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Attitude of University Students in the Use of Artificial Intelligence

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***Abstract*—**This exploratory work aimed to understand university students' perceptions of the use of artificial intelligence (AI) during their time in the classroom. The significance of using AI in education, the degree of interest, knowledge acquisition, and how it would influence an interactive resource for acquiring skills were explored. Within this framework, a test with 30 items was designed and administered to 800 volunteer first-year university students of natural and exact sciences. Based on a randomized pilot test, it was validated with Cronbach's alpha coefficient. Descriptive statistics of the sample used allowed us to observe the preponderance of the dimensions that constitute the attitude construct. Subsequently, factor analysis by dimensions provided insights into the students' habits, according to the knowledge acquired and the emotions engaged during the topics developed in the classroom.

***Keywords*—**Attitude, artificial intelligence, didactics, teaching.

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I. Introduction

IN the teaching of Physics, the didactic resources of modeling and algorithm are used for data processing of the object of study, and in this sense, AI in the physical sciences is fundamental for both teaching and scientific research. On the other hand, the teaching and learning process is continually undergoing changes due to the influence of the technology available for use in the classroom in order to provide students with a university education adequate to the demands of the world of work. In this context, the attitudes that students have about an object of study and the didactic tools used to analyze that object can act in a favorable or unfavorable way.

The attitudes held by students contribute to improving the teaching of a science in a significant way and are supported by three dimensions:

a) Affective dimension: it constitutes the degree of feeling of liking or disliking with respect to the object of study.
b) Cognitive dimension: it is the knowledge and its evaluation to the extent that the knowledge of the object of study is acquired.
c) Behavioral dimension: it is the positive or negative behavior that is manifested during participation in a class or during their formative practices on the characteristics of the object of study.

The three dimensions are related and interact with each other, although in the design of an attitude questionnaire the weight contributed by each of these dimensions is usually not precisely highlighted. For example, Eryilmaz et al. [1] demonstrated a linear relationship between attitude and motivation of students in physics classes, i.e., the higher the attitude, the higher the motivation during the class. For his part, Espinosa - Zárate [2] conducted an interesting work on the use of AI in the area of teaching to improve the affective capacity of students in the interaction of digital technological resources used by teachers in the classroom. While the affective dimension is brought out with the use of AI, it is indirectly associated with the acquisition of knowledge with the incessant flow of information about the object of study by young university students.

Alonso [3] referred to the incorrect use of the affective dimension by teachers, which affects students' motivation in a way that is unfavorable to academic performance due to their conditioned abilities.

In 2024, Muñoz and Aquise [4] adapted and validated an attitude questionnaire in relation to AI. The results also show that the higher the attitude, the better the predisposition to use digital didactic resources. However, they did not recommend the contribution of each dimension in the process of adapting and validating the test they used.

León et al. [5] argue that the use of AI will undoubtedly students in their academic training. However, to maximize its benefits, teachers must begin integrating AI into the didactic resources used in the classroom. In this context, the objective of this exploratory study is to understand students' perceptions of AI and its potential impact on their academic experience.

II. Methodology

An attitude questionnaire regarding the use of AI was designed and administered to first-year university students who studied Physics enrolled in Bachelor's degree programs in Bromatology, Clinical Analysis Laboratory Technician, Animal Husbandry Engineering and Forestry Engineering, all at the National University of Formosa, Argentina.

With a population of 800 students across the aforementioned programs and considering a margin of error of 2% for a confidence level of 95%, an online calculation was conducted, yielding a sample of 702 students. The sample was calculated online using the following electronic address [6].

The sample size of 800 participants (n = 800) was chosen, as it ensured a sufficient number of responses for the study. In this case a sample voluntary participants A simple random sampling method was used, ensuring each student had an equal probability of participating in the questionnaire.

The survey consisted of 30 items, evenly distributed across the dimensions of the attitude construct. A five-point Likert-

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type scale was employed to measure responses: 1 = not at all; 2 = not very much; 3 = indifferent; 4 = quite a lot; and 5 = very much.

For validation, a pilot test was conducted with 100 volunteer students. Following this, the Cronbach's alpha coefficient was calculated to determine the reliability of the instrument used. To justify the application of the Exploratory Factor Analysis (EFA), Bartlett's test of sphericity and the Kaiser-Meyer-Olkin coefficient (KMO) were calculated. Bartlett's test assesses whether the correlation matrix is not an identity matrix, with a significance level of less than 5% considered valid. The KMO coefficient compares the observed correlation coefficients with partial correlation coefficients, indicating the adequacy of sampling for each variable and ensuring the adequacy of the data's suitability for EFA.

EFA was then conducted on the total number of items and by dimension using SPSS software. This procedure helped identify the underlying structure (latent variables) of the set of observable variables (items) that explain the common variance of the analyzed items.

Based on the covariance or correlation matrix, the factors were extracted to identify the structure present in the data. A Varimax rotation, assuming orthogonal and uncorrelated factors, was applied to determine whether the number of factors should remain unchanged or be reduced for result analysis.

III. Results and Discussions

The Cronbach's Alpha, coefficient calculated to assess the internal consistency of the designed questionnaire, is shown in Table I. In all cases, the high coefficient values confirm the reliability of the questionnaire, which was designed and applied in a pilot stage to test to evaluate its effectiveness. Table I presents the Cronbach's coefficients for each case respectively.

TABLE I
CRONBACH'S ALPHA COEFFICIENTS

General	0.945
Affective dimension	0.909
Cognitive dimension	0.864
Behavioral dimension	0.842

The values 0.945 and 0.909 were high and could suggest that the same element of the attitude construct was measured [7], [8]. Oviedo and Arias [9] consider that the increase in the coefficient value corresponds to an increase in the number of items in the questionnaire due to the increase in variance. Consequently, they caution against overestimating the values recorded in Table I, as larger respondent samples typically result in greater variance. It is important to note that determining Cronbach's alpha for each component highlights that the reliability of each dimension does not influence the reliability of the others.

In summary, the coefficient values indicated in Table I were valid for the present study. For future research, the reliability of the questionnaire should be recalculated on the basis of new samples used, because it measures the reliability of the sample to which it is applied. The general statistical description, as well as its breakdown by dimension, is presented in Table II.

In the statistical summary, the variables V2: "AI is useful for everyone" and V8: "I know AI to create drawings from the interpretation of problems" presented the maximum and minimum values. respectively.

In the affective dimension, the maximum and minimum values corresponded to V25: "AI should be used as a didactic resource" and V27: "AI will replace the teacher in the classroom". Regarding the cognitive dimension, the maximum value corresponded to V6: "I value the help of AI" and V8: "I know AI to create drawings from the interpretation of problems". And finally, for the behavioral dimension, the maximum value corresponded with V2, consistent with the overall summary statistics and V18: "The Academic Unit trains me about the use of AI". The results indicated that AI is useful for students. Students perceived that AI should be applied in the classroom as a didactic resource to aid their academic training. However, they lacked experience in using them for creating diagrams, graphs, or drawings that facilitate the interpretation of the problematic situations. Furthermore, this lack of use prevented them from perceiving AI a potential replacement for teachers in the future. Additionally, the Academic Units had not proposed strategies for using AI-based teaching resources to encourage teachers to integrate them into their teaching practices.

TABLE II
STATISTICAL SUMMARY

Items	Median	Standard Deviation	Variance
30		General	
Average	2.65	1.28	1.65
Vmáx	3.76		
Vmín	1.71		
10		Affective dimension	
Average	2.67	1.35	1.81
Vmáx	3.15		
Vmín	1.82		
10		Cognitive dimension	
Average	2.45	1.24	1.56
Vmáx	3.36		
Vmín	1.71		
10		Behavioral dimension	
Average	2.83	1.25	1.59
Vmáx	3.76		
Vmín	1.89		

The determinant of the correlation matrix was recorded in Table III. The very small values indicated that the variables -items- are linearly related, justifying that the EFA is an appropriate technique for this work and is the initial condition that the factor analysis must fulfill when the principal components option is used.

TABLE III
CORRELATION MATRIX DETERMINANTS

Total components	2.95×10^{-4}
Affective dimension	0.002
Cognitive dimension	0.011
Behavioral dimension	0.019

TABLE IV
RESULTS OF THE KMO TEST

Total components	0.856
Affective dimension	0.877
Cognitive dimension	0.823
Behavioral dimension	0.836

The values of the KMO coefficient (Table IV) in all cases suggested that the exploratory factor analysis was adequate for the present work.

The Bartlett's sphericity tests in each case showed a significance of less than 0.05, indicating that the existing correlation between the variables could be formally contrasted. In conclusion, both tests confirmed the feasibility of using EFA.

From the data, the lowest values found in the diagonal of the anti-image matrix for all the variables, analyzed by dimension, identified V1: "I know what AI is" and V27: "AI will replace the teacher" as presenting the weakest correlation compared to the rest of the variables. These results indicate a low perception of knowledge about the use of AI among students and skepticism about whether AI could replace teachers in the classroom. This outcome might be attributed to misinformation, which could have influenced the students' perceptions and led to these conclusions.

The results obtained from the lowest communalities across dimensions and in the total of the variables identified the following items: V2: "AI is useful for everyone"; V15: "I know AI applications in my university career," and V27: "AI will replace the teacher in the classroom". Other variables with low communality values include V22 "My teachers have AI training" and V24: "AI training should be included in educational materials". These findings suggest that students perceive little or no practical use of AI within their university careers. However, the data also indicate a strong desire among students for AI to be included in their academic training.

Table V shows the results of the total variance explained. The reduction process focused on retaining components with eigenvalues exceeding unity. This reduction aimed to simply the structure while preserving the integrity of the data in the explained components. Notably, the affective dimension was reduced to a single component.

TABLE V
TOTAL VARIANCE EXPLAINED

Total components	6 COMPONENTS	66.490%
Affective dimension	1 COMPONENTS	55.961%
Cognitive dimension	3 COMPONENTS	68.964%
Behavioral dimension	2 COMPONENTS	56.996%

Finally, the rotated component matrix (Table VI) did not yield improved results in terms of component reduction. Specifically, for the affective dimension, the orthogonal rotation -Varimax- was not performed, as it would not have been meaningful to apply the rotation when only one component was presented. This indicates that the factors that made up integrated the single component were linearly correlated. These results suggest that students have as a limited perception of AI's use and its potential applications in their academic training. In this context, the lack of enthusiasm for using digital didactic resources can be attributed to the insufficient interaction with AI, which likely led to demotivation in its application with academic studies. To alter students' perceptions, AI should be incorporated into the curriculum.

TABLE VI
ROTATION MATRIX COMPONENTS

Total variables	6 COMPONENTS
Affective dimension	no rotation
Cognitive dimension	3 COMPONENTS
Behavioral dimension	2 COMPONENTS

The lack of engagement with AI-powered software, coupled with the students' disinterest in improving skills such as note-taking and problem-solving representations in Physics, could indicate a decline in the academic quality of first-year university students in the analyzed programs.

The study provided valuable insights into the students' attitudes towards AI, highlighting its perceived benefits for their educational development and the emotional aspects linked to the use of AI.

The references of the analyzed variables are included in Table VII of the annex.

IV. CONCLUSIONS

The findings suggest that students have the potential to use AI, which will help them improve critical thinking and enhance their ability to produce texts and diagrams that facilitate their understanding of the thematic content developed in university-level Physics classes.

The results of this exploratory work will highlight the need to make decision-makers aware of the importance of using AI-based learning models for the academic benefit of students.

Students perceive that AI can replace teachers due to their lack of technological experience. However, AI does not replace teachers; rather, it enhances the teaching and learning process by adapting the conceptual, procedural content, and, most importantly, attitudes. Therefore, a shift in perception will occur as students gain experience with new learning styles that incorporate digital educational tools with AI.

ANNEX

TABLE VII
QUESTIONNAIRE OF ATTITUDE

ITEMS	1	2	3	4	5
I know what AI is.					
AI is useful for everyone.					
I use AI in my university study.					
I use AI in my texts and drawings.					
I know the ethics related to the use of AI.					
I value the help of AI.					
I know AI as a resource to learn more.					
I know AI to create drawings from problem interpretation.					
I use AI to create new interpretations of problem resolutions.					
I use AI to create new theory notes from my own notes.					
AI improves my ability to read and understand new knowledge.					
AI fosters my creativity.					
AI captures my attention.					
AI increases my motivation.					
I know applications of AI in my college career.					
I benefit from the use of AI in my learning.					
The educational offer of AI training is deficient.					
The Academic Unit trains me on the use of AI.					
AI is used in professional internships.					
AI will improve my critical thinking.					
AI will improve my native language.					
My teachers are trained in AI.					
AI training should be mandatory for teachers.					
AI training should be included in educational materials.					
AI should be used as a teaching resource.					
AI adapts to my learning needs.					
AI will replace the teacher in the classroom.					
AI training will improve the teaching of different subjects in my career.					
AI training should be included in my career curriculum.					
AI training should be applied throughout my undergraduate career.					

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