the coordinator of the AsdUni project), Renata Clerici and all other AsdUni project members for the valuable feedback and contribution during the project implementation. An earlier version of this paper was presented at the 14th annual International Conference of Education, Research and Innovation (ICERI), held online on 8-9 November, 2021 (a short paper was then published in the Conference proceedings, available at https://library.iated.org/view/PACCAGNELLA2021ABO). The authors thank all conference participants.

Funding: No funding was received to assist with the preparation of this manuscript.

Conflict of interests: The authors have no competing interests to declare that are relevant to the content of this article.

initiative aimed at establishing a national, systematic approach to educational development. The project's primary focus was to analyze teachers' beliefs, practices, and needs. As part of this initiative, a comprehensive questionnaire was distributed to all academic staff within the participating universities. The survey concluded with three open-ended questions designed to explore: i) Excellence and innovation in personal teaching practices; ii) Critical issues in day-to-day teaching; iii) Types of support perceived as necessary for enhancing teaching and learning outcomes. Exploiting the rich qualitative data collected through this project and employing advanced statistical methods such as Latent Class Analysis, researchers identified ten distinct clusters of teachers. These clusters represent homogeneous groups based on various combinations of teaching excellences, criticisms, and needs, while exhibiting heterogeneity across clusters. Findings from this study have significant potential to inform and enhance staff development programs. By providing insights into the diverse profiles of teachers, this research enables the design of targeted, multi-level action plans that are tailored to address the specific needs of different teacher groups.

Keywords: faculty development; latent class analysis; multi-level action plans; qualitative research; university.

I. Introduction and theoretical framework

Higher education institutions today are increasingly called upon to rethink their teaching methods. The OECD emphasises the pressing need for countries and universities to fully commit to enhancing teaching quality (Hénard and Roseveare 2012). Similarly, the European strategic framework for cooperation in education and training (ET2020) offers avenues to establish best practices in education policies. In a shifting landscape where teaching and learning processes are evolving, it becomes essential to provide academics with the skills and knowledge they need to perform effectively in their teaching roles. This necessitates a re-evaluation of staff development strategies and initiatives (Postareff, Lindblom-Ylänne, and Nevgi 2007), ensuring ongoing improvement in their teaching practices (Dierdorff and Surface 2008). Particularly in the last decades, the landscape of higher education has changed a great deal and many challenges are appearing in this landscape. Not least those posed by technology and artificial intelligence, which have also been highlighted in the wake of the pandemic (Abu Talib, Bettayeb, and Omer, 2021; Ma, Akram, and Chen, 2024).

First of all, it becomes important to focus on the concept of "good teaching", identifying what quality in higher education means and how it can be operationalised in teaching daily practices (Prosser and Trigwell 1999; Ramsden 2003). Exploiting a wide review of empirical evidence, the "Seven Principles of Good Practice in Undergraduate Education" have been widely

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

used as a guide to the improvement of university teaching (Chickering and Gamson 1987). Hénard and Leprince-Ringuet (2008) show that *quality* is a broader term with different meanings, that could refer to the student performance, the output of an educational program, the student learning experience or the teaching itself.

The evolution of teaching in higher education has undergone a significant transformation—from a transmissive model, where the teacher served as a "knowledge holder," to more constructivist and interactive frameworks. Historically, university teaching was largely content-driven, with students playing a passive role in the learning process (Kember and Kwan, 2000). However, the emergence of constructivist theories has gradually shifted the focus toward student-centered approaches, emphasising active and participatory learning experiences (Trigwell and Prosser 1996). This paradigm shift has led, in recent decades, to the creation of tools designed to analyse and better understand teaching practices. Research on higher education teaching approaches has highlighted two dominant strategies: one content-oriented and one focused on student learning (Trigwell, Prosser, and Taylor 1994). The former prioritises the delivery of information from teacher to students, while the latter fosters interaction and active student engagement to enhance their conceptual understanding.

The Approaches to Teaching Inventory (ATI), introduced by Trigwell and Prosser (2004), distinguishes between rigid, transmissive teaching strategies and more flexible, reflective practices. Subsequent advancements in this research include the development of the *How You Teach* questionnaire, which enables teachers to reflect on their teaching approaches and identify their own teaching style (Parpala and Postareff 2022). Postareff and colleagues later refined this tool into the *Higher Education Approach to Teaching* (HEAT), a more detailed and context-sensitive analysis of teaching strategies (Postareff et al., 2024). Achieving teaching quality requires a clear understanding of what constitutes "good teaching" and how it can be embedded in daily practice (Prosser and Trigwell 1999; Ramsden 2003). However, as Hénard and Leprince-Ringuet (2008) argue, quality is a multifaceted concept that can refer to various aspects such as student performance, program outcomes, the learning experience, or the teaching process itself.

Similarly, the notion of teaching excellence is complex and often ambiguous (Gunn and Fisk 2013). Scholars have approached excellence as a nuanced construct, acknowledging its multidimensional nature (Skelton 2005; Trigwell 2001). Nixon (2007) frames excellence as a process of personal growth and flourishing. According to the High Level Group on the

Modernization of Higher Education (2013), the most effective teaching challenges students' preconceived ideas, compelling them to take ownership of their learning and become active agents of change. As Trigwell (2001) suggests, this mindset applies to educators as well, who must engage in ongoing reflection and learning to continuously enhance their teaching throughout their careers.

Empirical evidence further shows that good teaching is influenced not only by the subject matter but also by situational factors such as class size, student abilities, and assessment practices (Hénard and Leprince-Ringuet 2008; Young and Shaw 1999). Therefore, models for academic development must take local priorities and contextual factors into account (Naris and Ukpere 2009; Sorcinelli et al. 2006). Their success also hinges on adapting to institutional dynamics. As the Higher Education Academy notes (Locke et al. 2016), universal in-house or external training programs may not be suitable for every context. Instead, faculty development initiatives should be carefully tailored to address individual needs and provide targeted support at the appropriate times. Furthermore, successful programs must foster collaboration between institutions and their staff; otherwise, if perceived merely as mandatory obligations, they risk resistance or low engagement (Di Napoli 2014). In line with these insights, Sorcinelli et al. (2006) recommend several strategies for educational developers: grounding practices in scholarship, aligning initiatives with institutional goals, considering organisational culture, embracing faculty diversity, and designing inclusive programs. Development efforts must simultaneously address institutional objectives and individual needs, avoiding one-size-fits-all solutions.

Balancing these priorities was central to the research presented here. In 2016, a consortium of seven Italian universities launched a bottom-up initiative – the AsdUni project – aimed at fostering a systemic approach to academic development. The project sought to analyse teachers' beliefs, practices, and needs (Felisatti and Clerici 2020). By leveraging the qualitative data collected and employing advanced statistical methods such as Latent Class Analysis, this research identifies homogeneous groups of teachers based on their practices and needs. These insights can inform the design of customised strategies to enhance teaching quality across higher education institutions.

II. The AsdUni research

The AsdUni study sought to capture the voices of academics, exploring their perspectives on the strengths of their teaching practices, the challenges

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

they encounter, areas requiring improvement, and the types of support they desire for professional growth.

Given that staff development initiatives are still in their nascent stages within the Italian academic landscape, it was crucial to gather insights into the preferred forms of support that professors believe would enhance their teaching quality. The data collection aimed to provide a comprehensive overview of both national and local situations, with the goal of informing policies, shaping initiatives, and fostering both local and inter-institutional staff development programs. Indeed, as part of the AsdUni project, a questionnaire was distributed to academics across seven participating universities. This instrument included Likert scales assessing teachers' beliefs, practices, and needs. Additionally, it featured three open-ended questions, which form the core of our study. These questions were designed to explore:

1. Excellence and innovation in personal teaching activities.
2. Critical issues encountered in day-to-day teaching practices.
3. Types of support perceived as necessary for enhancing teaching and learning outcomes.

This approach allowed for a rich, multifaceted exploration of the academic teaching landscape in Italy.

The research gathered data from 4,289 participants through computer-assisted web interviews, achieving an overall response rate of approximately 59% (ranging from 46% to 74% across universities). The final analysis focused on 3,250 teachers who provided relevant responses to at least one open-ended question. The remaining participants either offered general comments unrelated to the study's focus or did not respond.

As illustrated in Table 1, the sample demographics reveal a predominantly male composition. With respect to age, over half of the participants fall within the 46-60 years class, with the remainder evenly split between younger and older age groups. In terms of academic positions, associate professors constitute about 37% of the respondents, while assistant professors and those in temporary positions collectively make up nearly 50% of the sample. The geographical distribution of participants shows a balanced representation, although academics from Central Italian institutions account for approximately half the number of those from Northern or Southern Italy.

Table 1

Summary of the main characteristics of the teachers in the final sample

Characteristic	n	%
Gender		
Male	1815	55.85
Female	1435	44.15
Age class		
30-45	756	23.25
46-60	1698	52.25
61-70	775	23.85
Over 70	21	0.65
Academic role		
Full professor	736	22.65
Associate professor	1226	37.72
Assistant professor	989	30.43
Temporary position	299	9.20
University		
A (Northern Italy)	782	24.06
B (Northern Italy)	555	17.08
C (Central Italy)	474	14.58
D (Central Italy)	141	4.34
E (South Italy)	155	4.77
F (South Italy)	644	19.82
G (South Italy)	499	15.35
Total	3250	100.00

Serbati et al. (2020, 52-58) conducted a thorough content analysis[5] of the open-ended responses from the AsdUni survey. They established three broad

[5] A content analysis is research tool used to discover the presence of certain words or concepts in a qualitative dataset.

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

code families corresponding to the main topics of inquiry: excellences, critical aspects, and needs. Each of these families was further subdivided into several Pre-codes, encompassing semantically related concepts, the so-called codes[6]:

a) Excellences: Seven pre-codes, including methodological and instructional choices, in-class activities, and student-focused approaches.

b) Critical aspects: Four Pre-codes, covering areas such as organisational issues and student characteristics.

c) Needs: Five Pre-codes, addressing factors like contextual elements and human/financial resources.

This structured approach allowed for a comprehensive examination of the multifaceted landscape of academic teaching in Italian universities.

III. Methodology

Latent Class (LC) analysis is a powerful statistical method for categorising individuals into hidden or unobservable subgroups (Vermunt and Magidson 2004). In the context of this study, this approach enables us to identify distinct groups of profiles based on various combinations of teaching practices and needs. These subgroups, or classes, essentially form the categories of an unseen categorical variable. Members within a single LC share similar characteristics according to specific criteria, while those in different LCs exhibit notable differences from one another (Collins and Lanza 2010). Unlike traditional clustering techniques, such as principal component analysis or cluster analysis, the LC approach is grounded in statistical modelling, offering a more robust and theoretically-driven method of classification.

Originally introduced by Lazarsfeld (1950) to explain respondent heterogeneity in survey response patterns based on dichotomous items, the latent class analysis has been strongly formalised, extended and further developed (Goodman 1974; Vermunt and Magidson 2003).

LC methodology has found widespread application across various disciplines, including social sciences, behavioral studies, and healthcare research, with education being no exception. The groundbreaking research

[6] Codes are labels that are linked to selected pieces of data derived the analysis of each collected open-ended answer.

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

by Aitkin, Anderson, and Hinde (1981) paved the way for the extensive use of LC analysis and latent trajectory class studies in educational contexts, particularly in K-12 education (Bowers and Sprott 2012; Fagginger Auer et al. 2016; Hickendorff et al. 2009; Ing and Nylund-Gibson 2013) and higher education research (Denson and Ing 2014; Pastor et al., 2007; Weerts, Cabrera, and Mejias 2013; Yocarini et al. 2020). Despite its popularity, it is worth noting that the majority of these studies have primarily concentrated on examining student outcomes. Comparatively less attention has been given to investigating teaching styles or instructional practices through this analytical lens (Campbell et al. 2017).

Consider a group of n teachers, where each teacher i is associated with a set of L reporting items. We denote the response to item l for teacher i as y_{il}. This variable takes a value of 1 if teacher i provides a valid answer in Pre-code l, and 0 otherwise. The latent variable is denoted by X, and we assume there are C latent classes.

The probability of observing a specific response pattern $\boldsymbol{y}$, represented as $P(\boldsymbol{Y} = \boldsymbol{y})$, can be expressed as a weighted sum of the probabilities specific to each of the C classes. This formulation allows us to model the heterogeneity in response patterns across different latent classes of teachers.

A fundamental principle in LC models is the assumption of local independence. This means that within each latent class, the L observed variables are considered to be independent of one another (Hagenaars and McCutcheon 2002). In our solution, logistic regression is used to estimate the conditional response probabilities. The likelihood of an individual belonging to a specific latent class x, known as the posterior membership probability, can be calculated using Bayes' theorem. This posterior probability serves as the basis for assigning individuals to latent classes. The most frequently used method for this assignment is the modal approach, where an individual is placed in the class for which they have the highest probability of membership.

More details on this methodological solution are reported in Paccagnella et al. (2021).

The parameters of LC models are typically estimated using maximum likelihood techniques. This process employs a modified version of the Expectation-Maximization (EM) algorithm, as proposed by Vermunt (2003). The LatentGOLD 5.0 software package, developed by Vermunt and Magidson (2013), provides a practical implementation of this algorithm.

Determining the optimal number of latent classes for profiling the sample is a complex task. It generally involves an iterative approach: the process begins by estimating a model with a single latent class, then progressively increases the number of classes one at a time. This continues until a

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

satisfactory model fit is achieved, and further increases in the number of classes fail to yield significant improvements in fit.

Upon completion of the model estimation, researchers have access to a comprehensive array of measures and statistics for assessing model fit. It is important to note that these various indicators may sometimes yield conflicting results, necessitating careful interpretation and judgment in the final model selection. The first set includes standard measures, such as the information criteria (BIC, AIC and CAIC are the most used indicators). A second group of indicators is based on classification statistics, such as Classification Errors, Entropy R2 and Standard R2. A third measure relies on the BiVariate Residual (BVR) estimates. As explained above, a key assumption in any LC analysis is the local independence and BVRs are a way to detect whether this assumption is violated. BVRs are conceptually similar to the Modification Indices in the structural equation modeling approach: low values of BVRs indicate good model fit, while large values identify correlations between the associated variable pairs, that have not been adequately explained by the model. As a consequence, violation of the local independence assumption could lead to a poor fit model (Vermunt and Magidson 2013, 25-26). In the current literature, there is not a general rule to assess the smallness of a BVR (Oberski, van Kollenburg, and Vermunt 2013, 268-269), even though van Kollenburg, Mulder and Vermunt (2015, 68) suggest the value of 3.84 for each pair as a benchmark. There are different solutions for solving violation of this assumption: i) increasing the number of LCs: ii) allowing for direct relationships between the two associated items (the so-called direct effects); iii) increasing the number of the latent variables underlying the theoretical framework.

In our work, we place significant emphasis on the size of each Latent Class (LC) as a crucial model indicator. Classes that are excessively small, encompassing only a few individuals, pose practical challenges, especially when the research goal is to develop tailored academic processes that address the genuine needs of these theachers. Furthermore, as the number of LCs increases, there is a higher likelihood of encountering groups that lack distinctly defining characteristics. This phenomenon can complicate the interpretation and practical application of the model results. According to our sample size, we believe that the classes should not have a size lower than 3%, which means a number of teachers approximately equal to 100.

Therefore, we strive for a balance between model fit and practical utility, seeking to identify classes that are not only statistically sound but also substantively meaningful and of sufficient size to inform actionable strategies in educational development.

IV. Results

Based on the classification obtained from the content analysis carried out by Serbati et al. (2020) (see Section II. The AsdUni research) as many dummy variables were created for each teacher as there are Pre-codes (results are summarised in Table 2[7]). Among the declared excellences, the most important category referred to the action of teaching in class, followed by the use of technologies and a specific focus on students' needs, but we cannot forget teachers' features and the relationship with extra-university context. With regards to critical points, the major problems concerned the organisational aspects (rooms, timetable, integration of different modules, etc.), as well as students' features (lack of disciplinary knowledge, low attendance and interaction) and, as a minor aspect, teachers' features. In the case of needs for improvement, once again the contextual factors appeared to be very problematic, together with a desire for more human and financial resources as well the need of training/educational courses.

Table 2

Distribution of the Pre-codes for each of the three code families according to the classification provided by the content analysis (Serbati et al., 2020)

Category	n	%
Excellences		
Relationship with extra-university context	137	2.67
Attention towards students	946	18.44
Teachers' features	264	5.15
Teaching in class	2753	53.66
Use of English (language)	39	0.76
Use of students' ratings about teaching	39	0.76
Use of technologies	952	18.56
Total	5130	100.0

[7] Given the qualitative nature of the collected data, one or more codes can be derived from the answers provided by the teachers to each of the three questions. This explains why the total number of answers is different among code families and, in two cases, larger than the number of teachers who provided useful answers to these questions.

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

Category	n	%
Critical Aspects		
Students' features	1530	40.14
Teacher' features	393	10.31
Organisational aspects	1875	49.19
Teaching evaluation	14	0.37
Total	3812	100.0
Needs		
University - community relationship	99	3.16
Training/educational courses	407	12.98
Contextual factors	1703	54.30
Technological aspects	232	7.40
Human and financial resources	695	22.16
Total	3136	100.0

At the same time, some categories show a very low sample size. For this reason, in the *Excellence* family we grouped the Pre-codes "Relationship with extra-university context", "Use of English (language)" and "Use of students' ratings about teaching" in a unique and more generic "Other excellences". In the *Critical Aspects* and *Needs* families we could not pool answers, since we observed only one Pre-code ("Teaching evaluation" and "University - community relationship", respectively) having a limited size. As a result, our LC analysis is based on five variables regarding *Excellences* ("Attention towards students", "Teachers' features", "Teaching in class", "Use of technologies" and "Other"), three variables on *Critical aspects* ("Students' features", "Teacher' features" and "Organisational aspects") and four involving *Needs* ("Training/educational courses", "Contextual factors", "Technological aspects" and "Human and financial resources").

This set of indicators is used to estimate many LC models and their fit is then evaluated and compared to choose the final solution (see Table 3). The information criteria suggested very different solutions for the model specification (large numbers of LCs according to AIC3, low numbers looking at the BIC and CAIC indicators). However, the differences across all estimated models - within each information criteria - were very low: for instance, the CAIC value increased by only 2.37% from model with 4 LCs to

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

the one with 15 LCs. The classification statistics suggested the model with 3 classes. However, all models with low numbers of LCs (i.e. until 9) suffered from very high values of BVRs: in such cases, the local independence assumption is hard to be assumed, therefore equation (2) might be no longer valid and it is likely we estimated something different from the model in equation (3). Increasing the number of LCs helped in reducing the value of BVRs, but it did not solve the problem at all. At the same time, as soon as the number of LCs exceeded the value of 10, some clusters appeared to have a small sample size in the corresponding estimated model (apart from just one case).

Table 3

Model fit according to several statistical indicators

Latent class	Direct effect	Information Criteria			Small size group	Classification statistics			Total BiVariate Residuals (BVRs)
		AIC3	BIC	CAIC		Classification errors	Entropy R2	Standard R2	
2	–	– 7065.78	– 23469.78	– 26694.45	0	0.054	0.7969	0.8323	814.48
3	–	– 7392.34	– 23729.89	– 26941.89	0	0.026	0.8939	0.9230	534.58
4	–	– 7501.09	– 23772.52	– 26971.52	0	0.054	0.8886	0.8885	344.36
5	–	– 7573.02	– 23778.32	– 26964.32	0	0.064	0.8552	0.8552	261.51
6	–	– 7617.13	– 23756.31	– 26929.31	0	0.105	0.8094	0.7923	198.77
7	–	– 7653.43	– 23726.49	– 26886.49	0	0.134	0.8084	0.7725	157.08
8	–	– 7698.42	– 23705.36	– 26852.45	0	0.145	0.7966	0.7466	144.55
9	–	– 7725.47	– 23666.28	– 26800.28	0	0.155	0.7871	0.7350	119.48
9	6	– 7859.60	– 23769.89	– 26897.89	0	0.233	0.7069	0.6217	38.36
10	–	– 7752.72	– 23627.41	– 26748.41	0	0.157	0.7928	0.7327	82.71
10	4	– 7823.70	– 23678.05	– 26795.05	0	0.144	0.8084	0.7532	42.20
11	–	– 7758.72	– 23566.62	– 26674.62	1	0.170	0.8021	0.7297	67.96
11	3	– 7883.47	– 23676.77	– 26781.77	1	0.232	0.7050	0.6178	32.29
12	–	– 7749.47	– 23491.92	– 26586.92	2	0.202	0.7600	0.6684	64.60
12	1	– 7867.72	– 23605.07	– 26699.07	1	0.247	0.7202	0.6098	28.21
13	–	– 7763.27	– 23439.58	– 26521.58	0	0.219	0.7508	0.6510	55.43
13	1	– 7806.67	– 23477.90	– 26558.90	2	0.201	0.7755	0.6801	35.54

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

Latent class	Direct effect	Information Criteria			Small size group	Classification statistics			Total BiVariate Residuals (BVRs)
		AIC3	BIC	CAIC		Classification errors	Entropy R2	Standard R2	
14	–	– 7756.79	– 23366.98	– 26435.98	2	0.190	0.7730	0.6916	45.70
14	2	– 7796.38	– 23396.40	– 26463.40	2	0.207	0.7429	0.6555	31.33
15	–	– 7746.27	– 23290.34	– 26346.34	4	0.285	0.6990	0.5621	45.03

Summing up, based on all these considerations and the interpretation we can give to each cluster, we decided in favour of the solution with ten LCs and four direct effects: (*Excellences*)Teaching in class & (*Excellences*) Attention towards students; (*Excellences*)Teaching in class & (*Excellences*) Teachers' features; (*Excellences*)Use of technologies & (*Excellences*) Teachers' features; (*Needs*)Technological aspects & (*Needs*)Training/ educational courses. In a LC analysis, it is unusual to identify four direct effects, but in this case all Pre-codes in a family are constructed from the unique answers provided by the teachers through the open-ended questions (as underlined before, more codes might be derived from a single answer). Main results are shown in Table 4, that is cluster size and the individual probability of reporting each occurrence, conditional to belong to the LC. Table 5 reports the main characteristics of the teachers in each class, as proportions of each teacher feature according to the ex-post assignment of individuals to LCs (indeed, individual covariates were not specified in the final estimated model).

Table 4

Size of each latent class and the conditional (to the latent class belonging) probability of reporting each occurrence

Category	Latent Class									
	1	2	3	4	5	6	7	8	9	10
Size (%)	17.8	17.7	15.5	13.6	9.5	7.4	6.1	4.3	4.3	3.7
Excellences										
Attention towards students	0.202	0.306	0.208	0.207	0.270	0.191	0.332	0.452	0.403	0.003
Teachers' features	0.055	0.097	0.074	0.090	0.071	0.047	0.099	0.189	0.079	0.016

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

Category	Latent Class									
	1	2	3	4	5	6	7	8	9	10
Teaching in class	0.545	0.674	0.619	0.637	0.625	0.616	0.585	0.928	0.683	0.010
Use of technologies	0.148	0.210	0.181	0.240	0.220	0.140	0.201	0.538	0.197	0.994
Other	0.049	0.071	0.078	0.078	0.085	0.068	0.092	0.203	0.097	0.036
Critical Aspects										
Students' features	0.018	0.997	0.978	0.003	0.077	0.002	0.069	0.327	0.994	0.371
Teacher' features	0.001	0.019	0.000	0.000	0.081	0.355	0.989	0.231	0.001	0.117
Organisational aspects	0.559	0.164	0.109	0.996	0.873	0.158	0.097	0.793	0.117	0.471
Needs										
Training/ educational courses	0.135	0.000	0.166	0.012	0.006	0.071	0.289	0.383	0.081	0.063
Contextual factors	0.005	0.995	0.119	0.997	0.313	0.992	0.130	0.474	0.003	0.521
Technological aspects	0.155	0.019	0.103	0.024	0.017	0.022	0.117	0.138	0.017	0.109
Human and financial resources	0.031	0.108	0.004	0.007	0.991	0.000	0.268	0.297	0.906	0.241

Table 5

Distribution of the main features of the teachers belonging to each latent class (in %)

Latent Class	Women	Age class			Academic role			
		Up to 45	46-60	61 or over	Full professor	Associate professor	Assistant professor	Temporary position
1	45.1	26.3	53.9	19.8	18.0	35.4	35.7	10.9
2	42.8	21.4	46.6	32.0	28.9	36.5	27.5	7.1
3	42.2	20.8	52.7	26.5	25.0	36.6	27.3	11.1

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

Latent Class	Women	Age class			Academic role			
		Up to 45	46-60	61 or over	Full professor	Associate professor	Assistant professor	Temporary position
4	42.8	22.9	54.7	22.4	19.0	37.6	36.6	6.8
5	40.7	21.6	53.9	24.5	26.5	41.3	24.5	7.7
6	48.8	32.9	46.7	20.4	15.4	38.3	30.9	15.4
7	45.7	23.6	56.8	19.6	18.6	43.2	29.1	9.1
8	56.0	22.0	60.3	17.7	22.0	37.6	34.0	6.4
9	43.6	17.9	50.0	32.1	32.8	37.9	20.0	9.3
10	43.8	21.5	53.7	24.8	19.0	40.5	33.9	6.6

The largest class comprises almost 18% of teachers and the smallest nearly 4%. Only one class (the eighth) is mainly composed of women and only one class (the tenth) is characterised by people with a very low probability of reporting innovative practices in their teaching activities.

In particular, the LC1 cluster is the most numerous and consists of teachers who are moderately likely to identify organisational issues as problematic. This group essentially comprises teachers who do not have a definite and firm view of excellences, weaknesses and needs. They acknowledge having some effective teaching methods (such as, following the most frequent answers of the respondents: continuous update of disciplinary knowledge and course contents; practice and theory interaction; classroom teamwork; case study analysis and discussion; link of course content to real word events; invited stakeholders during classes), but also point out some organisational shortcomings (some respondents say, for instance, that they find rooms and infrastructure not functional, due also to the large amount of students during classes; another problem is the matching of modules, in order to avoid overlapping and to design an appropriate progression of knowledge during the academic pathway). However, no clear overall picture emerges. This may stem from limited teaching experience. In fact, this group is predominantly made up of young people, with a substantial proportion of assistant professors or teachers holding one of the new temporary positions in Italy.

Clusters LC2 and LC3 are quite similar, composed of teachers with a very high probability of identifying criticism of students' characteristics and behaviour. Both groups show a fairly positive self-assessment of their excellent teaching practices, describing the various activities they carry out

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

in the classroom (as already reported for LC1), such as disciplinary knowledge and course content, and various teaching methods aimed at actively involving students. At the same time, they report significant problems arising from the students' characteristics and weaknesses, such as lack of prior knowledge, low motivation, poor attendance and participation in class, and student heterogeneity. These classes are also very similar in terms of the individual characteristics of their members (with LC2 including slightly older teachers than LC3), apart from the sample size. The main difference between them lies in the role played by the need for contextual support. In fact, only LC2 teachers ask for assistance in dealing with certain organisational issues, such as the availability and equipment of infrastructures and classrooms, coordination between different courses, more funding to improve the quality of teaching and support for the organisation of workshops and interactive laboratories.

On the one hand, LC4 is similar to LC2 in terms of both self-reported excellent teaching practices and challenging contextual variables. On the other hand, LC4 teachers tend to place blame on organisational problems rather than students, thus emphasising a strong need for organisational support (particularly towards rooms and infrastructures). The main differences between the two clusters concern the age and role of the teachers: LC2 teachers are much older than LC4 ones; in LC2 the proportions of full and assistant professors are quite comparable, while in LC4 the number of assistant professors is almost double the number of full professors.

LC5 is predominantly composed of men, having high probabilities to mention critical issues on organisational matters (similarly to LC4 teachers, in particular with regard to inadequate infrastructures and rooms, lack of coordination between the different courses and lack of funds to improve the quality of teaching) and requests for support on human resources (unlike LC4, LC5 teachers ask for assistance in laboratory activities and the presence of tutors to support students' individual study).

LC6 is characterised by teachers having a high probability of reporting teaching in class excellences' occurrences and the need for contextual support (in particular, with respect to organisational issues). To some extent, this cluster shares similar features with the second and the third classes; they differ each other in the role played by the critical aspects encountered in daily practices. Like the first cluster, LC6 is mainly composed of young people (about one third of them are younger than 46 years), with the highest fraction of teachers holding one of the new temporary Italian positions.

LC7 shows the highest fraction of associate professors and a small proportion of full professors. This cluster is characterised by teachers who

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

highlight strong criticism of themselves: in particular, they recognise their own difficulties in involving students, a lack of teaching training and collaboration with colleagues, as well as a very high bureaucratic workload.

The last three classes resemble each other only in their limited size, while they differ in the patterns of the answers given by their component teachers.

The eighth class is distinguished by a non-zero probability (or at least above 20%) for almost all occurrences, with innovative practices in the teaching as the largest. Although successful teaching practices characterise the teachers in this group, they do not show strong skills in the use of technology (such as, the use of multimedia devices, videos, blended-online activities and so on), for these activities. They also express some criticalities in relation to organisational issues (as in many other clusters). This is the only class with a majority of women and the smallest fractions of teachers over 60 years of age and holding a temporary position.

LC9 is characterised by old teachers (this group shows the largest proportion of over 60s and the smallest proportion of under 45s), as well as by the largest fraction of full professors. A strong need of support and assistants distinguishes the people in this cluster. Like the second and the third classes, they face strong problems related to the features of the students.

Teachers in tenth cluster do not show unique or specific individual characteristics, but they reveal two interesting combinations of answers: a high probability in reporting ability to teach with technologies and low probabilities of mentioning successful teaching practices. They also report moderate problems related to the contextual factors.

V. Discussion

Teacher quality is difficult to measure due to its multifaceted nature. For this reason, one promising solution of its study is the use of self-assessments collected among teachers (Goe, Bell, and Little, 2008). To this aim, an innovative Computer Assisted Web Interviewing (CAWI) survey was able to collect opinions and experiences on teaching practices and individual needs in a host of seven Italian universities.

On the basis of an advanced statistical solution that analysed patterns of excellences, criticalities and needs in teaching (in other words, a quantitative solution is used to investigate qualitative data), different clusters of teachers, homogeneous within themselves (with respect to these combinations of experiences) and heterogenous outside them, were identified.

The identification of homogenous groups of teachers can be helpful for the design and implementation of multi-level programmes, able to provide

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

adequate responses to the real needs of these academics and support their development. These initiatives can be *institutional* (that is, actions are planned within single universities), *inter-institutional* (where more universities can share their expertise and resources to create joint action plans) or *national* (where strategies to support the development of the Italian academic staff can be centrally developed and implemented).

More specifically, at the micro-level, results suggest that some important activities could be implemented within institutions:

- Providing detailed reports to the university management to face criticalities on organisational issues, as well emphasised by teachers belonging to LC4, LC5 and LC8. It is unlikely that all problems that were identified could be immediately solved by the institutional leaders. However, the awareness of academics' perceptions about the most crucial ones may help to map and then focus on the most urgent. Moreover, requests for further support in terms of human and financial resources (i.e., LC5 and LC9) could also become more explicit and possibly stimulate an answer from the university management.
- Providing students' services with specific reports addressing the main problems of that university students, as observed by teachers in LC2, LC3 and LC9. This can be useful for planning initiatives such as increasing student support and guidance, better integration between modules (avoiding overlapping contents) and the development of tutoring actions.
- Introducing formal and informal opportunities to share existing excellences and good practices. Within this approach, faculty learning communities (Cox 2004) and mentoring initiatives and networks (Sorcinelli and Yun 2007) could be developed as opportunities to discuss emerging issues, identify strategies to apply in their own and/or other contexts, and model practice for (junior) colleagues. These could involve teachers from all classes, with a specific focus on those in LC8, who appear to be teaching champions and can act as guides or mentors for others, and those in LC10, who appear to be experts in the use of educational technologies.
- Realising local staff development programmes, seminars and workshops to face key needs that have emerged (i.e., teaching methods, students' engagement, and so on), as well as the creation of centres and services for this purpose. It seems that professors are not fully aware of their development needs in the field of teaching: indeed, in no latent class

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

academics show a high probability of expressing their training needs. This could be explained by the Italian cultural tradition, in which research results still play an important role in careers and attention to teaching results has only started to emerge in recent years. However, institutions can promote initiatives to respond to these implicit needs, with the aim of raising awareness of these possibilities for improvement. More specifically, LC1 was found to be composed of teachers who do not have a clear and strong opinion about excellences, weaknesses and needs, being mostly young, inexperienced professors: this group could be involved in entry-level staff development programmes, dedicated to developing key teaching competences (Austin 2003), as well as in orientation programmes dedicated to presenting available resources, organisational aspects, key services, student life and functions and clarifying responsibilities and tasks. Professors grouped in LC7, who have shown a strong criticism of themselves, can benefit from workshops and activities focusing on teaching, learning and assessment methodologies, student engagement strategies and other specific aspects of the teaching practice.

At the same time, at the meso-level, important inter-institutional activities can be supported, with the aim of optimising efforts and resources. For example:

- The implementation of formal and informal initiatives involving professors from two or three institutions, offering shared discussion initiatives in the same subjects or at the interdisciplinary level. This activity could be very useful for academics included in LC2, LC3 and LC9, who tend to blame students for all aspects of inefficiency or difficulties in teaching; a sharing of opinions in different contexts may allow further reflection on this, as well as the identification of possible solutions not previously considered.
- The design and implementation of inter-institutional activities such as trainings, workshops and peer observation sessions on issues of common interest in several institutions, possibly using a common budget and involving academics from different universities with similar interests (i.e., for teachers in LC1 and LC7).

Through a bottom-up approach, this research has given the opportunity to identify teachers' point of view and discover the main needs for improvement and hidden good practices. At the same time, it can create an

Tuning Journal for Higher Education
© University of Deusto • p-ISSN: 2340-8170 • e-ISSN: 2386-3137 • Volume 12, Issue No. 2, November 2026, 179-203 •
doi: https://doi.org/10.18543/tjhe.3267 • http://www.tuningjournal.org/

increase of teachers' awareness and motivation to share teaching practices and identify areas of improvement.

V.1. Limitations and future research

Although the response rate within each university was quite good, sample size in some institutions was not large. This suggested analysing the answers of all AsdUni respondents as a whole, without carrying out university-specific estimations. Consequently, specific characteristics of each institution (such as size, teacher composition, educational offer, organisation, management) were not included in the analysis. However, many of these organisational features can be traced back to the national legislation.

Sample selection can be a potential problem. First, the teachers chose to take part in the AsdUni survey or not; second, they answered the last open-ended interview questions; third, in their answers, teachers recorded comments that were truly related to the dimensions under investigation. The risk is that the answers used in our analysis were provided by the most motivated or critical teachers from the various universities.

Then, some Pre-codes had very low sample sizes and this can make it difficult the right estimation of a latent class analysis. For this reason, some categories were grouped together (as the "Other" category among the *Excellence* family) or definitely deleted (as some Pre-codes among the other two families). However, precisely because of this small size, it is difficult to believe that the main results and conclusions can be strongly affected by these choices.

This research paves the way for possible further analysis and research developments. On the one hand, the data collected lend themselves to being investigated within each university, focusing only on the responses of local academics; on the other hand, inter-institutional analyses could delve into other variables, such as the perspectives and opinions of teachers according to disciplines, academic roles, age, gender and so on. On the other hand, in-depth qualitative approaches could be implemented by means of face-to-face interviews and/or focus groups, in order to supplement the data collected and investigate specific issues questions to clarify and detail the codes and categories that emerged.

References

Abu Talib, Manar, Anissa M. Bettayeb, and Razan I. Omer. 2021. "Analytical study on the impact of technology in higher education during the age of COVID-19: Systematic literature review." *Education and information technologies* 26, no. 6: 6719-6746.

Aitkin, Murray, Dorothy Anderson, and John Hinde. 1981. "Statistical modelling of data on teaching styles (with discussion)." *Journal of the Royal Statistical Society. Series A (General)* 144, no. 4: 419–61.

Austin, Ann E. 2003. Creating a bridge to the future: "Preparing new faculty to face changing expectations in a shifting contex." *The Review of Higher Education* 26, no. 2: 119–44.

Bowers, Alex J., and Ryan Sprott. 2012. "Examining the multiple trajectories associated with dropping out of high school: A growth mixture model analysis." *The Journal of Educational Research* 105, no. 3: 176–95.

Campbell, Corbin M., Alberto F. Cabrera, Jessica Michel, and Shikha Patel. 2017. "From comprehensive to singular: A latent class analysis of college teaching practices." *Research in Higher Education* 58, no. 6: 581–604.

Chickering, Arthur W., and Zelda F. Gamson. 1987. "Seven principles of good practice in undergraduate education." *AAHE Bulletin* (March): 3–7.

Collins, Linda M., and Stephanie T. Lanza. 2010. *Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences*. Hoboken, New Jersey: John Wiley & Sons.

Cox, Milton D. 2004. "Introduction to faculty learning communities." *New Directions for Teaching and Learning* 97, no. 1: 5–23.

Denson, Nida, and Marsha Ing. 2014. "Latent class analysis in higher education: An illustrative example of pluralistic orientation." *Research in Higher Education* 55, no. 5: 508–26.

Dierdorff, Erich C., and Erich A. Surface. 2008. "Assessing training needs: Do work experience and capability matter?" *Human Performance* 21, no. 1: 28–48.

Di Napoli, Roberto. 2014. "Value gaming and political ontology: Between resistance and compliance in academic development." *International Journal for Academic Development* 19, no. 1: 4–11.

Fagginger Auer, Marije F., Marian Hickendorff, Cornelis M. van Putten, Anton A. Béguin, A., and Willem J. Heiser. 2016. "Multilevel latent class analysis for large-scale educational assessment data: Exploring the relation between the curriculum and students' mathematical strategies." *Applied Measurement in Education* 29, no. 2: 144–59.

Felisatti, Ettore, and Renata Clerici, eds. 2020. *Bisogni, credenze e pratiche nella docenza universitaria. Una ricerca in sette Atenei italiani*. Milan: Franco Angeli.

Goodman, Leo A. 1974. "Exploratory latent structure analysis using both identifiable and unidentifiable models." *Biometrika* 61, no. 2: 215–31.

Goe, Laura, Courtney Bell, and Olivia Little. 2008. *Approaches to evaluating teacher effectiveness: A research synthesis*. Washington, DC: National Comprehensive Center for Teacher Quality.

Gunn, Vicky, and Anna Fisk. 2013. *Considering teaching excellence in higher education: 2007-2013. A Literature Review Since the CHERI Report 2007*. York, UK: The Higher Education Academy.

Hagenaars, Jacques A., and Allan L. McCutcheon, eds. 2002. *Applied latent class analysis models*. Cambridge: Cambridge University Press.

Hénard, Fabrice, and Soleine Leprince-Ringuet. 2008. *The Path to Quality Teaching in Higher Education*. Paris: OECD.

Hénard, Fabrice, and Deborah Roseveare. 2012. *Fostering quality teaching in higher education: Policies and practices*. Paris: OECD.

Hickendorff, Marian, Willem J. Heiser, Cornelis M. van Putten, and Norman D. Verhelst. 2009. "Solution strategies and achievement in Dutch complex arithmetic: Latent variable modeling of change." *Psychometrika* 74, no. 2: 331–50.

High Level Group on the Modernisation of Higher Education. 2013. *Report to the European Commission on Improving the quality of teaching and learning in Europe's higher education institutions*. Luxembourg: Publications Office of the European Union.

Ing, Marsha, and Karen Nylund-Gibson. 2013. "Linking early science and mathematics attitudes to long term science, technology, engineering and mathematics career attainment: Latent class analysis with proximal and distal outcomes." *Educational Research and Evaluation* 19, no. 6: 510–24.

Lazarsfeld, Paul F. 1950. "The logical and mathematical foundation of latent structure analysis & the interpretation and mathematical foundation of latent structure analysis." In *Measurement and prediction*, edited by Samuel A. Stouffer, Louis Guttman, Edward A. Suchman, Paul F. Lazarsfeld, Shirley A. Star, and John A. Claussen, 362–472. Thousand Oaks: Princeton University Press.

Locke, William, Celia Whitchurch, Hj Smith, and Anna Mazenod. 2016. *Shifting landscapes: Meeting the staff development needs of the changing academic workforce*. York, UK: The Higher Education Academy.

Ma Dongmin, Huma Akram, and I-Hua Chen. 2024. "Artificial Intelligence in Higher Education: A Cross-Cultural Examination of Students' Behavioral Intentions and Attitudes." *International Review of Research in Open and Distributed Learning* 25, no. 3: 134-57.

Naris, Sylvia N., and Wilfred I. Ukpere. 2009. "The effectiveness of an HR code: Staff development and training at the Polytechnic of Namibia." *African Journal of Business Management* 3, no. 12: 879–89.

Nixon, Jon. 2007. "Excellence and the good society." In *International perspectives on teaching excellence in higher education: Improving knowledge and practice*, edited by Alan Skelton, 15–31. Abingdon: Routledge.

Oberski, Daniel L., Geert H. van Kollenburg, and Jeroen K. Vermunt. 2013. "A Monte Carlo evaluation of three methods to detect local dependence in binary data latent class models." *Advances in Data Analysis and Classification* 7, no. 3: 267–79.

Paccagnella, Omar, Debora Aquario, Lorenza Da Re, and Anna Serbati. 2021. "A Bottom-Up Approach for Faculty Development: A Latent Class Analysis on Teaching Innovative Practices and Needs for Improvement." *ICERI2021 Proceedings*, 6992-6997.

Parpala, Anna, and Liisa Postareff. 2022. "Supporting high-quality teaching in higher education through the HowUTeach self-reflection tool." *Journal of Professional and Vocational Education* 23, no. 4: 61–67.

Pastor, Dena A., Kenneth E. Barron, B.J. Miller, and Susan L. Davis. 2007. "A latent profile analysis of college students' achievement goal orientation." *Contemporary Educational Psychology* 32, no. 1: 8–47.

Postareff, Liisa, Juulia Lahdenperä, Telle Hailikari, and Anna Parpala. 2024. "The dimensions of approaches to teaching in higher education: a new analysis of teaching profiles." *Higher Education* 88, no. 1: 37-59.

Postareff, Liisa, Sari Lindblom-Ylänne, and Anne Nevgi. 2007. "The effect of pedagogical training on teaching in higher education." *Teaching and Teacher Education* 23, no. 5: 557–71.

Prosser, Michael, and Keith Trigwell. 1999. *Understanding Learning and Teaching: The Experience in Higher Education*. Buckingham (UK): Open University Press.

Ramsden, Paul. 2003. *Learning to teach in higher education* (2nd ed.). London: Routledge.

Serbati, Anna, Debora Aquario, Lorenza Da Re, Omar Paccagnella, and Ettore Felisatti. 2020. "Exploring good teaching practices and needs for improvement: Implications for staff development." *Journal of Educational, Cultural and Psychological Studies* 21, (June): 43–64.

Skelton, Alan. 2005. *Understanding teaching excellence in higher education: Towards a critical approach*. London: Routledge.

Sorcinelli, Mary Deane, Ann. E. Austin, Pamela L. Eddy, and Andrea L. Beach. 2006. *Creating the future of faculty development: Learning from the past, understanding the present*. Bolton, MA: Anker.

Sorcinelli, Mary Deane, and Jung Yun. 2007. "From Mentor to Mentoring Networks: Mentoring in the New Academy." *Change: The Magazine of Higher Learning* 39, no. 6: 58–61

Trigwell, Keith. 2001. "Judging university teaching." *International Journal for Academic Development* 6, no. 1: 65–73.

Trigwell, Keith, and Michael Prosser. 1996. "Changing approaches to teaching: A relational perspective." *Studies in Higher Education* 21, no 3: 275-84.

Trigwell, Keith., and Michael Prosser. 2004. "Development and use of the Approaches to Teaching Inventory." *Educational Psychology Review* 16: 409–24.

Trigwell, Keith, Michael Prosser, and Philip Taylor. 1994. "Qualitative differences in approaches to teaching first year university science." *Higher Education* 27, 75-84.

van Kollenburg, Geert H., Joris Mulder, and Jeroen K. Vermunt. 2015. "Assessing model fit in latent class analysis when asymptotics do not hold." *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences* 11, no. 2: 65–79.

Vermunt, Jeroen K. 2003. "Multilevel latent class models." *Sociological Methodology* 33, no. 1: 213–39.

Vermunt, Jeroen K., and Jay Magidson. 2003. "Latent class models for classification." *Computational Statistics & Data Analysis* 41, no. 3-4: 531–37.

Vermunt, Jeroen K., and Jay Magidson. 2004. "Latent class analysis." In *The Sage Encyclopedia of Social Sciences Research Methods*, edited by Michael S. Lewis-Beck, Alan Bryman, and Tim Futing Liao, 549–53. Thousand Oaks, CA: Sage Publications.

Vermunt, Jeroen K., and Jay Magidson. 2013. *Technical Guide for Latent GOLD 5.0: Basic, Advanced, and Syntax*. Belmont, MA: Statistical Innovations Inc.

Weerts, David J., Alberto F. Cabrera, and Paulina Pérez Mejias. 2013. "Uncovering categories of civically engaged college students: A latent class analysis." *Review of Higher Education: Journal of the Association for the Study of Higher Education* 37, no. 2: 141–68.

Yocarini, Iris E., Samantha Bouwmeester, Guus Smeets, and Lidia R. Arends. 2020. "Allowing course compensation in higher education: a latent class regression analysis to evaluate performance on a follow-up course." *Assessment & Evaluation in Higher Education* 45, no. 5: 728–40.

Young, Suzanne, and Dale G. Shaw. 1999. "Profiles of effective college and university teachers." *The Journal of Higher Education* 70, no. 6: 670–86.

About the authors

OMAR PACCAGNELLA (corresponding author, omar.paccagnella@unipd.it) is Associate Professor of Economic Statistics at the Department of Statistical Sciences, University of Padua (Italy). He received the Ph.D. in Statistics applied to Social and Economic Sciences from the University of Padua in 2003. He has several research activities, among them the analysis of Student Evaluations of Teaching, studies on teacher practices and attitudes, multilevel modelling, missing data handling and economics of ageing.

DEBORA AQUARIO (debora.aquario@unipd.it) is Associate Professor at the Department of Philosophy, Sociology, Education and Applied Psychology (FISPPA), University of Padua (Italy) in the area of Teaching and Inclusive Education. Her research activities are mainly devoted to the analysis of educational assessment as a way to promote authentic and accessible learning processes. Member of research groups about the quality of teaching in higher education; the introduction of innovations in the learning assessment practices in schools and universities; the connection between assessment and inclusion. She is involved in pre- and in-service education for curricular and support teachers as well as in the co-design and evaluation of activities with practitioners in the field of disability.

LORENZA DA RE (lorenza.dare@unipd.it) is Associate Professor of Experimental Pedagogy at the Department of Philosophy, Sociology, Pedagogy and Applied Psychology (FISPPA), University of Padua (Italy). Her studies are concerned primarily with topics relating to educational and vocational guidance, tutoring, truancy and university dropout, the development of life skills and soft skills, educational leadership and staff development.

ANNA SERBATI (anna.serbati@unitn.it) is Full Professor of Educational Research at University of Trento, as well as Coordinator of the FormID – Teaching and Learning Center UniTrento and member of the Quality Assurance Unit. She is senior fellow of Advance HE (UK) and associate editor of International Journal for Academic Development (IJAD). Her research is focussing on higher and adult education; teaching and learning methods; academic and professional development; educational innovation; peer assessment and peer feedback in face to face and online contexts. She has been involved as instructor in several faculty development initiatives in Italy and abroad and she has authored/co-authored more than 70 peer-reviewed journal articles and book chapters.