Management of Agile Methodologies for the Development of Competencies of University Students in the Peruvian Context

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Abstracts

The fundamental purpose of this research work was to explain how the management of agile methodologies for the development of competencies of university students in the Peruvian context. Based on this question, it has been hypothesized that agile methodologies significantly help the development of students' competencies. This is complemented by a quantitative approach study, with a quasi-experimental design of the "Design with pre-test - post-test with experimental groups and control groups" model. The students of the one Peruvian University were considered as the study population, of which the students of the Faculty of Initial Education were taken as a study sample, within which 100 students participated as an experimental group. 100 from V, VII, X cycle and as a control group 100 students from II, III, and IV cycle respectively. Therefore, as the main result, it is evident that, with a bilateral significance of .000 less than the predetermined significance of 0.05 and a result of F = 1.013, they confirm that the first condition of equality of variances is met and thus establish the Test of the General Hypothesis or HG according to the normal "Z" equal to 8.965, in the case of two independent samples and a difference of 3.81 plus Gl = 51 degrees of freedom and assuming a 95% confidence level, the hypothesis is rejected null and the alternative Hypothesis is accepted, concluding that agile methodologies significantly help the development of students' competencies with a significance of pv ,000..

Keywords: Agile methodologies, Development of skills, Kanban method, Scrum method, General and specific competencies.

Introduction

The current educational context has been facing the accelerated changes in science and technology as a result of the pandemic and the post-COVID pandemic means that universities are projecting themselves taking into account all these changes.

In this sense, from the perspective proposed, the present research work prioritizes the use of the contribution of new technologies, which are part of the innovative processes in university education and that the role of students in higher education is changing and that the demands of their professional training invite the learning community to apply strategies according to the

competency-based educational model that is currently being said. The different universities of the world, therefore, in the Peruvian context have been progressively incorporating in their professional training curriculum. However, its implementation requires technological and pedagogical infrastructure and in the latter it is necessary to manage agile methodologies that facilitate the creative and innovative learning of future professionals.

Delving deeper, without a doubt, it can be said that current times are characterized by being volatile; organizations move very fast; institutions undergo enormous changes constantly; The economic, political, social and cultural system of today's world has been undergoing the reengineering of processes and that this forces us to make a revolution in the educational system of each country. For example, in our context, we are experiencing the preeminence of the virtual education model, obviously with many difficulties, and within this, it is noticeable with visibility that university teachers carry out the innovation of teaching practice through the management of agile methodologies for the development of students' competencies, making them proactive professionals, agile and flexible, capable of adapting to current paradigms of uncertainty and volatility, that is, as Gómez (2020) argues, in the university environment in the training of professionals, the use of agile methodologies is adopted to achieve student learning.

According to the statement, Vila-Grau & Capuz-Rizo (2021) "the education and professional preparation of the student must strengthen the promotion and acquisition of essential skills and specific skills for the entrepreneurship of their young people" (p. 8). Within this, agile methodologies can favor the innovation of educational practice, teamwork and cooperation, the development of soft skills, the development of competencies and above all can help to achieve the best results of student learning.

It is true, the educational challenges of universities are to train professionals in education with graduate profiles among all their faculties, in Early Childhood Education they are pedagogical leaders, with initiative to innovate, with the ability to work in a team, with critical and analytical thinking, with planning and organization skills, with relevant social responsibility, with oral and written communication skills with an emphasis on interculturality, with qualities of learning to learn and among others.

Theoretical foundations

The theoretical foundations of the research are based on:

Management of agile methodologies: According to Cortez-Herrera et al. (2017), agile methodology "is a term that encompasses a series of techniques that share common principles, which help disciplined project management based on teamwork, self-organization, adaptation, and responsibility" (p. 412). In other words, these methods have taken off due to their characteristics and advantages they offer to manage sustainable projects.

Garrido (2021) argues that, "agile methods are those that allow the way of working to be adapted to the conditions of the project, achieving flexibility and immediacy in the response to adapt the project and its development to the specific circumstances of the environment" (p. 78). For their part, Gálvez & Tolaba (2011) argue that agile methodologies "allow the acquisition of general

and specific competencies through the principles and practices they use for their development" (p. 62). In summary, going back to Muñoz Vázquez (2020), agile methodology is understood as "as a set of methods that are used in the development and management of projects in a fast, flexible, adaptable way and with endless tools" (p. 5).

Management dimensions of agile methodologies: Considering the studies by Vila-Grau & Capuz-Rizo (2021), this study is based on the following fundamental dimensions:

Kanban method: Muñoz Vázquez (2020) in one of his contributions argues that "kanban is a Japanese word that means 'visual cards' and is used to control the continuous progress of work on projects" (p. 11). According to Acevedo et al., cited by Cárdenas Parada & Jaimes Cerveleón (2021), the kanban method "is a production management technique based on the self-management of processes, eliminating centralized scheduling" (p. 82).

With the kanban method, maximization of learning efficiency, continuous improvement of learning, flexible learning processes can be achieved. And as Muñoz Vázquez (2020) argues, it is normally used in three (3) basic actions: (i) in tasks to be done; (ii) in tasks in progress; and (iii) in finished tasks.

Kanban principles: Cárdenas Parada & Jaimes Cerveleón (2021) state, in the application of kanban related to change management and especially during the professional training of students, it is at least important to take into account the following principles: (i) understand the processes with what is being done, respecting roles, responsibilities of each one; (ii) search for continuous improvement through relatively evolutionary time and space; (iii) promote adaptive leadership in all that is possible.

Kanban methodology rules: According to Muñoz Vázquez (2020) kanban as an agile method during its application in any teaching practice, it is necessary to mobilize the six (6) basic rules, such as: Rule 1. Defective product should not be sent to subsequent processes. Rule 2. Subsequent proceedings will require only what is necessary. Rule 3. Produce only the exact quantity required by the subsequent process. Rule 4. Balance production. Rule 5. Kanban is a means to avoid speculation. Rule 6. Stabilize and streamline the process.

Scrum method: According to Echeverría Briones et al. (2022: 12), the Scrum methodology "can be integrated into different subjects that focus on the development of an academic product in order to improve project management or execution skills. Schwaber and Sutherland (2020: 3) state that scrum as an agile method "is a framework by which people can address complex adaptive problems, while delivering products of the highest possible value productive and creative".

The scrum method mobilizes learning based on experiences, organizational dynamics, institutional change, self-organization and critical thinking; work planning skills (Sprint Planning); collaborative work skills (Scrum team); responsibility in the delivery of work (Scrum Master Role). As stated by Arias Becerra & Durango Vanegas (2018) in the scrum methodology, the "Scrum Team" during work takes on the people who participate in the project in vital importance, as dynamic managers who fulfill a role under responsibility.

Stages of the scrum method: As Cortez-Herrera et al. (2017) argue, scrum as a method operates in three (03) stages: (i) planning to determine the plan; (ii) development of the development increment in the form of a succession of sprints; (iii) closure and evaluation of the project.

Implementation of scrum in the classroom: Taking into account the experiences of Gálvez & Tolaba (2011) in university classrooms during the professional training of students, scrum is functional as a method, since students fully fulfill their responsibilities; it activates their acquired knowledge; it enhances their communication skills; they enhance teamwork; they achieve good management of intrapersonal relationships and Interpersonal; they develop their initiatives and problem-solving skills; they develop systemic and critical thinking; they apply their organizational skills and among others. Specifically, Scrum as a method allows students to enhance the following skills: self-evaluation, commitment, collaboration, relating, organizing, communicating clearly, etc.

Principles of agile methodologies: According to Paulk (2020), during the application of agile methodology, at least the following principles can be assumed: (a) Valuing individuals rather than processes for their talent. (b) Software that functions as a tool to systematize knowledge in real time. (c) Collaboration to achieve shared responsibilities as a team. (d) response over the follow-up of a plan through strategies of anticipation, flexibility and adaptation (p. 195).

Benefits of agile methodologies: Muñoz Vázquez (2020) as a result of his experience, argues that agile methodologies during classroom implementation help students to practice the principles of self-regulation, empathy, assertive communication, effective work, shared responsibility, self-motivation, creativity, and the permanent development of retrospection.

Development of competencies: Gálvez & Tolaba (2011) state that competencies "are related to forms of effective intervention in the different areas of life through actions, in which attitudinal, procedural and conceptual components are mobilized in an interrelated way" (p. 62). In other words, these skills are very useful for professional performance and without which much of the knowledge acquired could not be used.

For their part, Cañadas & Rappoport (2021) argue that competence "is the ability of a person to deal effectively, quickly, pertinently, creatively with the solution of problems of any kind" (p. 15). That is, in the educational field, a competent subject mobilizes a set of theoretical and practical knowledge and attitudes to perform a task that corresponds to him/her.

Tobón (2007: 58) argues that basic competencies "synchronize a set of capacities of human beings, within it, the cognitive, what is done and what is valued". For their part, Vidal Ledo et al. (2020) state that competencies involve "mobilizing different capacities of the individual, as necessary tools to succeed in school, at home, and in life."

Characteristics of competencies: According to Cañadas & Rappoport 2021, in the educational system, competencies are cauterized by "being observable, integrative, contextualized, transferable, dynamic, successful, functional, gradual" (p. 16). From this perspective, in a competency-based education system, it is important today to promote meaningful and functional pedagogical practices; the solution of a problem obeys the application of a set of innate and innate skills; at the same time, it is necessary to adopt strategies and measures of a globalizing

approach; To this, the importance of teamwork, cooperation and collaboration can be complemented, and finally, it is necessary to express that, in a competency-based education, reflection and the development of critical thinking play a role.

Dimensions of competency development: Considering the approaches of Alonso & Gallego 2010, during the development of students' competencies, two types of competencies can be mobilized, within them: (a) General competencies, in order to strengthen the personal, academic, professional and social ethical. (b) Specific competencies, consisting of disciplinary knowledge, design and operationalization of teaching, learning and evaluation strategies and systematization of pedagogical practices (p. 89).

Development of general competencies: According to Cañadas & Rappoport (2021), at least 18 general competencies can be developed that all vocational training students must achieve at the end of their studies, which are: Teamwork. Decision making. Problem solving. Ability to analyze and synthesize. Creativity. Adaptation to new situations. Recognition of diversity and multiculturalism. Planning and organizational skills. ICT management capacity. Development of oral and written communication based on the mother tongue and second language. Ethical commitment. Sensitivity to environmental and ecosystem issues. Knowledge and appreciation of other cultures, customs and traditions. Development of intrapersonal and intrapersonal skills. Multifaceted, multifaceted and interdisciplinary work. Relevant and timely use of a foreign language. Knowledge and sustainable management of digital culture.

For his part, Pérez Galindo (2018) the general competencies developed by students who are in the professional training stage, it is important that they can achieve: Leadership competencies. Written communication skills. Competencies in information and communication technologies. English skills. Citizenship competencies. Environmental competencies. Competencies in research and innovation. Competences in quantitative reasoning. Critical reading skills.

Alcaraz Rodríguez & González Salazar (2022) argue that students during their professional training, it is necessary for them to develop the following general competencies and this is linked to their specific performance, such as: Personal competencies, based on self-knowledge, emotional intelligence, integrity, orientation towards results, customer orientation, planning, organization, teamwork, leadership, communication, adaptation to change, decision making, analysis, innovation, etc. Competencies towards the achievement of goals, this is essential to achieve the expected results of goals set within the life project based on planning, orientation to results and orientation to the educational community.

Social competencies, this is achieved through the development of social skills within the family, institutional, cultural and work environment. Growth support skills, this helps to achieve the skills of analysis, decision-making, innovation, and adaptation to change. Competencies with a vision of the future, implies achieving the improvement of processes, strategies and negotiation, since it is necessary to recognize changes, opportunities, threats, weaknesses, virtues and propose alternatives for improvement.

Development of specific competencies: According to the UNE "EGYV" model, the development of specific competencies depends on each of the faculties, among them we have: Masters disciplinary knowledge. Design and operationalize the strategies of the teaching-learning process. Master curricular theory and methodology. Design and implement methodological strategies. Manages educational evaluation system. Selects, develops, validates and uses educational media and materials. It articulates conceptual, procedural and attitudinal knowledge. Reflect on pedagogical practice in the classroom. Manages the system of monitoring and accompaniment of teachers. Design and implement educational innovation projects. Design and implement educational management instruments. Handles the technical standards according to the Peruvian education system. It develops systemic and critical thinking within the educational field. It manages the resources directly collected by the educational institution. It handles the general administrative procedure system. In summary, the research team has set out to explain how agile methodologies help develop the competencies of students at a Peruvian university in 2023, so that innovative solutions can be generated taking into account experience-based learning, organizational dynamics, institutional behavior change, rethinking of the way of thinking, transformation of

Materials and methods

Research approach: The research will be carried out in compliance with the protocols of the quantitative research approach, without neglecting the perspective of the contributions of the qualitative approach.

Type of research: Research corresponds to the type of applied research, cross-sectional.

Research design: The study design corresponds to the quasi-experimental design of the model "Design with pre-test - post-test with experimental groups and control groups" Hernández-Sampieri et al., (2010: 173) whose scheme is:

Experimental Group 01 X 02

Control Group 03 -- 04

Where:

01 = Pretest, applied to the experimental group

03 = Pretest, applied to the control group

X = Experimentation of the independent variable (X1)

02 = Post-test, applied to the experimental group

04 = Post-test, applied to the control group.

Method: During the development of this research work, the experimental method will be used in order to deliberately manipulate the independent variable and thus be able to measure the effects on the dependent variable.

Population and sample: The research population consisted of 200 students from a Peruvian Faculty of Education." The study sample has been constituted according to table 02, determined by intentional non-probabilistic sampling.

Table (1) Study sample distribution

Institution	Group	Cycles	Classrooms	Quantity	Sample
UNE "Enrique Guzmán y Valle"-Faculty of Early Education	Experimental	II, III, IV	Cycle II: I-1, I-2; Cycle III: I-1, I-2, Cycle IV: I-1	100	100
	Control group	II, III, IV	Cycle II: I-3; Cycle III: I-3, I-4; Cycle IV: I-3	100	100

It is important to clarify that the sample selection criteria includes:

Inclusion criteria. In this research work, 100 students of V, VII and X cycles participated as an experimental group and 100 students of II, III and I V cycles as a group, both belonging to a Peruvian Faculty of Education, making a total of 200 students determined by the inclusion criteria according to the intentions of the researchers.

Exclusion criteria. For the present study, the participation of 100% of the population was decided using the census exclusion criterion. However, we are aware that not everyone participated at the same time during the application of both pre-test and post-test tests, proceeding to supply them at another time.

Techniques and instruments for data collection: During the execution of the research and basically for the collection of information, the survey technique has been used, complementing it, the recording technique and among others.

In this research work, the following instruments have been used:

Application program: In order to experiment with the independent variable, the application program will be developed on the management of agile methodologies for the development of students' competencies in order to carry out the experimentation of the independent variable (X1).

Descriptive Appreciation Scale: To measure the dependent variable (Y1), the Descriptive Appreciation Scale-EAD will be developed, which is supported by De Landsheere (1971, p. 66) cited by Ñaupas Paitán et al. (2014: 175) "in distance learning, categories and items are organized that are going to be appreciated or measured..." built based on the variables, dimensions and indicators of study.

Statistical data processing: to find the results , the following has been used: Quantitative analysis, to interpret the statistical data systematized in frequency tables and measures of central tendency.

Inferential analysis, to perform the hypothesis test according to the normality testing protocols for the normal parametric inferential statistics "Z".

Study hypothesis

- Agile methodologies significantly help the development of the competencies of the students of the UNE "Enrique Guzmán y Valle" 2023.
- Agile methodologies significantly help the development of students' general competencies.
- Agile methodologies significantly help the development of students' specific competencies.

Study variables

- Variable (X1) Agile methodologies
- Variable (Y2) Development of competencies

Operationalization of variables

Table (2) Operationalization of variables

Variables	Dimensions	Indicators	Measurement Index
Variable (X1) Agile methodologies	Kanban method	Maximizing Learning Efficiency	▪ Pre-Start (1) ▪ Home (2) ▪ Process (3) ▪ Sufficient (4) ▪ Featured (5)
		Continuous Learning Improvement	
		Flexible learning processes	
	Scrum method	Experiential learning, organizational dynamics, institutional change, self-organization, and critical thinking	
		Sprint Planning Capability	
		Collaborative work capability (Scrum team)	
		Responsibility in the delivery of work (Scrum Master Role)	
Variable (Y1) Development of competencies	General Competencies	Personnel	
		Professional Academic	
		Social ethics	
	Specific competencies	Disciplinary knowledge	
		Design and operationalization of teaching, learning and assessment strategies	
		Systematization of pedagogical practices	

Ethical aspects: During the execution of the research, the principles of objectivity, honesty and above all respect for the rights of authors and pertinent actions have been applied in order to avoid plagiarism.

Results:

After the questionnaire was applied to both the experimental group and the control group, the information was collected in its pre- and post-test modalities, then the data collected were organized in frequency distribution tables, as a result of the fieldwork. Once the data were

organized, the corresponding statistical calculation of the statisticians was carried out, at their descriptive and inferential levels, complementing them with the corresponding analyses.

In this way, the study variables were analyzed from the quantitative perspective. The validation of the instrument gave us the guarantee of its veracity and its certainty for subsequent analysis until the demonstration of the hypotheses, as will happen below where each hypothesis is demonstrated by comparing it with its respective null hypothesis. The following results are shown below:

Results at the descriptive level

Table (3) Frequency distribution of pre-test experimental group

		Frequency	Percentage	Valid percentage	Cumulative percentage
Score	2	8	15,4	15,4	15,4
	3	10	19,2	19,2	34,6
	4	22	42,3	42,3	76,9
	5	12	23,1	23,1	100,0
	Total	52	100,0	100,0	

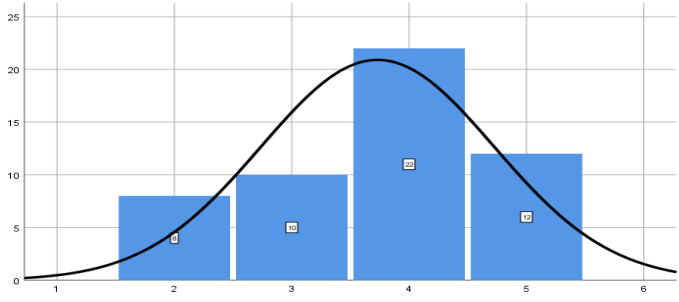

Figure (1) Histogram of the experimental group pre-test

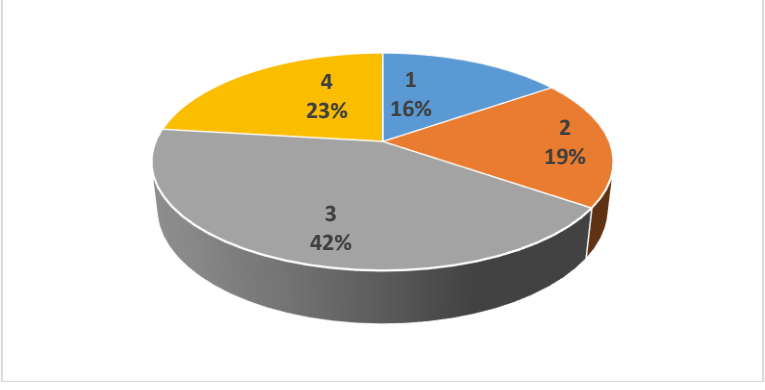

Figure (2) Percentage diagram of the experimental group pre-test

In Table 3, Figures 1 and 2 we observe that 22 students obtain a score of 4, representing 42% who respond that they have almost never developed their abilities based on the traditional methods applied by their teachers, 12 students obtain a score of 5, representing 23% who respond that they have sometimes obtained their abilities based on traditional methods, 10 students obtained a score of 3, representing 19% who responded that they had obtained their abilities almost always and 8 students had obtained a score of 2, representing 16% who responded that they had always obtained their abilities. These scores or grades are evaluated based on the vigesimal grade, which are generally failed grades.

Table (4) Frequency distribution of pre-test control group

		Frequency	Percentage	Valid percentage	Cumulative percentage
Score	2	6	11,5	11,5	11,5
	3	6	11,5	11,5	23,1
	4	16	30,8	30,8	53,8
	5	24	46,2	46,2	100,0
	Total	52	100,0	100,0	

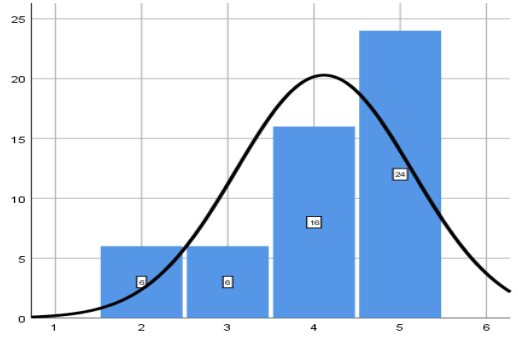

Figure (3) Histogram of the pre-test control group

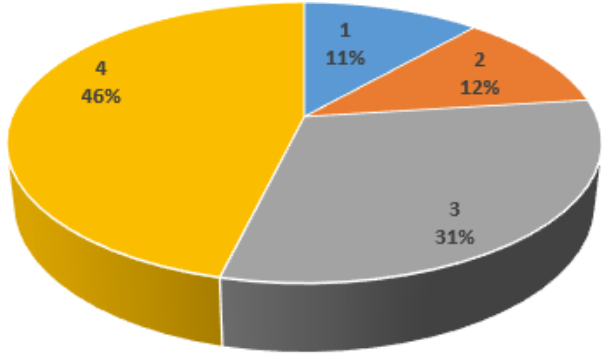

Figure (4) Percentage diagram of the pre-test control group

In Table 4, Figures 3 and 4 we observe that 24 students obtain a score of 5, representing 46%, who respond that they have almost never developed their abilities based on the traditional methods applied by their teachers, 16 students obtain a score of 4, representing 31%, who respond that they have sometimes obtained their abilities based on traditional methods, 6 students obtained a score of 3, representing 12% who answered that they had obtained their abilities almost always and 6 students had obtained a score of 2, representing 11% who responded that they had always obtained their abilities. These scores or grades are evaluated in the fail field. Under these conditions they entered experimentation.

Table (5) Frequency distribution of post-test experimental group

		Frequency	Percentage	Valid percentage	Cumulative percentage
Score	14	6	11,5	11,5	11,5
	15	8	15,4	15,4	26,9
	16	24	46,2	46,2	73,1
	17	6	11,5	11,5	84,6
	18	8	15,4	15,4	100,0
	Total	52	100,0	100,0	

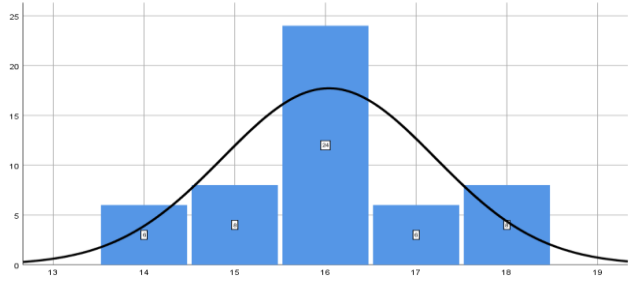

Figure (5) Histogram of the experimental group post-test

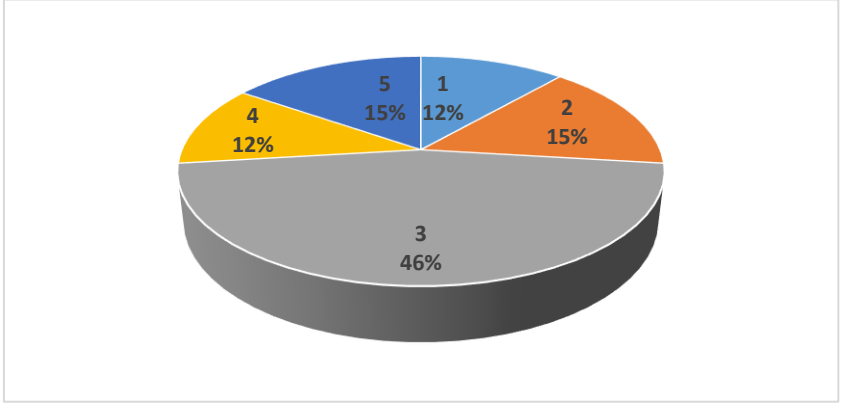

Figure (6) Percentage diagram of the experimental group post-test

In Table 5, Figures 5 and 6, we observe that 24 students obtain a score of 16, representing 46%, who respond that they have always developed their skills based on the new methods applied by their teachers, 8 students obtain a score of 18, representing 15%, that they respond that they have almost always obtained their skills based on the new agile methods, 8 students obtained a score of 15, representing 15% who responded that they had obtained their abilities rarely, 6 students had a score of 17, representing 12% who responded that they had almost never obtained their abilities based on new technologies, and 6 students had a score of 14, representing 12%. These scores or grades are evaluated in the pass field. Under these conditions they came out of experimentation.

Table (6) Frequency distribution of post-test experimental group

		Frequency	Percentage	Valid percentage	Cumulative percentage
Score	11	14	26,9	26,9	26,9
	12	20	38,5	38,5	65,4
	13	10	19,2	19,2	84,6
	14	8	15,4	15,4	100,0
	Total	52	100,0	100,0	

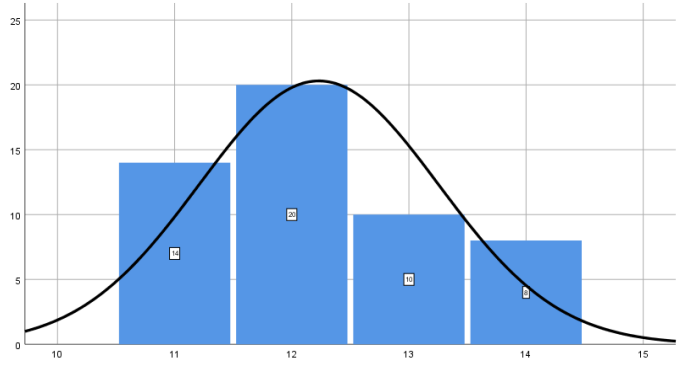

Figure (7) Histogram of the post-test control group

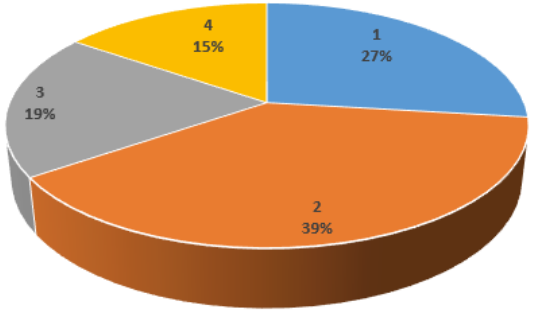

Figure (8) Percentage diagram of the post-test control group

In Table 6, Figures 7 and 8, we observe that 20 students obtain a score of 12, representing 39%, who respond that they have always developed their skills based on the new agile methods applied by their teachers, 14 students obtain a score of 11, representing 27%, who respond that they have almost always obtained their skills based on the new agile methods. 10 students obtained a score of 13, representing 19% who responded that they had rarely obtained their skills and 8 students had obtained a score of 14, representing 15% who responded that they had almost never obtained their skills based on the new agile methods. These scores or grades are evaluated in the pass field. Under these conditions they came out of experimentation.

Table (7) Statisticians of measures of central tendency

Statisticians	Pre test Experimental Group	Pre test Control Group	Post-test Experimental Group	Post-test Control Group
Stocking	3,73	4,12	16,04	12,23
Standard Mean Error	,138	,142	,162	,142
Median	4,00	4,00	16,00	12,00
Fashion	4	5	16	12
Standard deviation	,992	1,022	1,171	1,022
Variance	,985	1,044	1,371	1,044

Table 7 shows the statisticians or statisticians of the pre-test experimental group whose average score or grades is 3.73 and in the control group it is 4.12, making a difference of 0.39, their variances are 0.985 in the experimental group and in the control group it is 1.044, making a difference of 0.059 and their standard deviation in the experimental group is 0.992. being in the control group 1,022, which are very insignificant differences, considering both groups as homogeneous, in which circumstances they entered the experiment. After the experiment in the post-test, the experimental group obtained average scores or grades of 16.04, while in the control group its average is 12.23, making a difference of 3.81, which is a considerable difference in favor of the experimental group possibly a product of the experiment, for which we expose the inference part of the statistical process.

Results at the inferential level

Normality test

Here we expose the normality test required for the hypothesis test, where we verify that, if the data under study have a normal or non-normal distribution, using the inferential statistics Kolmogorov-Smirnov, Shapiro-Wilk.

Table (8) Normality Test

	Kolmogorov-Smirnova		
	Statistical	Gl	Gis.
Post-test experimental group	,243	52	,060
Post-test control group	,244	52	,058

In table 8 we observe that Sig. Pvalue = 0.060 in the Kolmogorov-Smirnov test, therefore, the rule is applied where P value is greater than 0.05 H0 is accepted, and the parametric statistics are developed that in this case corresponds to the normal Z,

Testing the Hypothesis

We developed the test of the hypotheses raised by means of normal parametric inferential statistics "Z" with the Computer Statistical Program SPSS – 25, (Statistical Package for Social Sciences).

A. Testing the general hypothesis.

HG: Agile methodologies significantly help the development of the competencies of the students of the UNE "Enrique Guzmán y Valle" 2023.

H0: Agile methodologies do not significantly help the development of the competencies of the students of the UNE "Enrique Guzmán y Valle" 2023.

Table (9) Z-Test for the General Hypothesis

	Levene test of variance quality		"Z" test for equality of means						
	F	Gis.	Z	Gl	Sig. (bilateral)	Mean difference	Standard error difference	95% confidence interval of the difference	
								Inferior	Super
Equal variances are assumed	1,013	,468	8,965	51	,000	3,81	,103	-2,796	1,693
Exit evaluation of both groups									
They are not assumed equal variances	1,025	,387	8,491	51	,000	3,43	,118	-2,583	1,561

Table 9 shows the results of the normal "Z" test, for independent samples (the experimental group and the control group), in its version of the Levene Test referring to the same or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 and a result of F = 1.013 confirm that the first condition of equality of variances is present and thus establish the General Hypothesis Test or HG according to the normal "Z" equal to 8.965, for the case of two independent samples and a difference of 3.81 plus Gl = 51 degrees of freedom and assuming a 95% confidence level, the null hypothesis is rejected and the alternative hypothesis that agile methodologies significantly help the development of the competencies of students of a Peruvian University in 2023 is accepted.

B. Testing of specific hypotheses

Now the demonstrations or docimasias of the specific hypotheses are presented, in accordance with the rules of decision, where the fulfillment or not of the alternative hypotheses with respect to the null hypotheses is determined, in each case that corresponds. This is what hypothesis testing is all about.

Specific Hypothesis Test 1

HE1: Agile methodologies significantly help the development of students' general competencies.

HE0: Agile methodologies do not significantly help the development of students' general competencies.

Table (10) Z-Test for Specific Hypothesis 1

Levene test of variance quality		Z-test for equality of means								
		F	Gis.	Z	Gl	Sig. (bilateral)	Mean difference	Standard error difference	95% confidence interval of the Difference	
									Inferior	Super
Exit evaluation of both groups	Equal variances are assumed	1,197	,482	8,949	51	,000	3,73	,181	-2,825	1,748
	Equal variances are not assumed	1,019	,374	8,537	51	,000	2,495	,187	-2,659	1,543

Table 10 shows the results of the normal "Z" test, for independent samples, such as Levene's test referring to the same or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 together with the normal "Z" equal to 8.949, the null hypothesis is rejected and the alternative hypothesis is accepted where agile methodologies significantly help the development of students' general competencies.

Specific Hypothesis Test 2

HE2: Agile methodologies significantly help the development of students' specific competencies.

HE0: Agile methodologies do not significantly help the development of students' specific competencies.

Table (11) Z-Test for Specific Hypothesis 2

Levene test of variance quality		Z-test for equality of means								
		F	Gis.	Z	Gl	Sig. (bilateral)	Mean difference	Standard error difference	95% confidence interval of The difference	
									Inferior	Super
Exit evaluation of both groups	Equal variances are assumed	1,085	,459	8,7	51	,000	3,18	,173	-2,778	1,683
	They are not assumed equal variances	1,038	,419	8,4	51	,000	2,317	,162	-2,594	1,583

Table 11 shows the results of the normal "Z" test, for independent samples, such as the Levene test referring to equal or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 together with the normal "Z" equal to 8.70, the null

hypothesis is rejected and the Alternative Hypothesis is accepted where agile methodologies significantly help the development of students' specific competencies.

Discussion

According to the statistical parameters, the results of the research objectively evidence the scientific validity of the study because they are coherent and pertinent according to the problem statement, objectives and the respective hypotheses.

Meanwhile, according to the values in Table 51, the statisticians or statisticians of the pre-test experimental group whose average score or grades is 3.73 and in the control group is 4.12, making a difference of 0.39, their variances are 0.985 in the experimental group and in the control group it is 1.044, making a difference of 0.059 and their standard deviation in the experimental group is 0.992. being in the control group 1,022, which are very insignificant differences, considering both groups as homogeneous, in which circumstances they entered the experiment. After the experiment in the post-test, the experimental group obtained average scores or grades of 16.04, while in the control group its average is 12.23, making a difference of 3.81, which is a considerable difference in favor of the experimental group possibly a product of the experiment, for which we expose the inference part of the statistical process. These results are fully close to the studies of Caro et al. (2021) who based their research on: Agile Methodologies and their Impact on Organizational Culture: Study in a Business Process Outsourcing company, ESAN University, Peru. Within this, in terms of the methodology, of qualitative approach, its results allowed to conclude that: the type of organizational culture is important for the effective implementation of agile methods, they must go through a process of change and flexibility.

Table 53 shows the results of the normal "Z" test, for independent samples (the experimental group and the control group), in its version of the Levene Test referring to the same or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 and a result of F = 1.013 confirm that the first condition of equality of variances is present and thus establish the General Hypothesis Test or HG according to the normal "Z" equal to 8.965, for the case of two independent samples and a difference of 3.81 plus Gl = 51 degrees of freedom and assuming a 95% confidence level, the null hypothesis is rejected and the alternative hypothesis that agile methodologies significantly help the development of the competencies of students of a Peruvian University in 2023 is accepted.

Table 54 shows the results of the normal "Z" test, for independent samples, such as Levene's test referring to the same or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 together with the normal "Z" equal to 8.949, the null hypothesis is rejected and the alternative hypothesis is accepted where agile methodologies significantly help the development of students' general competencies. Table 55 shows the results of the normal "Z" test, for independent samples, such as Levene's test referring to the same or different variances. Therefore, a bilateral significance of 0.000 less than the predetermined significance 0.05 together with the normal "Z" equal to 8.70, the null hypothesis is rejected and the Alternative Hypothesis is accepted where agile methodologies significantly help the development of students' specific competencies. This statement is quite close to the results of Sánchez Valcárcel (2019) who in his research entitled: Agile methodologies and their influence

on labor productivity Inversiones Innova S.A. Los Olivos- 2019, Universidad Cesar Vallejo del Peru.

Through a correlational descriptive research, it concludes that: there is a very high or strong correlation of 0.896 between agile methods and productivity, so it was determined that agile methods have a great impact on the labor productivity of workers, so it was proposed that if the right type of methodology is used in an agile environment, The organization would benefit, which confirms that these processes help to improve the process and maximize the skills of the company's employees. In this same idea, Kuz et al. (2018) in their scientific article entitled: Understanding the Applicability of Scrum in the Classroom evidences in one of their conclusions that, the different topics that are considered when working with Scrum, effective and efficient learning can be achieved, since collaborative work is a key element to achieve competencies.Consequently, all the results of this research work show 100% of the validity of the hypotheses formulated and as such, agile methodologies significantly help the development of students' competencies and then serve as a source of consultation for researchers.

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