ECLECTIC as a learning ecosystem for higher education disruption

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Abstract
The learning teaching paradigm in higher education is currently undergoing great transformation due to the irrefutable imposition, on the one hand, of the new technologies and, on the other, by the characteristics (habits and abilities) presented by the students that arrive to universities. These factors are not compatible with the teaching methodologies commonly used to date, that is, with the traditional model (lectures) consolidated in the nineteenth century. In this context, teachers who resort to active learning have attracted a lot of attention, since this type of approach stimulates students' motivation and autonomy to acquire more competencies and is one of the guidelines of the European Norms and Guidelines for Quality in Higher Education. Thus, as a way of responding to these challenges, an innovative pilot project was developed, from the pedagogical point of view, implemented in a first cycle course (Management and Information Systems) using active methodologies. In this framework, an approach called ECLECTIC was developed and implemented with the use of three active learning techniques (group project, peer review and peer teaching) in the "New Trends in IT" course, from first semester, second year. The results obtained are very promising, since they have allowed students to engage in and out of the classroom and have resulted in a high-rate course success.

Keywords Disruption · Learning ecosystems · Active learning techniques · Higher education

1 Introduction

Information technologies are the essence of up-to-date organizations in general and higher education institutions (HEI) in particular. Changes in this field are occurring at an uncontrollable pace, interrupting traditional models and forcing organizations to implement new models. According to Holzinger et al. [1], the organization of learning is changing with the introduction of technology in educational institutions, for example in learning activities. The same literature also points out that the correct use of most technologies stimulates the learning environments and promotes student motivation, being these important factors, determinants for learning. This is because attracting and motivating Net-Gen people constitutes challenges for educators around the world [2]. The integration of technological innovations with the new practices can enable significant advantage. On the other hand, the present students, named generation Z, who

Table 1 A summary of the characteristics of different generations. Adapted from [9]

Generation	Greatest/silent	Baby boomers	Gen X	Millennials	Gen Z
%population (%) relatively to the global	5	15	20	27	32
Communication style	Letter	Telephone	Email/SMS	Instant message	Emojis
Main technology	Car	Television	PC	Smartphone	Virtual/augmented reality
Digital proficiency	Pre-digital	Digital immigrants	Early digital adopters	Digital natives	Digital innate

reach HEI, force a disruption in teaching process. In this context, it is justified the need to introduce new paradigms in the teaching–learning process (TLP).

Focused on new learning strategies for educational innovation, we need to define first the concept of innovation as essentially the creation and implementation of new processes, products, services and methods of delivery, which result in significant improvements in the efficiency, effectiveness, or quality of outcomes [3]. Thus, there are three important elements of innovation [4]: It means the creation of something new; it is a process; and it should provide some kind of quantitative or qualitative improvement in the outcomes.

We live in a highly digitalized society, with continuous access to direct and indirect technology regardless of age, education, or profession. In order to evolve and create a real information society, people and of course our students, must have basic technological competences that allow them to access sources of knowledge and permit them to benefit from those sources by recognizing their quality and reliability. Modern society's technological bias makes learning necessary for all groups to get a job, learn an activity, or simply communicate with other people and be informed. This implies a need to access technological devices and possess a set of basic abilities to interact with technological elements and their applications. New conceptions regarding information systems, such as technological ecosystems, consider this and include users as another part of the ecosystem that must integrate and inter-operate with the rest of their components in order to achieve the desired goal [5].

If we focus on educational innovation, based on the ideas expressed in [6], this can be described as the process of changing teaching or learning activities that produce improvements in student performance. However, in order to consider this process, educational innovation should respond to certain needs: It should be effective and efficient; it should be sustainable over time; and it should produce transferable outcomes beyond the particular context in which it arose. In order to assess the needs identified, we can define other variables to be studied, namely the relationship between student motivation, degree of satisfaction and the user experience; or student perceptions of their interaction with and teaching of applied collaboration [7, 8].

As stated, the characterization of generations over time has been conditioned by the development of digital technologies and their application/use in everyday life by these same generations. Ma et al. [9] present a study in which this reality is evidenced clearly and unequivocally. Table 1 summarizes some of the characteristics that describe/characterize the different generations. From the analysis of the table, one can verify that the so-called traditional system of education does not conform to the current generations, so that there must be disruption in order for success in higher education.

However, this need for disruption is not linear, since there is a lot of resistance on the part of the educational institutions themselves [10]. Furthermore, the expectation of change is directly related to the fact that the expository experiences centered on the performance of teachers in the classroom still present a predominant style [11]. Therefore, the need to reinvent education is latent, since this instructional model, consolidated in the nineteenth century, "has now also to meet the demands and needs of a democratic and inclusive society, permeated by differences and guided by the inter-, multi- and trans-disciplinary knowledge, with which we live in this early twenty-first century" [12]. This change is necessary because as stated by Chickering and Gamson "Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives. They must make what they learn part of themselves" [13].

In order to meet this need, in the last decade, according to Freeman et al. [14], classes that resort to active learning have attracted a great deal of attention, since they stimulate students' motivation to seek to build higher competences. According to [15], "In the context of new pedagogical trends, the Active Methodology is one of the possible strategies, for which the student is the central protagonist, that is, responsible for his/her educational trajectory and the teacher is as a facilitator of the experiences related to the learning process." However, "literature rarely identifies the key elements of pedagogical innovations or explains how to implement them in the classroom" [16].

Active learning methodologies [17–20] are, in turn, student-centered approaches that transfer to those the

responsibility over the management of their learning experience. It is advised to place students often in a situation of collaboration with classmates. In an active learning situation, teachers assume the role of facilitators or mediators rather than information providers in a unidirectional way. The presentation of facts, often introduced through direct reading, is mitigated in favor of class discussion, problem-solving, cooperative learning and writing exercises (classified and unclassified). Other examples of active learning techniques include role-playing, case studies, group projects, or role-reversal dynamics such as think–pair–share, peer teaching, debates, just-in-time teaching and small practical demonstrations followed by class discussion.

HEI's policy regarding the improvement in TLP is to encourage the adoption of active methodologies because it is believed to, on the one hand, be most adequate for success in the acquisition of competencies and, on the other hand, meet the characteristics of the students who are coming to HEIs, with the aforementioned.

The need to frame the generation of students who are coming to HEIs leads teachers to make an effort to change the pedagogical practices that they have often followed for many years. This is because the generation of students who, as referred to, attend HEIs have a very great attention deficit when they are confronted with classes that use the expository-active method. Thus, it is necessary to interrupt the knowledge transmission stream and create alternative activities that lead them to refocus along the sessions in the classroom context. The use of rotation of group elements in each project, the process of project construction, peer review of projects from other groups and the ability to convey what they learned during the construction of the project to other groups is essential for awakening attention and motivate students during one semester of classes.

In this paper, a validated approach will be presented, in which an innovative learning approach developed to a curricular unit of a first cycle course was introduced. The proposed approach took into consideration, in addition to the motivational aspects, the fusion of several learning strategies for the development of new competences, framed in the current and future moment, in which the digital transformation predominates. The new approach was coined as lEarning eCosystem bLendEd aCTIve teChniques (ECLECTIC[1]), and it is a new mix of active pedagogy with digital support based on a learning scenario.

The ECLECTIC approach can be considered as a combination of approximations that together merge to give rise to a new approximation. The basic principle development of

the approach is that the students in an effective and efficient way acquire the necessary skills for the twenty-first century. The proposed approach thus relies on different active methodologies and resources, including some digital teaching materials.

The developed and validated approach (empirically) encompasses several learning techniques: group projects, peer review and peer teaching. The operation process consists of six blocks: (1) group compositions; (2) a mini-lecture in which the teacher gives a 10- to 20-min presentation on a particular topics; (3) group projects—research on the theme for the construction of a small theoretical project; (4) peer review—evaluation of projects, with this evaluation being part of the final assessment of each members group; (5) peer teaching—the projects presentation and teaching of this topic to the remaining students; and (6) process control. At the end of the semester, the projects produced are shared by all students and are used as study basis material for the final examination. The results obtained, with this new approach, allowed to promoting students' engagement inside and outside of the classroom and achieving an approval rate of over 80%. Moreover, the approach indirectly also contributes to developing digital competences. The five digital competences (Information and data literacy, Communication and collaboration, Digital content creation and Safety solving) defined in [21] are all framed in the proposal presented in this paper, since the students to conclude, with success, the various projects will have to observe in particular each one of them.

The remaining sections of this paper are organized as follows. In Sect. 2, the research methodology is presented. In Sect. 3, the background of active learning techniques is presented and discussed. Section 4 presents the state of the art. The ECLECTIC approach is presented in Sect. 5. Section 6 presents the analysis and discussion of results. In Sect. 7, the research limitations and future directions are discussed, and finally, in Sect. 8 the final conclusions are presented.

2 Research methodology

The main goal of this research is to propose and validate an approach, named ECLECTIC, to teaching a curricular unit "New Trends in ITs" of a first cycle course based on active learning techniques, i.e., group project, peer review and peer teaching. The approach has as main goal to motivate students to acquire knowledge and develop hard and soft skills.

Recognition of value and scientific validity of a research project are guaranteed by the scientific methodology in which the work is based. The research methodology must be carefully chosen because it is based on philosophical assumptions that guide and aim to achieve the success of the research project. In order to achieve that success, we

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[1] ECLECTIC—according to Cambridge dictionary, is "Methods, beliefs, ideas, etc. that are eclectic combine whatever seem the best or most useful things from many different areas or systems."

chose the Design Science Research (DSR) methodology [22, 23] as a theoretical basis that supports the scientific validation of this study.

Firstly, a review of the main concepts of the method and techniques used [24], i.e., active learning, group projects, peer review and peer teaching was carried out, in order to identify the literature gaps and the opportunity and need of a new approach to teaching and learning the Curricular Unit and in this way recognize the change benefits.

The use of the DSR allows the design and implements the proposed model, leading it in interaction with persons (students and teachers), technology and the organization (HEI), which needs to be managed if it is to consider a successful application of the model/approach [24].

The DSR methodology is driven by the development of information technology artifacts intended to solve known organizational problems [25], such as the difficulty in developing TLP. This has been most widely used in disciplines such as engineering and computer science, where design is accepted as a valid and valuable research methodology, with several contributions from the scientific community to the extent of application of the methodology in the development of engineering artifacts [26–28].

Additionally, this research used the quantitative methodology, which can be generically defined as a method of social research that uses statistical techniques for the collection and analysis of data. The quantitative methodology is thus, with the collection of data on motivations of concrete groups, in line with the understanding and interpretation of certain behaviors, opinions and expectations of a concrete group of individuals. This approach aims essentially to find relationships between variables, to make descriptions using the statistical treatment of collected data, to test theories and to draw conclusions. The selection of the quantitative methodology is justified by the need to collect the opinions and attitudes of the respondents, i.e., the study was descriptive in nature, and the data collection was carried out with the use of a questionnaire. The choice of the questionnaire was based on the research of questionnaires that best fit this type of investigation. Thus, the questionnaire chosen was adapted from [29], for the context of the work accomplished.

The use of questionnaires requires special care, as it is not enough to collect the answers on the issues of interest, it is also important to perform a statistical analysis for the validation of the results [30]. The questionnaire before being submitted was submitted to the evaluation of four experts in the area.

Data collected were treated by using the IBM SPSS Statistics 24.0 software. Statistical analyses used in our study were descriptive analysis (frequency analysis, descriptive measures and graphical representations), correlation analysis and reliability analysis (Cronbach's alpha).

3 Background

3.1 Active learning

Various approaches to active learning have been recorded for more than 20 years [13]. Chickering [13] identified the use of these strategies as a fundamental part of good teaching practice. There are several authors in the literature who define the concept of active learning, for example Vos and Graaff [31], who identify the concept of active learning as an effective teaching methodology to stimulate students to become actively involved in their own learning, to achieve complex goals, to think critically and to solve problems. Gudwin [32] state that active learning is "the technical term for a set of pedagogical practices that address the students' learning process under a different perspective from that of classical methodologies." Konopka et al. [33] defined active learning as "the process of acquiring knowledge, skills, values and attitudes by any educational strategy that involves or engages students in the process by leading them to activities and debates, instead of just putting them in the position of passively listen to the information given by the teacher."

According to Freeman et al. [14], "Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work." By opposition, Bligh [34] states that traditional lecturing could be defined as "…continuous exposition by the teacher." Under this definition, student activity is considered as limited to taking notes and/or asking occasional and unprocessed questions by the instructor. To counteract this tendency, according to Duron et al. [35] a university should offer multiple opportunities for students to engage in the analysis, synthesis and evaluation levels of Bloom's taxonomy, since active learning at these levels (analysis, synthesis, evaluation) helps students to think critically—one of the skills suggested as fundamental for the twenty-first century [36].

Activities that constitute active approaches seek to promote a higher level of learning by emphasizing students' abilities/skills to control their learning environments and to develop interdependent or cooperative relationships with their peers. According to [37], active learning promotes a higher level of learning through the process of metacognition. In this context, Kane [38] defined a set of characteristics that characterize active learning: (1) active engagement of students in learning, (2) students taking responsibility for their own learning and sometimes for the learning of others and (3) teachers providing activities that facilitate active learning, instead of simply transferring information.

From the foregoing, it can be stated that active learning puts the focus on the "how"; however, as ECLIT is an

approach which also seeks to cover connection with learning cycle (process) and reflexive pedagogy, it is necessary to expand active learning to the Kolb approach. The trend in experiential learning was introduced by Kolb [39] as an efficient pedagogical model of learning. This theory is strongly in line with constructivism. Kolb suggested that "effective learners should have four types of abili- ties: (1) Concrete Experience ability (CE), (2) Reflective Observation ability (RO), (3) Abstract Conceptualization ability (AC) and (4) Active Experimentation ability (AE). Hence, the optimal learning takes place when learners have adequate balance of these four stages during their learning experience." According to Abdulwahed and Nagy [40], learning requires that individuals first should "*detect, depict, or grasp knowledge, and then a phase of construction should take place to complete the learning process.*" Still according to the same authors, Kolb proposed that "the optimal learning would pass through a cycle of the Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation."

Garnett and Vanderlinden [41] use the term "reflexive" in the minimal sense suggested by Matthew and Jessel [42], a "focus on the self and one's assumptions," an ethic of reflective practice that encourages teachers/professors to "think about their own concepts and what they bring to any situation," however in contrast to Burke and Dunn's [43] definition of reflexive pedagogy as the attempt to "reveal the power relations within educational institutions and within wider society."

3.2 Group projects

Group projects can be defined as a learning tool that encourages collaborative work [44] and have been used for a long time in face-to-face classes with the aim of contributing to the improvement in students' cognitive learning. In addition, group projects not only provide practical experience, but also allow students to practice the concepts learned, to be creative and to understand group dynamics [45].

Group projects thus contribute to helping students develop skills that are increasingly required in the professional context [36, 46, 47]. According to [48–50], the use of group projects is an irrefutably positive practice that contributes to the learning, retention and success of teaching in the context of higher education.

According to Park et al. [51], group projects also contribute to living positive emotional experiences, since in the course of a project, as students' perception of group harmony and positive social goals increases, their engagements with the group design as well as their positive emotional experiences also augments.

The group project is considered, from the point of view of research, a teaching–learning technique, since it allows to

developing essentially the soft skills so necessary to respond to the twenty-first century core competences that students and future professionals must meet. The innovation introduced in this proposal is the rotation of the elements of the working groups in each of the four projects. This dynamic enables students to develop skills to adapt to new elements of the group, as a way of thinking and working, from group to group. Thus, the student when making the transition to the labor market already has this much needed competence for his/her "survival" in this labor market, so competitive and global.

3.3 Peer review

Peer review is defined in [52] as a teaching strategy that involves the active participation of one student in the formative assessment of another student's work. In this context, peer review allows students to experience the "collaborative process of construction and refinement of knowledge, the subjective nature of evaluation and peer review, and the role of creativity in research" [53]. The peer-reviewed base format allows students to evaluate written work by other students and make suggestions for improvement. Peer review can be done in class and/or outside of class.

Prins et al. [54] argue that peer assessment is an effective way to help students develop the ability to provide valuable feedback and suggestions for performance improvement to another person or group in any situation. Students develop core or key capabilities, such as abstraction, argument development, assessment, critique, analyzing and proofreading. With these capabilities, students find engaging ideas, ponder important issues and develop critical thinking skills.

According to [55], the peer review technique can be applied to a wide variety of activities, for example "to review research papers, to research lecture material, to annotate lecture notes, to make up original problems, to review other students' designs and to weekly reviews in independent-study courses." Students contrast the formative process of peer evaluation with other assessment approaches used in higher education for purely summative purposes. Peer assessment helps students identify their strengths and weaknesses, develop and manage their learning processes and work to achieve the learning outcomes specified during the learning process itself [56].

Before being implemented, the peer review process should be explained to the students, i.e., who, what, when, how and why of the collaborative experience, as well as the evaluation criteria, so that the activity is effective [57].

According to the ECLECTIC approach, feedback is always transmitted to the students, so that they do not lose interest, nor the engagement with the curricular unit nor with the teacher. Feedback is performed throughout the TLP. The reference to the safe environment is realized in the sense that

students are still in a university environment, so it is easier, and even advisable, to make mistakes in this environment before entering the job market.

3.4 Peer teaching

According to the literature, the peer teaching method [58] is a very relevant approach given the benefits recognized at different levels. For educational institutions, peer teaching can be used, even with limited faculty resources, without compromising the quality of teaching. Student-centered design in peer teaching activities, along with the active role of students in the learning process, helps to shift the focus from passive apprentice to active apprentice and increase student cohesion [59]. The main benefits of peer teaching according to Briggs [60] include the following: "Students receive more time for individualized learning; direct interaction between students promotes active learning; peer teachers reinforce their own learning by instructing others; students feel more comfortable and open when interacting with a peer; peers and students share a similar discourse, allowing for greater understanding; peer teaching is a financially efficient alternative to hiring more staff members; teachers receive more time to focus on the next lesson."

Ramaswamy et al. [61] claim that peer teaching has been widely used in education to improve student learning. Secomb [62], for his part, points out that there is clear evidence that the peer teaching methodology is effective on a wide range of objectives and content. The use of peer teaching benefits students by taking on the role of teachers, since preparation for teaching involves an in-depth study of materials through analysis and selection of key concepts that will be taught in their own words. This methodology describes a collaborative and cooperative teaching and learning strategy where students are active and equal partners, self-directed, participate with interventions and participate actively in the discussions [63, 64].

Currens [65] states that "peer teaching and learning was first conceptualized by Bell in the eighteenth century." Topping [66], for its part, argues that peer teaching originates in the ancient Greeks. However, according to [58] the first documented use of this methodology occurred in New York City as a method called the "Lancastrian system."

4 State of the art

The literature in the field of active learning methodologies is vast. However, studies that combine several active methodologies in one framework are nonexistent. For the construction of the state of the art, the B-on portal[2] was used, which is an Online Library of Knowledge that provides unlimited

and permanent access to thousands of international scientific journals and e-books.

To verify that related studies have been performed three different searches were conducted: (1) (Active learning OR active learning OR Active Learning) AND (Group projects OR group projects OR Group Projects); (2) (Active learning OR active learning OR Active Learning) AND (Peer review OR peer review OR Peer Review) and (3) (Active learning OR active learning OR Active Learning) AND (Peer teaching OR peer teaching OR Peer Teaching). The result was very interesting, because there were a lot of entries, even though most of them are not directly related to the entire search queries. However, the number of articles found with the application of a set of active methodologies in a single framework is nonexistent. In this context, and based on this study, it was possible to conclude that there are none comparative studies, thus making it relevant and justified the proposed approach.

As mentioned, there are a large number of approaches using active methodologies. However, for the most part, they are far from the proposed approach. The closest approaches/models are (1) Lernen durch Lehren (LdL) and (2) Define, Measure, Analyze, Improve and Control (DMAIC). These two approaches integrate some of the active methodologies of the ECLECTIC proposal, though not in an integrated way. The DMAIC model was defined as a complex methodology to support the Six Sigma implementation [67]. Santos and Martins [68] confirm the relevance of this model by stating that one of the important aspects for the success of the Six Sigma implementation is the focus on the DMAIC model, a disciplined quantitative approach to the improvement in metrics defined in manufacturing, financial, though with a reduced practical application in the teaching–learning process. For its part, the process outlined for ECLECTIC is different from LdL [69] and Atelier Pédagogique Personalisé (APP) [70], since none of the approaches takes into account all the methodologies included in ECLECTIC, as previously discussed.

The LdL didactic model was created by Jean-Pol Martin in the early 1980s [71] to teach foreign languages in schools. The central idea of the methodology is to have a pair or group of students (selected by the teacher or by the students themselves) to teach most of the topics to their colleagues, in a way that activates the participation and communication of their colleagues in the best way possible [71–73]. It is not the students' task to present only one question in a linear fashion, but to think of ways in which their colleagues will find the answers to the questions and thus gradually arrive at structured knowledge in the end. In this way, students have the opportunity to acquire creativity, independence,

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[2] www.b-on.pt.

self-confidence and key competences such as the ability to work in a team, ability to communicate, complex thinking, competence to seek and find information, exploratory behavior and presentation skills, project competence, Internet skills, ability to structure information and generate knowledge, punctuality, reliability and patience.

The Ateliers de Pédagogie Personnalisée (APP) [70] is based on the basis of a fully personalized educational approach which is designed to make learners responsible for their own career progression. This is achieved thanks to a unique protocol, which is tailored to their circumstances and in which "learning to learn" is the core skill. The methodology itself is based on the principle of "supported self-study": Learners sign a contract specifying the objectives, content, duration and pace of the training, along with evaluation methods tailored to their particular circumstances and any difficulties they face in their personal and professional lives. Therefore, a sequence in which a dozen people participate could consist of learning modules totaling up to 300 h of study in a resource center with several hundred themed resource packs (scientific culture, writing, etc.), all backed up by different levels of progression. Learners receive support in the center from a single contact person who will have worked with them to diagnose their needs and draw up their training contract.

LdL can be considered a subset of ECLECTIC, since with the proposed approach it is possible to develop more competences. The rotation of the group elements in each of the projects is the first competency to develop what differentiates ECLECTIC from any other approach. Peer reviewing the work of colleagues in a guided and teacher-controlled way is also a differentiating characteristic of LdL and peer teaching of each of the themes to the rest of the class throughout the four projects is also another differentiating element with respect to LdL.

Based on the literature review, it can be seen that none of the models or approximations present a complete structure and a mixture of as many active methodologies as ECLECTIC. For example, in none of the papers analyzed is there a combination of peer review and peer teaching, as well as the rotation of the elements of each group in each of the four projects.

5 ECLECTIC approach

5.1 Rationale

During the academic year 2017/2018, in the context of a pedagogical training on Active Learning, promoted by the Center for Excellence in Teaching of the Portucalense University (CET-UPT) in July 2017, the challenge was to develop an innovative pilot project. The innovative character

would have to be from the pedagogical point of view, applied to the course "New Trends in ITs," of the first semester, second year in the course of first cycle in Management and Information Systems. In this context, and as a result of this training, a model, the ECLECTIC approach, was developed and implemented, supported by three active learning techniques—group project, peer review and peer teaching. Within this curricular unit, the student is expected to be able to: (1) know the emerging technologies and associated business models; (2) know the trends of adoption in the organizations, to analyze the strategies of their adoption and evaluated impacts; (3) acquire the ability to analyze the challenges to business processes and the future of information systems in organizations; (4) acquire research capacity, systematization and knowledge structuring. In this approach, students are the core of the TLP, the teacher, according to the Bologna process, ceases to be the center of knowledge and transmitter of this knowledge, and starts to assume the role of tutor. The work that the teacher will perform, when compared with traditional teaching and the use of the expository method, will be greater, since it requires prior preparation, and has "complementary" tasks, namely managing the work groups, conducting the process peer review so that students, within the time available, conducting the review as closely as possible and following the process of introducing the suggested improvements in the review process. In the end, the teacher must follow the process of peer teaching in order to ensure that the contents presented have the appropriate scientific rigor.

Therefore, the role of the teacher is to select the groups in each of the projects and assign the topics. The teacher guides the students about the didactic possibilities and the relevance of the content, helping the students during the preparation of the initial versions and provides feedback on the review process and peer teaching, observing the learning process reflected by the actions and reactions at work. Moreover, he/she ensures that, despite potential problems, all students will ultimately know what the main insights or conclusions of the presentation sessions will be. The teacher and the students are understood as partners, the hierarchy is flat.

In addition to the above, the rational of the proposed approach used the model proposed in [74] that highlights the need to define the students profile and their prior knowledge, something basic for educational improvement [75], in order to help to select the right tools and the design and development of teaching materials. The approach consists of five different components with a defined sequence (Fig. 1).

The model uses the VARK[3] questionnaire to identify the multimodal population and to construct some materials, as well as to lead the various groups, depending on the result

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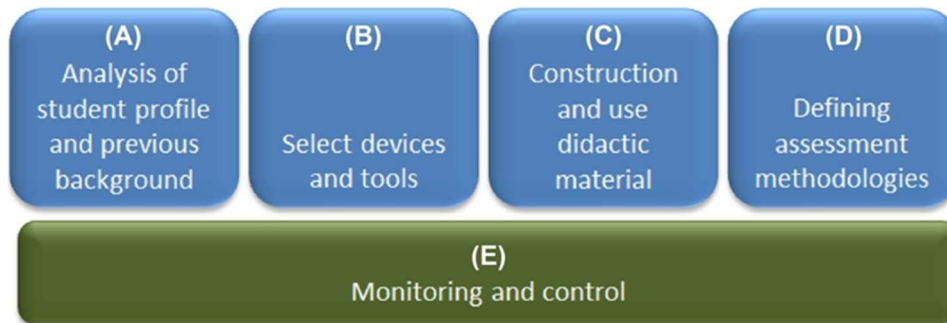
of the questionnaire, to indicate the materials most adapted to their profile.

In the component (A), both the VARK questionnaire and background study are used to analyze and define the students' profile who attend UC contents in order to understand what kind of devices and tools will be used, if the model is applied to classroom teaching, distance learning (e-learning) and blended learning (b-learning) or is to be used in mobile devices (mobile learning, m-learning) only (B). Once it has chosen the teaching model, which materials to use or build from scratch (for instance, if those materials should be more descriptive or visual, etc.) will be defined (C). For instance, the use of e-learning or m-learning involves the production of materials appropriate for such type of devices. Some of the most important components in the teaching–learning models are the assessment methodologies used (D). The whole methodology has a monitoring and control process (E) which allows the adjustment of the materials, devices used and assessment methodology, as long as students and teachers understand these needs.

5.2 Approach description

The organization of the semester, which includes information on key aspects of the pilot project, consists of several phases. In the first phase, the Active Learning techniques to be used were selected taking into account the students profile (see preview section), type of subjects taught and the number of students enrolled in the curricular unit. In this study, the number of students enrolled was positive, because only nine students attended the course, which made possible to carry out a pedagogical experience in a controlled manner given their reduced number. With regard to the topics, taught/programmatic contents of the curricular unit are based on the expression "New trends in IT," which immediately indicates the need to not resort to traditional classes due, for example, to the absence of literature/reference manuals. Thus, the possibility of electing some of the

trends in IT (Cloud Computing; Mobility; Industry 4.0; Big Data; BYOD; Augmented Reality; Virtual Reality; Gamification; Internet of Things; Telemedicine; 3D Printing; Privacy/Security; Smartphones; Wearables; Digital Transformation) allowed the organization and operation of the curricular unit in a different way.

The selection of the Active Learning techniques took into account the presented factors, as essences, and in parallel the competences that the students will have to possess in the twenty-first century [36]. Thus, in order to respond in the best way to the factors listed, three techniques were selected: group project, peer review and peer teaching. The three techniques are described in Sect. 2, and in parallel the positive contributions that each offered in the overall context of the ECLECTIC approach are also presented. In the course design, two evaluation instruments were also defined: a grid for peer review evaluations and a grid for oral evaluations during the use of the peer teaching technique. All documents were evaluated by the course teacher, with the final grade consisting of a set of components related to the various projects and the outcome of the final examination.

Moodle serves only as a platform for communication between the students and the teacher. The students submit the initial version of the work and the teacher makes a distribution of this version by another group, to begin the peer reviewing phase. The teacher performs the evaluation and gives the appropriate feedback, so that the work submitted is subject to corrections (suggested by the students and the teacher), and a new version (final version) is submitted.

Student performance or learning performance is measured over the period in which the work is developed through direct observation and through the use of a set of instruments that are applied in the various phases. During the time the student is developing the group project, the teacher gives a direct and guided follow-up on how the student researches, aggregates and consolidates the information that will be the basis for the development of his/her project. In the peer reviewing phase, there is an instrument designed by the teacher that is used to evaluate the revision work that is carried out by the students. In the last phase, peer teaching, there is another instrument, also designed by the teacher that
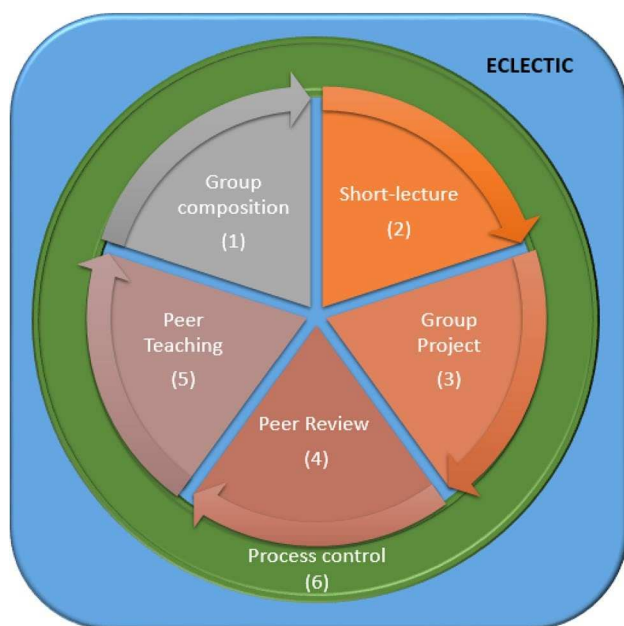
Fig. 2 ECLECTIC approach

allows to evaluating the performance of teaching, both in groups and individually. These evaluation steps are repeated in each project; as students have to complete four projects, this process is repeated four times. To ensure a competency assessment, in an individualized way, so that the final classification is as fair as possible, students must take a final examination on all subjects included in the projects of all groups. There are four evaluation phases during the semester, as well as an examination at the end of the semester.

5.3 ECLECTIC approach components

As presented previously, three active learning techniques were selected to be used during the semester consisting of 15 weeks. These techniques are used together in a predefined sequence (group project, peer review and peer teaching) for each of the group projects carried out. The accomplishment of each of the group projects is preceded by the creation of the working groups and by a short lecture where the topics assigned to the working groups are presented.

The semester is divided into blocks of 4 weeks, in which each block represents the application of the ECLECTIC approach (Fig. 2). In the first class of each block, the groups (three elements in each group) are constituted by the teacher and the assignment of one of the topics listed in Sect. 3.2 (1). The group spirit is achieved through the face-to-face contact classes, in the accompaniment at key moments and in the feedback in all phases of the work developed within each project. The rotation of the group elements, previously referenced, allows for extra dynamism and motivation.

In the next phase (2), a short lecture on each of the subjects assigned is carried out by the teacher. In phase (3), the guidelines of the group project technique are explored, always with the supervision of the teacher when the students are present in class. At the end of this period, students submit their work through the LMS Moodle. After this moment, the second phase of the project is started using the peer review technique (4), by assigning the works submitted to different groups.

The groups review the papers (using the peer review techniques of a scientific paper) and complete the corresponding evaluation grid. At this stage, the teacher evaluates the work and evaluates the revisions presented by the students. The revisions are sent to the authors of the works who have to make corrections/changes suggested by their peers, after the supervision of the teacher, who analyzes and verifies the proposed changes. The groups submit the final version in the LMS Moodle. In the penultimate phase (5), teaching sessions are held by the students to the other students on the topic they have worked on; at this stage, the peer teaching technique is applied. This activity is assessed through an evaluation grid indicated above.

The peer review and peer teaching strategy is directly related to the students' attention and motivation factor. In the first case (peer reviewing), it allows students to constructively review their peers' work, always with teacher supervision and feedback, and feel that they are fully integrated into the TLP. Regarding the second case (peer teaching), this methodology will complement the involvement in the TPL, when students take on the role of "teachers," regarding the topic they are dealing with, increases their responsibility and involvement in the process.

During each block, a Process Control (6) is performed in order to verify how each technique that constitutes the ECLECTIC approach is being applied and meets its purpose.

The control of the whole pedagogical process is carried out, on the one hand through direct observation during classes and on the other hand through questions posed by another teacher who is not involved in the process, so that this control is independent. With the information collected, at the end of each project an improvement action is implemented for the next project.

At the end of this session, a new block begins with the redistribution of the elements of each group, to ensure that practically all the students worked with all. At the end of the four blocks, the final versions of all papers are grouped together and presented as conference proceedings. These proceedings are the study material that students have to prepare for a final exam.
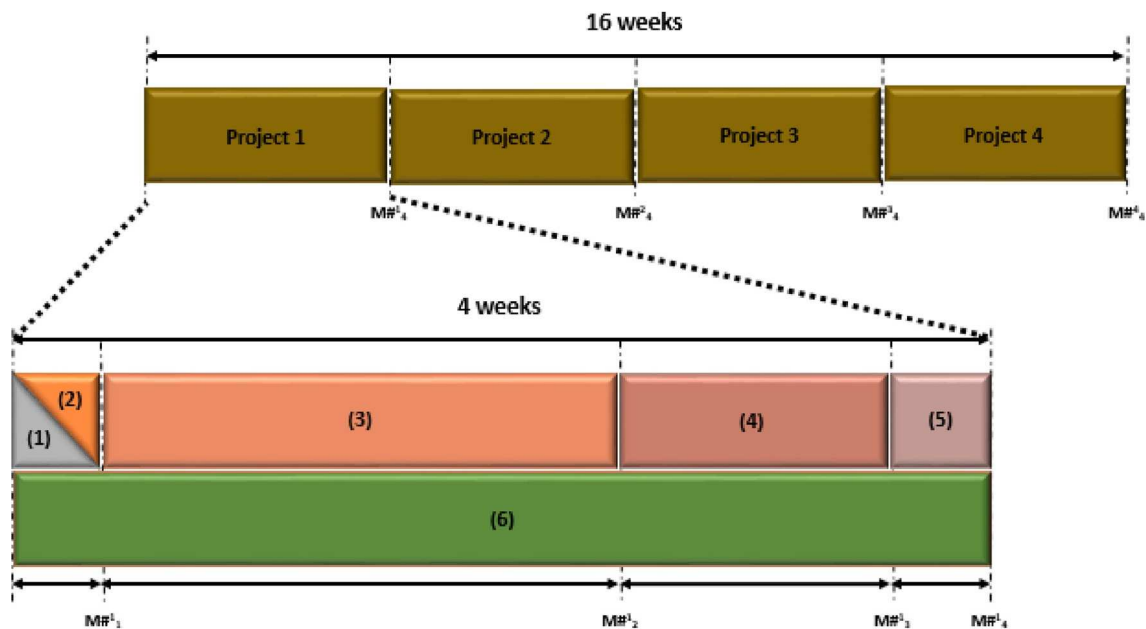
Fig. 3 Milestones and assessment

5.4 Milestones and assessment

The work is monitored on the basis of Milestones ($M\#_m$, with "n" representing the project number and the "m" milestone for delivery or evaluation of project "n") (Fig. 3). These moments are constituted by the presentation by the teacher ($M\#^1$), by the submission of the report ($M\#^2$) in the LMS Moodle, by the peer review of the works ($M\#^3_n$) and by the use of the peer teaching technique ($M\#^4_n$) by the groups. In addition to this objective, they aim to provide students with moments of feedback allowing a dialogue between teachers and students and among students.

The pedagogical strategies used in the classroom context are the combination of the expositive and active method. The lectures (called short lectures) aim to present the themes attributed to each working group. All students are encouraged to do reading exploration activities, consult databases, namely the use of B-on,[4] and feedback from the teacher, in light of the work to be done, in the context classroom work and/or work done outside the classroom. The active method is achieved through the use of the three active learning techniques already mentioned.

As regards the evaluation elements, these are distributed at different times and designated by milestone $M\#_4$ (with "n" representing project number), throughout the semester and by a final examination. The final grade of the student results from the classifications of the four projects (60%,

with a weight of 15% each project) and a final examination (40%), allowing different final classifications for each of the students. The evaluation elements of each project are as follows: *Report_#1* (50%), *Revision_of_Other_Report_group_#2* (30%), *Presentation/Teaching_#3* (20%). The final examination dealt with the themes of the projects compiled and made available to students.

The performance indicators were measured by means of evaluation instruments developed for this purpose and applied in the three phases (3), (4) and (5) (Fig. 2). In the first case (3), the instrument measures competencies such as leadership, participation and integration of the various elements of the group in their work dynamics, as well as the way they research, analyze and integrate the information to solve the problem of the project that are develop. For the moment (4), another instrument was developed that allows to verifying depth regarding the knowledge needed to review the work of other groups. Finally, an instrument was developed for the moment (5) that allows to evaluating communication competence, in group and individual, as well as the mastery of the thematic that they are teaching.

6 Analysis and discussion of questionnaire results

The results of the operation of the curricular unit had two moments, at the beginning of the ECLECTIC approach and at the end. In the first phase, students' expectations regarding the application of active learning techniques were evaluated.
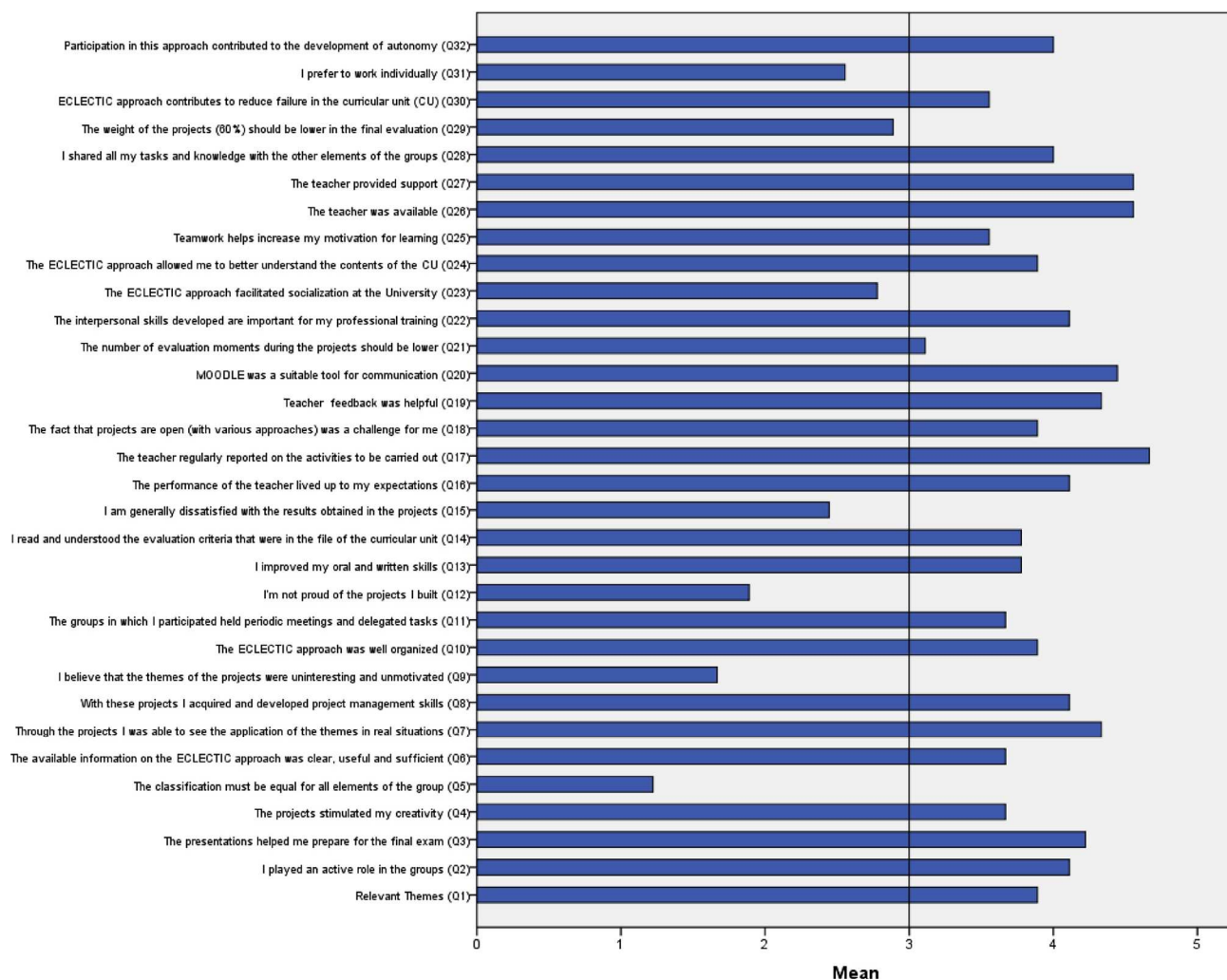
Fig. 4 Mean for each of the 32 questions

In the end, an evaluation was made regarding students' perceptions.

The data were collected through the use of two questionnaires (adapted from [29]), the first with five open questions and the second with 32 closed questions [in these questions we use a five-point Likert scale ranging from "Strongly Disagree "(1) to " Strongly Agree "(5)] and three open questions. The study sample consisted of nine students (88.8% male) whereby the majority of students were aged between 18 and 21 years.

Generally speaking (see Fig. 4), in all questions the mean value is above neutral position 3 ("I do not agree or disagree"). Exceptions are questions Q5, Q9, Q12, Q15, Q23, Q29 and Q31. Regarding questions Q9 ("I think the project themes were uninteresting and demotivating"), Q12 ("I am not proud of the projects I have built") and Q15 ("I am generally dissatisfied with the results of the projects"), the mean value is positive since all these questions are written in the "negative" form.

The fact that the mean values are low shows that the students disagree that the project themes were uninteresting and demotivating, disagree that they are not proud of the projects they have built and disagree with the fact that they are unsatisfied with the results of the projects. The remaining exceptions demonstrate that most students disagree that "The classification obtained in each project should be equal for all members of the group" (Q5), "The ECLECTIC approach facilitated socialization at the University" (Q23), the "weight of the projects should be lower in the student's final assessment" (Q29) and also disagree that they prefer to work individually (Q31).

Table 2 Cronbach's alpha

Reliability statistics	
Cronbach's alpha	*N* of items
.788	29

In order to verify whether the variability in the answers results from the opinions of each student, the internal consistency measured by Cronbach's alpha was calculated. Internal consistency is defined as the proportion of variability in responses that result from differences in respondents. This measure is one of the most used to verify the internal consistency of a set of items, varying between 0 and 1, and the higher the value of alpha, the greater the internal consistency. However, it assumes as presupposition that the various items are categorized in the same sense which does not happen for questions Q9, Q12 and Q15 that we chose at this point to remove them from the analysis.

The value obtained was 0.788 (see Table 2). According to Pestana and Gageiro [76], for values between 0.7 and 0.8 internal consistency is considered reasonable and between 0.8 and 0.9 is considered good; hence, we were in a comfortable position to proceed with our study.

The set of 32 questions makes it possible to highlight the existence of specific dimensions, namely:

- **(D1)** Students' perspective on teacher performance (Q16, Q17, Q26 and Q27);
- **(D2)** Students' perspective on their performance (Q2, Q12, Q13, Q14, Q15, Q18, Q22, Q28 and Q31);
- **(D3)** Students' perspective of the contributions of the ECLECTIC approach for themselves (Q3, Q4, Q8, Q19, Q23, Q24, Q25 and Q32);
- **(D4)** Students' perspective on the assessment and material made available in this project (Q5, Q6, Q20, Q21 and Q29);
- **(D5)** Students' perspective on the ECLECTIC approach (Q1, Q7, Q9, Q10, Q11 and Q30).

In order to evaluate the existence of a possible association between issues, we calculate Spearman's correlation coefficient, r_s (appropriate for the case where at least one of the variables is on an ordinal scale—in this case all the variables).

Analyzing the results, it was verified that:

- There is no relationship between the fact that the teacher's performance met the student's expectations and the remaining questions;
- There is a strong correlation in the negative sense between the fact that the teacher has regularly informed about the activities to be carried out in the preparation of the projects and that the students consider the projects were uninteresting or motivating ($r_s = -0.976$), which means that when the teacher keeps the students informed, the greater the interest and motivation;
- There is a strong positive correlation between the fact that the teacher has regularly informed about the activities to be carried out in the project preparation and that the students consider that the ECLECTIC approach was well organized ($r_s = 0.878$), the feedback was useful ($r_s = 0.7$), MOODLE was an adequate tool for communication ($r_s = 0.816$) and the interpersonal skills developed are considered important for vocational training ($r_s = 0.777$), that is, students who consider that the teacher reported on a regular basis on the activities to be carried out are those who most consider the ECLECTIC approach well organized, those who most consider that the feedback on the presentations and report was useful and those who most consider that the interpersonal relationship skills developed are important for their training professional;
- There is a strong positive correlation between the fact that the teacher is available to support the students and the fact that they consider that MOODLE was an adequate tool for the communication and delivery of documents ($r_s = 0.826$) as well as between competences and the fact that the student considers that interpersonal development is important for his/her professional education ($r_s = 0.736$);
- It should also be noted that in this dimension, questions Q26 and Q27 are strongly associated ($r_s = 1$) in the sense that the students who most indicated they agree/disagree with the fact that the teacher is available to support the students, are those who more agree/disagree that it provides the necessary support for the realization of the projects. Thus, there is a strong positive correlation between these two questions and Q19, that is, there is a strong correlation between the teacher being available and the teacher providing support with the fact that the student finds the teacher's feedback useful;
- $r_s = 0.75$ between question Q2 ("During the semester I played an active part in the groups") and Q28 ("I shared all my tasks and knowledge with the other members of the groups to which I belong"), which was also to be expected;
- $r_s = -0.719$ between Q12 ("I am not proud of the projects I have built") *and Q28* ("I shared all my tasks and knowledge with the rest of the groups I belonged to"), which shows that the more they shared, the more pride they felt in the project built;
- $r_s = -0.816$ between Q22 ("I think the interpersonal skills developed are important for my professional training") and Q31 ("I prefer to work individually than in a group"). Given the negative sense of correlation, it can be concluded that students who prefer to work as a group are those who most consider that interpersonal skills developed are important for their professional training;
- It is also interesting to relate this dimension to the D5 dimension on the students' perspective on the ECLECTIC approach. In particular, there is a strong negative association between Q9 and Q22 ($r_s = -0.695$), which

indicates that the more students consider project themes uninteresting and demotivating, less importance given to interpersonal skills in vocational training. There is

also a strong association, in the negative sense, between Q30 and Q31 ($r_s = -0.982$), that is, the less students are in favor of working individually instead of working in groups, the more they think that ECLECTIC approach contributes to reducing failure of UC;

- Those students who most consider that the classification obtained in each project should be the same for all elements of the group, Q5, are those who most agree that with these projects they have acquired and developed project management skills, Q8 ($r_s = 1$), and are those who least agree who shared the tasks and knowledge acquired with the rest of the group, Q28 ($r_s = -0.75$).
- It is interesting to note that those students who most agree that the teacher's feedback was useful, Q19, are those who disagree more that with the projects it was possible to see the application of the themes in real situations, Q7 ($r_s = -0.7$), and are the ones who most agree MOODLE was a suitable tool for communication, Q20 ($r_s = 0.897$);
- The students who most agree that teamwork contributes to increase learning motivation, Q25, are also the ones who most agree that with projects they have acquired and developed management skills, Q8 ($r_s = 0.736$). However, students who most agree that teamwork contributes to increased learning motivation, Q25, are the ones who least share the tasks with the rest of the group, Q29 ($r_s = -0.75$);
- Concerning the fact that the information available on the ECLECTIC approach was clear, useful and sufficient, Q6, the ones who most agree are those who also agree that the ECLECTIC approach was well organized, Q10 ($r_s = 0.8897$), but are those who least agree that the themes were uninteresting and demotivating, Q9, which makes perfect sense ($r_s = -0.976$);
- The fact that, through the projects, the students can see the application of the themes in real situations, Q7, is strongly correlated positively with Q29 ($r_s = 0.732$) and Q32 ($r_s = 0.709$), which means that it is in agreement with the ones who most consider that the weight of the projects should be smaller, Q29, and that participation in this approach contributed to the development of autonomy, Q32. However, it is related in the negative sense to Q26 ($r_s = -0.791$) and Q27 ($r_s = -0.791$), that is, students who consider that the teacher is more available and that the teacher has provided the necessary support are the ones who least agree that with the project it was possible to see the application of the themes in real situations ($r_s = -0.791$ in both cases);
- The students who least considered the projects unattractive and demotivating, Q9, are those who agree that

Table 3 Descriptive measures for the five indexes

Statistics	mean_D1	mean_D2	mean_D3	mean_D4	mean_D5
Mean	4.4722	3.7460	3.8194	3.0667	3.8667
SD	.49124	.23450	.42441	.22361	.34641
Minimum	3.75	3.29	2.88	2.60	3.40
Maximum	5.00	4.14	4.25	3.40	4.40
Variation coefficient (%)	11	6.3	11.1	7.3	8.9
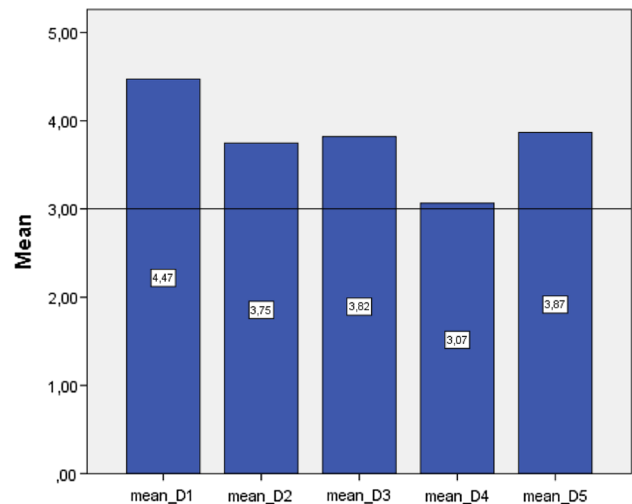
Fig. 5 Graphical representation of the means of the five indexes

MOODLE was an adequate tool for communication, Q20 ($r_s = -0.841$), but consider that the interpersonal skills they have developed are important, Q22 ($r_s = -0.695$), that teamwork increased motivation, Q25 ($r_s = -0.740$), which allowed them to better understand UC contents, ECLECTIC approach, Q24 ($r_s = -0.692$), and that the teacher was available and provided support (Q26 and Q27) ($r_s = -0.772$ in both cases);
- There was also a strong positive correlation between those who agree that the ECLECTIC approach was well organized, Q10, with students who agree that the teacher regularly reported on the activities to be carried out, Q17, $r_s = 0.878$, with those who agree that MOODLE was an appropriate communication tool, Q20 ($r_s = 0.797$), with those who consider that the interpersonal skills developed are important, Q22 ($r_s = 0.7815$), and with those who agree that teamwork contributed to increase motivation, Q25 ($r_s = 0.932$).

Concerning the fact that, during the projects, the groups in which they participated had regular meetings delegating

Table 4 Pearson's correlation between the five indexes

Correlations					
	mean_D1	mean_D2	mean_D3	mean_D4	mean_D5
mean_D1					
Pearson's correlation	1	− .108	.535	.360	.453
Sig. (two-tailed)		.783	.138	.341	.221
N	9	9	9	9	9
mean_D2					
Pearson's correlation	− .108	1	.626	.499	.454
Sig. (two-tailed)	.783		.072	.171	.219
N	9	9	9	9	9
mean_D3					
Pearson's correlation	.535	.626	1	.702*	.794*
Sig. (two-tailed)	.138	.072		.035	.011
N	9	9	9	9	9
mean_D4					
Pearson's correlation	.360	.499	**.702***	1	.581
Sig. (two-tailed)	.341	.171	.035		.101
N	9	9	9	9	9
mean_D5					
Pearson's correlation	.453	.454	**.794***	.581	1
Sig. (two-tailed)	.221	.219	.011	.101	
N	9	9	9	9	9

Bold values indicate strong results for Pearson's coefficient of correlation

*Correlation is significant at the 0.05 level (two-tailed)

tasks, Q11, there is a strong correlation with students who agree that MOODLE was an adequate tool for communication with the teacher and for delivery of documents, Q20.

Turning to the five dimensions and removing the few variables expressed in the opposite direction to the majority, the analysis was continued constructing five indexes (corresponding to the five dimensions) that summarize the information provided by the questions that integrate them through their average: mean_D1 until mean_D5 (see Table 3 and Fig. 5).

Regarding (D1) student's perspective on teacher performance (Q16, Q17, Q26 and Q27), this is the index where the average degree of agreement is greater (4.47) (between "I agree" and "I strongly agree") which represents a very good performance of the teacher.

Concerning the student's perspective on his/her performance, D2 (Q2, Q13, Q14, Q18, Q22, Q28 and Q31), the student's perspective on the ECLECTIC approach for him/herself, D3 (Q3, Q4 (Q1, Q7, Q10, Q11 and Q30), and the student's perspective on the ECLECTIC approach, D5 (Q1, Q7, Q10, Q11 and Q30), all three averages are between 3.75 and 3.87 which points to an agreement that this approach was useful to the student from the point of view of his training, his performance and the functioning of the ECLECTIC approach. The lowest mean dimension, 3.07 (although above the neutral point), concerns dimension D4—student's perspective on the assessment and the material made available in this project (Q5, Q6, Q20, Q21 and Q29). The values obtained for the coefficient of variation indicate a low dispersion in the given responses for any of the indices (see Table 4).

In order to verify the existence of an association between the five indexes, the Pearson's coefficient of correlation, *r* (ranging from − 1 to 1), was calculated, suitable for quantitative variables, and it was concluded that there is a strong positive correlation between *mean_D3* and *mean_D4* (*r*=0.704) and between *mean_D3* and *mean_D5* (*r*=0.794). These values show that the students who most agree that the ECLECTIC approach contributes to their training are also the ones who most agree with this type of approach. They also show that the students who most agree that the ECLECTIC approach contributes to their training are those who have the most positive opinion on the assessment and the material made available.

As a final analysis, and according to the results of the questionnaire, it can be affirmed that the students' satisfaction with the approach presented and operationalized is very positive. At the same time, it was verified that one of the indicators that demonstrate this satisfaction is the rate of approval to the curricular unit. The TLP also received very positive comments as can be seen from the 85% of responses. Satisfaction with the LMS was not evaluated

since the platform only serves as a medium for communication between students and the teacher. Moreover, the number of elements constituting the test sample is a limitation of the results obtained; however, no gender effect was felt throughout the work developed during the semester, since the female element, due to the rotations, participated in all groups.

The performance of the teacher is evaluated according to the success rate at the conclusion of the curricular unit, as well as through an inquiry, entitled Pedagogical Survey, developed and conducted by HEI Pedagogical Council, answered anonymously by the students, at the end of each semester.

7 Research limitations and future directions

Despite its contributions, this research includes a number of limitations, some of which should prompt further research. One of the main limitations of this work is related to the number of students who attended the Curricular Unit, although this work constitutes, as mentioned, a contribution that may be useful in the teaching learning process of generation z students, who are already attending higher education, since it was tested only once and with a small number of students.

A second limitation is related to the fact that the approach has only been applied to a single course. In addition, to apply the proposed model to a great number of courses and in other universities, even in other countries (e.g., in the rest of Europe) is necessary to further validate and enhance its current base. Furthermore, a larger sample of high education institutions would provide more robust results and enable cross-country comparisons, as well as identify cultural differences.

The workload for students and for teachers is high, though at different moments. For the teachers, the workload is heavy in the preparation of the curricular unit through the definition of the topics and preparation of materials and in the stage of accompaniment of the process of peer reviewing. Students' workload is heavier during the construction phase of their projects, reviewing assignments and preparing lessons for other students.

Finally, we did not address how teachers might use the proposed approach to align the different techniques of active learning in curricular units within the first cycle course for optimal diffusion.

8 Conclusions

In the current context of teaching, traditional lessons, consolidated in the nineteenth century, remains the predominant style (expository method). However, this approach is increasingly viewed as one of the problems of the current teaching system and is offering resistance to adaptation to the requirements of the twenty-first century. Thus, in order to meet the need for change, the lessons that use active learning have attracted a great deal of attention, since they stimulate the motivation to achieve more skills on the part of the students. However, this change also requires a change in attitude on the part of teachers regarding the methodologies used in the teaching–learning process.

In order to respond to the needs listed above, an innovative pilot project was developed, from the pedagogical point of view, in the first cycle course in Management and Information Systems. Thus, a model built by three Active Learning techniques (group project, peer review and peer teaching) was developed and implemented, in the course "New trends in ITs," of the first semester, second year, designated by ECLECTIC approach.

Based on the results presented and discussed in the previous sections, it is verified that the issues related to autonomy, individual evaluation and success in the curricular unit were largely achieved by the students. The change in the role of the teacher, adapting the profile of a tutor, rather than transmitter, was very positive in the progress of student learning. Finally, the construction of study materials for the final examination of the course unit by students was one of the characteristics (among others) of this project that makes it more innovative, since the success rate of the curricular unit was higher than 80%.

However, the results obtained show a limitation, which is the reduced sample size. Therefore, it may be claimed that the success achieved with this experiment is total (without taking into account the limitations due to the size of the sample), due to the high success rate at the conclusion of the curricular unit, but mainly due to the way the competences were developed during the semester. With this approach, students developed soft (group and individual) and hard skills (themes developed in the curricular unit) that allowed a disruption of the model used so far in the teaching–learning process.

In short, the present paper has addressed the reasons underlying the development of an encompassing teaching learning process approach for a curricular unit that is part of a first cycle course. The ECLECTIC approach was developed to address the teaching and learning process complexity in an actual context where the students are digital and the technologies are in constant evolution. This model was developed in line with the methodological procedures for creating maturity models, with a view to guaranteeing its recognition, solidity and relevance, both in the academic field and in society as a whole.

To validate ECLECTIC, the approach was applied and the level of student satisfaction and was assessed through questionnaires administered to students who attended the

Curricular Unit. The results of this investigation have been encouraging, while revealing a high level of acceptance among the students.

As a final conclusion, we can state that the results show that it is possible to take (controllable) risks and diversify the teaching methodologies by making use of several and creating new approaches in order to improve students' learning. In this context, the ECLECTIC approach will be applied in the academic year 2018–2019, improving aspects related to the peer review technique in order to ensure that the revisions are more independent due to the fact that the students know each other, and the number of students may be reduced.

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