Competence-based multiple learning paths: on the road of implementation

María Dolores de Prada and Julia González

Abstract: This article presents the results of an action-research implementation project based on a system that weaves together five different routes to facilitate the development of competences through the use of multiple learning paths for primary and secondary teachers. The first and initial results that the article deals with relate to the experience of math teachers for ages 11 to 14. Other levels and other fields are in the process of being developed. The article deals briefly with the justification, the background and the fundamental principles that underpin the research methodology and introduces a number of elements such as the method followed by the research, the resources and the materials used as well as the results obtained at the end of the second year of this experience. It also justifies the model chosen and the criteria and strategies selected for its reliability and verification. In addition, it provides significant elements of reflection about a number of burning issues: The development of a new profile of the "teacher" in a student-centred system and the implementation system to be followed, the importance of multiple but integrated learning paths and the relevance as well as the reflection on real cases of competence evaluation.

Keywords: Learning paths; teachers; competence-based learning; action – research; personalised learning; multiple intelligences; cooperative learning.

I. The context and justification

Teaching is a challenge and an art in itself. Being able to fully engage the students, stretching their capacities and their motivation, is a task that requires from teachers ongoing learning and reflection. The attempt to search for quality is the first justification for engaging in action –research projects. Nevertheless, there are others.

According to Eurostat,[1] Spain, where this research takes place, occupies the first place in the ranking of 4 years old in education in the whole of EU. However, this position is reversed when looking at the performance of the age group at the end of school period at 18 years old. Only Portugal and Malta were below in 2012. By 2014, despite the fact that Spain has made some progress in

[1] European Commission, "Eurostat," http:epp.eurostat.ec.europa.eu/cache/ITY-SDDS/en/educ_esms.htm

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improving its school dropout rate, nearly one in four young Spaniards are still dropping out of school at an early age. This is the highest rate in the European Union. In 2013, 23.5 percent of people aged 18 to 24 in the country had left the education system before completing compulsory education. While this is Spain's best result on record, it is still double the EU rate of 11.9 percent. From 2007 the school dropout rate in Spain has come down from 31 percent in 2007. But in the meantime, Portugal and Malta, have made more substantial progress.

Further, according to the Organisation for Economic Co-operation and Development (OCDE) Program for International Student Assessment (PISA), the performance of Spain is below country performance average by 30 points in mathematics[2] and it is average in the case of students with weak results and four points below also in the percentages of students with high performance. It occupies the 31 and 36th place without much improvement since 2003. Besides, according to the same source, there is an 85% of variation in mathematics that relates to socioeconomic differences. In this context the search for an improvement in the teaching of competences in mathematics is a real need.

There are diverse causes that can contribute to make the problem more critical (social and educational policies, context of marginalization, low investment in education, situation of the teachers). However, what can be done from the perspective of the teaching experience, by the teachers themselves to avoid early school leaving and drop out? What can the teacher do so that every student reaches the level of excellence attainable to him or her? And, even more, what elements can be brought into the education of teachers, into their profile that can act as an enhancing element?

The value of competence-based learning is broadly considered as a way forward in the development of learning of high significance. A student-centred approach is complementary since the competences look at the student and his or her profile as the point of reference. The methodology for designing profiles and meta-profiles has now being developed by the Tuning Project[3] in several Higher Education Regions in the four Continents. The contribution of this article is that it offers an experience of implementation.

The Castroverde-IEPS Foundation is leading the project which involves 26 researchers from ESCUNI (Teachers Training center ascribed to University Complutense of Madrid), Center Virgen de Europa (University of Cadiz) and the Department of Education of Universidad de Burgos, as well

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[2] Organisation for Economic Co-operation and Development (OCDE), "PISA 2012 Technical report" (PISA 2012), Tables I.2.1a, I.2.1b, I.2.3a), http://www.oecd.org/pisa/pisaproducts/pisa2012technicalreport.htm.

[3] Julia González and Robert Wagenaar, eds, *Tuning Educational Structures in Europe. Universities´Contribution to the Bologna Process*, 2nd ed. (Bilbao: University of Deusto, 2008).

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as mathematics primary teachers in seven centers in Madrid, Cordoba, La Linea de la Concepción and Burgos involved in the implementation of a holistic methodology to enhance the development of sets of competences through multiple learning paths according to the possibilities and interests of the students. The study has completed the second year and it includes the detailed follow up of a population of 384 students. The fact that the experience is not only being designed but also implemented and the results compared and contrasted in a set of very different schools: private and public, in well-established residential zones and in very deprived areas of the same and different cities- allow for significant conclusions and reflections.

There are, therefore, three groups of learners in this context: the students who are at the core of the experience and the teachers who act some as the designers of the process and others as the persons who implement the process. One of the roles is the designer of the process and the other is that of the implementer. Looking at the competences selected for Tuning Higher Education in Europe in 2008[4] two clusters of competences correspond to the different roles of this project and are made to reflect and consider the capacity of the training and the experience to develop them.

Cluster A. It relates, in the project, to the group named researchers and their role is one of designing and therefore it refers to the ability to make operational educational changes. The cluster of competences, selected from the Tuning Project, for them to develop relates to ***the ability to****:*

- Understand and apply educational theories and methodology as a basis for activities.
- Do appropriate educational research in different contexts.
- Manage educational/developmental projects.
- Manage and evaluate educational programs, activities and materials.
- Lead or coordinate a multidisciplinary educational team.
- Understand trends in education and be able to recognize their potential implications.
- Adjust the curriculum and educational materials to a specific educational context.

Cluster B. It relates, in the project, to the group of teachers who is in charge of making operational the new system in the class. The cluster of competences, selected from the Tuning Project, for them to develop relates to ***the ability to****:*

[4] Julia González and Robert Wagenaar, eds., *Tuning Higher Education Structures in Europe. Reference Points for the Design and Delivery of Degree Programmes in Education* (Bilbao: University of Deusto, 2009), 42.

- Recognize and respond to the diversity of learners and complexities of learning process.
- Understand processes of development and change in the community.
- Have competences in a number of teaching and learning strategies.
- Create a climate conducive to learning, improving the teaching / learning environment.
- Make use of e-learning and to integrate it into the learning environment.
- Design and implement varied strategies, based on specific criteria to evaluate learning.
- Design and implement education which integrates people with specific needs.
- To have commitment to learners' progress and achievement.

II. **Purpose and Project steps**

The purpose of the project is to go beyond the design to the implementation and validation of a holistic methodology for the development of basic competences through the enhancement of multiple intelligences and the use of multiple learning paths. It has in the core the student-centred approach and, what is more innovative, a new type of class management involving a new teacher´s profile and role. The project uses a qualitative approach, with interpretative patterns derived from the characteristics of educational data, but it also uses quantitative techniques in order to measure the impact of the achievement. It looks at the processes where the student is at the centre and hence, his or her interests/capacities and inclinations are at the starting point of the approach and guide the openings of learning paths. In this context the project emphasizes and enlightens two critical roles for the teacher: s/he is the mediator who knows the students paths and possibilities and opens new roads, new approaches, new alleyways for the student to explore, his or her role is to explain, to back, to encourage and accompany in the exploration, creating balances between personal exploration and group search.

The proposal is to transform a traditional system of teaching into one of multiple learning paths to serve the student process. It is a personalized education which begins with the strengths of the student, of his or her learning styles which are the pragmatic manifestations of the multiple intelligences according to Amstrong[5] and which develops all the capacities of the learner in

[5] Thomas Amstrong, *Multiple Intelligences in the Classroom*, 3rd ed. (Alexandria: ASCD Publications, 2009).

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terms of knowledge and understanding of the topics, as well as attitudes, abilities and behavior, giving the tools and the techniques to the teacher to facilitate the learning from the balanced development of all his or her strengths.

The project envisions the following steps:

(1) **Elaboration**: Development of the theoretical framework, design of the learning outcomes, competence levels, learning paths, environments and experiences, as well as experimental materials: guides and tools and other educational resources to use in the experimental phase. 26 researchers from three Universities have taken part in this step.

(2) **Experimentation**: The second step is the experimental phase and an important achievement is the training of the teachers who experiment this methodology. There are 12 teachers from 7 schools from areas related to the universities where this approach is being tested from a variety of backgrounds and three regions of Spain: Madrid, Castilla and León (centre - north) and Andalucía (far-south). The experimentation has taken place in mathematics with Primary Teachers. There has been a pilot study followed by two years of experimentation and further comparison of the results is being carried out.

(3) **Analysis**: The Analysis is being carried out by groups of students and by schools, with a follow up of the individual student cases. The results are very consistent and are being discussed by the teachers research-team (the 26 researchers) as well as by the teachers (12) who do the experimentation. It is a two-layer process.

III. **Theoretical Framework**

Five educational trends are behind this approach:

- The discoveries of brain functioning by neuroscience and the theory of multiple intelligences of H. Gardner.
- The principles of the personalized learning revisited.
- The guidelines of the Universal Design of Learning.
- The contribution of the new technologies in the learning process.
- Cooperative Learning and self -regulation.

All these trends have a characteristic in common: the valuing of the student as a person who develops and is at the centre of all the system and the techniques, the understanding of teaching as a holistic task and the possibility

of integration in the development of competences. These elements are complementary in the pedagogical, scientific, anthropological and social approaches.

1. *The discoveries of the brain functioning by neuroscience and the theory of multiple intelligences of H. Gardner*

For several years now, the development of neuroscience and the application of technological research in brain exploration have made a significant contribution allowing us to understand better the processes of how students learn and how we learn. This is of capital importance for the teaching experience. These technological advances have confirmed well-known theories such as the importance of early experiences in the development of intellectual capacity development of Piaget,[6] or significant learning of Ausubel[7] or different styles and rhythms of learning of personalised education; or the significance of social interactions, a fundamental mechanism for the construction of knowledge.[8] For Vygotsky, the act of learning awakens a series of developmental processes capable of operating when the learner is in interaction with people in different environments and when he/she is cooperating with another person.

More recent advances are proving that there are significant connections between emotions –feelings and likes- and rational thought and, in this context, it is the emotions that govern the decisions that people make during their own life. In the words of Ignacio Morgado,[9] (2003) learning basically means to acquire new neuronal representations of information and establish functional relationships within them and those existing in the brain. This is possible when the learning is significant. According to Ausubel, in significant learning new connections are created – synapses. These come to strengthen others that were present, or could even replace already existing ones.

Joaquin Fuster,[10] from his research in neuroscience, also considers that the cognitive cycle of "action-perception" is parallel to the cycle of the emotions and interacting in parts of the brain, intervening strongly in decision-making.

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[6] Jean Piaget, *The Psychology of the Intelligence*, 2nd ed. (Oxon: Routledge, 2001).

[7] D.P. Ausubel, , J. Joseph D. Novak, and H. Hanesian *Psicologia educativa. Un punto de vista conoscitivo*, (Mexico: Editorial Trillas, 1987).

[8] James V. Wertsch, *Vygotsky and the social formation of mind* (Cambridge, MA: Harvard University Press, 1985).

[9] Ignacio Morgado, "Claves Neurocientíficas de la Enseñanza y el Aprendizaje," *Participación Educativa. Revista del Consejo Escolar del Estado*. Vol 1, nº 1 (2012), 15.

[10] Joaquin M. Fuster, *Cortex and Mind: Unifying Cognition* (Oxford: Oxford University Press, 2003).

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This is why it is so important to take into consideration the emotional intelligence in the process of learning, because it is the emotions that allow the knowledge and the skills to be transferred to the outside world into real decisions. This brings the attention to a field that is not new but needs to be revisited: the importance of weight of motivation in the learning process. This also emphasises one of the critical roles of the teacher, particularly in the new paradigm: the teacher as capable of creating motivation, interest and passion in the learner and his or her capacity to create experiences in accordance with capacities, curiosity and type of learning the student can develop and enjoy. In a system where the learner is at the centre, the capacity to provoke his or her alertness and active attitude could never be emphasised enough.

Already in 1983, the developmental psychologist Howard Gardner[11] launched the well known theory of multiple intelligences based on the belief that learning takes place in a different manner in each person due to his or her type of intelligence: musical / rhythmic, visual / spatial, verbal / linguistic, logical / mathematical, bodily / kinesthetic, interpersonal, intrapersonal, and naturalistic, suggesting later that the existential and moral intelligence may also be worthy of inclusion. His vision was not to limit the learner to a specific type of intelligence and mode of learning but rather to open the exploration of different paths and encourage the development of the unique blend possible in each person. If every person has a variety of possibility of learning styles it would be the mastery of the teacher to help to discover, to facilitate its use, to stimulate and stretch to the maximum potential its capacity and development. Considering that intelligence is a capacity and can be developed and also contextualised, the burning need is to give the context and the experiences where it can open, unfold and enrich itself in the contact with people, environments, books, cultures and all type of resources.

2. *The principles of personalised learning revisited*

The student-centred learning approach needs to revisit the principles of the personalised learning[12] in order to benefit from the sources of generations of

[11] Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic books, 1993); Howard Gardner, *Multiple intelligences: The theory in practice* (New York: New York Basic Books, 1983).

[12] In the 1970s and 1980s the Fundación Castroverde IEPS was at the forefront of the development and implementation of the personalized learning with development of its principles in hundreds of guides for the implementation in the different sectors of knowledge: Mathematics, natural sciences, music and the arts, social sciences, languages…this article inherits the essence of this movement which suffered different conversions and developments

educational scientists. Starting with Parkhurst[13] and the Dalton Plan in 1914, in which she defended the importance that each student could program his or her curriculum in order to meet his or her needs, interests and abilities; to promote both independence and dependability; and to enhance the student's social skills and sense of responsibility toward others. Following a significant number of educators that defended this approach, many consider personalised learning to be one of the four primary pillars of systems-level reform that are linked with the acquisition of what has been described as 21st Century Skills.

From personalised learning, the project incorporates the following principles: activity, individualisation, sociability, freedom and creativity which, in the context of student-centred learning, acquire stronger relevance. *Activity:* in the sense that it must be the student himself or herself who builds their own learning, because given the importance of the interaction between the emotional world and the opening to new knowledge it provokes, the activities that the teacher presents need to connect with his or her interests and motivations. In this context, the analysis of errors is of great relevance since these are sources of inspiration to the teacher and give clues on the learning that has not been properly integrated. *Individualisation:* this relates to the interests, characteristics and learning rhythms and the awareness of strengths to trace the development through them. *Sociability*: this principle is based on the pillars of one´s own dignity and that of others and on competences of communication and relationships as well as the starting point for the responsibility of citizen´s rights and duties. It is mainly through cooperative learning that social abilities will be attained. The *freedom* principle refers to the exercise of his or her freedom to accept the consequences of one´s own decisions and develop autonomy, personal initiative and critical thinking. Finally, *creativity* is linked with initiative and entrepreneurial spirit.

3. *The guidelines of the Universal Design for Learning*[14]

Structured around three leading principles, the Universal Design for learning is particularly used in one of the important elements to consider: the development of educational materials. Since learners differ in the ways that they perceive and comprehend information presented to them, it is important

[13] Helen Parkhurst, *Education on the Dalton Plan* (University Digital Library, 1922).

[14] These principles are lengthily explain in publications such as *Teaching Every Student in the Digital Age* (Rose and Meyer, ASCD, 2002), *The Universally Designed Classroom* (Rose, Meyer, and Hitchcock, eds., Harvard Education Press, 2005), and *A Practical Reader in Universal Design for Learning* (Rose and Meyer, eds., Harvard Education Press, 2006).

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to provide them with multiple ways of representation, because this will facilitate the connections within and between concepts.

As learners differ in the ways that they can relate to a learning environment and express what they know, it is necessary to provide them with multiple means of action and expression. Finally, because learners differ significantly in the ways in which they can be engaged or motivated to learn, activities, environments and materials should provide them with multiple means of engagement.

The research team has elaborated alternative elements for students to interact with the materials as well as different options they can use for expressing and communicating ideas, situations and relationships. There are activities designed to motivate and stimulate managing functions; and others that support the initiative, capacity to choose and the development of autonomy with free option plans, peer tutorial, assessment and self-assessment.

4. *The contribution of the New Technologies, Cooperative Learning and Self-regulation*

The use of New Technologies does not necessarily lead to a methodology of multiple learning paths; it does so when they favor interaction, collaborative learning and foster learning by discovery and incorporates emerging technologies in this respect. All these elements[15] need to be taken into consideration in the design and the experimentation and have been transformed into the following: computer programs, interactive games, electronic materials, web quest, glogster, web pages, digital platforms, moodle, etc.

In the project, cooperative learning is used in the broadest sense as a resource to develop social and civil abilities and meta-cognitive skills, enhancing interpersonal competences. Meta-cognitive skills, such as planning and organisation of tasks, decision-making abilities, and negotiation are much related with the cooperative interaction. All this allows for the construction of shared knowledge and contrast in different perspectives in relation to a particular task. This mobilises the existing intellectual structures and compels to restructure them. Positive interdependence favours the establishments of more personal relationships based on respect and valorisation, and fosters attitudes and values of self-esteem, resilience , mutual respect and co-responsibility. Self-regulation, on the other hand,

[15] Eloísa Montero Pascual, ed., *Aprendiendo con Videojuegos. Jugar es pensar dos veces* (Madrid: Narcea, 2010).

means that the student builds a personal system of learning and acquires in this way the greatest autonomy possible in his or her learning. This may mean to revise objectives, to change initial perceptions on the objective of the tasks, change some of the options needed to carry it through or the conditions of realisation. Self-regulation is planned to support the development of three major competences: (1) to be able to mentally represent the actions that the student needs to carry out successfully the tasks that are proposed; (2) to be able to recognise and make one's own the evaluation criteria; and (3) to manage the difficulties and errors occurring in the learning process, since these are relevant for advancement.

IV. **The methodology**

The *objective* sought by the project is the transformation of a traditional class into one of multiple learning paths, from a personalised approach that fosters all the capacities of the student, giving tools and techniques to the teacher to facilitate the student development of the set of competences, seeking to develop all of his/her strengths.

From the *perspective* of student-centred learning, the approach is of guided discovery where the student is active in his/her own learning and the concept of the teacher is revisited. In this context, a number of roles are suggested for the teacher: that of (i) guiding the process, (ii) opening diverse paths, (iii) supporting the student search, and (iv) helping them to build on strengths. The teacher would be the mediator between the interests of the student and the programmed curricula and would offer a number of experiences that can lead students to the achievement of the designed learning outcomes and eventually competences through multiple learning paths, motivating the student and fostering his or her strengths to reach the best results. The approach gives a fundamental place to the *diagnosis* of the different styles of learning. It counts on the tools to measure the level of advancement in the learning path (the pre-text and the post-text) which allow a close follow-up of the development and facilitate the possibility of integration of the different logics: that of the student, that of the teacher, and that of the designed curricula.

Learning activities, experiences, and environment need to be presented and required in *different formats* and using *diverse materials* and *resources* to enhance the strengths. The need to plan the process is one of the clearest elements present in every experience of student-centred learning. In this project, it becomes critical to program the working units, the activities, experiences and context for their engagement. The research group has also prepared guides for the teachers on how to use the experience in a collaborative

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manner. They have also developed guides for multimedia resources, guides for students self- regulation, multi-level resources and provisions for the evaluation of the experience for both students and teachers.

The *evaluation methods*, *techniques and instruments* are developed in accordance with the final outcome - the designed competences - but also in agreement with personalised learning, going beyond learning to integrate the different dimensions of the competences required. In a system based on multiple learning paths, evaluation needs to adapt to the students´ itineraries of learning as well as in their dominant strengths, motivations, interests, curiosity, initiative, etc. The methods are many: observation of the teacher, participation, portfolio, conceptual maps, rubrics, written answers, oral presentations, forms for the self- regulation, etc. In fact when talking about pre-test and post-test we refer here to a period, not to a single form of evaluating learning. In fact, the competences of learning how to learn and entrepreneurial spirit are evaluated with the self-regulation methodology, with the portfolio and the participation in collaborative groups. The digital competence is assessed in the exercises in class and the advances of intrapersonal and interpersonal elements in collaborative work.

The *class is conceived* as a neuralgic point of the learning experience, because it is a qualified moment when the teacher can be aware of the student's capacities, can present the outcome learning expected, the educational resources available, activities and paths are selected by the student and guidance can be given by the teacher. It is there that the student can follow spaces of personal work as well as work in a cooperative group. It is where discoveries are shared, debates and discussion take place, methodology is explained and a portfolio is prepared.

An important element of the methodology refers to the *development of the teachers* who are to experiment with the different units and to take part in the experience. This is done through blended learning. There are also practical experiences that are done online. The follow up is also carried out online, mainly to share about experiences and difficulties, the use of different types of materials and their experienced impact on the students. The materials also offer an important platform for evaluation of the experience while suggesting ways for improvement.

In terms of the *validation* of the action-research methodology, fourteen validated instruments are presented for their implementation. It also uses a number of criteria: Internal and external validation, reliability and neutrality systematized in a number of techniques used such as triangulation prolonged work, contrast with participants, detailed descriptions, standard protocols, and external observers.

V. **Obtained results**

An analysis of the data obtained throws light on several issues. A number of questions can be asked in order to analyse the results. The ***first question*** that can be asked is whether the data show evidence of students' overall improvement in the set of competences that were selected to be developed. Each of the modules has a period of six to eight weeks for implementation and evaluation. Figure 1 gives the total improvement measuring the 384 students belonging to the seven schools involved in the experience.

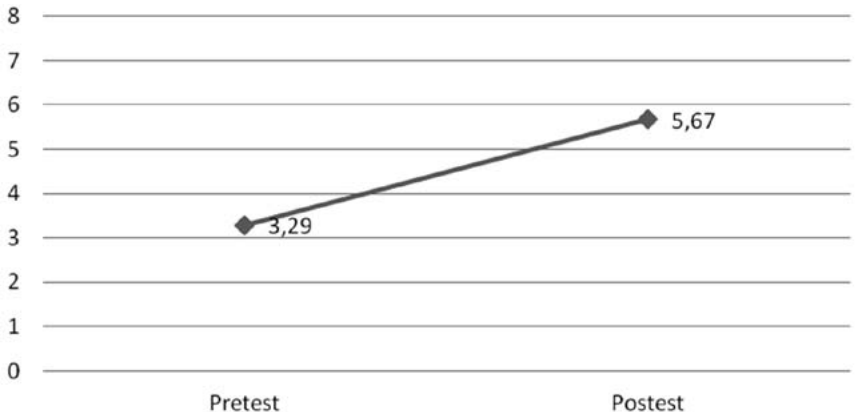

Figure 1

Means of the punctuations of the groups of all the schools, the 384 students who have made the experience

Vertical: scale of mean punctuations of the total of students who took part in the experience. The scale is up to 8 because there is no highest number than 8 as mean.

According to the data, the improvement in the total population of students was very significant; it was a mean increase of 2,38 - high for such a short period.

The ***second question*** to be asked is if all the schools improved or if the location of the school and, consequently, the socio-economic background of the students played a role in this improvement. Graph 2 shows, in an integrated manner, the mean growth for each of the seven schools as it compares with the total figure. The conclusion is clear: there is a substantial improvement in each and every one of the schools and there is a message that this type of research is quite balanced in the cost-benefit turnover because of the positive impact it has on teacher training.

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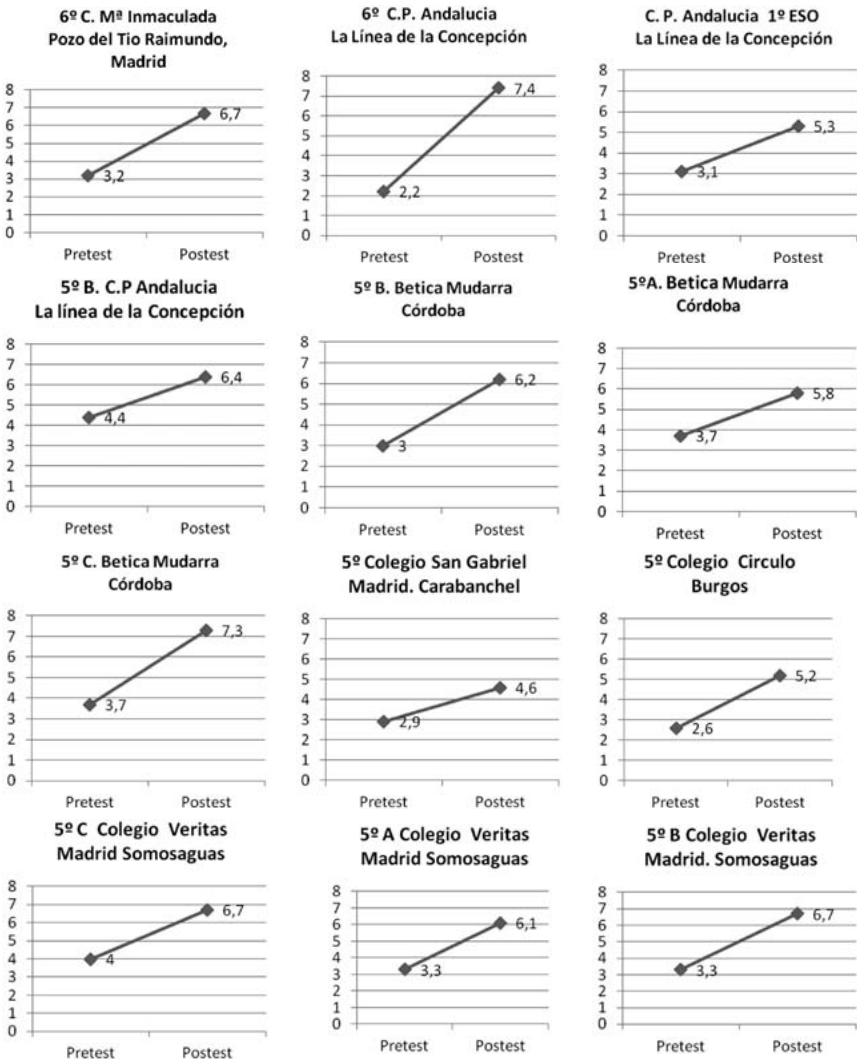

Figure 2

Means of each Group and School

Vertical: Scale of Mean punctuations per group.
Horizontal: Results of the Pre-test and those reached after a period of experience-Post-test.

The conclusion is that all the schools register a marked improvement. This is particularly high in the case of the schools located in very deprived

areas (Pozo del Tio Raimundo, Carabanchel in Madrid or CP Andalucía in Linea de la Concepción). This level of achievement takes place in all the educational centres and is significant with the probability of 99% by the T-student for small populations. It is also relevant to note that not all the schools start at the same level, but all register an important growth in the deprived zones as well as those located in residential areas. The first analysis shows that there are other elements, such as teacher and students motivation, that can have a strong impact.

The ***third question*** is actually a set of questions that () relate to the learning of the students: do all the students learn or only some do? What is the tendency in this respect? Is the class moving to integration or to dispersion? Does learning in such a personalised way foster integration or dispersion? Figures 3, 4 and 5 give three examples of the trend, which is repeated, in all the participating schools. The growth in competences relate to all and practically to every student in the group.

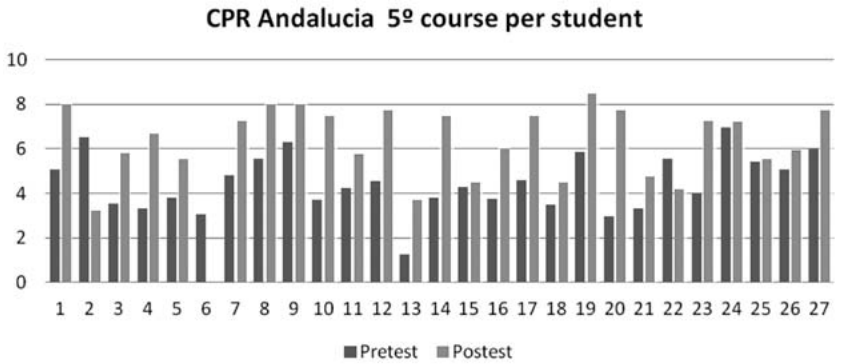

Figure 3

Vertical: Total of punctuations of each student in pre and post-test.
Horizontal: number of students in the class by enrolment number.

In CPR pre-test 4 students are above 6 and in the post-test 15 students are above 6.

Figure 4 shows that in Circulo School in Burgos all students, except nº 14, show a significant improvement, in the pre-test only one student had reached a 6 as mean. In the post-test nine students reach 6 and three get a mean of over 8.

At the Veritas Institute, it would be important to study the performance of student nº17, who was one of the three best in the pre-test and improved only slightly, but all the others improve. The improvement here is important.

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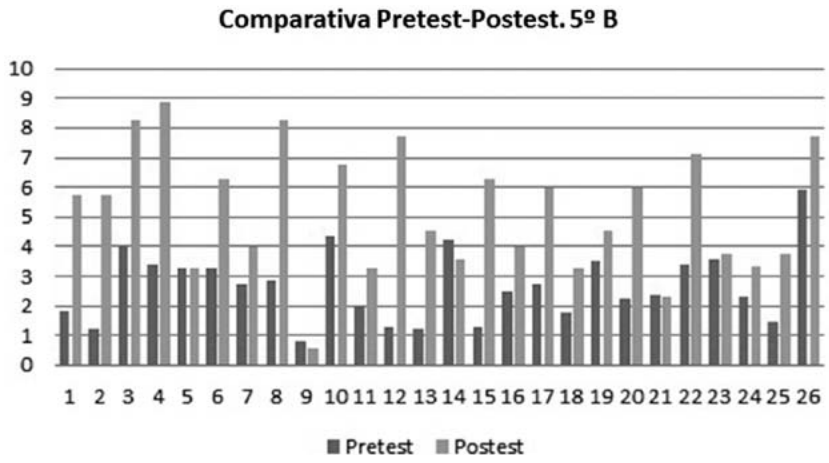

Figure 4

School Círculo in Burgos: Performance per student

Vertical: Total of punctuations of each student in pre and post-test.
Horizontal: number of students in the class by enrolment number.

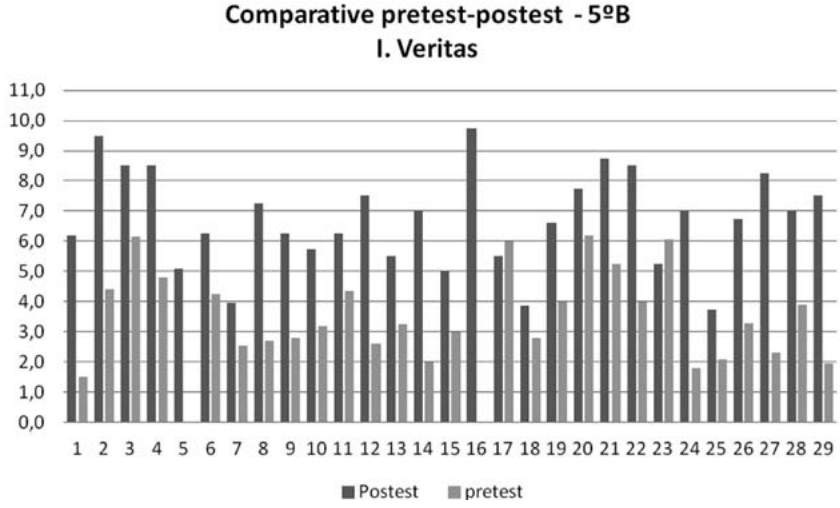

Figure 5

Instituto Veritas- Madrid

Vertical: Total of punctuations of each student in pre and post-test.
Horizontal: number of students in the class by enrolment number.

21 students are beyond 6, with 14 reaching a 7 or higher. 7 received a grade above 8 and 2 receive 9 and higher.

The ***fourth question*** relates to the evidences regarding the competences which are best achieved and to (what is) the variation according to the schools. Table 1 presents the keys to the competences and their relationship with the corresponding multiple intelligences, while figures 6, 7 and, 8 give different groups performances according to the pre-test and the post-test.

Table 1

Explanation of the type of competence
and its relationship in the project with a type of intelligence

Questions – Competences and Multiple Intelligences		
Qs	Designed Competence	Multiple Inteligences
1	CL, CM,	Ling, Mat, Vis-Es,
2	Cl,CM,CSC,CEC	Ling, Log-Mat, Vis-Es
3	Cl,CM,	Ling, Vis-Esp
4	CL, CM, CEC,	Ling,Log-Mat,Natur,Vis.-esp,
5	CM,	Log-Mat,Vis-esp
6	Cl, CM,	Log-Mat,Vis-esp
7	Cl. CM.	Ling. Log-Mat
8	CM, Inic	Ling, Log-Mat, Vis-esp
9	CM, CL,	Ling, Log-Mat,Vis-Esp,
10	CM,CAA,CL	Ling, Log-Mat,Vis-Esp,intrap
11	CM,	Ling,Log-Mat, Kineste
12	CM, Inic, CEC	Ling, Log-Mat, Inter, Intra

Keys	
Designed Competences	Multiple Intelligences
CL = Linguistic Communication CM = Math, basic sciences and Technology CD = Digital Competence CAA = Learn how to learn CSC = Social and civic Competences IEP = Initiative and entrepreneurial spirit CEC = Awareness and understanding of cultural expressions	Linguistic = Ling Logic-Mathematics = Log-Mat Visual-Spatial = Vis-esp Kinestésica-Corporal = Kineste Naturalist = Nat Intrapersonal = Intrap Interpersonal = Interps

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It must be said that the pre-test and the post-test are important elements of the project. They are designed to measure the student learning during the experience that extends between these two moments. The competences of learning how to learn and entrepreneurial spirit are evaluated with the self-regulation methodology, with a portfolio and by participation in groups. The digital competence is assessed through classroom exercises and the advances of the intrapersonal and interpersonal elements through collaborative work.

Looking at the performance of the pre-test and pos-test, we can see the development of three very different schools. Figure 6 shows CPR of Andalucia which has a significant performance in most of the competences.

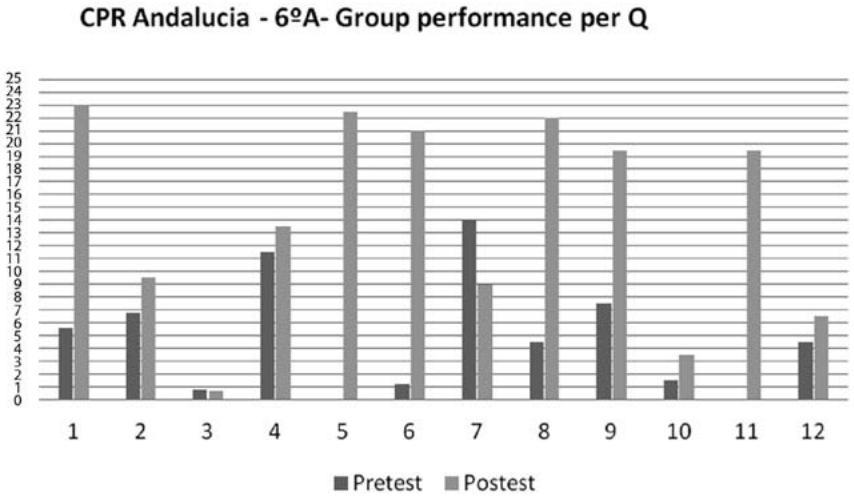

Figure 6

Group performance in the different issues presented in the Pre and Post-test

Vertical: Sum of all the punctuations of each student in all the issues of the Pre and Post-test. Horizontal: Number of students in the class by enrolment number.

The impact is quite remarkable in numbers 1,2,5,6 and then 8, 9, 10 11 and 12. It is important to see that number 7 is below the pre-test.

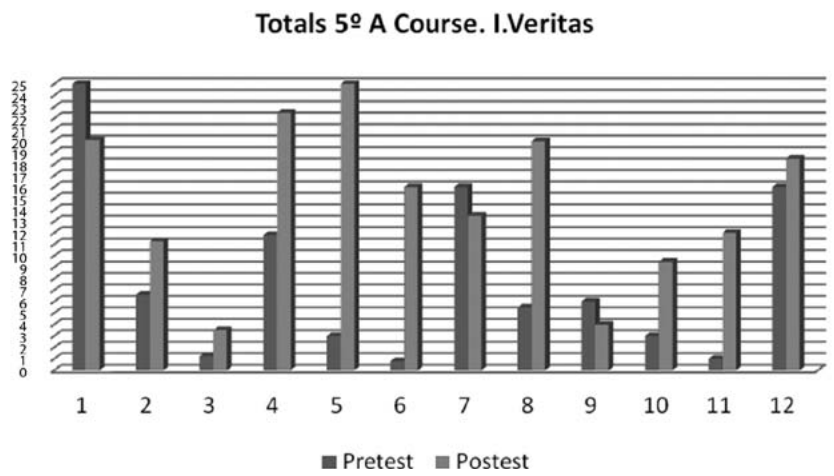

Figure 7

Group performance in the different issues presented in the Pre and Post-test

Vertical: Sum of all the punctuations of each student in all the issues of the Pre and Post-test.
Horizontal: Number of students in the class by enrolment number.

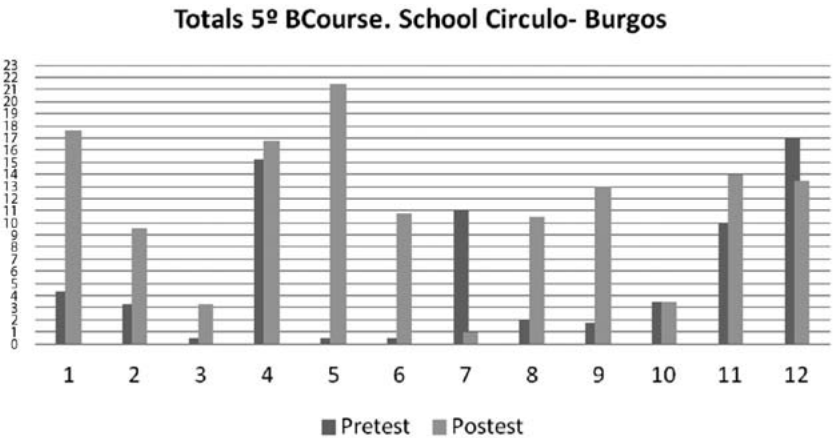

Figure 8

Group performance in the different issues presented in the Pre and Post-test

Vertical: Sum of all the punctuations of each student in all the issues of the Pre and Post-test.
Horizontal: Number of students in the class by enrolment number.

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Again in the case of Veritas Institute, the competences which do not seem to have had any development is number 7 again, and ,to a certain extent, number 12. In this case, the growth is quite harmonious in 1, 2, 3, 4, 5, 6, and very considerable in 8, 9 and 11.

Figure 8 shows how at the Circulo School in Burgos there is a similar pattern developing in terms of competences 7 and 12; these are not improving and, on the contrary, they seem to be decreasing.

There is a marked consistency in the trends registered in the schools which, in completely different settings, have major coincidences in their learning achieved. The differences and the explanations are detailed in the very thorough reports which accompany every school and which deals with what the students have learned. Besides, they offer an analysis of the statistics, a summary of the student opinions on the experience and the opinions of the teachers on the experience as well as any errors which should be analysed. Thus, there are settings, activities and context that () are very conducive to growth.

Three further lines of analysis were introduced. The first was designed to answer the question of whether this system of learning helped with the integration of the class or favoured dispersion. An homogeneity index was developed through a coefficient of variation which shows a higher level of homogeneity in the class between the pre-test and the post-test. This demonstrates that the system facilitates advancement of the students but in an integrated manner. There is improvement for all.

The second line related to the difference between genders and on how they perform. In reality, it was not possible to conclude anything on this issue () given that there was a significant variety in relation to the schools and the specific competences. Finally, there is an index of continuity or steadiness that is related to the way students answer the questions, the effort made and the interest shown. Further studies will probably throw light on these two issues.

Conclusions and Further Reflections

A number of conclusions could be drawn from this project. These lead to further reflections on a number of issues which are critical for the implementation: what lies behind the development of competences, the impact of modes of teaching and learning, the profile of the new teacher.

The first conclusion is that after two years of experience of an approach based on clearly designed learning outcomes and competences and the use of multiple learning paths, evidence seems quite solid to show that **there are**

remarkable improvements in the performance of students when this approach is implemented. Between the pre-test and the post-test the students improve their achievement by 2 or 3 points on the mean performance during the period of 6 to 8 weeks.

The important advancement in the development of learning highlights the **relevance in the approaches of teaching and learning** as a way of making significant steps in the development of the agreed competences. This is in line with the conclusion of research by Ginés Mora[16] according to whom some teaching and learning modes are effective in developing competencies and others are not, following that traditional modes in teaching and learning contribute little, if any, to develop competencies and innovation.

The second conclusion is that **students with specific difficulties** produced by lack of interest or low level of achievement **get more integrated into the classes** with this system of learning. The quantitative study of the results of this learning shows that the students who have a higher level of improvement are those who were in the lower tail of the achievement curve. This suggests a path to integration with the benefit of all and a path to advance in the goal of equal opportunities to learn.

Following the teachers' questionnaires, the third conclusion can be drawn: **students have participated "much" and "quite a lot" in class** in an active, adequate, interested, rigorous and collaborative manner and they have worked with a large variety of tools and materials. The variety of methodologies and the flexible approaches can adjust better to different needs and possibilities because every student is different and has diverse needs and capacities and not a single approach can fit all.

The reports include also the opinion of the students. The conclusion to be drawn from their opinions is that **they are greatly in favour of the experience;** their evaluation includes reflections on the methodology, where they have found the difficulties and where do they find the major interest in this form of working. They particularly emphasise the importance of collaborative work, they feel that they learn more within a group; they consider that they also learn responsibility; they remark the role of argumentation in the group, and of "drawing out" what they have inside. A further conclusion is that the fact that awareness of the learning process can

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[16] Jose Guinés-Mora, "Are Graduates equipped to succeed in the Global World of the future?" (a presentation made at the university-business forum on "Universities, Businesses & Co.: Together We Can. Strategic Inter-sectorial Partnerships for Economic Growth and Social Change and Growth"Rome (Italy), 2 October 2014: http://www.ubcforum-italy.com/our-crew-1/).

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be provoked and speeded up with specific activities. **Being able to recognise where the learning took place and where the difficulties occurred** is an important step for being able to manage one's own learning process, which is at the core of student-centred learning.

A theme that runs throughout the study is **motivation**. The research team has reached the conclusion that there is a direct relation between the motivation of the teachers and their capacity of provoking motivation in the students. The ability to develop diverse contexts and activities, as to create a reaction of participation and engagement needs to be considered. It is a key element in the profile of the teacher who needs to develop student-centred learning. It is the learning experience which both (student and teacher) share that needs the passion to encourage risking to go beyond and to motivate while keeping one's own motivation.

In the new paradigm, a number of concepts need to be revisited. One of them is the place for **collaborative groups,** which tend to be necessary and fruitful at all levels both for the students and for the teachers. The impact and the contrast require these types of structures in order to handle the amount of knowledge and possibilities for information and diversity paths. Another is the **concept of implementation**. There are stages in the process and the project here refers to initial champions who are able to initiate the innovation trend that others can follow. The role of pilot projects is quite essential in the work of implementation.

Another concept is the **concept of the class**. Contrary to the idea that the class loses meaning with the student-centred learning, in this project it becomes a rather central point. It is there that the core of learning occurs, it is there that the learning experience between the teacher and the student is more intense, it is there that the getting together takes place and the debate of the work done, the methodology followed is discussed and it is there that peer learning tends to be more intense. It is in the class that the teacher needs to make a synthesis of the learning achieved and that which is pending. It is the context where students could recapitulate in their portfolio, where the necessities to complement or catch up find a place and where students present their collaborative work and their findings.

Finally, there is the concept of **the teacher**. In the project there were two roles for teachers: the designers of activities and the environments where learning took place and the implementers. Nevertheless, the role of the teacher is more complex but not less important. His or her role is less to impart knowledge and more to open roads, less to dictate lessons and more to draw attention to the essentials, do less teaching and more facilitating, advising, guiding, motivating, being less of a dominant power and more of an inspiring presence.

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