

Agile methodologies in times of pandemic: acquisition of employment skills in higher education

Pedro Canales-Ronda and Cristina Aragonés-Jericó
*Departamento de Comercialización e Investigación de Mercados,
Universitat de Valencia, Valencia, Spain*

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Abstract

Purpose – This research aims to focus on analysing the opinion of university students on the effects that agile methodologies are having on their education during this time of pandemic that is affecting the normal functioning of on-site universities. Specifically, the authors intend to analyse the effect that different constructs have on the development of their skills for labour markets through the application of agile methodologies in blended learning. Thus, the authors will analyse the effects of intrinsic motivation, the interactivity of the system, the involvement of students, their engagement to these activities and their level of satisfaction with this training process.

Design/methodology/approach – The authors conducted research based on the use of agile methodologies applied to higher education. To this end, various activities were designed within different subjects in marketing area. 115 business students were consulted, who valued their experience and the usefulness of this methodology in relation to the improvement of the learning process.

Findings – The results of the research show the usefulness of agile methodologies for university students. In addition, these methodologies allow them to develop certain skills that will be important for labour markets, such as teamwork, motivation and engagement to tasks to be developed.

Originality/value – The main value of this research lies in the application of a methodology from the business environment in higher education and the subsequent analysis of the students' assessment of these agile methodologies in terms of their usefulness for their professional future. Moreover, this application of agile methodologies has been carried out in an unusual environment due to the pandemic situation that has changed the usual development of face-to-face university training towards the application of e-learning methodologies.

Keywords Agile methodologies, Motivation, Interactivity, Active learning, Engagement, Satisfaction

Paper type Research paper

1. Introduction

The situation experienced during Covid-19 has shown that university teaching is no stranger to the VUCA world. The environment, far from being stable, is characterised by four factors: volatility, uncertainty, complexity and ambiguity. This acronym VUCA comes from the American military (Whiteman, 1998; Bennett and Lemoine, 2014).

In companies, VUCA environments transformed stakeholders into agile learners, using agile methodologies that allow them to adapt the way of working to the conditions and objectives of the project, achieving flexibility and immediacy in the response to adapt the project and its development to the specific circumstances of the environment (Doheny *et al.*, 2012).

Similarly, at university, the pandemic has forced us to end 2019–2020 academic year adapting quickly to a totally virtual university. The 2020–2021 academic year began with a blended learning methodology, where the implementation of hybrid training strategies with face-to-face and virtual training are no longer just a future trend but an imposed reality. Thus, the teaching action carried out online involves three stages: (1) design, based on the



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conceptualisation of the teaching action; (2) development and (3) a closing stage that involves the analysis of the results and proposals for improvement with a view to a new teaching action. The cyclical process that occurs enables innovation and improvement of virtual teaching (Guiter and Romeo, 2019). Therefore, it is important to train face-to-face professors in the configuration of this virtual teaching and evaluation.

However, the design of hybrid learning environments must consider four basic issues (Boelens *et al.*, 2017), which should be considered as a challenge: (1) incorporating flexibility, (2) stimulating interaction, (3) facilitating learning processes and (4) fostering a suitable learning climate.

Through this paper, the authors aim to analyse how a teaching innovation can improve the experience of university students and improve student outcomes (Butt, 2014; Mok, 2014).

2. Literature review

Recognising the limitations of the traditional lecture method in fostering employment skills, scholars favour experiential learning approaches currently used like problem-based learning (PBL) and action-based learning, among others.

In PBL, students learn by designing and constructing solutions to real-life problems, often from real organisations. PBL's defining characteristic is the collective learning structured around an ambiguous and complex problem. Here, the professor becomes a facilitator, supporting and guiding students in the problem-solving process (Smith, 2005).

Similarly, Eisenstein and Hutchinson (2006) defined action-based learning like learning that occurs as a by-product of making repeated decisions with outcome feedback. Their study shows that accuracy depends on whether the learning goal directs attention away from or toward informative stimuli and whether the goal increases the likelihood of discovering important relationships among stimuli (e.g. a simple verbal rule). However, this dependence emphasises the riskiness of relying on action-based learning.

In this sense, the application of agile methodologies takes on special meaning. These methodologies have emerged in the business environment as a way of working that reduces development times, eliminates uncertainty, improves production efficiency and the quality of end products, is responsive to change and provides the greatest possible customer satisfaction through early delivery and continuous feedback during product construction. To achieve this, they are based on four fundamental principles (Paulk, 2002):

- (1) Assessment of individuals more than processes and tools: the talent and know-how required for some tasks can only be provided by certain people with the suitable attitude.
- (2) Working software rather than exhaustive documentation: the documentation is valid to verify and transfer knowledge as well as providing useful help in many legal matters, but its relevance must be much less than the final product.
- (3) Collaboration with the customer before contractual negotiation: it is more appropriate an involvement relationship and continuous collaboration with the customer, than a contractual relationship of delimitation of responsibilities.
- (4) The answer to change over the follow-up of a plan: anticipation, flexibility and adaptation are fundamental values of agile methods.

2.1 Adapting agile methodology to the university training

Agile methods can be incorporated into the learning context to enhance project-based learning, collaborative experiences and student-led learning, and can support learning that is

goal driven rather than plan-driven (Parsons and MacCallum, 2019). However, examples in the literature outline agile education in very broad terms and this indicate that interpretations of what is “agile” in the classroom need to be more clearly defined. In addition, more concrete examples are needed to illustrate the specific ways that professors can use agile methodologies to transform teaching and learning. Parsons and MacCallum (2019) define agile education structured around the concepts of values, processes and techniques, expressed as a pyramid where techniques build on processes, and processes on values. Firstly, they examine agile values as meaningful learning. This is primarily skills-based: adaptability, collaboration, knowledge construction, real-world problem-solving and innovation. Secondly, when Parsons and MacCallum (2019) look at processes emphasise: learner pace, reflection and iteration. Short learning cycles support a sustainable pace of learning, with regular feedback and reflection on actual learning outcomes. Finally, authors contemplate that the most important techniques are those that support collaboration, communication and problem-solving.

The research gap that is being fulfilled by the current study is the application of a methodology from the business environment in higher education and the subsequent analysis of the students’ assessment of these agile methodologies in terms of their usefulness for their professional future. A recent study presents the process to perform a Master of Science class with agile methodologies integrating real world problems as projects. The study found that the students value the agile method using real world problems and authors observed the integration of the agile methodology into teaching in the fields of engineering, computer science or information systems (Neumann and Baumann, 2021). However, to use agile methods in higher education in the field of business and marketing is innovative and remains under-investigated.

Adaptation of this agile methodology to the university environment does not involve excessive complexity, since the education system is also based on the primacy of people and in it personal and intrapersonal relationships are basic, especially if a collaborative learning process is followed, where students acquire a leading role (Martín-Gómez, 2020). Albadalejo (2017) defines the agile methodology adapted to teaching as a practical and experiential method, where students learning by doing. In this way, students develop their autonomy, skills and abilities. It is a method that relies on creativity, testing, adaptation, reflection and constant improvement as a learning system.

In this vein, employability skills acquired and important role in this methodology and need to be defined. As Baker and Henson (2010) notice there has been debate on this concept. However, an accepted definition is employability skills as graduate attributes or capabilities students develop at university that go beyond content and increase the chances of acquiring and maintaining different types of employment” (Milne, 2000, p. 87). Employability skills includes, among others: (1) Interpersonal attributes such as teamwork abilities, co-operation and communication. (2) Personal abilities as higher order skills such as decision making, work under pressure, flexibility, problem solving and knowledge). (3) Affective skills and traits such as dependability, responsibility and a positive attitude (Baker and Henson, 2010; Cassidy, 2006; Rosenberg *et al.*, 2012).

The use of agile methodologies in university teaching, according to various studies, improves the results and academic performance of students (Lee, 2011). Thus, several studies focused on marketing subjects (Orus *et al.*, 2014; Canales-Ronda and Hernández-Fernández, 2019) conclude that these agile methodologies favour the acquisition of transversal competences and improve their academic results, although not all university students accept the application of these methodologies with pleasure (Bishop and Verleger, 2013).

The research aims to test the effects that certain variables can produce in the development of skills through the application of agile methodologies in higher education in marketing. In this sense, the main constructs to be analysed are:

- (1) Motivation: it affects psychological well-being and expected outcomes in a learning process (Ryan and Deci, 2000). In particular, the most positive outcomes in people's learning come from intrinsic motivation (Guay *et al.*, 2008).
- (2) Interactivity: agile learning is related to the interactivity between peers given that the difficulty of a task can be overcome through collaboration between them (Vallet-Bellmunt *et al.*, 2017). Moreover, it is an aspect of their training that is well valued by university students (Canales-Ronda and Hernández-Fernández, 2019).
- (3) Active learning: thanks to the improvement of the relationship between the members of the training groups, each member increases their desire to learn in a collaborative context (Vallet-Bellmunt *et al.*, 2017), improves their own knowledge and has a positive effect on the valuation of the activities that require their active participation (Canales-Ronda and Hernández-Fernández, 2019).
- (4) Engagement: the involvement and responsible role of learners is a fundamental condition for the success of agile methodologies, given that their participation depends on it (Braxton *et al.*, 2000). It is a psychological process, which produces a higher level of attention, interest and effort during the learning process (Ros *et al.*, 2012).
- (5) Satisfaction: it allows us to measure the pleasure experienced by having performed a certain task and having achieved the proposed objective (Bitrián *et al.*, 2020).

Based on these assumptions, this research aims at responding to the following questions in relation to the development of skills of university students:

- RQ1. How do university students rate agile methodologies compared to traditional methodologies?
- RQ2. Are there different groups of university students depending on their assessment of agile methodologies?
- RQ3. Does university experience, years at university, affect the valuation of agile methodologies?

3. Methodology

3.1 Research tools and participants

The application of the educational innovation methodology was developed in different stages. Firstly, the conceptual framework of the project was developed. The project is part of two key concepts: blended learning and agile methodologies. The systematic review of the literature allows us to identify fields of knowledge that served as a basis for developing our correct practical application of the methodology. In a second stage, the teaching materials were designed employing an agile approach. Thus, first of all, E-learning theory sessions were set up. The theory sessions focused on short online face-to-face sessions, videos, guided slides, accompanying theory exercises, etc. Subsequently, face-to-face sessions were held based on the Scrum and Kanban methodology (Ladas, 2008). Based on a case of business reality, a project was proposed in small teams in the classroom, with the active participation of the students. Following the agile methodology, they periodically made partial deliveries of the project to the teachers, to improve and evaluate, with the aim of reaching the optimal solution. The implementation stage involved the development of the training action, a key element being communication both in the digital and face-to-face environment. The learning strategies used were diverse; communication, present in all actions of the learning process,

through multimedia channels. The teachers guided the learning process in a flexible way and with a personalised follow-up aimed at achieving the course objectives. Development of an individual and group learning process aimed at overcoming problems and difficulties; finally, the evaluation of the different tasks in a personalised and continuous way in order to achieve the objectives. This agile approach improves from what might be expected in PBL or action learning in 12 agile principles to the classroom environment (Stewart *et al.*, 2009):

- (1) High priority to prepare the student to be self-organised, continuously delivering course components that reflect competence.
- (2) The professor and students can adapt to changes at any time to facilitate learning and better develop employability skills.
- (3) Working deliverables from the students over short time periods allowing for frequent feedback.
- (4) Iterative interaction between the professor and student groups.
- (5) Give students the environment and support necessary to be successful.
- (6) Allow for direct face-to-face interaction with student groups.
- (7) Working deliverables are the primary and most tangible measure of student progress.
- (8) The cooperative learning environment is the basis for teaching the skills needed for life-long learning.
- (9) Meaningful and project-based learning is primarily encouraged with continuous attention to technical excellence and good design; it enhances learning.
- (10) Understanding the problem and solving it simply and clearly is essential.
- (11) Student groups should self-organise, but all should participate equally in the effort.
- (12) At regular intervals, the students and professor reflect and offer feedback on how to be more effective and then they adjust accordingly to be more efficient.

To carry out our research, a multi-stage process was designed. Firstly, the group dynamics technique was used to obtain qualitative information on the students' opinions regarding the scales commonly used in the literature. In order to carry out the group dynamics, groups of students from the subjects involved in the study were invited to participate on a voluntary basis. This technique made it possible to go deeper into their opinions and evaluations beyond a mere individual assessment, favoured by the effect of the interaction generated by the exchange of opinions among the members of each group. Based on these conclusions, the group of teachers drafted a series of items based on the reference scales that would facilitate the design of the questionnaire, after which the initial students were brought together again to individually analyse the content of the questionnaire in terms of its capacity to reflect the conclusions of the initial dynamic. After this phase, and with a few simple modifications, the final questionnaire was drafted. (see [Annex](#))

The study was carried out using a sample of higher education students who are taking a subject in marketing area at Universitat de València (Spain). A self-administered questionnaire was used, which they answered at the end of the activity or subject in which one of the different agile methodologies was implemented during the 2020–2021 academic year. Participation in the study was voluntary and non-participation did not affect their grades in any way. Anonymity and confidentiality of the data they provided was also assured.

In order to allow the students investigated to compare the two training models, traditional and innovative, it was decided that they would only be students who were already in at least the second year of their university education. From a total population of 145, the final sample was composed of 115 (79.3%). In order to obtain a representative sample of the different levels of university experience, subjects were chosen from the different courses starting from the second year of university. Of the sample, 44.3% belonged to finance and accounting; 20.0% were enrolled in the third year of business administration, 18.3% in fourth year of business administration and 17.4% in master in marketing. Most of the students had previous experience in agile methodologies (74.8%) (see [Table 1](#)).

3.2 Measurement of variables

Scales that have been shown to be appropriate in previous studies were used to measure the different constructs analysed. The measures were carefully adapted to ensure that the items fit the context. The measures were carefully adapted to ensure that the items fitted the context. 7-Point Likert-type scale items were used, ranging from 1 (strongly disagree) to 7 (strongly agree). Although the variables used have been tested and validated in previous research, we test them using the coefficient alpha values. The results obtained show that the constructs derived from the items described presents a high degree of internal consistency with reference to Cronbach's alpha ([Table 2](#)).

To measure their degree to which they felt intrinsically motivated, the students were asked to rate the activities carried out in relation to the degree of interest they generated, as well as whether they were enjoyable and interesting. In order to analyse the evaluation of the different activities carried out by the students, they were asked to rate their overall satisfaction and their feeling of having actively participated in their learning process (active learning). The scales used for these constructs were adapted from previous studies by various authors ([Bitrián et al., 2020](#); [Canales-Ronda and Hernández-Fernandez, 2019](#); [Konak et al., 2014](#); [Vallet-Bellmunt et al., 2017](#)).

In all activities, students worked in groups and therefore had to collaborate in order to perform the assigned task properly. Students were also confronted with scenarios that required them to solve new problems with their peers and to reflect on their learning collaboratively. To measure the degree to which students interacted with each other during

Table 1.
Sample description

Gender	%	Students' academic background	%	Previous experience	%
Man	42.6	Finance and Accounting	44.3	Yes	74.8
Woman	53.1	Business Administration	38.3	No	25.2
Other	4.3	Master in Marketing	17.4		

Table 2.
Correlation matrix and
Cronbach's alpha

	A	B	C	D	E	F
Intrinsic motivation (A)	<i>0.818</i>					
Interactivity (B)	0.336*	<i>0.849</i>				
Active learning (C)	0.558*	0.574*	<i>0.900</i>			
Engagement (D)	0.328*	0.595*	0.462*	<i>0.806</i>		
Satisfaction (E)	0.692*	0.462*	0.716*	0.463*	<i>0.895</i>	
Skills development (F)	0.463*	0.471*	0.645*	0.403*	0.643*	<i>0.870</i>

Note(s): * Correlation is significant at the 0.01 level; Cronbach's alpha is shown on the diagonal in italic

the activity, we adapted the scales previously used by Canales-Ronda and Hernández-Fernandez (2019) and Vallet-Bellmunt *et al.* (2017).

To measure engagement, the proposals of Buil *et al.* (2019) and Konak *et al.* (2014) were used. This construct aims to measure students' willingness to participate and complete the activity assigned to them for each subject.

Finally, to measure employment skills that can be acquired during university education, the proposals of Buil *et al.* (2019) and Bitrián *et al.* (2020) were used.

Table 2 shows the correlations between the different variables.

Students surveyed were also asked whether, or not, they had previously participated in any agile activity during their university education. In addition, they were asked to rate the educational usefulness of traditional and agile methodologies on a scale from 1 "not useful at all" to 7 "very useful".

To find out their opinion or qualitative assessment of agile methodologies, students were asked to define these activities with an adjective. An open-ended question was used for this purpose, giving them complete freedom to answer.

4. Data analysis

4.1 Assessment of agile and traditional educational methodologies by higher education students

In order to answer the first research question (RQ1), the students' assessment of agile and traditional methodologies, we carried out a mean analysis of the assessment they give to them. In addition, we also compared the values given to the different variables that affect the acquisition of the necessary skills to develop their future professional activity (Table 3).

The analyses carried out indicate that agile methodologies are more useful for university students than traditional approaches. Regarding the different variables analysed that affect the development of employment skills, we can indicate that the most highly valued aspects are the commitment involved in this type of activities and the satisfaction produced by carrying them out. On the other hand, the questions related to the interactivity involved in this type of agile methodologies have a medium-low score, perhaps because university students usually interact regardless of the type of task to be carried out.

To analyse the qualitative assessment of agile methodologies, textual analysis was performed with the adjectives provided by the students to define these activities. A word tags (Figure 1) is prepared to indicate the highest frequency of words used to define agile

	Mean (Sd)
<i>Educational methodology*</i>	
Traditional	3.94 (1.51)
Agile	5.92 (1.02)
<i>Variables**</i>	
Engagement	6.03 (1.05)
Satisfaction	5.97 (0.93)
Active learning	5.62 (0.98)
Intrinsic motivation	5.55 (1.01)
Interactivity	4.84 (0.80)
<i>Skill development**</i>	5.48 (0.94)
Note(s): *Scale from 1 "not useful at all" to 7 "very useful"; **Scale from 1 "strongly disagree" to 7 "strongly agree"	

Table 3. Mean analysis of educational methodologies and skill development

Figure 1.
Word tags agile
methodologies



methodologies (Heimerl *et al.*, 2014), and shows the words in a larger, darker font that appear most frequently in the responses of the students surveyed (Cidell, 2010).

As can be seen in Figure 1, most of the qualifiers are of a positive nature (dynamic, entertaining, interesting, useful, etc.). There are also some statements that could be qualified as neutral (curious, different and regular). This result confirms the positive assessment of agile methodologies by higher education students.

4.2 Do all university students value agile methodologies equally?

To respond to second research question (RQ2), and following the methodology used by Btrián *et al.* (2020), different cluster analyses were carried out to differentiate groups of students with different opinions regarding usefulness of agile methodologies in relation to development of their professional skills. To determine the number of groups, dendrogram was analysed and the existence of three groups of students was determined.

Subsequently, different analysis of variance (ANOVA) analyses were performed to examine the existence of any differences in the valuation of agile methodologies by each groups (Mahajan *et al.*, 2022). To test the existence of significant differences between the means of the different groups, post-hoc multiple comparison tests were performed, using Tukey's honestly-significant-difference (HSD) for equal variances and Games-Howell for unequal variances.

Figure 2 shows the mean values obtained for the different groups and their comparison with the mean value of the total sample.

The majority group (44.3% of the sample) is made up of those students who are close to the average values in the different variables analysed (Group 1). Their assessment regarding the acquisition of skills is the second highest (mean of 5.63 on a scale of 7).

The group that recognises having acquired the fewest skills (4.36 on a scale of 7) is made up of 30.5% of the sample (Group 2). This group has lower values than the other two groups in all the variables analysed.

The third group is the group of students who claim to have acquired more professional skills through the application of agile methodologies (6.54 on a scale of 7). This is the smallest group (25.2% of the sample) and presents the highest scores for the variables analysed.

Analysing the differences between the three groups allows us to draw some other interesting conclusions. Group 1 is motivated and values the interactivity of agile

methodologies as much as the group that acknowledges having developed their skills the most (Group 3), but their level of commitment to agile methodologies is similar to the group that claims to have achieved the least skills. Group 2 is less intrinsically motivated than the other two groups and does not like the interactivity of agile methodologies. Group 3, on the other hand, particularly values commitment and satisfaction with the activities carried out, as well as active participation in their learning process.

4.3 How agile methodologies are valued according to years of university experience

The third research question (RQ3) focuses on analysing whether there are differences in the acquisition of professional skills using agile methodologies according to university experience, measured based on the course (year) the student is taking.

Figure 3 shows the mean values obtained for the different groups and their comparison with the mean value of the total sample.

Students with less experience, in their second year of university (2nd), are the ones who best value their active participation in the learning process and are very committed to the use of agile methodologies. They are also those who consider that they have developed the most professional skills, assigning a score of 5.89 on a scale of up to 7.

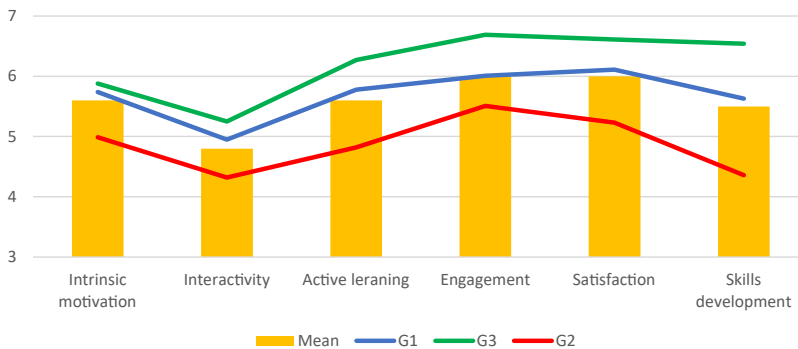


Figure 2. Ratings by skill group developed

Note(s): Scale from 1 (strongly disagree) to 7 (strongly agree)

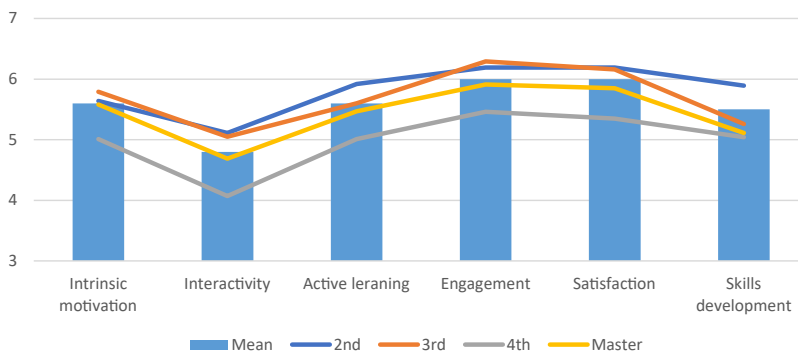


Figure 3. Ratings by university experience

Note(s): Scale from 1 (strongly disagree) to 7 (strongly agree)

Students in the third year (3rd) are the most intrinsically motivated (5.79 on a scale of 7) and are also the most engaged with agile methodologies (6.29 on a scale of 7). Regarding the acquisition of professional skills, they are in a medium position (5.26 on a scale of 7).

Students in the fourth year (4th) are the ones who give the worst evaluations to all the variables analysed, and in all cases the differences are statistically significant. The low rating (4.07 on a scale of 7) given to the interactivity required in the application of agile methodologies stands out. Regarding their assessment of the professional skills acquired, they barely exceed 5.

Finally, students with more university experience, those studying for a Master's degree in marketing, are in the average values of the total sample, except in their assessment of the skills acquired. In this variable, they give a similar score to the 4th year students, giving it a score of 5.11 on a scale of 7.

5. Discussion

Compared agile methodologies to the traditional methods learning are mostly adaptative (over fully specifiable), value more students and interactions (over processes and tools), working projects (over exhaustive documentation), students and professor collaboration (over rigid course syllabi) and responding to feedback (over following a plan) (Paulk, 2002; Stewart *et al.*, 2009).

Previous studies suggest that agile can be effective, especially where active and project-based learning can be applied. Applying agile methodologies to learning and teaching transforms from knowledge transfer to knowledge generated from rich collaboration and experience. Teachers become facilitators, coaches and inspirational servant leaders for students that are self-directed learners. The focus is not on rigid plans; rather flexibility is required to take into account students' feedback and their different abilities, interests, difficulties and experiences, aiming at unlocking their hidden strengths and passions. The emphasis is on delivering the highest value, in terms of both discipline specific learning outcomes and soft skills such as organisation, planning, collaboration and teamwork (Salza *et al.*, 2019).

The main objective of this research has been to analyse the opinion that university students have of agile methodologies versus traditional methodologies, especially in the case of marketing subjects. The purpose is to find out different constructs that affect the assessment of these agile methodologies, given that they bring students closer to business and marketing reality.

With regards to the first research question, the analyses carried out indicate that agile methodologies are more useful for higher education students than traditional approaches. Regarding the different constructs analysed that affect the development of skills, we can indicate that the most highly valued aspects are the commitment involved in this type of activities and the satisfaction produced by carrying them out. On the other hand, the questions related to the interactivity involved in this type of agile methodologies have a medium-low score, perhaps because university students usually interact regardless of the type of task to be developed. Regarding the qualitative assessment of agile methodologies, we can conclude that it is good given that most of the words provided by the respondents are positive and there are no negative evaluations of them.

To answer the second research question, which aims to analyse the existence of different groups of students according to their perception of the usefulness of agile methodologies, a cluster analysis was carried out. The results obtained suggest that students should be classified into three groups according to the degree of employment skills they have developed through the application of agile methodologies. The first group, the majority, highly value agile methodologies, although they feel less committed and satisfied than the members of the

third group. A second group is characterised by a lower appreciation of agile methodologies; what they seem to like least about them is the interactivity, and they are the ones who value traditional methodologies the most. A third group is made up of those who value agile methodologies the most, they feel particularly committed to them and are quite satisfied with them, perhaps for this reason they are the ones who value traditional methodologies the least.

Finally, regarding the third research question, which seeks to determine the effect that experience has on the valuation of agile methodologies, it seems that the longer students have been at university, the lower their valuation of these methodologies.

In terms of implications for higher education, and especially for university professors, the results indicate that students in the first years are more receptive to agile methodologies, which is an opportunity to implement them in the future.

Like all research, the present work is not without limitations. It is necessary to mention that this research is based on a sample of university students from different courses taking marketing subjects. Future research should include analysis of the views of students from other professional areas.

Another limitation is due to the pandemic situation in which this research has been carried out. The different types of training faced by students and university teachers, sometimes fully E-learning and sometimes blended learning, may have affected the assessment of the methodology. Even the different degrees of availability of the necessary resources on the part of the students to adequately follow the classes may have influenced the opinion about agile methodologies. All these considerations constitute an interesting challenge for future research.

In conclusion, the results of our study show the usefulness of the application of agile methodologies in university education and the usefulness of agile methodologies in the acquisition of students' professional skills for labour markets. These methodologies allow students to perceive the practical applicability of the theoretical knowledge they acquire during their training. In addition, they allow the development of certain personal skills that will be useful in their professional and personal lives, given that relationships with other people are strengthened.

References

- Albadalejo, X. (2017), "Proyectos ágiles", available at: <https://proyectosagiles.org/que-es-scrum/> (accessed 14 June 2021).
- Baker, G. and Henson, D. (2010), "Promoting employability skills development in a research-intensive university", *Education+ Training*, Vol. 52 No. 1, pp. 62-75, doi: [10.1108/00400911011017681](https://doi.org/10.1108/00400911011017681).
- Bennett, N. and Lemoine, J. (2014), "What VUCA really means for you", *Harvard Business Review*, Vol. 92 Nos 1/2, p. 27.
- Bishop, J. and Verleger, M. (2013), "The flipped classroom: a survey of the research", *ASEE Annual Conference & Exposition*, Atlanta, pp. 1-23.
- Bitrián, P., Buil, I. and Catalán, S. (2020), "Flow and business simulation games: a typology of students", *The International Journal of Management Education*, Vol. 18 No. 1, p. 100365, doi: [10.1016/j.ijme.2020.100365](https://doi.org/10.1016/j.ijme.2020.100365).
- Boelens, R., De Wever, B. and Voet, M. (2017), "Four key challenges to the design of blended learning: a systematic literature review", *Educational Research Review*, Vol. 22, pp. 1-18, doi: [10.1016/j.edurev.2017.06.001](https://doi.org/10.1016/j.edurev.2017.06.001).
- Braxton, J.M., Milem, J.F. and Sullivan, A.S. (2000), "The influence of active learning on the college student departure process", *The Journal of Higher Education*, Vol. 71 No. 5, pp. 569-590, doi: [10.1080/00221546.2000.11778853](https://doi.org/10.1080/00221546.2000.11778853).
- Buil, I., Catalán, S. and Martínez, E. (2019), "Encouraging intrinsic motivation in management training: the use of business simulation games", *The International Journal of Management Education*, Vol. 17 No 2, pp. 162-171.

- Butt, A. (2014), "Student views on the use of a flipped classroom approach: evidence from Australia", in *Business Education and Accreditation*, Hilo-Hawaii, The Institute for Business & Finance Research, Vol. 6 No. 1, pp. 33-43.
- Canales-Ronda, P. and Hernández-Fernández, A. (2019), "Flipped classroom methodology in university teaching", *Revista Iberoamericana de Educación Superior*, Vol. X No. 10, pp. 116-130, doi: [10.22201/iisue.20072872e.2019.28.432](https://doi.org/10.22201/iisue.20072872e.2019.28.432).
- Cassidy, S. (2006), "Developing employability skills: peer assessment in higher education", *Education+ Training*, Vol. 48 No. 7, pp. 508-517, doi: [10.1108/00400910610705890](https://doi.org/10.1108/00400910610705890).
- Cidell, J. (2010), "Content clouds as exploratory qualitative data analysis", *Area*, Vol. 42 No. 4, pp. 514-523, doi: [10.1111/j.1475-4762.2010.00952.x7](https://doi.org/10.1111/j.1475-4762.2010.00952.x7).
- Doheny, M., Nagalim, V. and Weig, F. (2012), "Agile operations for volatile times", *McKinsey Quarterly*, Vol. 3, pp. 126-131.
- Eisenstein, E.M. and Hutchinson, J.W. (2006), "Action-based learning: goals and attention in the acquisition of market knowledge", *Journal of Marketing Research*, Vol. 43 No. 2, pp. 244-258.
- Guay, F., Ratelle, C. and Chanal, J. (2008), "Optimal learning in optimal contexts: the role of self-determination in education", *Canadian Psychology*, Vol. 49 No. 3, pp. 233-240.
- Guitert, M. and Romeo, T. (2019), *Estrategias para la docencia en línea*, Ed. FUOC, Barcelona.
- Heimerl, F., Lohmann, S., Lange, S. and Ertl, T. (2014), "Word cloud explorer: text analytics based on word clouds", in *2014 47th Hawaii International Conference on System Sciences*, IEEE, pp. 1833-1842, doi: [10.1109/HICSS.2014.231](https://doi.org/10.1109/HICSS.2014.231).
- Konak, A., Clark, T.K. and Nasereddin, M. (2014), "Using Kolb's Experiential Learning Cycle to improve student learning in virtual computer laboratories", *Computers and Education*, Vol. 72, pp. 11-22.
- Ladas, C. (2008), *Scrumban: essays on Kanban systems for lean software development*, Modus Cooperandi Press, Seattle, WA.
- Lee, Y. (2011), "A study on the effect of teaching innovation on learning effectiveness with learning satisfaction as a mediator", in *World Transaction on Engineering and Technology Education*, Melbourne, Wieste, Vol. 9 No. 2, pp. 92-101.
- Mahajan, R., Gupta, P. and Misra, R. (2022), "Employability skills framework: a tripartite approach", *Education + Training*, Vol. 64 No. 3, pp. 360-379.
- Martín-Gómez, S. (2020), "Application of agile methodologies to the university teaching-learning", *Revista de innovación docente universitaria: RIDU*, Vol. 12, pp. 62-73, doi: [10.1344/RIDU2020.12.7](https://doi.org/10.1344/RIDU2020.12.7).
- Milne, C. (2000), "Tertiary literacies: integrating generic skills into the curriculum", in Fallows, S. and Steven, C. (Eds), *Integrating Key Skills in Higher Education: Employability, Transferable Skills and Learning for Life*, Kogan Page, London, pp. 87-98.
- Mok, H.N. (2014), "Teaching tip: the flipped classroom", *Journal of Information Systems Education*, Vol. 25 No. 1, pp. 7-11.
- Neumann, M. and Baumann, L. (2021), "Agile methods in higher education: adapting and using eduScrum with real world projects", *2021 IEEE Frontiers in Education Conference (FIE)*, pp. 1-8, IEEE.
- Orús, C., Barlés, M.J., Belanche, D., Casaló, L.V., Fraj, E. and Gurrea, R. (2014), "Consecuencias afectivas y objetivas del uso de un canal de youtube de apoyo a la docencia en marketing", in *Congreso Nacional de Marketing AEMARK*, ESIC Editorial, Madrid.
- Parsons, D. and MacCallum, K. (2019), "Agile education, lean learning", *Agile and Lean Concepts for Teaching and Learning*, pp. 3-23, Springer, Singapore.
- Paulk, M. (2002), "Agile methodologies and process discipline", *Crosstalk The Journal of Defense Software Engineering*, October, pp. 15-18.

- Ros, I., Goikoetxea, J., Gairín, J. and Lekue, P. (2012), "Student engagement in the school: interpersonal and inter-center differences", *Revista de Psicodidáctica*, Vol. 17 No. 2, pp. 291-307, doi: [10.1387/Rev.Psicodidaca.4557](https://doi.org/10.1387/Rev.Psicodidaca.4557).
- Rosenberg, S., Heimler, R. and Morote, E.S. (2012), "Basic employability skills: a triangular design approach", *Education+ Training*, Vol. 54 No. 1, pp. 7-20, doi: [10.1108/00400911211198869](https://doi.org/10.1108/00400911211198869).
- Ryan, R. and Deci, E.L. (2000), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American Psychologist*, Vol. 55 No. 1, pp. 68-78, doi: [10.1037/0003-066X.55.1.68](https://doi.org/10.1037/0003-066X.55.1.68).
- Salza, P., Musmarra, P. and Ferrucci, F. (2019), "Agile methodologies in education: a review", *Agile and Lean Concepts for Teaching and Learning*, pp. 25-45.
- Smith, G.F. (2005), "Problem-based learning: can it improve managerial thinking?", *Journal of Management Education*, Vol. 29 No. 2, pp. 357-378.
- Stewart, J.C., DeCusatis, C.S., Kidder, K., Massi, J.R. and Anne, K.M. (2009), "Evaluating agile principles in active and cooperative learning", in *Student-Faculty Research Day*, CSIS, Pace University (P. B3).
- Vallet-Bellmunt, T., Rivera-Torres, P., Vallet-Bellmunt, I. and Vallet-Bellmunt, A. (2017), "Cooperative learning, perceived learning and academic achievement in teaching marketing", *Educación XXI*, Vol. 20 No. 1, pp. 277-297, doi: [10.5944/educXXI.11408](https://doi.org/10.5944/educXXI.11408).
- Whiteman, W.E. (1998), *Training and Educating Army Officers for the 21st Century Implications for the United States Military Academy*, Defense Technical Information Center, Carlisle, PA.

Corresponding author

Pedro Canales-Ronda can be contacted at: pedro.canales@uv.es

Assesses the two types of methodologies in relation to their usefulness for learning the subjects, with 1 being “Not useful” to 7 “Very useful”

Traditional	1	2	3	4	5	6	7
Agile (learn by doing)	1	2	3	4	5	6	7

Evaluate the following aspects, being 1 “Completely disagree” to 7 “Completely agree”

The practical classes have been ...

... interesting	1	2	3	4	5	6	7
... nice	1	2	3	4	5	6	7
... entertaining	1	2	3	4	5	6	7

The activity carried out ...

... facilitates interaction between colleagues	1	2	3	4	5	6	7
... it gives me the opportunity to exchange opinions with my colleagues	1	2	3	4	5	6	7
... facilitates dialogue between colleagues	1	2	3	4	5	6	7
... allows the exchange of information between colleagues	1	2	3	4	5	6	7
... it has allowed me to better understand the concepts of the subject	1	2	3	4	5	6	7

Developing the activity ...

... I felt that I was actively collaborating in my learning	1	2	3	4	5	6	7
... I have felt that I have collaborated in creating my own learning	1	2	3	4	5	6	7
... I have felt the freedom to create my own learning	1	2	3	4	5	6	7
... I have felt the freedom to participate in my own learning	1	2	3	4	5	6	7

In the activity carried out ...

... I have felt that my opinions have been considered	1	2	3	4	5	6	7
... the interactions with my colleagues have made me feel valued	1	2	3	4	5	6	7
... it has helped my personal relations with my colleagues	1	2	3	4	5	6	7

Usually, ...

Table A1.

... the work done in the practices is valuable	1	2	3	4	5	6	7
... I am very satisfied with the practical classes	1	2	3	4	5	6	7
... I have had a very positive learning experience	1	2	3	4	5	6	7
... I have been involved in the activity	1	2	3	4	5	6	7

With these classes I have developed ...

... my initiative for decision making	1	2	3	4	5	6	7
... my skills to work under pressure	1	2	3	4	5	6	7
... my abilities to adapt to new situations	1	2	3	4	5	6	7
... my teamwork skills	1	2	3	4	5	6	7
... my abilities to apply theory to practice	1	2	3	4	5	6	7
... my communication skills	1	2	3	4	5	6	7
... my conflict management skills	1	2	3	4	5	6	7
... a better understanding of the concepts of the subject	1	2	3	4	5	6	7

Define with one adjective your opinion of agile methodologies:

Gender:

Age:

Degree:

Table A2.