Attitude Towards Technology And Its Relationship With Academic Self-Efficacy In Ecuadorian University Students

[1] Jacqueline Regatto-Bonifaz , [2] Víctor Viteri-Miranda

[1]Universidad Estatal de Milagro, Milagro-Guayas-Ecuador.
jregattob@unemi.edu.ec.
[2]Universidad Estatal de Milagro. Milagro-Guayas-Ecuador.
vviterim@unemi.edu.ec.

Abstract

The attitudes of university students towards technology and academic self-efficacy are two components that contribute to the teaching-learning processes, since they develop in university students digital competencies and skills for the critical and effective use of information in which organization, regulation and execution contribute to academic results. In addition, it is important to consider these variables in higher education in order to overcome the academic demands that allow students to develop in any context. The objectives of this research are to identify the prevalence and establish the relationship between these two constructs in classroom processes. For this purpose, the Attitudes towards Technology Scales (ACUTIC) and the Academic Situations Specific Perceived Self-Efficacy Scale (EAPESA) are used. The study has a quantitative approach, using a non-experimental design of descriptive, cross-sectional, comparative by gender and correlational type. The sample selected was 570 students, 76% were female and 24% were male, with a mean age (M=25.29). The results show that there is a direct and moderate correlation between the variables. Furthermore, there are no statistically significant differences by gender ($p > 0.05$). It is concluded that both Attitude towards technology and Academic Self-efficacy are fundamental resources within Higher Education, allowing the interaction, production and meaning of knowledge.

Keywords: Attitudes, self-efficacy, education, relationship, technology.

Introduction

Academic self-efficacy is described as the set of evaluative judgments that students make about their own abilities to accomplish academic activities Dominguez-Lara, (2016),

Therefore, its evaluation is important at any level of education, both basic and higher. In addition, it is considered as one of the main mediators in the relationship of academic performance (Honicke & Broadbent, 2016), as it plays a fundamental role in Higher Education because it contributes to the development of digital competencies in the student within their professional area (Regatto-Viteri, 2022). In addition, they allow professional training to be interactive and productive (Castaño, Duart, & Sancho, 2015) in which greater self-directed learning is achieved (Márquez et.al, 2014) giving the learner the ability to organize, regulate and execute actions that allow them to achieve the desired levels (academic self-efficacy). While, Islas- Torres (2017) points out that the incorporation of ICT in education has ceased to be an option, to become tools that generate meaningful learning. From this approach, we seek to deepen the relationship between these elements and how they contribute to educational training processes.

Cognitive aspects and attitudinal dimensions

According to Tapia- Silva (2018) attitude is a systemic response or tendency that originates in a subject in front of a phenomenon or object. In the case of education, Comas et al. (2017) consider that attitudes are an integral part in the learning of all subjects, since they occupy a central place in the educational act, guiding the student's perceptual process.

Attitudes can be understood as a summary of the observable information behind the cognitive, behavioral and affective responses that stimulate certain objects or events, which, although they do not always occur together, are mutually associated (Cheung, 2009; Guitart Aced, 2002). Among the components of attitudes are: a) affective information that refers to feelings or attitudes of anxiety, joy, fear, among others; b) cognitive information associated with beliefs, an object, person or act; and c) behavioral information, related to the object being addressed. These three components are correlated, so that a positive feeling could not imply negative behaviors or beliefs (Huskinson and Haddock, 2004; Maio and Haddock, 2004).

Based on these positions, Knezek and Christensen (2008) establish that attitude is a predisposition (or tendency) that can be favorable or contrary to a specific behavior. This predisposition can be directed to: a) towards a specific object (situation, idea, subject, among others) as a consequence of its evaluation (Teo, 2008); or b) towards the development of a behavior (Kroenung and Bernius, 2012). This predisposition would arise, therefore, as

a result of the affections, knowledge and behaviors experienced by the subject.

Since the attitudinal aspect is important for learning and positive receptivity in order to acquire more and new technological competences (Cabello, 2006). The relationship between favorable attitudes towards technology for the acquisition of educational competences (Estrada, et al., 2015) and its contribution to Higher Education stems from this.

Attitudes of university students regarding the use of technologies.

Technologies play a fundamental role in the classroom process. For this, it is necessary that teachers make a change in the teaching-learning methodologies, so that students develop significant learning that allows them to develop in any context (Albitres et. al, 2021). To this is added the thought of Cáceres (2020), who considers that the use of programs or applications such as Zoom, Google meet, Google Classroom, Skype, WhatsApp, Facebook among others, allow students to share ideas, experiences, suggestions, doubts and knowledge in order to achieve their academic objectives. In this sense, the use of ICT is based on the use of interactive materials with the objective of generating knowledge, skills and attitudes according to the student's needs (Estrada, Op. Cit).

Several organizations have selected ICT knowledge or skills that should be incorporated into teacher training, such as the International Society for Technology in Education of the United States (ISTE, 2008); the French Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche (MENESR, 2015); Unesco (2011) and in Ecuador, the Ministry of Education (1884) for education at the initial, basic and high school levels and the Higher Education Council (CES, 2016) for university education. Such knowledge and attitudes are shaping a type of use of ICTs in education that students should incorporate, so teachers are requested to include the project-based learning methodology in order to make the thinking process interactive, productive and reflective, in which the student is the protagonist of his own learning, product of the experience.

However, in the educational context of Latin America, the majority of higher education students show a favorable attitude towards the use of ICTs as useful and effective learning tools, but their use is limited to entertainment, leisure (Aburto, 2018) and also to fulfill daily tasks (Assinnato et al., 2018), while for academic purposes in which the aim is to diversify educational environments and generate motivation to create and lead new

learning, it is more limited (Bullones et al., 2015). However, it is known that the use of social networks for collaborative work, as well as for training activities, is increasingly evident, with younger students having a better attitude towards the use of technologies in the learning process (Cabero et al., 2019).

This favorable attitude also seems to be marked by some gender differences (Pedraza & Araiza, 2020). For example, men show a higher valuation or self-concept referred to knowledge, tool management and general attitude towards technologies (Aranda et al., 2019; Cabezas-González et al., 2017; Fernández et al., 2020) than women; while, inversely, women apparently present greater use of social networks for communicative purposes (Valencia-Ortiz, Almenara & Vasco, 2020). Differences are also identified in the operational, creative and recreational uses of ICTs, but with fluctuating variations between men and women (Guevara-Ayón, 2020).

All this suggests the relevance of not only the mastery of ICTs, but also the predispositional and attitudinal aspects towards their learning and use, so it is necessary to deepen on this phenomenon in the actors of the educational process (students and teachers) and especially in the university context of Ecuador, since research in this regard is practically null.

Academic self-efficacy in higher education.

Bandura (1977) defined self-efficacy as the set of self-perceptions that people have about what they achieve with their abilities. While academic self-efficacy is a process of self-evaluation where the individual refers to personal confidence regarding his or her own abilities (Veliz and Apodaca Urquijo, 2012). In which, activities, content, knowledge, interest in learning or academic and research competencies play a transcendental role (Reyes & Gutiérrez, 2015). A high level of self-efficacy facilitates self-regulatory control and therefore is a good predictor of high performance (Alegre, 2014) along with other variables of self-regulation; conversely, a low self-efficacy perception will impair academic performance. In this perspective, Prieto (2003) considers that for a successful performance of a task it is not enough to do it, but it is equally important to feel empowered to cope with it and manage the resulting emotions. A relationship has also been detected between the time dedicated to study and the effectiveness in achieving it (Valle et al., 2009), which also contributes to self-regulation and improved academic performance. On the contrary, less self-regulated students with poorer academic performance will tend to have a perception of lower self-efficacy and even to give up in the face of obstacles

(Schunk and Zimmerman, 1994; Zimmerman, 2000, cited in Valle et al., 2009).

In studies conducted by González et al. (2020) on academic self-efficacy, academic social support and school well-being, it is evident that these variables are significantly correlated with academic performance and it was also identified that it is less likely to achieve satisfactory academic performance when there is low or medium AA. However, Moreta-Herrera et al. (2021) consider that OA levels tend to be moderately and moderately high in students. In the context of Ecuador, according to Moreta-Herrera and Montes de Oca (2019), AA at any level turns out to be a significant predictor.

Therefore, it is necessary, in addition to analyzing OA, to establish how attitudes towards technology contribute to educational practices and the institutional dimension.

It should be noted that there is no evidence of studies related to these two variables under investigation as a whole. Only data on each component are found individually.

Objetivos e hipótesis

After the respective analysis, the objectives of the study are: a) To know the levels of Academic Self-efficacy and the profiles according to the Attitude towards Technology, in Ecuadorian university students; b) To identify the gender differences in the variables under analysis; and c) To know the relationship between the variables under study. For this purpose, it is hypothesized that there is a high moderate presence in the variables under analysis (H1); furthermore, there are statistically significant differences ($p < .05$) by gender (H2); and there is a significant relationship between the study variables (H3).

Method

Research design

The current study is based on a quantitative approach, with a non-experimental design of descriptive cross-sectional type with a correlational and comparative scope by gender (Ato et al., 2013) of the Attitudes towards Technology and Academic Self-Efficacy in a sample of university students in Ecuador. In addition to the application of multivariate analysis through principal components, which allows identifying patterns and trends in the data and reducing their complexity (Zhu et al., 2022).

Participants

The study sample consisted of 570 students from public universities in Ecuador. Seventy-six percent (n= 433) were female and the remaining 24% (n= 137) were male. With a mean age (M= 25.29 years; SD= 6.5 years). Seventy percent of the participants lived in the urban sector and 30% in the rural sector. With respect to marital status, 77.8% were single and the remaining 22.2% were married, divorced and/or separated.

Participants were selected by means of non-probabilistic convenience sampling with inclusion criteria. These criteria corresponded to: a) Being a university student; b) Voluntary participation; and c) Having signed the letter of consent to participate in the study.

Measurements or instruments

Perceived Self-Efficacy Scale Specific to Academic Situations (EAPESA, Palenzuela, 1983) in the adapted version of Domínguez et al. (2012) and García-Fernández et al. (2010), validated in Ecuador, in university students (Moreta-Herrera et al., 2021). The purpose of this scale is to know the levels of Academic Self-Efficacy of students, through a 9-item questionnaire. The response component to the items is structured on a Likert scale of 4 options between 1 (Never) and 4 (Always). Although there are no specific normative values for the scale, it is considered that the higher the score, the higher the perceived self-efficacy. The referential cut-off point is 50.

Regarding the psychometric properties of the scale, the internal consistency type reliability in the Spanish version is high with a value of α= ,89 and temporarily stable with r= .87. In the present study, the internal consistency for this scale is α= .91 which is equivalent to high.

Technology Attitudes Scale (ACUTIC; Buendía et al., 2009). The purpose of this scale is to know the students' attitudes towards technology through a questionnaire of 31 items that allow the evaluation of 3 dimensions: a) attitude (items 1 to 7); b) training/knowledge (items 8 to 19); and c) use (items 20 to 31). The response to the items is structured on a Likert scale of 5 options between 1 (Strongly disagree) and 5 (Strongly agree). Regarding the reliability of the scale, the internal consistency is α= .89 which is equivalent to high. In the present study, the internal consistency is high for this scale is α= .97. Whereas, the internal consistency for each dimension is: Attitude α= .95, training α= .95 and use α= .96.

Procedure

The development of this research included requesting the respective authorizations from the institutions participating in this study. Subsequently, the socialization of the project, the explanation of the objectives and the evaluation process were carried out. In addition, the confidentiality of the data collected during the process was guaranteed. All the work was carried out virtually by means of the Google Forms application through the following link https://forms.gle/gsredpLNsM51wV3S9. The group under analysis completed the authorized consent form, including sociodemographic data, the EAPESA and ACUTIC scales. Once the evaluations were completed, the data were filtered and systematized in electronic spreadsheets for the pertinent statistical analyses. Finally, the hypotheses were contrasted and the respective research reports were prepared. The present research considered the recommendations issued by the Helsinki Convention regarding the ethical management of research on human beings.

Results

Analysis of results

To analyze the data collected, a workflow consisting of several stages was carried out. First, a descriptive analysis of the instrument items was performed to measure the distribution and dispersion of the data. This analysis allows us to obtain an overall view of the mean ratings and the variation of the responses in each of the aspects evaluated. Measures of central tendency such as the arithmetic mean (M) and of dispersion such as the standard deviation (SD) were used. However, since the data are not continuous, the Kolmogorov-Smirnov (KS) test was performed to demonstrate the assumption of normality. If the p-value > 0.05, then there would be no reason to reject the fit to the normal model, suggesting a possible assumption of normality, although it cannot be definitively stated that there is normality. This result allowed us to continue with null hypothesis testing (PHN).

The second block is a comparative analysis by group (sex) of the variables in the study to find out the possible significant statistical differences ($p < .05$) that probably exist.

The third block of results comprises the correlation analysis between the scales of Attitudes towards Technology and Academic Self-Efficacy. For this analysis, the Pearson Product-Moment Correlation Coefficient (r) was used to identify the degree of relationship between the variables in question.

Statistical management for the aforementioned work blocks was performed with SPSS software in version 27 (IBM Corp., 2012) in which descriptive, comparative and correlation analyses were developed.

In the fourth block, multivariate principal components analysis was applied, which are linear combinations of the original variables that explain most of the total variance (Zhu et al., 2022). When performing a principal components analysis, it is possible that the items or variables are grouped differently than they were in the original structure. This is because the analysis seeks to maximize the variance explained and to group related variables into smaller and more significant components.

Finally, a causal model was designed based on the principal components obtained. This model was subjected to statistical goodness-of-fit tests, including chi-square tests, to assess the fit and significance of the model. For this section of data processing and evaluation for multivariate analysis and reliability testing, Jasp statistical software was used. Version 0.17.2. 1.

Descriptive Analysis

The information found in Table 1 indicates that both the Attitudes toward Technology and Academic Self-Efficacy variables do not follow a normal distribution. As for the scores of the Attitudes towards global technology and its training and use dimensions are moderate. While the Attitudes dimension is high. With respect to Academic Self-efficacy, mean scores are presented that correspond to a moderate type of presence.

Table 1. Descriptive Analysis of Technology and Academic Self-Efficacy

Variables	M	DT	As.	Cu.	K-M
Attitude	27,44	6,48	-1,30	1,52	,192***
Training	41,99	9,85	-0,13	-0,15	,065***
Use	41,27	10,38	-0,09	-0,30	,068***
Attitudes towards Technology	110,70	23,61	-0,25	1,41	,034***
Academic Self-Efficacy	26,24	4,95	-1,21	1,52	,170***

Nota: n= 570 cases; M: arithmetic mean; SD: standard deviation; As: skewness; Cu: kurtosis; K-M: Kolmogorov-Smirnov test.

Comparative gender analysis

Table 2 shows the mean scores obtained by men and women in the Attitudes towards Technology and Academic Self-efficacy variables. The scores in the Attitudes toward Global Technology and its dimensions in the training and use show that in men they are higher than in women; while in the Attitudes dimension the relationship is inverse. For OA, women's scores are lower than

those of men. However, despite these variations between groups, in none of the cases are statistically significant differences observed (p> 0.05), so that in inferential terms they are considered equal.

Table 2. Gender Difference Analysis of Technology and Academic Self-Efficacy

	Male		Female	
Variables	**M**	**DT**	**M**	**DT**
Attitude	26,97	7,08	27,59	6,28
Training	42,51	10,69	41,82	9,57
Use	41,93	11,00	41,06	10,17
Attitudes towards Technology	111,41	26,36	110,48	22,69
Autoeficacia Académica	26,53	5,05	26,15	4,93

Note: M: arithmetic mean; SD: standard deviation.

Correlation analysis

Table 3 shows the correlation analyses, according to Pearson's coefficient (r), where it is evident that the relationship between the variables OA and Attitudes towards Technology. Within the attitudes towards technology, the dimension of attitudes is the one that correlates the most with OA in a direct and moderate way; unlike the dimensions of training and use that correlate in a lesser relationship and is direct, but at a low level.

Table 3. Analysis of correlations between Attitudes toward Technology and Academic Self-Efficacy.

Factores	**A**	**F**	**U**	**AHTEC**	**AA**
Actitud	1	,428**	,404**	,631**	,542**
Formación		1	,987**	,968**	,377**
Uso			1	,962**	,344**
Actitudes hacia la Tecnología Global				1	,457**
Autoeficacia Académica					1

Nota: A (Actitud); F (Formación); U (Uso); AHTEC (Actitudes hacia la tecnología global); AA: Autoeficacia del Académica

Reliability Analysis

Guttman's λ2 value is used to evaluate the internal consistency of the items or questions in relation to the different components or factors that can be grouped together. In this case, it is applied to the "frequent" scale to evaluate its reliability. See Table 4.

Tabla 4

Frequent scale reliability statistics

Estimate	Guttman's λ2
Point estimate	0.976
95% CI lower bo	0.973
95% CI upper lir	0.979

According to the information provided in the search results, it can be stated that Guttman's λ2 value for the "frequent" scale is 0.976, which is considered acceptable in terms of reliability (Li, 2001). In addition, a 95% confidence interval for Guttman's λ2 value is provided, which indicates that there is 95% confidence that the true value of Guttman's λ2 is within the range of 0.973 and 0.979.

Chi-square analysis

The Chi-square contrast is performed by calculating the χ2 value to evaluate whether there are significant differences between two or more groups. In our case, the Chi-square value is 150820.874, with 626 degrees of freedom (gl) and a p value of less than 0.001 (< .001), see Table 5. This indicates that there is a probably significant relationship between the variables analyzed. (Li, 2001; Quevedo Ricardi, 2011).

Table 5.

Chi-square contrast

	Valor	gl	p
Model	150820.874	626	< .001

Multivariate Principal Component Analysis

In the principal component analysis, 4 components were used, and in the sedimentation graph 1 it can be seen that this number of components is adequate to describe the data. The first component called "Teaching resources" explains 49.2% of the total variance made up of items P18, P19, P30, P29, P15, P26, P25, P14, P20, P23, P17, P28. The second component called "Virtual platforms" explains 21.0% made up of items P27, P16, P8, P31, P9, P7, P11, P22, P12, P21, P10, P13, P24, the third component called "Perceived self-efficacy" explains 6.2% P7E, P6E, P2E, P3E, P8E, P4E, P5E, P1E. Finally, the fourth component is called "Integration of ICT in teaching-learning", which explains 4.4% of the items that comprise it: P2, P3, P4, P6, P5, P1, P9E.

Figure 1 Sedimentation

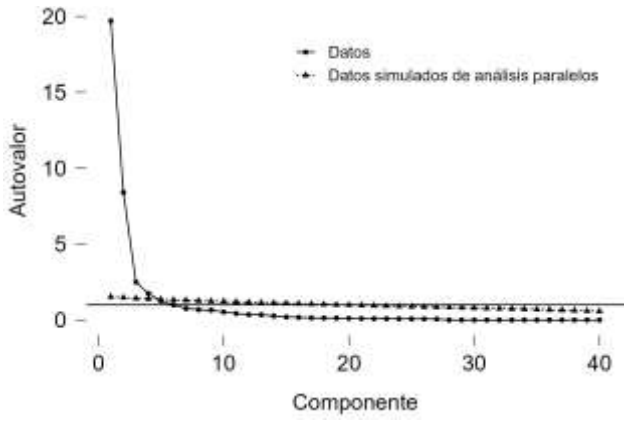

Table 6

Component Loads

	RC1	RC2	RC3	RC4	Unicidad
P18	1.070				0.083
P19	1.070				0.083
P30	1.070				0.083
P29	1.070				0.083
P15	0.977				0.165
P26	0.977				0.165
P25	0.641				0.231
P14	0.641				0.231
P20	0.641				0.231
P23	0.641				0.231
P17	0.514				0.276
P28	0.514				0.276
P27		0.472			0.287
P16		0.472			0.287
P8		1.057			0.229
P31		1.057			0.229
P9		0.916			0.305
P7		0.879			0.346
P11		0.857			0.289
P22		0.857			0.289
P12		0.818			0.408
P21		0.706			0.323
P10		0.706			0.323
P13		0.675			0.367
P24		0.675			0.367
P7E			0.949		0.103
P6E			0.936		0.093
P2E			0.927		0.084

Component Loads

	RC1	RC2	RC3	RC4	Unicidad
P3E			0.926		0.077
P8E			0.923		0.104
P4E			0.915		0.081
P5E			0.906		0.097
P1E			0.901		0.125
P2				0.939	0.103
P3				0.924	0.081
P4				0.917	0.078
P6				0.915	0.089
P5				0.910	0.102
P1				0.902	0.108
P9E				0.857	0.149

Note: The rotation method applied is promax.

The component loadings indicate the relationship between the original variables and the identified components. Variables P18, P19, P29 and P30 have a component loading close to 1 in the first component, indicating that they are strongly related to this component. Variables P8 and P31 have a component loading close to 1 in the second component, indicating that they are strongly related to this component. Variables P27 and P16 have component loadings close to 0.5 in the third component, indicating that they are moderately related to this component.

Table 7

Component Characteristics

	Unrotated solution			Rotated solution		
	Eigenvalue	Ratio var.	Eigenvalue	Sums of squared loads	Ratio var.	Acumulative
Component 1	19.695	0.492	0.492	9.475	0.237	0.237
Component 2	8.405	0.210	0.702	9.300	0.232	0.469
Component 3	2.496	0.062	0.765	7.345	0.184	0.653
Component 4	1.742	0.044	0.808	6.217	0.155	0.808

This analysis served to identify patterns and relationships in the data in each of the 4 components, since they represent linear combinations of the original variables. By analyzing the contribution of each component to the total variance, it was

possible to determine the degree of importance of each factor in the structure of the data.

Discussion

The objectives of this research are to identify the prevalence of Attitudes towards Technology and Academic Self-efficacy in a sample of university students in Ecuador; to identify gender differences in the variables of analysis; and to know the relationship between the variables of study in a sample of university students in Ecuador.

Regarding the prevalence of technology and OA, the relationship is moderate in the use and training components, while in the attitudes component it is high. With respect to academic self-efficacy, the relationship is moderate. These prevalence results are in agreement with preliminary studies with similar tendencies (Prieto, 2033) carried out in other contexts outside Ecuador, and indicate that this phenomenon seems to be typical of the university population. Thus, further exploration of this phenomenon is still required, so the results found here should be taken with caution.

Regarding gender, according to the study conducted, no significant differences are evident, which disagrees with the data proposed by (Pedraza & Araiza, 2020, Aranda et al., 2019; Cabezas-González et al., 2017; Fernández et al., 2020) who consider that men have a better attitude towards technology than women. While, Valencia-Ortiz, Almenara & Vasco (2020) consider that women make effective management of technology. However, Guevara-Ayón (2020) considers that gender is indistinct, the important thing is how they contribute to academic processes.

On the other hand, in this research we can say that teaching resources and virtual platforms are predominantly associated with the technology variable and that this has a significant impact on academic self-efficacy.

In addition, it should be noted that there are no specific studies on these findings in university students in Ecuador, so this work opens a framework of analysis for educational research in the country.

Among the implications of the study, the following should be considered. At a theoretical level, the study provides evidence that establishes the association between OA and technology in an Ecuadorian sample that has not been previously considered. At a practical level, the results point to the importance of considering the relationship between the two variables within the curricular process by teachers and educational institutions for the acquisition of knowledge and academic competencies that will

help them to develop in any context. In this way, it will allow the curricular design to be meaningful and contribute to the student's profile based on evidence.

Conclusions

The levels of the variables attitudes towards technology are moderate in the use and training components, while in the attitudes component it is high. With respect to academic self-efficacy, the relationship is moderate. In addition, there are no significant differences by gender among them.

Within the attitudes towards technology, the attitudes dimension is the one that correlates most directly and moderately with OA; unlike the training and use dimensions, which correlate less strongly.

The analysis allowed us to identify patterns and relationships in the data in each of the 4 components. The reorganization of the items into new components reflects a clearer underlying structure in the data, which can be beneficial for a better interpretation and understanding of the constructs being assessed. By examining the contribution of each component to the total variance, the relative importance of each factor in the structure of the data is determined. In particular, the "Resources for teaching" component showed the highest contribution to the model, which highlights the fundamental role of Information and Communication Technologies (ICT) and their tools in the process of acquiring competencies.

These digital resources allow users to easily access relevant information, communicate effectively, create interactive multimedia content and even analyze data more accurately. In addition, their broad reach and versatility make them valuable tools for enhancing educational processes in both academic and professional environments.

Referencias

Aburto, C. (2018). Actitudes, uso y conocimientos de las TIC en estudiantes de programa de Ingeniero agrónomo de la Universidad Autónoma de Nayarit. Revista Educateconciencia, 10(20), 164-186. http://tecnocientifica.com.mx/educateconciencia/index.php/revistaeducate/article/view/81/88

Albitres, J., Salinas, L., Herrera, H., Bazan, R., & Agüero, J. (2021). Actitud hacia el uso de las Tecnologías de la Información y la Comunicación para la enseñanza en docentes universitarios en el contexto de la COVID-19. Revista Innova Educación, 3(2), 424-437. https://doi.org/10.35622/j.rie.2021.02.009

Alegre, A. (2014). Autoeficacia académica, autorregulación del aprendizaje y rendimiento académico en estudiantes universitarios iniciales. Propósitos y Representaciones, 2(1), 79-120.

Aranda, L., Rubio, L., Di Giusto, C. & Dumitrache, C. (2019). Evaluación del uso de las TIC en estudiantes de la Universidad de Málaga: diferencias de género. Innoeduca. International Journal of Technology and Educational Innovation, 5(1), 63-71. http://doi: 10.24310/innoeduca.2019.v5i1.5175

Ato, M., López, J.J. y Benavente, A. (2013). A classification system for research designs in psychology. Annals of Psychology, 29(3), 1038–1059. https://doi.org/10.6018/analesps.29.3.178511

Assinnato, G., Sanz, C., Gorga, G. & Martin, M. V. (2018). Actitudes y percepciones de docentes y estudiantes en relación a las TIC. Revisión de la literatura. Revista Iberoamericana de Tecnología En Educación y Educación En Tecnología, 22, 7-17. http://doi: 10.24215/18509959.22.e01

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.

Buendía, l., Berrocal, e. & Olmedo, E.M. (2009). «Competencias técnicas para la recogida de información». En Colás, Buendía y Hernández-Pina (coords.), Competencias científicas para la realización de una tesis doctoral. Barcelona: Davinci, 141-162.

Bullones, M., Vivas, M. & Caseres, E. (2015). Actitud de los estudiantes frente al uso de tecnologías educativas para el aprendizaje de la matemática: una visión desde los estudiantes de ingeniería de la Universidad Centroccidental Lisandro Alvarado. Revista Educación En Ingeniería, 10(20), 143-153. http://doi: 10.26507/rei.v10n20.592

Cabello, R., & Moyano, R. (2006). TIC y EDUCACIÓN: Competencias Tecnológicas y capacitación para la apropiación de las tecnologías. Razón y palabra, (49), 139.

Cabero, J., Del Prete, A., & Arancibia, M. L. (2019). Percepciones de estudiantes universitarios chilenos sobre uso de redes sociales y trabajo colaborativo. RIED. Revista Iberoamericana de Educación a Distancia, 22(2), 35-55. http://doi:10.5944/ried.22.2.22847

Cabezas-González, M., Casillas-Martín, S., Sanches, M. & Teixeira, F. L. (2017). ¿Condicionan el género y la edad el nivel de competencia digital? Estudio con estudiantes universitarios. Fonseca, Journal of Communication, 15, 109-125. http://doi:10.14201/fjc201715109125

Cáceres, K. (2020). Educación virtual: Creando espacios afectivos de convivencia y aprendizaje en tiempos de Covid-19. CienciAmérica, 9(2). http://cienciamerica.uti.edu.ec/openjournal/index.php/uti/article/view/284/424

Castaño, J., Duart, J., & Sancho-Vinuesa, T. (2015). Determinantes del uso de Internet para el aprendizaje interactivo: un estudio exploratorio. J. NAER, 4(1), 25-34.

Cheung, Derek. (2009). Developing a Scale to Measure Students' Attitudes toward Chemistry Lessons. International Journal of Science Education, 31(16), 2185-2203. http://doi:10.1080/09500690802189799

Comas, C., Martins, J. A., Nascimento, M. M., y Estrada, A. (2017). Estudio de las Actitudes hacia la Estadística en Estudiantes de Psicología. Boletim de Educação Matemática, 31(57), 479-496.

Cubo, S., Martín, B. & García, J.L. (coords.) (2011). Métodos de investigación y análisis de datos en ciencias sociales y de la salud. Madrid: Pirámide.

Domínguez, S., Villegas, G., Yauri, C., Mattos, E., & Ramírez, E. (2012). Análisis de las propiedades psicométricas de la escala de autoeficacia percibida específica de situaciones académicas (EAPESA).

Dominguez-Lara, S. (2016). Valores normativos de una escala de autoeficacia académica en estudiantes universitarios de Lima. Interacciones, 91-98.

Estrada, V., Febles, J., Passailaigue, R., Ortega, C., & León, M. (2015). La Eduacción Virtual. Diseño de los cursos virtuales. Universidad ECOTEC.

Fernández, C., Fernández-Morante, M. C., Cebreiro, B., Soto-Carballo, J., Martínez-Santos, A. E. & Casal-Otero, L. (2020). Competences and attitudes for the use of ICT in Galician students of the degree of teaching. Publicaciones de La Facultad de Educacion y Humanidades Del Campus de Melilla, 50(1), 103-120. https://doi.org/10.30827/PUBLICACIONES.V50I1.11526

García-Fernández, J. M., Inglés, C. J., Torregrosa, M. S., Ruiz-Esteban, C., Díaz-Herrero, Á., Pérez-Fernández, E., & Martínez-Monteagudo, M. C. (2010). Propiedades psicométricas de la Escala de Autoeficacia Percibida Específica de Situaciones Académicas en una muestra de estudiantes españoles de Educación Secundaria Obligatoria. European Journal of Education and Psycholgy, 3(1), 61-74. https://doi.org/10.1989/ejep.v3i1.46

Guevara-Ayón, R. (2020). Género, tecnología y educación: Un estudio de caso sobre las diferencias de género en el uso de las TIC 1. Revista Peruana de Investigación Educativa, 12, 89-122. https://doi.org/10.3426/rpie.12.2020_4

Guitart Aced, Ros. (2002). Las actitudes en el centro escolar: reflexiones y propuestas. Barcelona: Editorial Graó.

Huskinson, TL y Haddock, G. (2004). Diferencias individuales en la estructura de la actitud: variación en la dependencia crónica de la información afectiva y cognitiva. Revista de Psicología Social Experimental , 40 (1), 82-90.

Honicke, T. y Broadbent, J. (2016). La influencia de la autoeficacia académica en el rendimiento académico: una revisión sistemática. Revista de investigación educativa , 17 , 63-84.

Islas Torres, C. (2017). La implicación de las TIC en la educación: Alcances, Limitaciones y Prospectiva. RIDE. Revista

Iberoamericana para la Investigación y el Desarrollo Educativo, 8(15), 861-876.

ISTE (International Society for Tecnology in Education). (2008). NETS for Teachers 2008. http://www.iste.org/docs/pdfs/nets-t-standards.pdf?sfvrsn=2

Knezek, Gerald., y Christensen, Rhonda. (2008). The importance of Information Technology attitudes and competencies in primary and secondary education. En Joke Voogt and Gerald Knezek (Eds.), International handbook of information technology in primary and secondary education.1,321-331. Estados Unidos de América: Springer US.

Kroenung, Julia. y Bernius, Steffen. (2012). Four Types of Attitudes in ICT Acceptance and Use? A Critical Assessment on the Basis of Empirical and Scientometric Data. Proceedings from 45th Hawaii International Conference on System Sciences

Li, Z. (2001). Covariate adjustment for non-parametric tests for censored survival data. Statistics in Medicine, 20(12), 1843-1853. https://doi.org/10.1002/sim.815

Maio, Gregory. y Haddock, Geoffrey. (2004). Theories of attitude. En Geoffrey Haddock and Gregory R. Maio (eds.), Contemporary perspectives on the psychology of attitudes (424-446). Hove, East Sussex; New York: Psychology Press.

Márquez U, Carolina, Fasce H, Eduardo, Pérez V, Cristhian, Ortega B, Javiera, Parra P, Paula, Ortiz M, Liliana, Matus B, Olga, & Ibáñez G, Pilar. (2014). Aprendizaje autodirigido y su relación con estilos y estrategias de aprendizaje en estudiantes de medicina. Revista médica de Chile, 142(11), 1422-1430. https://dx.doi.org/10.4067/S0034-98872014001100009

Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche [MENESR] (2015). Compétences numériques. Qu'est-ce que les compétences numériques? https://c2i.enseignementsup-recherche.gouv.fr/enseignant/les-competences-numeriques

Moreta-Herrera, R., Mayorga-Lascano, M. & Carrera-Aldás, J.C. (2019). Actitudes hacia el consumo de sustancias. Diferencias entre colegiales y universitarios en el Ecuador. Revista Española de drogodependencias, 44(3), 13-26.

Moreta-Herrera, R.; Montes De Oca, C.; Navarro-Cuéllar, L.; Villegas-Villacrés, N. (2021). Validez factorial con estimación robusta de la Escala de Autoeficacia Percibida Específica de Situaciones Académicas (Eapesa) en universitarios ecuatorianos. Revista de Ciencias Psicológicas. 15(1),21-53. https://doi.org/10.22235/cp.v15i1.2153

Palenzuela, D. (1983). Construcción y validación de una escala de autoeficacia percibida específica de situaciones académicas. Análisis y Modificacion de Conducta, 9(21), 185-219.

Pedraza, E. & Araiza, M. de J. (2020). Apreciación de los universitarios por género del uso de TIC a partir de las competencias

digitales. Espacios, 41(4), 28-37. http://revistaespacios.com/a20v41n04/a20v41n04p28.pdf

Prieto, L. (2003). La autoeficacia en el contexto académico. Exploración bibliográfica comentada. Emory University.

Quevedo Ricardi, F. (2011). The chi-square. Medwave, 11(12), e5266-e5266. https://doi.org/10.5867/medwave.2011.12.5266

Regatto-Bonifaz, J., & Viteri-Miranda, V. (2022). Análisis de las estrategias de enseñanza multimodal en los estudiantes universitarios del Ecuador. Veritas & Research, 4(1), 4-15. http://revistas.pucesa.edu.ec/ojs/index.php?journal=VR&page=article&op=view&path[]=105

Reyes- Cruz, M., & Gutiérrez- Arceo, J. (2015). Sentido de autoeficacia en investigación de estudiantes de posgrado. Sinéctica, 45, 1-15.

Schunk, D.H., y Zimmerman, B. (1994). Self-regulation of learning and performance: issues and educational applications. Erlbaum.

Tapia Silva, H. G. (2018). Actitud hacia las TIC y hacia su integración didáctica en la formación inicial docente. Actualidades Investigativas en Educación, 18 (3), 702-731. https://dx.doi.org/10.15517/aie.v18i3.34437

Teo, T. (2008). Pre-service teachers' attitude towards computer use: A Singapore survey. Australasian Journal of Educational Technology, 24(4), 413-424.

Unesco. (2011). UNESCO ICT Competency Framework for Teachers - Version 2.0. Paris: UNESCO.

Valencia-Ortiz, R., Almenara, J. C. & Vasco, P. (2020). Influencia del género en el uso de redes sociales por el alumnado y profesorado. Campus Virtuales, 9 (Marzo), 29-39. http://uajournals.com/ojs/index.php/campusvirtuales/article/view/630/393

Valle, A., Nuñez, J.C., Cabanach, R.G., Rodriguez, S., Gonzalez-Pienda, J.A., y Rosario, P. (2009). Perfiles motivacionales en estudiantes de secundaria: Análisis diferencial en estrategias cognitivas, estrategias de autorregulación y rendimiento académico. Revista Mexicana de Psicología, 26(1), 113-124

Veliz, A., y Apodaca Urquijo, P. (2012). Niveles de autoconcepto, autoeficacia académica y bienestar psicológico en estudiantes universitarios de la ciudad de Temuco. Salud y Sociedad, 3(2), 131-150. https://doi.org/10.22199/S07187475.2012.0002.00002

Zimmerman, B.J. (2000). Attaining self-regulation: a social cognitive perspective. In M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), Handbook of Self-Regulation (pp. 13–40). San Diego, CA: Academic Press.

Zhu, Z., Wang, T., & Samworth, R. J. (2022). High-dimensional principal component analysis with heterogeneous missingness. Journal of the Royal Statistical Society: Series B (Statistical Methodology), 84(5), 2000-2031. https://doi.org/10.1111/rssb.12550