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Didactic Resources and Cooperative Learning, In the Achievement of Competencies in Higher Education Students Lima

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ABSTRACT: The purpose of this study is to ascertain how cooperative learning and didactic resources affect the development of competencies in the training units for students in the automotive mechanics specialty's II, IV Cycle at the Antenor Orrego Espinoza public technological higher education institute in the district of Chorrillos, Lima, 2026. The current study is of a basic kind with a causal correlational descriptive level, a non-experimental design, and a sample of 135 students. The results are supported by the test of a particular general hypothesis and the descriptive analysis presented in tables and figures. The findings show that cooperative learning and didactic materials have a positive impact on students' acquisition of competencies in the training units of the Antenor Orrego Espinoza public technological higher education institute of the district of Chorrillos, LIMA-2026's automotive mechanics specialty in cycles II and IV.

1. INTRODUCTION

In the new era, the whole world has been experiencing gigantic changes, in the economic aspect, in the quality of infrastructure and in the quality of education. At the international and national level, not all these changes of globalization respond to solving educational policy, in some countries economic development is centralized in education, because education is the basis for social development. In Latin America, education requires an economic boost, enhancing the quality of education. [1]

The national government in Peru is no stranger to the educational problem, the country has undergone several changes in educational policy, without being able to improve the quality of education, one of the most relevant problems is corruption in educational officials. In addition to this, the scarce budget allocated to the education sector, another of the problems that afflicts the country: education in Peru is centralized in Lima, and the schools outside the country are totally neglected, added to the teachers with difficulty in the development of their classes due to lack of training. [2] In the place of studies of the present study work, there is difficulty in the adequate use of educational resources in the process of developing academic activities, as a result of which graduate students have many difficulties to enter universities, to insert themselves into the productive sector. [3], [4]

Education has been focused more on instruction and not on the cognitive training of students, currently other countries point to learning as the basis of training processes, but not the achievement of competencies in students. Published by UNESCO in 2015. He has published a study on the state of the world and highlights the changes that globalization has brought about throughout the world. [5], [6]

Economic globalization in the world has generated various changes, for example, poverty has been reduced in the world, as well as the growth of underemployment. This has generated youth unemployment in addition to informal work, economic globalization in the world is generating inequalities between the Netherlands. [7] The education system contributes to inequalities by discriminating against the primary educational needs of school-age inhabitants, due to this disadvantageous situation the inhabitants of poor countries do not find opportunities for quality of life. While developed countries globalization and economic growth have strengthened the education system, and therefore have a very specific character to learning activities and quality education. These changes that are being generated are generating different educational systems. The new context of social changes requires an educational approach focused on learning and educational quality. [8]

In Peru the educational system has gone through many educational reforms, these educational reforms have not solved the problem of educational coverage and quality in the technological institutes, this can be observed, in the infrastructure of the public technological institutes that are falling apart, the discontinued educational materials that are not in accordance with the technological advances in the automobile. [9] All this directly influences learning, as a result of which graduates have obstacles to insert themselves into the productive sector, the government of the day has not been clear how it should be done to face this educational problem that has afflicted for decades, to all this is added educational inequality, the lack of updating of teachers, and inadequate management of educational methods during the teaching and learning process. [10], [11]

In the public technological higher education institute Antenor Orrego Espinoza (AOE), in the district of Chorrillos, he is not oblivious to the problem that affects the educational sector, since the educational policy and the lack of understanding of the government affects, to the automotive mechanics specialty of the AOE institute, the main problem in the aforementioned specialty is the lack of implementation with the latest generation diagnostic equipment and instruments. to carry out the diagnosis, maintenance and repair of vehicles, directly affects the training of students, added to it lack of training of teachers, inadequate use of teaching resources, lack of adequate teaching methods and strategies, without a doubt these weaknesses negatively influence learning, as a result of which graduate students have many difficulties to insert themselves into the productive sector.

The objective of this research study is to provide a teaching-learning method through an interactive educational method. The appropriate use of didactic resources, plus cooperative work in the academic training of students of the automotive mechanics specialty of the AOE Institute.

2. PREVIOUS WORK

2.1 International Jobs

In [12] conducted a study: The general goal was to determine the relationship between sixth-grade Loyola School students' attitudes toward cooperative work and their ability to earn a Bachelor of Licentiate degree from Rafael Landívar University in Guatemala. 97 students made up the sample for the descriptive methodology, which used a qualitative approach, a non-experimental cross-sectional design, a survey, and a Likert-type questionnaire as an instrument. The SPSS software, version 3.0, was used for statistical analysis. After completing his research, he was able to draw the conclusion that Colegio Loyola students have a favorable attitude toward teamwork; They also observed that there are no statistically significant variations between male and female pupils regarding the attitude towards cooperative work.

Also, in [13], carried out a research in Ecuador entitled: Proposal for the implementation of puppet theater as a pedagogical tool for the development of creativity and aesthetic training of children from 5 to 6 years old, from the Equinoccial Technological University, Ecuador. Be set as an objective. To design a program proposal for the implementation in the classroom of puppet theater as a pedagogical tool for cognitive development and creativity and aesthetic training in children from 5 to 6 years old, the experimental design, at the end of the research concludes that teachers are willing to participate in training for the incorporation of puppets in the process of training students, On the use of puppet theater as a pedagogical tool, teachers are motivated.

In [14], carried out a research entitled. Future teachers of Social Sciences in the face of new educational technologies: Competencies and attitudes at the University of Alicante – Spain, type of non-experimental research, the design of cross-sectional descriptive research, the technique applied was applied to 267 students of pedagogy, at the end of the research study it reached

the following conclusion: The majority of respondents believe that the use of ICT's is beneficial for teaching-learning of the CC.SS. They serve from greater to lesser importance, to motivate, apply, instruct and attend to diversity.

The following are the research works carried out on cooperative learning:

In [15], supported a research study at the University of Rafael Landívar- Guatemala entitled Cooperative Learning and its Impact on Spelling. The type of quantitative research of quasi-experimental design, the population was made up of all the students of the first grade of the Communication and Language course. He worked with a sample of 13 males and 12 females. At the end of the study, the following conclusions were reached: There is a significant difference when the spelling of the students was compared before and after cooperative learning. On the other hand, it was found that cooperative learning techniques improve students' spelling since some of the students had spelling mistakes that corrected their academic performance.

Next, in [16], carried out a research study entitled Cooperative learning as a strategy for learning the English language, at the Rafael Landívar University- Guatemala. The type of experimental research, the population was made up of 74 students. The sample consisted of 34 students who were part of the control group and 34 students from the experimental group. Reaching the following conclusions: the application of the cooperative learning method applied in the English course has contributed positively to the experimental group, from having a failing average to having a passing grade.

In [17], carried out a research study entitled Cooperative work as a didactic strategy to develop the capacity for autonomous and critical thinking promoting meaningful learning in students of the San Bartolomé School and the University of Cuenca – Ecuador. The objective of the study has been to design a methodological proposal based on cooperative work strategies and techniques that promote in the student the development of the capacity for autonomous and critical thinking in the subject of mathematics. Experimental and propositional research design, in which exploratory and descriptive work was used in a mixed population of 235 students. And reaching the following conclusion: Cooperative work in the learning process of students is one of the dynamic models that has influenced academic performance, and autonomy in students, since it has as a platform the direct interaction between students, where each student is the protagonist in contributing cooperatively in the tasks to achieve common objectives. for this, the teacher plays an important guiding role.

In [18] conducted a research study. Entitled Dynamic cooperative learning in the achievement of competence in the mathematical area with students of the I cycle of computing of the Institute of Education. In which the objective has been planned: To achieve with Dynamic Cooperative Learning the competence of the area of mathematics with students of the I cycle of computing of the Institute of Technological Higher Education of Juli – 2016. The population was made up of 145. The sample was 80 students in the experimental group and 40 students in the control group. Technique: Data analysis. The instrument: Observation, at the end of the research study reached the following conclusion: It is stated that the application of Dynamic Cooperative Learning in academic activities significantly achieved the competencies Problem Solving, Mathematical Reasoning and Argumentation, Mathematical Calculations.

Also, [19] in his research entitled Group techniques as a methodological strategy in the acquisition of teamwork competence and the change of attitudes in the group work of students of the first year of teaching - Granada, Spain, proposed as a study objective to sensitize students in participatory techniques, such as teamwork, through fluid, clear communication, with respect and empathy as fundamental values; as well as responsibility towards the common goal. The methodology of applied quasi-experimental research, with a quantitative approach, experimental research design, the technique used was a survey and as an instrument the multiple-choice questionnaire, the sample was non-probabilistic of 59 students. The inferential statistician was U Mann Whitney and Kolmoboro - Smirnov. He came to the following conclusions: through teamwork, students value communication, highlighting dialogue and listening as fundamental elements of it.

The following are the research works carried out on the achievement of competencies:

In [20], carried out a research entitled. Pre-Professional Practices for the development of competencies of Educational Psychology students of the Vicente Rocafructe Lay University for the optimization of their training and proposal of an alternative system, with the following objective: To investigate the current system of pre-professional practices of educational psychology students. The descriptive-exploratory methodology, the population was made up of 264 students and 20 teachers of Educational Psychology. Survey technique. At the end of the research study, it came to the following conclusion: Being an education career, 96% considered that it is beneficial to carry out in educational institutions to develop skills, 84% students considered that carrying

out pre-professional internships before completing their professional career is a fundamental pillar for the achievement of professional competencies

Moreover, in [21] conducted a research study entitled Application of methodological strategies for the development of critical thinking in the area of language and literature in sixth-year students of basic education at the Tres de Noviembre school in Cuenca – Ecuador. Aiming to. Determine how to communicate from the production and comprehension of texts, to use and value language as a tool for personal expression. The type of applied research of quasi-experimental design. The methodology used in this research study was constructivism, reaching the following conclusion: as a result of the research study, it provides important material for the teacher to use in his/her activities within an educational center or outside of it, the research study also provides important material for students.

2.2 National works

The following are the research works carried out at the national level on teaching materials, cooperative learning and the achievement of competencies:

In [22], carried out a research entitled The incorporation of modern audiovisual media in the teaching of the secondary level at the Enrique Guzmán y Valle National University – La Cantuta. Type of research applied. Quasi-experimental design, and came to the following: The use of audiovisual media as a didactic medium in the development of academic activities improves student learning, it has also been determined that without the use of audio-visual media, students have learning difficulties. Teaching materials as a didactic resource in the training of students influences cognitive development.

In [23] conducted a research study entitled Internet Use in Schoolchildren in Metropolitan Lima at the Women's University of the Sacred Heart – UNIFE. Type of descriptive-explanatory research, the causal correlational descriptive design. The instrument used was a survey of 112 secondary school students, in its conclusion: "The most frequent use of the Internet by schoolchildren is online games, which are of the type of action games with a high content of aggressiveness and death. Other uses also indicated as frequent are: searching for information for schoolwork, looking for information about things that interest them and writing emails."

In [24], carried out a research study entitled, Use of information and communication technologies in the learning of social sciences of students of IV Semesters of the IST Gilda Ballivian Rosado 2016, with the following objective: To determine the relationship of ICTs in the learning of Social Sciences. Quantitative research methodology. Design does not experiment. The instrument used was a Likert questionnaire. The technique through data collection and respective tabulation reached the following conclusion: The use of ICTs positively influences student learning, since students actively turn to information and communication technology.

Also, in [25] conducted a research study entitled ICTs as a didactic resource in the learning of Natural Sciences in students in the First Year of Secondary Education of the Educational Institutions of San Juan de Miraflores. Type applied. Pre-experimental design. The Likert-type instrument. The survey technique applied to 99 students. As a result of the research, he reached the following conclusion: ICTs are the fundamental means in the process of student training, since their use as a didactic means students can observe, experiment, identify, qualify the topics developed in the classroom, allowing the understanding of the topics covered to be significant

Below are the research works carried out on Cooperative Learning

In [26] defended at the César Vallejo University the thesis Cooperative work and its incidence in learning in the area of Communication of students in the first grade of secondary school. The type of study was applied with a quasi-experimental design. The population was composed of 1520 students at the secondary level; the sample consisted of 70 students, corresponding to sections B-C. In short, reaching the following conclusions: The application of the cooperative learning method as an academic method increases the level of learning of students. According to the interpretation of the results, it is observed that a percentage of 91% was obtained learning compared to the control group, who showed a percentage of good-regular of 55%.

Then [27], carried out a research entitled in his thesis he carried out the research entitled Cooperative Learning and Self-Regulation of Behavior in Students of the Cesar Vallejo Mendoza Lima Educational Institution. The objective was to determine the influence of the cooperative method to self-regulate the behavior of basic education students. The study is of a basic type, the design is quasi-experimental, using the pre-test and the post-test with experimental and control groups. The population was

composed of 280 students from the first to the fifth grade of secondary school, and the sample was chosen in a non-probabilistic way and was made up of 26 students from the 4th year A who make up the experimental group and 26 students from the 4th year B who make up the control group, the technique was observation and the instrument that has been used an observation guide. The author concluded: The application of cooperative learning as a strategic method significantly influences the self-regulation of students' behavior in the workplace.

Next [28] presented the thesis entitled Cooperative work and its relationship with the academic performance of students in the subjects of educational sciences. Its objective was: To analyze the relationship between the cooperative work method and the academic performance of students of the Faculty of Education of the University of the Amazon. The sample consisted of 187 students, the methodology used was hypothetical deductive of basic descriptive type. Non-experimental design. The liker-type questionnaire instrument. The survey technique. He came to the following conclusion: Cooperative learning is significantly related to the academic performance of students at the National University of the Amazon.

In [29], their research work entitled Cooperative Teaching Strategies, Puzzles and Group Research, in the development of Social Skills in the Fifth Grade of Primary Education in an I.E.P of Canto Grande. Setting as an objective: To determine the cooperative teaching strategy through the puzzle and group research, for the development of social skills in order to strengthen interpersonal relationships. The hypothetical deductive methodology. The type of research was descriptive with a quantitative approach. The non-experimental design applied the techniques of the survey for which they used the questionnaire as an instrument, for observation they used the observation sheet as an instrument, the population has been constituted by the students of the primary level of the private educational institution Canto Grande in a sample of 40 fifth grade students. They concluded that 75% of students manage to develop social skills through the collaborative teaching strategy, when the teacher incorporates the puzzle game into the didactic sessions.

Plus, in [30] conducted a research study titled Cooperative Learning and Academic Performance in Santa Anita District Colleges. Its objective is to determine the relationship between cooperative learning and academic performance. Type of study Descriptive research at the correlational level. Non-experimental study design, Hypothetical deductive method with a quantitative approach. The population was made up of 120 students, the non-probabilistic sample has been taken 100% of students. Questionnaire instrument, Survey technique. He came to the following conclusion: According to the results of the research, it has been determined that cooperative learning as a strategic method is closely related to the academic performance of students, according to the statistical results the Pearson value equal to 0.789 % describes a positive relationship, the value of $p = .000$ which is less than 0.05, It is assumed with the proposed model and the working hypothesis is accepted, that is, that cooperative learning influences academic performance.

Besides, in [31] conducted a research study entitled Cooperative Learning in the Development of Cognitive Skills in High School Students of I.E. 3051. The objective has been to determine the influence of Cooperative Learning on the improvement of the development of cognitive skills. The research was of an applicative type of explanatory level. The quasi-experimental design. The population was made up of 62 students. The research work consisted of two control groups and an experiment group. He used an observation sheet with 25 questions as an instrument. He concluded as follows: Cooperative learning significantly influences the development of cognitive skills with a significance level $p=0.026$ lower than $\alpha= 0.05$.

The following are the research works carried out on the achievement of competencies:

In [32], his thesis entitled: Improvements in the achievement of competencies in anatomy learning, through the application of the Problem-Based Learning (PBL) method students of the II cycle of the subject of Human Anatomy of the Faculty of Dentistry of the San Luis Gonzaga University of Ica. Setting itself as an objective. To determine improvements in the achievement of competencies through the application of the Problem-Based Learning (PBL) method. The type of research is applied. The design of quasi-experimental research. The study population consisted of 44 students. The sample was made up of 44 students, at the end of the research the following conclusion was reached: The problem-based learning method according to the analysis of the descriptive statistical results the achievement of conceptual, procedural and attitudinal competencies significantly improves ($p<0.05$) the achievement of conceptual competencies which was demonstrated by applying the Student's t-test

In addition, [33] carried out a research study entitled: The development of labor competencies and the training of professionals in tourism, at the National University of San Marcos- Year 2013. The objective has been to determine the relationship between the development of labor skills and the training of professionals in Tourism. Basic descriptive type. Non-experimental design. It used a Lickert scale questionnaire as an instrument, and the non-probabilistic sample that was made up of 96 students. The result

was that 59.38% of the work skills are good and the training of professionals in Tourism is described as a percentage of 48.96% that means good. He came to the following conclusion. The relationship between the development of work skills and the training of professionals is direct and significant.

As well, in [34] carried out a research study entitled Project Management and the Development of Labor Competencies in the Municipality of San Juan de Lurigancho. Its objective is to determine the relationship between project management and the development of work skills. The hypothetical deductive method, at the correlational level. The design of non-experimental research. He used the questionnaire as an instrument, and the technique was a survey. The population was made up of 100 workers, including technical professionals, formulators and project managers from the municipal management areas. The sample was the non-probabilistic method, according to the interpretation of the statistical results reached the following conclusion: The 100 students surveyed where 16% reveal that they do not know about investment project management, while the other 40% reveal that they have an acceptable level, and another 40% of respondents have a good level in project management. And in the inferential results, in the general hypothesis "There is a direct relationship with Spearman's Rho, a value of 0.823** was obtained (the correlation is significant at the level 0.01 (bilateral)) and with a degree of significance is 000, then it is satisfied to be less than 0.05, therefore, the rejection of the null hypothesis is concluded, and it is accepted that there is a significant relationship between the management of public investment projects and the development of workers' skills.

Besides, in [35] carried out a research entitled Scientific attitude and achievement of the competencies of the research course in the students of Education of the National University of San Marcos, 2015. Its objective is: To determine the relationship between the scientific attitude and the achievement of competencies. The quantitative research approach of the correlational descriptive type, basic research design. The population was made up of 620 students, and the probabilistic sampling sample, at the end of the research study, reached the following conclusion: according to the inferential statistical results, there is a significant relationship between the scientific attitude and the achievement of competencies, given the value ($r = 0.600$) and the value of significance = 0.000, then ($p < 0.05$). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, according to the results obtained there is a direct and significant relationship between the scientific attitude and the achievement of competencies.

3 THEORETICAL FRAMEWORK

3.1 Teaching Resources

Didactic resources are those means that provide the teacher in the development of academic activities in the classroom, facilitating learning and the development of skills, without a doubt the appropriate use of didactic resources is essential in the course of teaching, since they are intermediaries in curricular development. Below are the authors who support the importance and impact of teaching resources. [36], [37]

In, [38] says that didactic resources are the whole set of mediating and strategic elements that facilitate the teacher to develop a dynamic class.

In [39], classifies the educational resources, the conventional didactic means are any material that has been developed as a didactic means that facilitates the development of the classes for the teacher, and at the same time facilitates the learning of the students, below, the didactic resources conventions are mentioned: reprints, books, photocopies, didactic models, blackboard, Gigantography, cardboard, Still images project them (photos), slides, photographs. Among the modern teaching materials or new technologies we have. Audiovisuals, simulators, TV, virtual platforms, interactive whiteboards, websites, blogs, virtual tours, WebQuest. These teaching materials allow students to consolidate their motivation and learning. (p.4).

It states that: Didactic media are all those audiovisual equipment and materials developed with the purpose of facilitating the teaching and learning processes. Therefore, these didactic media are channels that facilitate in the course of teaching-learning, during the course of academic activities in the classroom, offering significant advantages in the acquisition of concepts, skills, attitudes and abilities (p.5). [40]

According to the definition of the aforementioned authors, the use of didactic resources at the educational level for the teacher, it is essential to choose properly the didactic resources for the course of instruction and meaningful learning, since the use of didactic resources and educational materials are strategic tools that enrich the teaching and learning process in the classroom. [41]

Throughout history, teaching resources have evolved significantly, enriching the process of instruction and learning. In education, initially the blackboard has been one of the most used didactic resources in the classroom, nowadays with the appearance of new technologies, the blackboard continues and will continue to be one of the essential means in the classroom, then, highlights the importance of ICT in the educational course. [42]

It argued that ICT is a tool and very important in the search for information and exchange of information if it is used properly, these innovative didactic resources help to develop the capacities and strengthen the acquired competencies of students, ICT as a didactic resource offer many advantages in the course of teaching and learning in an educational institution various tools that when used and appropriately, it becomes an educational means fundamental as an educational tool, the incorporation of new information and communication technologies within the course of instruction. [43]

The use of new information and communication technologies ICTs, in the process of the academic training of students, ICTs are considered an important means in this process since the use of ICTs facilitate the processing of the topics developed in the classroom, likewise the association of ICTs in humanity specifically in the contour of education has been gaining significantly the importance of their use In the classroom, since the proper use of these media raises the level of learning of students, added to it the incorporation of ICTs in education, the teacher had to be trained and adapt to these media to the strategies and methods of their teaching. [44]

It indicated that ICT is the set of tools that plays an important role in different areas, its incorporation in an educational institution is fundamental as an instrument for the exploration of information and exchange of information and storage, the use of ICT in the course of pedagogical training significantly expands the physical and mental capacities of students. [45]

It agrees that didactic materials are those means and resources that facilitate the teacher to carry out academic activities in the classroom, and in students it significantly influences learning, on the other hand, modern or technological didactic resources require a certain training in correct handling, in order to lead and advise students. [46]

It considered that didactic materials are considered to be all the means and materials that facilitate the process of developing capacities in various subjects, these didactic resources have been developed for educational purposes and must have certain characteristics, their use goes directly in the manipulation during academic activities, hence their importance as channels or mediators that facilitate the development of actions academic within a classroom. Didactic resources make it easier for teachers and students to organize, plan, elaborate projectable resources, prepare charts, elaborate visual organizers, exchange information, store information, etc. [47]

It stated that since the beginning of the human being, education and instruction have been a fundamental process in the improvement of skills, in which didactic resources have been strategic and didactic means. At present, the use of didactic resources as methodological strategies in educational institutions is a fundamental instrument in the course of teaching, learning and the achievement of competencies in students. [48]

In this regard, it indicated that educational materials that incite the senses and train knowledge, harmonized with the mental and motor capacity of the human being, are those that actually accommodate it during the course of teaching mathematical logic and increase the interest of students. [49]

According to Ausbel's theory, the human being through his experiences, learning is generated, from that point of view the use of didactic materials in educational institutions, is of utmost importance, since these resources facilitate students the acquisition of new knowledge and the achievement of competencies, that is why in this research study the hierarchy of the use of didactic resources in the field is highlighted. classroom, since the educational media significantly favor the teaching-learning process. [50]

Dimensions of the variable teaching resources

It classified the educational resources conventional materials: Printed matter (texts), books, photocopies, newspapers, documents, Didactic boards: blackboard, flannelography, manipulative materials: cut-outs, cardboard, Games: architectures, board games laboratory materials b). Audiovisual materials: Projectable still images (photos), slides, photographs, sound materials (audio): cassettes, records, radio programmes, audiovisual materials (video): audiovisual montages, films, videos, television programmes c) New technologies: Educational software (CD or on-line), video games, author's languages, learning activities, multimedia presentations, encyclopaedias, animations and interactive simulations, Telematic services: websites, weblogs, virtual tours, webquests, treasure hunts, email, chats, forums, teaching units and online courses, interactive TV and video. [8]

Dimension 1: Conventional teaching resources.

For the present research study, conventional didactic resources used with public technological higher education students AOE from the district of chorrillos have been taken as conventional didactic resources. The blackboard reprints, flip pages, sheets and didactic models. [11]

Dimension 2: Modern teaching resources

For the present research study, conventional didactic resources used with public technological higher education students AOE from the district of chorrillos have been taken as conventional didactic resources. Multimedia equipment, electronic presentations, web pages and video conferences. [16]

3.2 Cooperative Learning

It stated that Cooperative Learning is a strategic method of learning in groups that start from the classification and organization of the class into mixed and heterogeneous cooperative groups, in which students work collectively in a coordinated way to solve academic tasks and achieve the common goal, for the achievement of common objectives each student has the responsibility to cooperate. [25]

It stated that cooperative learning is a strategic means in the process of instruction and learning in small groups, with this method of cooperative learning traditional teaching is abandoned. Given that cooperative learning as a teaching and learning strategy fosters the responsibility in each of the students to cooperate in the development of academic work to achieve common objectives, for this purpose the help of the other classmate is essential. Working cooperatively together in a cooperative way improves academic performance, autonomy and self-esteem and social skills in students. [28]

It stated that "cooperation consists of working together in academic work to achieve common objectives. To this end, individual students have the responsibility to cooperate in order to seek personal success and that of the cooperative group." [5]

Following, "they stressed that cooperative learning "is the instructive use of small groups for students to work together and make the most of their own learning and that which occurs in interrelation". [10]

According to the authors' definition, cooperative learning is an educational model based on teamwork, and emphasizes the role of each member as a committed and actor in their learning process, which means that each of the members of the cooperative group work together to achieve the common goal, Through this educational model, students will develop skills, since companies require people with certain potentialities to solve the needs of the general population. [11]

Next, the definition of the theoretical bases of the dimensions of the cooperative learning variable.

According [22], they argue that cooperative work is a didactic method of learning in small groups, where each student is the protagonist of his or her own learning, in cooperative work each student has the responsibility to cooperate in the tasks to achieve the objectives set by the cooperative group. The student, through interaction with their classmates, develops the ability to reason, critical thinking. In such a way that learning in cooperative groups during academic training in the classroom generates the following: learning to learn, interdependence, autonomy, interpersonal relationships, social skills, the capacity for self-criticism, values are promoted.

According to the definitions through cooperative work, students carry out group work sharing responsibilities in each activity and then cooperate with what they have learned. Through this learning strategy students strengthen their learning techniques. From the beginning, man coordinated day by day to carry out various activities in his daily life, and through dialogue and coordination and interaction they achieved common objectives, from that perspective cooperative work becomes a tool for interactive teacher-student learning. With this research study, cooperative work will be encouraged in the study center with the purpose of the student developing social skills and cognitive skills. [26], [28], [33]

It stated that the current educational reform in the curriculum is focused on developing capacities to achieve conceptual, procedural, and attitudinal competencies in students. The methodology of working together cooperatively in the resolution of academic tasks in the classroom, this activity of working cooperatively is beneficial in the learning of the students. [34]

The aforementioned authors agree that the cooperative learning strategy is not the same as group work. In the cooperative learning method, each student performs a task and then cooperates what they have learned to reach the common goal of the cooperative group, from that point of view with the cooperative work of learning, with the work method [46]

Cooperative: The teacher and the students actively participate during the course of teaching-learning, through this active method, students learn to teach and help each other.

They emphasize that CA "is the instructive use of small groups for students to work together and make the most of their own learning and that which occurs in the interrelation". [51]

In addition [40], highlight two types of cooperative learning groups: informal learning groups. Students work together in temporary groups that last from a few minutes to a class to achieve shared learning goals. These groups are used to focus students' attention on the subject the teacher is teaching, create expectations and mood that are conducive to learning, ensure that students cognitively process the subject matter, and conclude an instructional session. These groups also ensure that misconceptions or incompleteness are identified and corrected and that learning experiences are personalized. Every 10 to 15 minutes, students should be asked to talk about what they are learning. Interrupting the lectures with moments of cooperative processes will undoubtedly shorten the time available for the presentation, but it will help to solve the fact that the classes go from the teacher's notes to those of the student without going through his mind. b) Formal learning teams. Students work together during one or more sessions to achieve shared learning objectives and complete tasks or activities together (decision-making, problem solving, completing a unit, writing a report, conducting an experiment, reading a chapter of a book, learning vocabulary, answering questions in the topic). In this type of group, the teacher:

- a) Make prior decisions: formulate objectives, decide on the number of members of the groups, choose a method for creating the groups, decide on the role of each member of the group, organize the class and prepare the material.
- b) Explain homework and cooperative structure: explain the academic task to students, explain the criteria for success, structure positive interdependence, explain individual responsibility, and communicate the behaviors you expect to see during the lesson.
- c) Observe and intervene: observe and follow each group, intervene only when necessary to improve teamwork and conclude the lesson.
- d) Evaluate and process: Evaluate the quality and quantity of the result obtained by each student, ensure that students process the effectiveness of their work groups, encourage students to carry out an improvement plan and get students to celebrate the good work of group members. Students are expected to complete the task with each other, to interact, to share material and ideas, to support each other, to verbalize concepts and strategies, and to hold each other accountable. The teacher must be clear that the challenge is not only to cover the subject to pour it on the students but to discover it with them so that they integrate it into their knowledge.

3.3 Achievement of competencies

According [35], it indicated that "competencies are a set of behaviors put into practice in a work situation: specific knowledge and knowledge, aptitudes and know-how, personal and professional intelligence, willingness to take action". (p.15).

Likewise, it stated that "they are the ability to effectively perform an activity, mobilizing the knowledge, skills, and abilities necessary to achieve the objectives of the activity. It involves the provision of solutions to situations that arise during the development of the work". [49]

Conceptual competencies

Conceptual competencies are related to basic knowledge of things, data, facts, concepts, principles, and laws.

Procedural competences

Procedural competencies are orderly procedures aimed at solving problems, these procedures facilitate the achievement of competencies. Where the student will be the main actor in the development of the ability to know, do and be.

Attitudinal competencies

Attitudinal competencies are made up of values, norms, solidarity, honesty, tolerance. Attitudinal competencies include knowing how to be, knowing how to do.

The Theory of Learning. It is focused on the learning process of the individual. In the works of Piaget, Vygotsky and other theorists.

For Piaget, when students cooperate in the classroom, there is an exchange of ideas and critical appreciations in the classroom, generating new learning

For the said that the acquisition of new knowledge is the consequence of interactions in the classroom, the dynamics of interaction between the teacher and the students creates an adequate environment generating the zone of proximal development is nothing more than the distance between the real level of development, explicit by the ability to independently solve a problem, and the level of potential progress, determined through the resolution of an issue under the guidance of an adult or in collaboration with another more capable partner". [52], [53]

Piaget, according to theory, considers that the learning of the individual is not only a product of the student's learning processes, but is also a main point for cognitive development. Vygotsky and Piaget consider it as processes of interaction that allow the individual to achieve competencies to solve problems.

During the professional training of every human being, in the first instance, basic competencies are developed, since they are of an internal nature of the person which are defined by the personality (how they express themselves, how they feel, how they develop in different situations of life. According to the aforementioned authors, they highlight the importance of achieving conceptual, procedural, attitudinal competencies, these qualities.

Below [54], it cited by Morales, García, Campos and Astroza. They considered: That being competent is not only having the skills to perform a certain job as they have been trained in educational institutions, to be competent every human being must develop conceptual, procedural and attitudinal competencies, these competencies once achieved have a direct impact on students having the ability to analyze, verify, determine the processes to solve the new tasks and tasks and then reflect and give the value judgment.

The author also classifies three capacities to be developed for the achievement of competencies.

Table 1. Learning concepts

Data	Concepts
Description	Defines concepts, describes, classifies, examines the Contents Organizes, Prepare essays Production of texts

Concept learning involves bringing together the cognitive structure, the basic elements such as memorizing data, discriminating, listing, comparing, then putting together propositions relating to them.

Table 2. Learning procedures and processes

Procedures	Processes
Description	Procedural knowledge is made up of a set of actions to perform a job, procedural learning accumulates in memory, and these have a long duration. Procedural competence is related to the tasks to be done, the knowledge to do is gradually acquired through routines and the development of problem-solving skills

Knowing how to do demands knowledge, techniques and accumulated skills, since problem-solving work requires a sequence of procedural actions to carry out a job.

Table 3. Learning attitudes and values

Attitudes	Values
Description	Values and attitudes are essential for professional practice in all areas since responsibility and autonomy are fundamental pillars of every human being, among the capacities that the student must develop know how to justify, criticize, evaluate and argue.

Attitudes and values are immersed in the entire process of students' academic training, therefore, in the teaching and learning process they must be addressed, once the concepts and processes for the achievement of competencies have been learned.

In the present research study, it has been shown that the appropriate use of didactic resources and the cooperative learning strategy, during the course of teaching and learning, significantly favor the achievement of competencies in students, of the public technological higher education institute "AOE" in this way the present research highlights the importance of the variables under study, because it aims to determine, describe the importance of the variables under study

The achievement of competencies in the students of the AOE institute of technological higher education in the district of Chorrillos, it is essential that they develop conceptual competencies, procedural competencies and attitudinal competencies and be able to insert themselves into the labor market.

Dimension 1: conceptual competence.

Conceptual competencies are closely related to theoretical learning, memorization of data and facts, comparing, relating. Explain through visual organizers.

Dimension 2: procedural competence.

Procedural competence encompasses a whole of procedures and processes to solve a problem in the area in which it is surrounded, is related.

Dimension 3: attitudinal competence.

Attitudinal competence is closely related to knowing how to be or know how to act in a given situation.

According to [18] "competencies are a set of behaviors put into practice in a work situation: specific knowledge and knowledge, aptitudes and know-how, personal and professional intelligence, willingness to take action".

It considers that "being competent is not only being skilled in the execution of specific tasks and activities, school or not, based on the skills acquired, new tasks or challenges that involve going beyond what has already been learned". [5]

4 SYSTEM IMPLEMENTATION

Beyond the descriptive and inferential confirmation that didactic resources and cooperative learning positively influence the achievement of competencies, this research proposes a technological response capable of operationalizing that influence at the classroom level. We introduce the Smart Cooperative Learning and Competency Analytics System (SCLCAS), an artificial-intelligence-driven platform that automatically forms balanced cooperative groups, recommends didactic resources targeted at each group's competency gaps, and predicts the achievement of conceptual, procedural, and attitudinal competencies using the same ordinal logistic regression and Nagelkerke pseudo- R^2 logic already applied in this study's inferential analysis. The design follows recent evidence on AI-assisted competence-based training in vocational and technical education. [12], [14], [16], [19]

4.1 System Architecture

SCLCAS is organized into four layers:

Profiling layer: captures each student's baseline scores on conceptual, procedural, and attitudinal competencies, together with their reported use of conventional and modern didactic resources, mirroring the variables already operationalized in this study. [30]

Grouping layer: an algorithm that automatically forms heterogeneous cooperative groups, balancing each team so that strengths in one competency dimension offset weaknesses in another, consistent with the positive-interdependence principle of cooperative learning. [41]

Recommendation layer: matches each group's detected competency gap to a specific didactic resource, ranging from conventional materials to augmented-reality automotive diagnostic simulators, drawing on the conventional/modern resource taxonomy. [18]

Predictive analytics layer: re-estimates, after every training unit, the probability that each student reaches a Low / Average / High level of conceptual, procedural, and attitudinal competence, using an ordinal model whose logic mirrors the Cox and Snell, Nagelkerke, and McFadden pseudo- R^2 coefficients reported in this study's Results section.

Table 4. Correspondence between the SCLCAS architectural layers, their function, and the study's variables

Layer	Main Function	Related Variable
Profiling	Capture baseline competency scores and resource usage	Teaching resources questionnaire
Grouping	Form balanced heterogeneous cooperative groups	Cooperative learning questionnaire
Recommendation	Match competency gaps to didactic resources	Conventional / modern resource dimensions
Predictive analytics	Estimate Low/Average/High competency achievement	Achievement of competencies (conceptual/procedural/attitudinal)

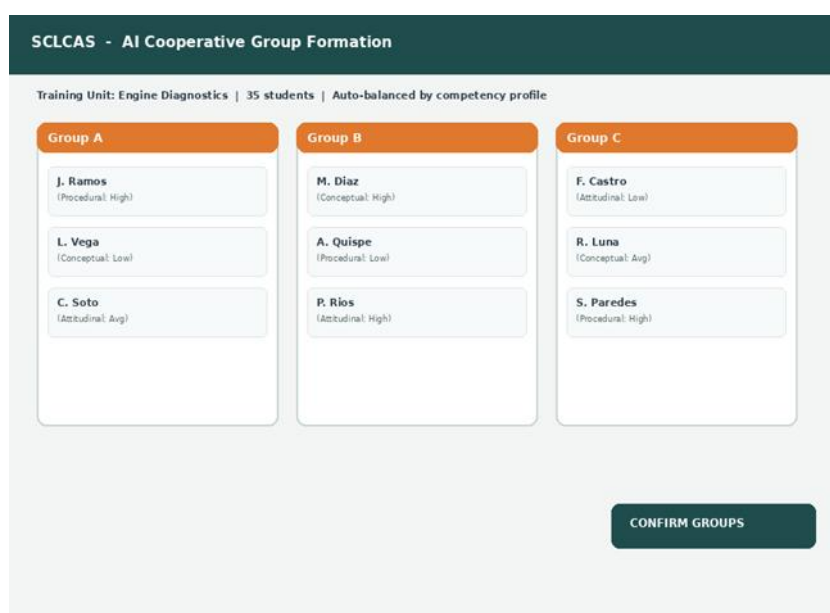


Fig. 1. Sign-in screen of the SCLCAS profiling layer, used by students of the automotive mechanics specialty.

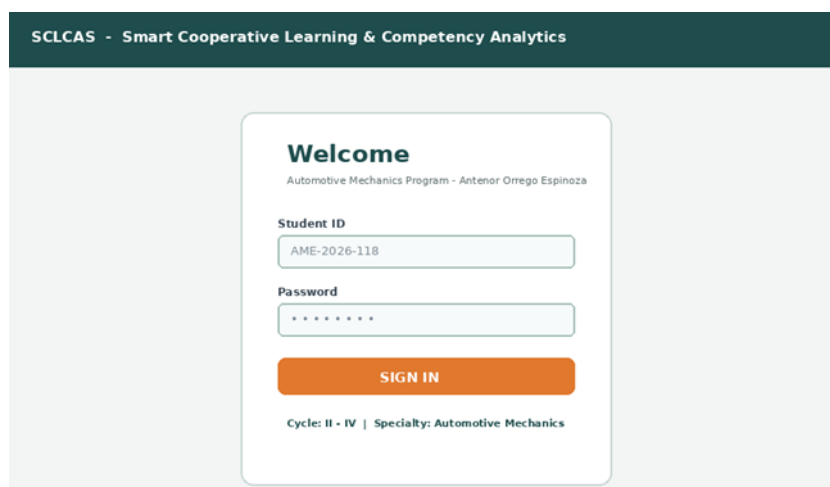


Fig. 2. AI-balanced cooperative group formation screen for the Engine Diagnostics training unit.

4.2 Predictive Algorithm

Algorithm 1 describes, in pseudocode, the logic used by the predictive analytics layer to classify each student's competency level after every cooperative training unit.

Algorithm 1: SCLCAS_Predict(resource_use, coop_score, competency)

Input: resource_use[conventional, modern], coop_score, competency c

Output: level[c] in {Low, Average, High}

```
1. w1, w2, w3 ← learned_weights[c]
2. // weighted combination, analogous to an ordinal logit
3. score_c ← w1*resource_use.conventional + w2*resource_use.modern + w3*coop_score
4. p_c ← Logistic(score_c)
5. if p_c < 0.50: level[c] ← Low
6. elif p_c < 0.75: level[c] ← Average
7. else: level[c] ← High
8. if level[c] == Low:
9.   RecommendResource(c)
10. return level[c]
```

Because the algorithm performs a constant number of operations per competency dimension per student, its time complexity is $O(1)$ per prediction and $O(n)$ for a full cohort of n students, which allows SCLCAS to re-score the entire sample of 105 students after each training unit without noticeable delay.

4.3 Reference Implementation

A minimal Python reference implementation of Algorithm 1 was coded to validate the classification logic before connecting it to the production grouping and recommendation engine.

```
import math

def logistic(x: float) -> float:
    return 1 / (1 + math.exp(-x))

def predict_competency(conventional_use: float, modern_use: float,
                       coop_score: float,
                       weights: tuple[float, float, float]) -> dict:
    w1, w2, w3 = weights
    score = w1 * conventional_use + w2 * modern_use + w3 * coop_score
    p = logistic(score)

    if p < 0.50:
        level = "Low"
    elif p < 0.75:
        level = "Average"
    else:
        level = "High"

    action = recommend_resource(level)
    return {"probability": p, "level": level, "action": action}

def recommend_resource(level: str) -> str:
    if level == "Low":
```



```
return "Assign targeted didactic resource and cooperative activity"
return "No immediate action required"
```

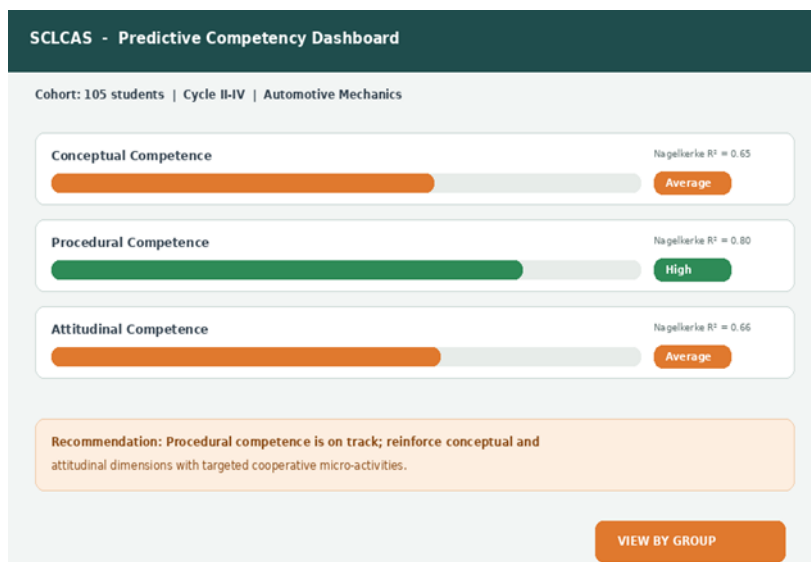


Fig. 3. Predictive competency dashboard showing the cohort's estimated achievement level for conceptual, procedural, and attitudinal competencies, expressed with the same pseudo- R^2 logic reported in the Results section.

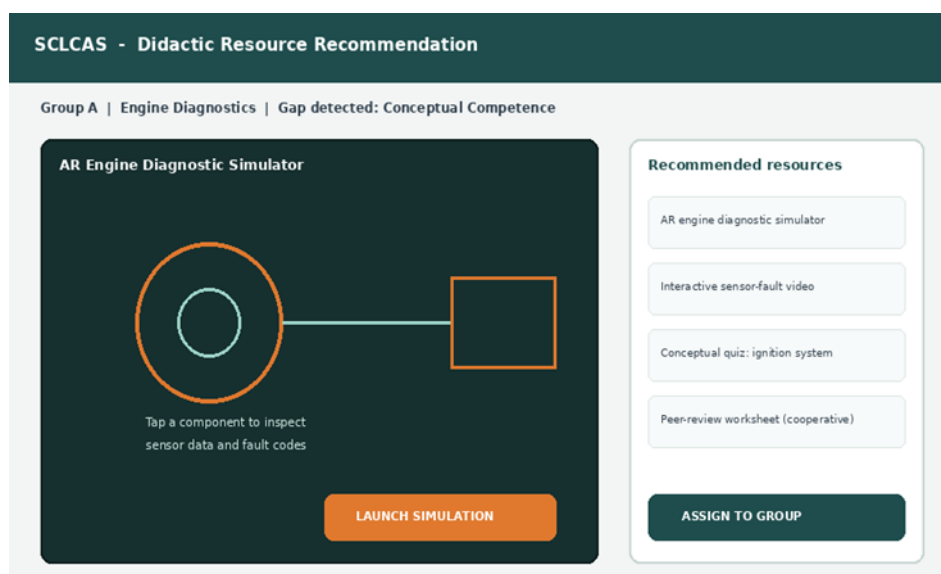


Fig. 4. Didactic resource recommendation screen, matching a detected conceptual-competency gap to an augmented-reality engine diagnostic simulator and cooperative follow-up activities.

4.4 Implementation Limitations

SCLCAS is conceived as a continuous-monitoring complement to, not a replacement for, the cross-sectional inferential analysis already reported in the Results section, which remains the basis for this study's confirmatory hypothesis tests. The grouping algorithm relies on self-reported questionnaire data rather than direct classroom observation, so its competency estimates should be interpreted as a planning aid for instructors rather than a summative evaluation instrument. Future versions of SCLCAS could incorporate sensor data from the augmented-reality diagnostic simulator itself, in line with IoT-based vehicle diagnostic architectures already documented in the literature (Panga, Zamfir, Bălan, & Popa, 2016; Mandlik, 2019), to validate and triangulate the questionnaire-based predictions reported here.

5 METHODOLOGY

5.1 Research Design

The design of the present research study is basic in that the study variables are not deliberately manipulated, because the study variables have already occurred. Inferences about the relationships between variables are made without direct interference and these relationships are only observed as they have occurred in their natural context, as can be seen in the following diagram of the design.

5.2 Variables, operationalization

Variable 1: Teaching resources

Conceptual definition

They are a set of educational elements that facilitate the development of students' capacities and competencies, and for the teacher they are a set of resources that facilitate the development of academic activities during the teaching-learning process.

According to [55], he stated that: "didactic resources and materials are the entire set of elements, tools or strategies that the teacher uses, or can use as support, complement or help in his teaching task".

Variable 2: cooperative learning

Conceptual definition

Cooperative learning is a didactic strategy that seeks the cooperative and organizational teaching-learning process, which generates interaction and encourages teamwork to achieve the same common goal.

According to [11], who referred to it as: "The process of learning in a cooperative group refers to the learning that is generated through interaction between students. The best teacher of a child is another child.

The strategy of learning in cooperative groups allows students to analyze, organize and plan in the development of academic activities cooperatively to achieve the common goal, later this learning methodology will allow students to issue the results in a descriptive way through an exhibition.

Variable 3: Achievement of competence Conceptual definition

Achievement of competencies a set of skills obtained that allow the individual to manifest social affections and cognitive skills.

According to [8], he states that "competencies are a set of skills, knowledge, and aptitudes that establish a set of exercises that provide the achievement of an end set in daily activities".

5.3 Population and sample

Population

The population was made up of 305 students of the Automotive Mechanics specialty of the AOE Institute of Public Technological Higher Education in the district of Chorrillos de Lima – 2026.

According to [56], "Population is defined as the totality of the phenomenon to be studied where the population units have a common characteristic which is studied and gives rise to the research data"

Table 5. Distribution of the population of higher education students

I.E.S.T.P. AOE from the district of chorrillos de lima	Students
Day shift:	80
Night shift :	225
Total	305

Sampling

Non-probabilistic sampling was applied, with the non-random sampling technique. According to [56], he states that the sample is the group of individuals that is taken from the population to study a statistical phenomenon.

Table 6. Distribution of the population and sample of students at the higher level

CYCLE	II	IV	TOTAL
Day shift	27	23	50
Night shift	30	25	55
TOTAL			105

5.4 Data collection techniques and instruments, validity and reliability

Data collection techniques

Morone, referring to research techniques, states that: Techniques are the procedures and instruments we use to access knowledge. Surveys, interviews, observations and everything that derives from them. [11]

Technique

The technique used in this study is the survey. Likewise, [33] on the survey, states that: data collection techniques are the different ways or means of obtaining information. Examples of techniques are direct observation, survey and interview, documentary analysis, content, among others. The survey is the material means used to collect and store information, examples of which are: questionnaire formats and interview guides.

Data collection tools

Instruments

The instrument used was the questionnaire.

Questionnaire

Regarding the questionnaire, it stated that "the questionnaire is a set of questions, carefully prepared, on the facts and aspects that are of interest in a research, so that it can be answered by the population or its sample". [40]

Validity of instruments.

The validity of the scale will be obtained through the judgment of experts who will determine that all the items that make up the scale constitute a representative sample of the indicators of the measured property. According to [57], "validity is an instrument, it refers to the degree to which an instrument actually measures the variable it intends to measure".

Instrument Reliability

For reliability, a pilot test will be applied to 40 students, for reliability results the Cronbach's Alpha test was used. In this regard, it establishes a scale that determines the reliability given by the following values: Null (-1 to 0), Very low reliability (0, to 0.2), low reliability (0.2 to 0.4), fair reliability (0.4 to 0.6), acceptable reliability (0.6 to 0.8), high reliability (0.8 to 1). In this sense, the instrument is reliable. [48]

Following [42], reliability occurs when an instrument is applied repeatedly to the same subject or object of research, so the same or similar results must be obtained within a reasonable range.

Table 7. Results of the reliability analysis of the instrument that measures teaching resources

Dimension/variable	Alpha of Cronbach	Number of items
Teaching resources	0,865	15

Table 7 shows that the reliability value is close to 1, which is why the instrument is said to be reliable

Table 8. Results of the reliability analysis of the instrument that measures cooperative learning

Dimension/variable	Alpha of Cronbach	Number of items
Cooperative learning	0,850	15

Table 9. Results of the reliability analysis of the instrument that measures the achievement of competencies.

Dimension/variable	Alpha of Cronbach	Number of items
Achievement of competencies.	0,808	15

Table 9 shows that the reliability value is close to 1, which is why the instrument is said to be reliable.

5.5 Data analysis methods

Once the data provided by the students through the instruments were collected, the statistical analysis was carried out using the SPSS version 24 program. The data were tabulated and presented in tables and graphs according to variables and dimensions.

5.6 Ethical aspects

To carry out this research project, we have the authorization of the director of the Institute of Public Higher Technological Education AOE of the district of Chorrillos de Lima.

6 RESULTS

6.1 Descriptive results

Variable: Teaching resources

Table 10. Distribution of frequencies of teaching resources perceived by students

		Frequency	Percentage
Valid	Very suitable	78	74,3
	Suitable	22	21,0
	Unsuitable	5	4,8
	Total	105	100,0

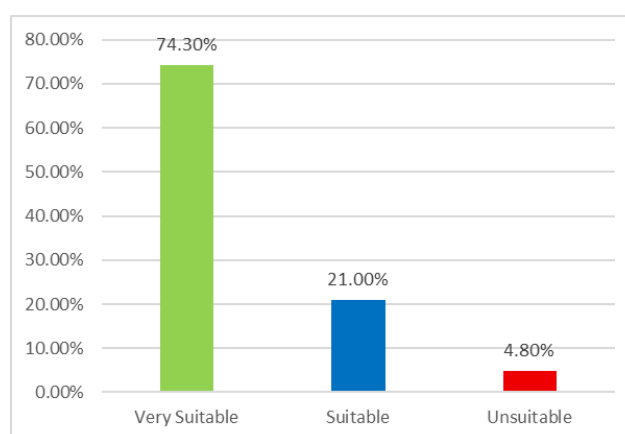


Fig. 5. Levels of teaching resources perceived by students.

Table 10 and Figure 5 show that regarding the teaching resources, a significant group of 78 students, representing 74.3%, consider them to be very adequate. A group of 22 students representing 21.0% consider it adequate and 5 students representing 4.8% state inadequate.

Dimension: Conventional teaching resources

Table 11. Frequency distribution of conventional teaching resources

		Frequency	Percentage
Valid	Very suitable	73	69,5
	Suitable	24	22,9
	Unsuitable	8	7,6
	Total	105	100,0

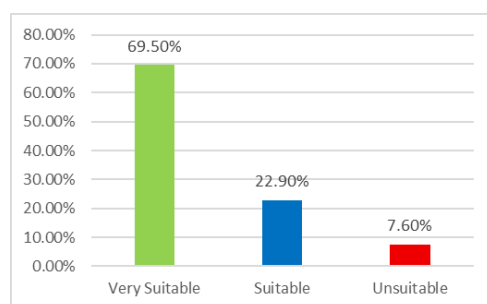


Fig. 6. Levels of conventional teaching resources

It is observed that, regarding the conventional teaching resources, a significant group of 73 students consider them very adequate. A group of 24 students considered it adequate and 8 students stated that it was not adequate.

Dimension: Modern Teaching Resources

Table 12. Frequency distribution of modern teaching resources

		Frequency	Percentage
Valid	Very suitable	79	75,2
	Suitable	25	23,8
	Unsuitable	1	1,0
	Total	105	100,0

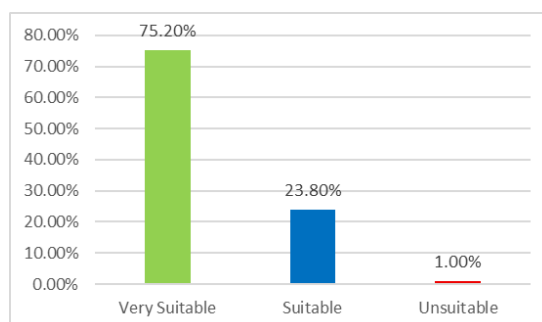


Fig. 7. Levels of modern teaching resources.

It is observed that, regarding modern teaching resources, a significant group of 79 students consider them to be very adequate. A group of 25 students considered it adequate and 1 student said it was inadequate.

Variable: Cooperative learning

Table 13. Cooperative Learning Frequency Distribution

		Frequency	Percentage
Valid	High	68	64,8
	Medium	33	31,4
	Low	4	3,8
	Total	105	100,0

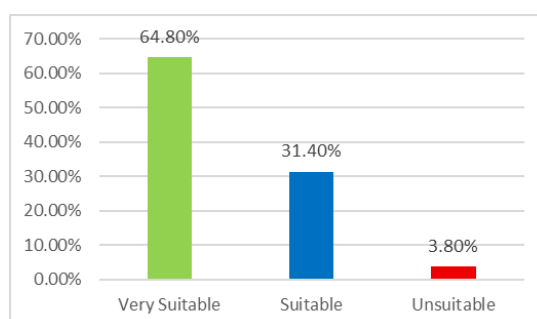


Fig. 8. Levels of cooperative learning

Table 13 and Figure 8 show that a significant group of 68 students consider cooperative learning to be very adequate. A group of 33 students considered it adequate and 4 students stated that it was not adequate.

Dimension: Informal group

Table 14. Informal Group Frequency Distribution

		Frequency	Percentage
Valid	High	80	76,2
	Medium	24	22,9
	Low	1	1,0
	Total	105	100,0

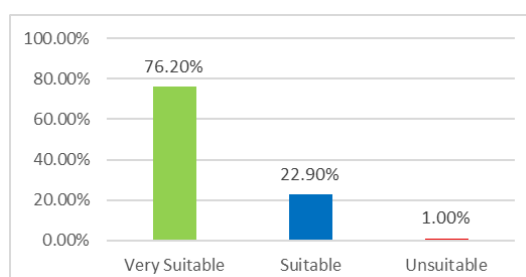


Fig. 9. Levels of the informal group

Table 14 and Figure 9 show that a significant group of 80 students consider the informal group to be very suitable. A group of 24 students considered it adequate and 1 student said it was inadequate.

Dimension: Formal Group

Table 15. Frequency distribution of the formal group

		Frequency	Percentage
Valid	High	77	73,3
	Medium	21	20,0
	Low	7	6,7
	Total	105	100,0

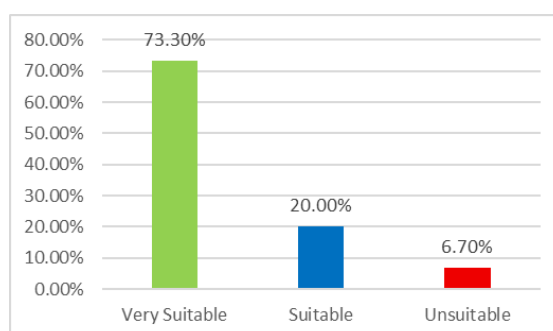


Fig. 10. Formal Group Levels

Table 15 and Figure 10 show that a significant group of 77 students consider the formal group to be very suitable. A group of 21 students consider it adequate and 7 students say it is not adequate

Variable: Achievement of competencies

Table 16. Frequency distribution of the achievement of competencies

		Frequency	Percentage
Valid	High	68	64,8
	Medium	35	33,3
	Low	2	1,9
	Total	105	100,0

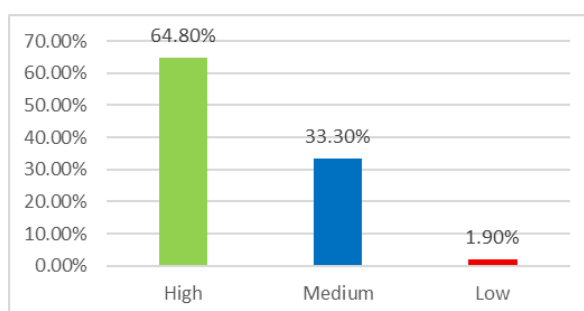


Fig. 11. Levels of competency achievement

Table 16 and Figure 11 show that a significant group of 68 students consider them to be very suitable for achieving proficiency. A group of 35 students considered medium and 2 students stated low.

Dimension: Achievement of conceptual competencies

Table 17. Frequency distribution of the achievement of conceptual competencies

		Frequency	Percentage
Valid	High	74	70,5
	Medium	21	20,0
	Low	10	9,5
	Total	105	100,0

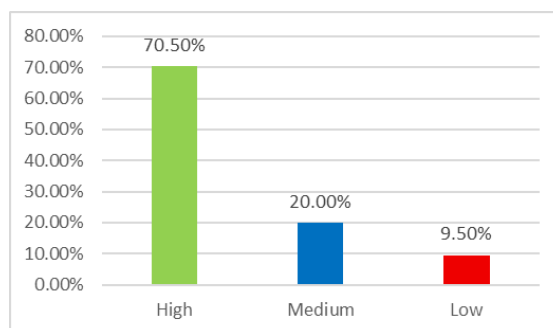


Fig. 12. Levels of Conceptual Competency Achievement

Table 17 and Figure 12 show that a significant group of 74 students consider the achievement of conceptual competence to be very adequate. A group of 21 students consider medium and 10 students manifest low.

Dimension: Achievement of procedural competencies

Table 18. Frequency distribution of the achievement of procedural competencies

		Frequency	Percentage
Valid	High	78	74,3
	Medium	21	20,0
	Low	6	5,7
	Total	105	100,0

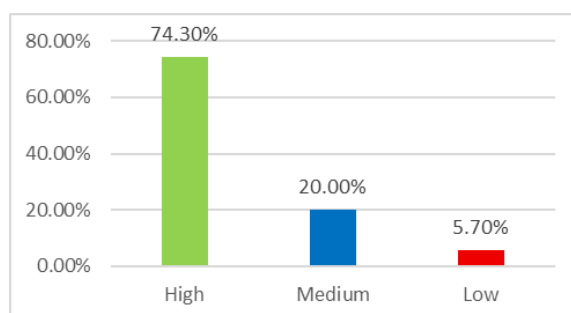


Fig. 13. Levels of achievement of procedural competencies

Table 18 and Figure 13 show that a significant group of 78 students consider them to be very suitable for the achievement of procedural competence. A group of 21 students consider medium and 6 students manifest low

Dimension: Achievement of attitudinal competencies

Table 19. Frequency distribution of the achievement of attitudinal competencies

		Frequency	Percentage
Valid	High	79	75,2
	Medium	25	23,8
	Low	1	1,0
	Total	105	100,0

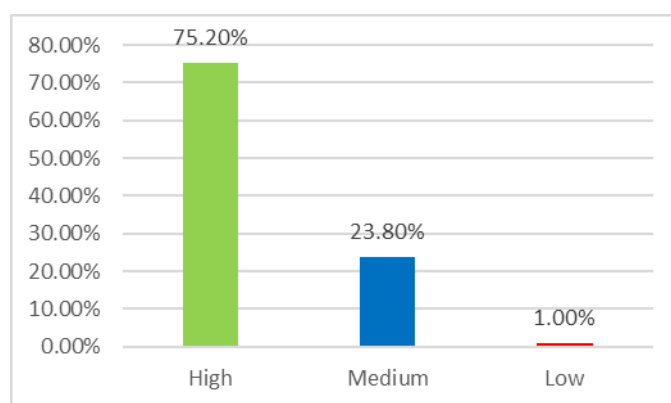


Fig. 14. Levels of achievement of attitudinal competencies

Table 19 and Figure 14 show that a significant group of 79 students consider them to be very suitable for the achievement of attitudinal competence. A group of 25 students considered medium and 1 student manifested low

6.2 Inferential results

General hypothesis

Ho: Didactic resources, cooperative learning, do not influence the achievement of Competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Hp: Didactic resources, cooperative learning, significantly influences the achievement of Competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

$\alpha = .000$ decision level: if $\alpha \geq \alpha$, accepts the working hypothesis; if $p < \alpha$, rejects the hypothesis null proof: ordinal regression

Table 20. Model tuning information general hypothesis

Model	Logarithm of Likelihood -2	Chi-square	gl.	Sig.
Intersection only	119,846			
Final	10,247	109,599	4	,000

The data in Table 20 show that the significance value ,000; which corresponds to the value of Chi-square = 109.599 would indicate that there are data that show the influence of the variable

Cox and Snell ,648

Nagelkerke ,847

McFadden ,722

The values of Pseudo R-squared are shown, Nagelkerke's R^2 indicates that there is a .847% variability, which is explained by the model.

Statistical decision

Given that $P = 0.000 < \alpha = 0.05$ it is assumed that the proposed model is complied with and the working hypothesis is accepted, that is, the didactic materials, cooperative learning positively influences the achievement of competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Specific Hypothesis 1

Ho: didactic resources, cooperative learning do not influence the achievement of conceptual competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Hp: didactic resources, cooperative learning influence the achievement of conceptual competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Table 21. Fit information for the models of the specific scenario 1

Model	Logarithm of Likelihood -2	Chi-square	gl.	Sig.
Intersection only	95,803			
Final	19,212	76,591	4	,000

The data in Table 21 show that the significance value 0.000; which corresponds to the value of the Chi-square statistic = 76.591 would indicate that do not explain the model.

Cox and Snell ,518

Nagelkerke ,651

McFadden ,460

The values of Pseudo R-square are shown, Nagelkerke's R^2 indicates that there is a .651% variability, which is explained by the model.

Statistical decision

Given that $P = 0.000 < \alpha = 0.05$ it is assumed that the proposed model is complied with and the working hypothesis is accepted, that cooperative learning influences the achievement of conceptual competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima-2026

Specific hypothesis 2

Ho: didactic resources, cooperative learning do not influence the achievement of procedural competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Hp: didactic resources, cooperative learning significantly influence the achievement of procedural competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Table 22. Fit information for the models of the specific scenario 2

Model	Logarithm of Likelihood -2	Chi-square	gl.	Sig.
Intersection only	110,177			
Final	12,343	97,834	4	,000

The data in Table 22 show that the significance value 0.000; which corresponds to the value of the Chi-squared statistic = 97.834 would indicate that the do not explain the model.

Cox and Snell ,606

Nagelkerke ,801

McFadden ,660

The values of Pseudo R-square are shown, Nagelkerke's R^2 indicates that there is a .801% variability, which is explained by the model.

Statistical decision

Given that $P = 0.000 < \alpha = 0.05$ it is assumed that the proposed model is complied with and the alternative hypothesis is accepted, that cooperative learning significantly influences the achievement of procedural competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026.

Specific hypothesis 3

Ho: didactic resources, cooperative learning does not influence the achievement of attitudinal competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Cooperative learning significantly influences the achievement of attitudinal competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Table 23. Fit information for the models of the specific scenario 3

Model	Logarithm of Likelihood -2	Chi-square	gl.	Sig.
Intersection only	73,895			
Final	9,014	64,881	4	,000

The data in Table 23 show that the significance value 0.000; which corresponds to the value of the Chi-squared statistic = 64.881 would indicate that the do not explain the model.

Cox and Snell ,461

Nagelkerke ,660

McFadden ,515

Table 29 shows the values of Pseudo R-squared, Nagelkerke's R^2 indicates that there is a .660% variability, which is explained by the model.

Statistical decision

Given that $P = 0.000 < \alpha = 0.05$ it is assumed that the proposed model is complied with and the null hypothesis is accepted, that cooperative learning influences the achievement of attitudinal competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima - 2026.

7 DISCUSSION

The following descriptive results were reached, 78 students, representing 74.3%, consider that the didactic resources used during academic activities are very adequate. A group of 22 students representing 21.0% consider it adequate and 5 students representing 4.8% state inadequate, in relation to the descriptive analysis of the study variables.

It was also concluded that the pseudo R square test would represent the percentage dependence of the didactic materials, cooperative learning in the achievement of competence in the students of II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026, which has a Nagelkerke coefficient, implying that the variability of the achievement of competence depends on 847% of the didactic resource, cooperative learning in the institute of technological higher education AOE chorrillos 2026.

Therefore, there is a coincidence with [48], the result found through Pearson's correlation allows us to accept the research hypothesis, that is, that there is a positive correlation between University Education, Didactic Resources, and the Performance of the subject of General Didactics I of the students of the E.A.P. of Education of the Faculty of Education of the Universidad Nacional Mayor de San Marcos. Confirmed by R^2 that it is of value 0.741 which indicates that 74.1% of the variable Academic Performance is being correlated by University Teaching and the Use of Didactic Resources. g). There is a high relationship between University Education and the use of Didactic Resources with Academic Performance, that is, the greater the use of Didactic Resources, the better the Academic Performance of students.

Continuing, there is a similarity with [50], who concluded the study by correlating the variables of the cooperative learning study with the dimensions: Positive interdependence, individual and team responsibility, stimulating interaction and internal team management, with the dimensions of the other variable comprehension of philosophical texts in their dimensions: literal comprehension and inferential comprehension; The results of the research show that there is no direct or statistically significant relationship between cooperative learning strategies and reading comprehension of philosophical texts (0.193). Likewise, it is reported that there is no relationship between positive interdependence, individual responsibility, stimulating interaction and internal team management with the comprehension of philosophical texts

According to [33], didactic resources and materials are the entire set of elements, tools or strategies that the teacher uses, or can use as a support, complement or help in his teaching task. (p.42).

Also according to the theory of [58], cooperation involves proposing learning structures where there is a substantial change in the forms of interaction, sharing tasks among all contributes to the achievement of a common goal for the team. Personal learning will be achieved only if each and every one of the members has achieved it as well. He also considered Martín's (2000) theory that: It is the result of the interaction between all the elements and factors of the organization, in a determined proximate framework (internal context) and an external socio-educational framework, based on a structure and a process in which planning is decisive.

In specific hypothesis 1, it was arrived that as for the pseudo-R square test, what would be presented is the percentage dependence of didactic resources and cooperative learning in the achievement of conceptual competence in students of the public technological higher education institution. AOE, chorrillos 2026. Which is based on the Nagelkerke coefficient, implying that the variability of the achievement of conceptual competence depends on the use of didactic resources and cooperative learning of the public technological higher education institution. AOE, chorrillos 2026.

According to [49], the construction of knowledge is the result of social interactions and the use of language, so learning is rather a shared experience. He adds that "The zone of proximal development is nothing more than the distance between the actual level of development, determined by the ability to independently solve a problem, and the level of potential development, determined through the resolution of a problem under the guidance of an adult or in collaboration with another more capable partner."

Specific hypothesis 2, concluded that as for the pseudo R square test, what would be presented is the percentage dependence of didactic resources and cooperative learning in the achievement of procedural competence in students of the public technological higher education institution. AOE, chorrillos 2026, which has the Nagelkerke coefficient, indicates that there is a .801% variability, which is explained by the model.

According to [53], competencies are a set of behaviors put into practice in a work situation: specific knowledge and knowledge, aptitudes and know-how, personal and professional intelligence, willingness to take action.

Specific hypothesis 3, regarding the pseudo-R square test, what would be presented is the percentage dependence of didactic resources and cooperative learning in the achievement of attitudinal competence, in students of the public technological higher education institution. AOE, chorrillos 2026, which is based on the Nagelkerke coefficient, implying that the variability of attitudinal competence indicates that there is a .660% variability, which is explained by the model, of the public technological higher education institution AOE, Chorrillos 2026

In [34], states that by developing competencies we will be forming beings capable of demonstrating and using their knowledge and skills, in this competitive society in the time they live.

Finally, [39] considers that being competent is not only being skilled in the execution of specific tasks and activities, school or not, as they have been taught, but beyond that, being able to face, based on the skills acquired, new tasks or challenges that involve going beyond what has already been learned.

8 CONCLUSIONS

First: Didactic materials, cooperative learning positively influences the achievement of competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Second: Cooperative learning influences the achievement of conceptual competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima-2026

Third: Cooperative learning influences the achievement of procedural competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima -2026

Fourth: Cooperative learning influences the achievement of attitudinal competencies in the training units, in students II, IV Cycle of the automotive mechanics specialty, of the AOE public technological higher education institute of the district of chorrillos, Lima-2026.

AUTHOR CONTRIBUTIONS

Wilver Ticona-Larico: Conceptualization, Investigation.

Nerio Enriquez-Gavilan: Methodology, Laboratory Analysis.

Naara Eunice Medina-Altamirano: Data Curation, Formal Analysis.

Gladys Cristina Tenorio-Molina, Rosa Maria Sota-Maldonado: Supervision, Writing—Review & Editing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICS STATEMENT

Ethical approval was not required for this study.

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