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SELF-EFFICACY AND ACADEMIC COMMITMENT AS PREDICTORS OF DIGITAL SKILLS IN PERUVIAN UNIVERSITY STUDENTS

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Abstract

Digital skills are essential for university students' academic and professional development as they face an increasingly digitalized environment. These skills have become an essential requirement in the educational and labor fields. The study aimed to determine how self-efficacy and academic engagement predict the digital competencies of university students. Using a quantitative approach, the Academic Self-Efficacy Scale and the Utrecht Work Engagement Scale-Student were applied; the sample consisted of 650 university students between 18 and 50 years of age, and a structural equation model analysis was conducted. The results confirmed that academic self-efficacy and engagement are significantly related to digital competencies. However, self-efficacy had a more substantial influence ($\beta = .51$, $\rho < .001$) than engagement ($\beta = .08$, $\rho < .05$). In addition, the resulting model presented adequate adjustment indices $\chi 2$ (153) = 13007.9, $\rho<.001$. CFI = 1.00, RMSEA = .000, SRMR = .030, allowing the acceptance of the study hypothesis. In conclusion, self-efficacy and engagement predict, on average, 26.65% of the variability of digital competencies. This finding suggests that university decision-makers should consider these factors when designing educational strategies that adapt to the needs of a digitally advanced academic environment and expand the processes of digital competencies.

Keywords **–** Self-efficacy, Academic engagement, Digital literacy, Structural equations, Safety, Problem-solving, Vigor, Students.

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1. Introduction

The emergence of digital tools has produced several changes in various aspects. Their impact represents a significant challenge at different levels of the educational sector since it requires the adoption of specific skills and learning competencies (Gutiérrez-Ángel, Sánchez-García, Mercader-Rubio, García-Martín & Brito-Costa, 2022); therefore, educational actors must work in a coordinated manner to respond promptly to this social demand to ensure their good training (Jatmoko, Suyitno, Sattar, Nurtanto, Kholifah, Masek et

al., 2023), as well as adapt teaching methods to educational needs to ensure their efficient performance (Youssef, Dahmani & Ragni, 2022). Therefore, digital skills are considered essential to ensure the success of students, mainly in higher education, since they are subject to a variety of changes that limit their productive performance (Raji, Busson-Crowe & Dommett, 2023; Wang, Zhang, R., Wang & Li,, 2021).

In this sense, through various investigations, it has been possible to recognize that students who develop basic digital skills for the execution of their academic activities are more likely to obtain significant educational achievements (Latif, Raheem, Khan & Muhammad, 2022; Ardhiani, Hadjam & Fitriani, 2023), which entails strengthening their competencies and skills in a digital environment (Omotoy, 2023; Bubou & Job, 2020). However, according to the authors Honicke, Broadbent and Fuller-Tyszkiewicz (2023) and Önder and Baltaci (2023), there are several predictors of digital skills in higher education students, among which self-efficacy stands out as a central element since it allows them to regulate their perception of difficulties and persevere in meeting their goals, as well as academic *engagement* because it causes students to present a greater degree of well-being (Gómez, Peñalver, Martínez & Salanova, 2023; Park & Kim, 2022).

At the global level, competent educational agencies have tried to adopt digitalization and technology as strategies to optimize the execution of the learning process in universities; however, aspects associated with the infrastructure and availability of technological resources have limited the effective implementation of the strategies (Afari, Eksail, Khine & Alaam, 2023; Fernandez, 2022). Likewise, the high prevalence of self-efficacy in higher education students had a positive and significant impact on the development of digital skills in Thailand (Chonsalasin & Khampirat, 2022), as well as on the success of the learning process in Germany (Hoss, Ancina & Kaspar, 2022).

In Latin America, for example, even though only 52% of the inhabitants have digital tools at their disposal (Aguilera-Hermida, Quiroga-Garza, Gómez-Mendoza, Del Río, Avolio & Avci, 2021), in recent decades, there has been a continuous increase in the use of these learning tools in higher education, mainly due to the health emergency, which has demanded that institutions change their teaching modality and promote digital resources to develop their academic activities. These facts led to the fact that in various countries, 87% of students are willing to use digital tools (Salas-Pilco, Yang & Zhang, 2022), and this is reflected in the improvement of their academic performance (Alvarez-Risco, Estrada-Merino, Anderson-Seminario, Mlodzianowska, García-Ibarra, Villagomez-Buele et al., 2021).

The lack of familiarity with digital tools and conformity to the permanence of traditional pedagogy is considered a latent problem in the university community since it prevents students' adequate skills development (Suyo-Vega, Meneses-La-Riva, Fernández-Bedoya, Ocupa-Cabrera, Alvarado-Suyo, Da Costa et al., 2022). This reinforces the need for universities to make educational improvements to develop the required academic competencies (Rojas, Zeta & Jiménez, 2020). That is why it is essential to strengthen students' self-efficacy and commitment since the latter shows a moderate tendency, according to 39.3% of the students evaluated (Uribe, Alegría, Shardin-Flores & Luy-Montejo, 2020; Estrada & Paricahua, 2023).

A review of the scientific literature shows that digital skills are mostly at medium or intermediate levels in more than 50% (Paredes-Valverde, Quispe-Herrera & Garate-Quispe, 2020; Rodríguez, Contreras, Manrique & Montano, 2024); these, in turn, are key to student performance (Carranza, Mamani-Benito, Morales-García, Caycho-Rodríguez & Ruiz-Mamani, 2022). Correlational studies show a significant association between self-efficacy and *engagement*, as well as the dimensions of dedication (Acosta-Gonzaga, 2023; Azila-Gbettor, Mensah, Abiemo & Bokor, 2021; Hayat, Shateri, Amini & Shokrpour, 2020; Meng & Zhang, 2023; Zhao, Zheng, Pan & Zhou, 2021), despite the difference in gender or academic degree (Luo, Chen, Yu & Zhang, 2023).

Likewise, the relationship between self-efficacy and digital skills has been demonstrated, in addition to positively predicting the latter's variability (Carranza et al., 2022). In this sense, to the extent that self-efficacy increases, his competencies and skills do so significantly (Ibrahim & Aldawsari, 2023; Levterova-Gadjalova & Tsokov, 2021). However, statistical evidence of a lack of relationship is also recorded (Getenet, Cantle, Redmond & Albion, 2024). For its part, studies on *engagement* and competencies have been extensively studied, where their positive and considerable relationship has been visualized

(Aldhaen, 2024; Burgos-Videla, Castillo, López & Martínez, 2021; Cabero-Almenara, Gutiérrez-Castillo, Guillén-Gámez & Gaete-Bravo, 2023; Heidari, Mehrvarz, Marzooghi & Stoyanov, 2021; Holm, 2024; Huamán-Romaní, Estrada, Olivares-Rivera, Rodas-Guizado & Fuentes-Bernedo, 2021; Nkomo, Daniel & Butson, 2021; Zhao, Awais-E-Yazdan, Mushtaque & Deng, 2022). However, despite an extensive analysis of the relationships between the variables, no predictive studies were formulated on this triad. This is why the research was necessary and uses a robust method of Structural Equation Models (SEM).

Theoretically, literature analysis conceptualizes academic self-efficacy as the belief or psychological construction a student has about themselves for the organization and execution of academic tasks so that they are successful (Greco, Annovazzi, Palena, Camussi, Rossi & Steca, 2022; Tumino, Quinde, Casali & Valega, 2020). In addition, the feedback, previous experiences, and perspectives of others represent key aspects to consider in self-efficacy (Freire, Ferradás, Regueiro, Rodríguez, Valle & Núñez, 2020). From the theoretical approach, Bernard Weiner studies how individuals explain the failures and successes they present; that is, if a student attributes their achievement to their skills and competencies, they are more likely to increase their self-efficacy and motivation in the development of academic tasks (Lee & Hall, 2020). In addition to this, Zimmerman's academic self-regulation model describes how students manage to self-regulate their learning since the greater their self-efficacy, the more likely they are to set realistic academic goals and employ effective educational strategies (Brenner, 2022).

Academic *engagement* includes the sustained commitment that students put in when carrying out their school tasks to achieve the desired academic achievements (Alonso-, Merino-Tejedor & Huertas, 2023; Amerstorfer & Von, 2021), where the cognitive and emotional aspects play essential roles (Tannoubi, Quansah, Magouri, Chalghaf, Bonsaksen, Srem-Sai et al., 2023). In addition, according to the theory of self-determination, motivation that is increased by personal interest and satisfaction is essential for student engagement and performance (Ryan & Deci, 2020).

Conceptually, digital skills are the skills that an individual possesses for the critical and safe use of technological tools in the development of specific tasks in such a way that they can foresee risky situations (Rosman, Ruzaina, Aris, Teoh, Deni, Nadzri et al., 2022) therefore, it is essential to continuously evaluate digital information and the skills that must be developed to use digital tools (Öncül, 2020); to prepare students to face academic challenges and achieve success in the digital world (Pegalajar & Rodríguez, 2023). This is based on Paul Gilster's theory of digital literacy, through which the ability to effectively understand and use technological resources is studied (Pangrazio, Godhe & González, 2020).

In this reality, the objective was to determine if self-efficacy and academic *engagement* predict digital skills in university students. Based on the need to identify them as essential qualities that they must possess to be better prepared in a world where digital tools are integrated into all aspects of life to ensure personal, academic, and professional success. In contrast to the research objectives, the following hypotheses were formulated (See Figure 1):

H_1: Academic self-efficacy directly and significantly affects digital skills in university students.

H_2: Academic engagement directly and significantly affects digital skills in university students.

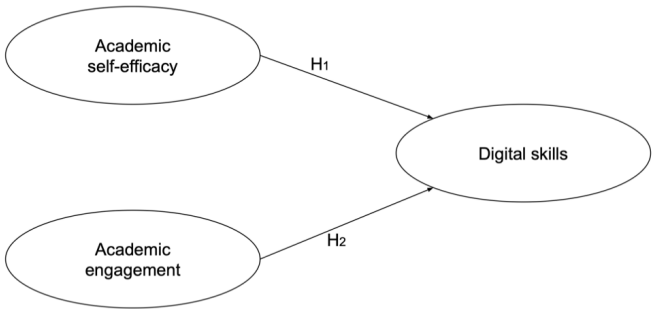

Figure 1. Theoretical model

2. Methodology

This research was characterized by presenting a non-experimental cross-sectional design (Wang & Cheng, 2020). In addition, it was correlational (Siedlecki, 2020) of a predictive type (Ato, López & Benavente, 2013).

2.1. Participants

For the selection of participants, we worked with a non-probabilistic sampling (Mweshi & Sakyi, 2020), since it was a structural equation SEM, the Digital Soper calculator was applied (Soper, 2023), for which the desired statistical power (0.8) was considered, in the number of latent variables (3) and the number of observed variables (61), with a probability level (0.05). This calculation has resulted in at least 296 students. The sample consisted of 650 university students, with a mean M = 20.6 and a standard deviation SD = 2.86. Men (60.6%) were more prevalent than women (See Table 1).

	Characteristics	Frequency	%
Sex	Female	256	39.4
	Male	394	60.6
Origin	Coast	51	7.8
	Jungle	187	28.8
	Mountain	412	63.4
Type of University	Private	632	97.2
	Public	18	2.8
Educational modality	Face-to-face	623	95.8
	Blended	27	4.2
Weekly internet usage time	1-5 hours	194	29.8
	11-15 hours	97	14.9
	6-10 hours	181	27.8
	Less than 1 hour	27	4.2
	More than 15 hours	151	23.2

Table 1. Sociodemographic characteristics

2.2. Instruments

2.2.1. Questionnaire of Sociodemographic Characteristics

It was used to detail the social and demographic qualities of the subjects sampled since their gender, age, origin, type of university, educational modality, and weekly time of internet use would be questioned.

2.2.2. The Academic Self-Efficacy Scale

Adapted by Dominguez-Lara (2016), it has 10 items to evaluate the indicators: Capacity, understanding, confidence, conviction, positive perception, decision-making, ease, security, and perception of their abilities. For its filling, this Likert Scale was considered: 1= Never; 2= Sometimes; 3= Often; 4= Always. This instrument presented a convergent internal validity (AVE = .596) with a high-reliability coefficient (.901).

2.2.3. Utrecht Work Engagement Scale – Student

This scale was adopted by Dominguez-Lara, Sánchez-Villena and Fernández-Arata (2020) and consisted of 9 items to evaluate the indicators: Vigor, dedication, and absorption. He presented a Likert scale, from 0= Never; 1= Rarely; 2= Sometimes; 3= Regularly; 4= Often; 5= Usually; 6= Always. This instrument was validated (VME = .733), and the reliability coefficient was α = .937.

2.2.4. Digital Competence Questionnaire - DigComp 2.1

This questionnaire was adapted by Casildo-Bedón, Sánchez-Torpoco, Carranza-Esteban, Mamani-Benito and Turpo-Chaparro (2023). It comprised 42 items that evaluated the indicators: Information and information literacy, communication and collaboration, digital content creation, security, and problem-solving. He presented a Likert scale from 1= No; 2= Yes, always with help; 3= Yes, with help when needed; 4= Yes, on my own; 5= Yes, I can easily even guide others; 6= Yes, I can easily even evaluate and/or propose other tools. This instrument was validated with the judgment of experts (V > 0.70); in addition, it recorded adequate fit indices ($\chi2$ = 2198.946, df = 809, p = 0.000; CFI = 0.919; TLI = 0.914; RMSEA = 0.071 and SRMR 0 .063), while the internal consistency was α > 0.80.

2.3. Procedures

The study was approved by the university ethics committee of the Universidad Peruana Unión with code (2024-CE-EPG-00078), permission was requested from local universities, and then the virtual forms were designed in Microsoft Forms ®; these were shared through WhatsApp groups and distributed among the students. Data was collected in May 2024, with an average of 20 minutes spent on the responses before each participant accepted the informed consent form. Then, the data was downloaded in Excel format, encoded, and refined with the identification ID.

2.4. Data Analysis

The analysis of the data began by verifying the structure of the instruments using Jamovi ®, where the confirmatory factor analysis (CFA) was carried out to test the stability of the models, the comparative fit index (CFI) with a value ≥.90, goodness of fit index (GFI) ≥.90, Tucker-Lewis index (TLI) ≥.90, goodness of fit indices (GFI) ≥.93; root mean square error of approximation (RMSEA) ≤.80 was considered (Bentler, 1990). Cronbach's Alpha (α) and McDonald's Omega (Ω) were used to analyze internal consistency. In addition, developing the predictive model using the SEM module with the WDLS estimator was contemplated, and the ability to predict self-efficacy and engagement in digital skills was tested.

3. Results

To develop the study, it was necessary to analyze the internal structure of the scales according to the initial models. Regarding academic self-efficacy, the unidimensional structure of 10 items presented adequate adjustment indices $\chi2$ (45) = 6409.3, ϱ < .001, CFI = 1.000, TLI = 1.000, RMSEA = .009, SRMR = .032. Likewise, academic engagement with its three dimensions and 9 items presented adequate adjustment indices $\chi2$ (36) = 3912.7, ϱ < .001, CFI = 1.000, TLI = .999, RMSEA = .011, SRMR = .034. Similarly, the digital competencies scale, composed of five dimensions and 42 items, presented adequate adjustment indices $\chi2$ (861) = 126912, ϱ < .001, CFI = .995, TLI = .995, RMSEA = .034, SRMR = .051.

After determining the scales' structure, the scores and means for each variable and dimension are appreciated. Asymmetry and kurtosis show a normal distribution within the range of ±1.5, which indicates that they come from an asymmetric distribution (Table 2).

Table 3 presents the correlation matrix of the variables, where the highest correlation was found between academic self-efficacy and digital skills (r = .48, ϱ < .01), while the lowest significant value was between vigor and safety (r = .09, ϱ<.05). In addition, a non-significant correlation between information and literacy with vigor was obtained. The results also showed the levels of internal consistency of the variables and dimensions, from .738 to .976 for Alpha and .766 and .977 for McDonald's Omega.

Variables	M	SD	Min	Max	g1	g2
Academic self-efficacy	**28.1**	**5.8**	**10**	**40**	**0.03**	**-0.35**
Engagement	**37.0**	**9.3**	**2**	**54**	**-0.52**	**0.44**
Dedication	13.5	3.4	0	18	-0.70	0.46
Vigor	11.3	3.7	1	18	-0.28	-0.32
Absorption	12.2	3.4	0	18	-0.55	0.39
Digital competences	**166.2**	**43.0**	**42**	**252**	**-0.30**	**-0.49**
Information and information literacy	24.9	6.7	6	36	-0.30	-0.67
Communication and Collaboration	47.0	12.8	12	72	-0.26	-0.59
Creation of digital content	32.1	8.9	8	48	-0.37	-0.50
Security	32.0	9.4	8	48	-0.36	-0.58
Problem resolution	30.2	10.0	8	48	-0.24	-0.69

Note. M = Mean, SD = Standard deviation, Min = minimum, Max = maximum, g1 = skewness, g2 = kurtosis.

Table 2. Descriptive analysis of the study variables

Variables	α	ω	1	2	3	4	5	6	7	8	9	10	11
(1) Academic Self-efficacy	.902	.906	—										
(2) Academic engagement	.897	.898	.13**	—									
(3) Dedication	.807	.808	.10*	.86***	—								
(4) Vigor	.738	.788	.12**	.90***	.64***	—							
(5) Absorption	.756	.766	.11**	.90***	.66***	.75***	—						
(6) Digital competences	.976	.977	.48***	.15***	.14***	.11**	.14***	—					
(7) Information and information literacy	.905	.907	.45***	.11**	.13***	.07	.10*	.83***	—				
(8) Communication and collaboration	.920	.921	.47***	.17***	.15***	.14***	.16***	.92***	.81***	—			
(9) Creation of digital content	.924	.926	.40***	.13***	.11**	.11**	.13**	.91***	.69***	.8***	—		
(10) Security	.925	.927	.43***	.11**	.11**	.09*	.10**	.92***	.69***	.76***	.83***	—	
(11) Problem resolution	.935	.936	.41***	.11**	.09*	.09*	.12**	.88***	.60***	.72***	.76***	.84***	—

Note. * p < .05, ** p < .01, *** p < .001

Table 3. Correlation matrix and reliability analysis

The analysis of the resulting theoretical model obtained adequate adjustment indices $\chi 2$ (153) = 13007.9, ϱ<.001. CFI = 1.00, RMSEA = .000, SRMR = .030; where H1 demonstrated the direct and significant influence of self-efficacy on digital competencies, β = .51 and ϱ<.001, and H2 refers to the direct influence of academic engagement on digital competences β = .08, ϱ < .05. Although one of the independent variables is more influential, approximately 26.65% of the variability in digital competencies (CompD) is explained by academic self-efficacy (Autoef) and academic engagement (EAcademic) together (Figure 2).

4. Discussion

Regarding the objectives and confirmation of the research hypotheses, it was proposed to determine whether academic self-efficacy directly influences digital skills. As a result, a direct and significant effect was found (β = .51, ϱ < .001). Therefore, the first research hypothesis is accepted. In addition, it was verified whether academic engagement directly influences digital competencies. As a result, a direct and

significant influence was obtained ($\beta = .08$, $\varrho < .05$). Therefore, the second research hypothesis is accepted.

Regarding the main findings, it is observed that academic self-efficacy positively influences the digital skills of university students. These results are similar to those reported in previous studies, such as those of Paredes-Valverde et al. (2020), who mentions that an average level of digital skills prevails, as expressed by 66.7% of university students, while Carranza et al. (2022) they recognized that self-efficacy and digital skills are high in the investigated context. These studies reinforce the sense that self-efficacy and academic engagement are significant predictors of digital skills in higher-level students (Rodríguez et al., 2024). In addition, it has been shown that self-efficacy is positively associated with academic engagement (Meng & Zhang, 2023; Zhao et al., 2021; Azila-Gbettor et al., 2021; Hayat et al., 2020). Therefore, the higher the level of self-efficacy, the higher the academic engagement.

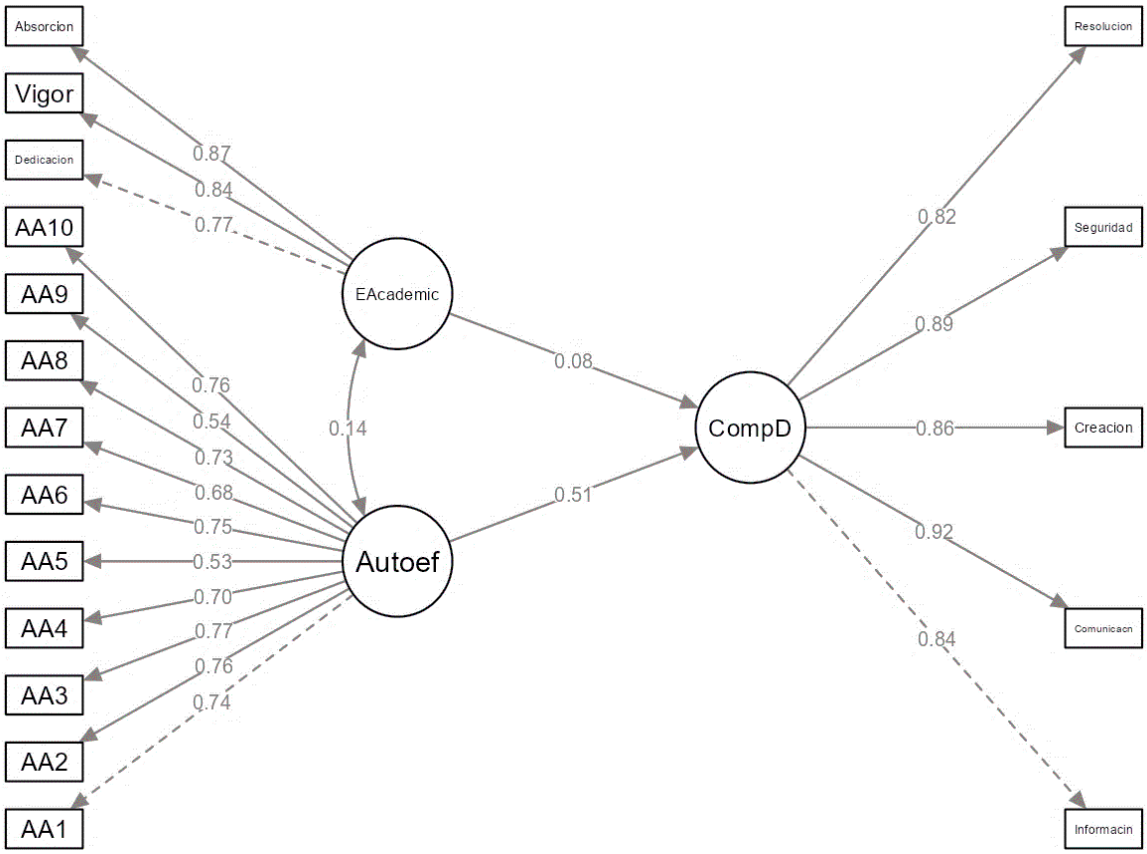

Figure 2. Structural Equation Model of the Effect of Self-Efficacy and Academic Engagement on Digital Skills

Regarding academic engagement, it also showed a positive impact on digital skills, supporting previous research such as that of Huamán-Romaní et al. (2021) and Rodríguez et al. (2024), who reported that greater engagement is positively correlated with better digital skills. These results are also compatible with the studies conducted by Cabero-Almenara et al. (2023), Heidari et al. (2021), Zhao et al. (2022), and Holm (2024), which emphasize a robust correlation between engagement and digital competence. However, it is essential to mention that while some studies, such as those of Levterova-Gadjalova and Tsokov (2021) and Ibrahim and Aldawsari (2023), suggest that self-efficacy significantly improves digital skills, others, such as Getenet et al. (2024), do not find a significant relationship. This may indicate the existence of moderating or contextual variables that could influence how self-efficacy affects digital skills.

Despite the interesting results obtained, this study has limitations that must be considered. First, the participants were selected through non-probability sampling, which prevents the findings from being

generalized to the entire population of Peruvian university students. This type of sampling can introduce biases and limit the sample's representativeness. Therefore, to increase the external validity of the results, it is recommended that future research use probabilistic sampling, selecting samples that more accurately reflect the diversity and characteristics of the Peruvian university population.

Secondly, the study relied on self-reported measures for data collection. Although common in social and educational research, this method may be subject to social desirability biases. Participants may provide responses that they consider socially acceptable or that project a favorable image of themselves rather than reflecting their actual behavior or beliefs. This bias can affect the accuracy of the data and, therefore, the validity of the conclusions derived from the study. To mitigate this problem, it is suggested that self-reported measures be supplemented with other data collection techniques, such as direct observations, structured interviews, and mixed methods that allow triangulation and cross-validation of the information obtained.

The results significantly impact higher education, especially in today's digital age. According to our research, universities could develop programs and workshops that strengthen self-efficacy and academic engagement, improving students' digital skills. In addition, considering the evidence that self-efficacy can positively influence dedication and vigor (aspects of engagement), as Acosta-Gonzaga (2023) suggested, these interventions could be multidimensional, addressing multiple facets of student performance and behavior. This study contributes to a deeper understanding of how self-efficacy and academic engagement can serve as levers to improve digital skills among university students. Future research should consider exploring these effects in different cultural and educational contexts to generalize and expand the applicability of the findings. In addition, it would be beneficial to investigate how other psychological and pedagogical variables can interact with self-efficacy and engagement to influence digital skills.

5. Conclusions

In summary, the significant relationship between academic self-efficacy and digital skills ($\beta = .51$, $\varrho < .001$) highlights the importance of trust in one's abilities to manage digital tools effectively. Although academic engagement also positively influenced digital competencies, its effect was smaller ($\beta = .08$, $\varrho < .05$), suggesting that self-efficacy is a stronger predictor of digital competence. These findings reveal that academic self-efficacy and academic engagement together explain approximately 26.65% of the variability in digital competencies. This study not only underscores the interrelationship between these constructs but also provides a solid foundation for future research and the development of educational interventions to improve university students' digital skills.

Declaration of Conflicting Interests

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