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The role of digital competences in the academic success of "digital natives"

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ABSTRACT

The aim of this article was to measure the digital proficiency levels of university students, analysing their relationship with the degree of academic success, using a quantitative, non-experimental, correlational and descriptive approach. Of the 211 students surveyed, the majority had an intermediate level of digital proficiency. Furthermore, academic success was evaluated using quantitative indicators such as the higher education application grade, the number of completed courses, and the number of failed courses. The majority of students were found to be at the low, moderate and high levels of academic success. Moreover, our findings suggest that an increase in the frequency of digital technology usage is associated with an increase in academic success.

Keywords: digital competences, digital proficiency, university students, academic success

INTRODUCTION

The contemporary era is characterised by a relentless pace of change, driven by a multitude of factors, including technological advancement (Reis & Malacarne, 2021). Consequently, this phenomenon has restructured our socialisation spaces, promoting novel ways of thinking, acting, working and learning (Reis & Malacarne, 2021).

Consequently, the field of education, and particularly higher education, has been acutely aware of these developments (Moreira & Simões, 2017). In this regard, Moreira and Simões (2017) underscored the necessity (and significance) for education to align with this evolution, which (inevitably) entails a redefinition of teaching methodologies in accordance with the prevailing context.

With this reconfiguration, the student becomes the main element in the teaching and learning process, playing a much more active role (Moreira & Simões, 2017). Beluce et al. (2019) and Velazco et al. (2021) emphasise the importance of integrating digital technologies (DT) into teaching, as they not only facilitate access to knowledge (Moreira et al., 2022) but also contribute to academic success.

Despite the inherent advantages of using DT, many Portuguese citizens do not utilise them properly. This is because, although access to technology and the internet is almost universal at the national level (Eurostat, 2023), the digital proficiency of Portuguese citizens remains low. This is slightly above the European Union average, as highlighted by the digital economy and society index (European Commission, 2023).

These facts (even more evident in the pandemic) motivated our curiosity to assess the level of digital proficiency of the so-called digital natives (Prensky, 2001), in an attempt to understand its relationship with the degree of academic success. In addition, it seems pertinent to emphasise the relevance of this study in the Portuguese context, given the lack of studies aimed at measuring the level of digital proficiency among university students (Lucas et al., 2022).

By focusing on this still underexplored relationship between these two constructs, we aim to contribute to the existing literature by providing a more comprehensive and contextualised understanding of this phenomenon in Portugal, given that most studies have been carried out in other countries, whose social, cultural and educational realities are different.

Digital Competences: Deconstructing the Concept

The term "digital competence" is not merely a matter of the technical utilisation DT (Gilster, 1997). It entails the ability to synthesise, evaluate, create and present information from digital environments in a responsible manner, applying it in all social contexts (Martin, 2008).

In an era when technology has become pervasive in all social contexts (Reis & Malacarne, 2021), digital competences entail not only the ability to navigate the internet responsibly, assess the credibility of consulted sources, and understand digital security and ethical practices (European Parliament,

2021), but also the capacity to construct knowledge in digital environments in an effective manner, meeting everyday needs (Lankshear & Knobel, 2008).

In this context, digital competences can be considered a transversal concept that is subject to constant evolution, and which complements other skills (such as problem-solving, communication, collaboration and autonomy) (Lucas et al., 2022; Vuorikari et al., 2022).

Consequently, as a pervasive and pivotal component in the advancement of other competencies, technology assumes a significant position in the field of higher education, facilitating the transformation of the pedagogical and learning processes (Moreira et al., 2022). This will be the focus of our subsequent discussion.

The Impact of Digital Technologies on Higher Education

The current period is witnessing a significant transformation in the higher education sector, with DT emerging as a pivotal driver for redefining various aspects of this field (Bond et al., 2020; Moreira et al., 2022). The core purpose of higher education Institutions has evolved from a narrow focus on the transmission of knowledge to a broader mission. This new mission is to prepare students for continuous learning and to meet the challenges of a constantly evolving labour market. This is in line with the objectives set by the Bologna process (Pereira & Passos, 2018).

In adopting the guidelines of the Bologna process (formalised in Portugal by decree-law 74/2006 of 24 March), higher education Institutions sought not only to align themselves with European standards but also to address the global challenges of a constantly evolving society (Pereira & Passos, 2018).

In this context, the necessity for the incorporation of tools that align with contemporary educational standards becomes apparent, particularly those that are technology-driven (Lucas et al., 2022). This digital evolution has implications that extend beyond mere technical changes, influencing not only teaching methods but also the curricular and organisational structure of higher education institutions (Moreira et al., 2022; Reis & Malacarne, 2021).

The utilisation of digital tools appears to be a significant factor in facilitating new opportunities for the entire academic community, including researchers, educators and students. These tools have the potential to enhance teaching methods, fostering collaboration between educational stakeholders and increasing student motivation, which in turn can positively impact academic performance (Lin et al., 2017; Moreira et al., 2022; Reis & Malacarne, 2021).

In this context, the relationship between digital competencies and the promotion of a scientific culture, in formal and/or informal environments, becomes crucial (Bond et al., 2020; Santos & Serpa, 2017). This relationship provides a robust foundation for the academic and professional advancement of those involved, reflecting the evolving dynamics of the educational environment in the digital age (Sparks et al., 2016).

Digital Proficiency of University Students and the Relationship with Academic Success

In accordance with Prensky (2001), students currently enrolled in higher education can be considered “digital natives”. This concept reflects the idea that, having grown up in an environment permeated by technology, university students have naturally developed the necessary skills to work in these digital environments (Bittencourt & Albino, 2017; Prensky, 2001).

Nevertheless, research findings tell us that not all students may possess a high level of digital proficiency (Argelapós & Pifarré, 2017; Prior et al., 2016; Sparks et al., 2016). Furthermore, Azad and Semiyari (2020) discovered that students entering higher education tend to overestimate their digital skills due to their frequent use in everyday life. Nevertheless, the majority of young adults presented low and moderate levels of digital proficiency, indicating challenges in effectively utilizing digital tools despite their high proficiency in social networking and online browsing (Azad & Semiyari, 2020).

In this context, Bernate et al. (2021) reported that the students demonstrated basic competencies in searching, organising, evaluating and processing information, which is a crucial skill in the era of growing importance of information and data literacy in higher education (Santos & Serpa, 2017). Nevertheless, they demonstrated considerable creativity and digital innovation in the creation and development of new projects (Bernate et al., 2021).

Arranz et al. (2017) have observed that students in the field of communication sciences, who are often referred to as “digital natives” (Prensky, 2001), despite spending considerable time online, whether via computer, laptop or smartphone, exhibited low digital proficiency.

Similarly, Alvárez-Flores et al. (2017) identified a notable deficiency in digital competencies among university students, which constrained their digital interactivity and resulted in a loss of developmental opportunities. Consequently, a notable deficiency in the utilisation and exploitation of digital resources and similar technologies that facilitate the generation of new knowledge is evident, which in turn constrains creativity and innovation (Alvárez-Flores et al., 2017).

The level of digital proficiency was also evaluated at the national level by Lucas et al. (2022), who concluded that the majority of individuals demonstrated a satisfactory or moderate level of digital skills. These deficiencies have been demonstrated during the pandemic, when both professors and students exhibited shortcomings in digital proficiency, resulting in learning challenges that contributed to the academic failure of some students (Ibrahim & Aldawsari, 2023).

As Arranz et al. (2017) observed, even when dealing with a group that is familiar with DTs, young adults are not always adequately prepared to utilise them to their full potential. Arranz et al. (2017) posit that students are increasingly inclined to engage with digital resources that are primarily focused on social networking and other forms of entertainment. Nevertheless, these activities are not

conducive to enhancing digital proficiency and effectively navigating the digital landscape (Arranz et al., 2017).

In order to understand the relationship between digital proficiency levels and academic success, it is essential to first delineate the characteristics that define success.

The concept of academic success has evolved over time, largely due to the increasing diversity of the student population (Valadas & Fragoso, 2022). This can be interpreted based on a vision centred on the complete psychosocial development of students (Almeida & Casanova, 2019). From this perspective, success is conceptualised in a more comprehensive way, considering indicators such as the student's experiences before entering higher education and satisfaction with the academic path (Almeida, 2019).

From this perspective, which can be categorised as qualitative and subjective (Araújo, 2017), success is influenced by personal, socio-familial and contextual factors, including student well-being, involvement and adaptation experiences, as well as expectations and aspirations in relation to the programme (Farias et al., 2022).

In this study, we have elected to adopt an alternative approach to the concept of academic success. This approach is objective and quantifiable (Araújo, 2017), and it represents a significant practice for understanding student performance. It allows for objective and comparative analysis throughout the student's academic career (Gray & Bunte, 2022).

This approach, which is considered more traditional (Araújo, 2017), is based on objective criteria associated with the completion of course units (CUs) during each year of the course, as well as the results achieved in each of these CU´s. These indicators reflect learning in quantitative terms and include course completion rates and the average time to complete the course (Araújo, 2017; Gray & Bunte, 2022).

The advent of DT has redefined the very paradigms of learning, introducing a plethora of novel modalities, including the ability to learn via computer or to attend a conference online (Koyuncuoglu, 2022). This has led to a challenge to the traditional pedagogical model (Reis & Malacarne, 2021). This adaptation necessitates that students continuously endeavour to enhance their digital competencies, as Koyuncuoglu (2022) asserts that proficiency in computer operations connected to the internet has become a crucial prerequisite for students.

The increasing utilisation of DT in higher education Institutions facilitates the creation of a more enriching teaching and learning environment, capable of responding to individual diversities and multiple approaches to learning. This has the effect of considerably improving the quality of the educational service, which in turn has a positive impact on the academic performance of students (Moreira et al., 2022).

Furthermore, DT has the potential to transcend the boundaries of knowledge construction, sharing and dissemination in a multitude of contexts. As evidenced by Cabero-Almenara et al. (2022) and Moreira et al. (2022), it has the capacity to transform not only pedagogical practices but also the methodologies used, which in turn has been shown to increase student motivation and academic performance (Lin et al., 2017; Moreira et al., 2022).

In light of the fact that DT is an integral part of students' daily lives, it is incumbent upon teachers to recognise its relevance and to train themselves to use it as a tool to facilitate the teaching-learning process. This is because DT has opened up new educational horizons and promoted student collaboration and autonomy (Moreira et al., 2022; Ota & Dias Trindade, 2020).

A number of studies have highlighted the significance of regular and prudent technology usage, indicating a favourable correlation between DT, motivation, commitment and academic achievement (Beluce et al., 2019; Lin et al., 2017). From the perspective of some authors (e.g., Bittencourt & Albino, 2017; Cassiano et al., 2023; Ibrahim & Aldwsari, 2023), the key to a successful teaching-learning process is related to how technologies are integrated into the classroom context. This integration should place students at the centre of the process and expand access to educational resources.

The collaboration between students, enabled by digital platforms, is of paramount importance for the development of skills that can contribute, either directly or indirectly, to academic success (Moreira et al., 2022). Nevertheless, the influence of DT on student performance is contingent upon the regularity and objective of utilisation. Indeed, only assiduous engagement with digital resources with a view to enhancing learning outcomes is conducive to enhanced results (Arranz et al., 2017).

In conclusion, digital skills are crucial both for those in an educational setting and for those entering the labour market (Vuorikari et al., 2022). An effective understanding of DT allows for adequate adaptation to constant technological change, while also ensuring efficient navigation in digital environments and the ability to solve problems (Vuorikari et al., 2022).

A high level of proficiency related to DT enables individuals to adapt adequately to constant technological changes, while also ensuring efficient navigation in digital environments and problem-solving skills (Vuorikari et al., 2022). The acquisition of adequate digital proficiency levels has a positive impact on the learning process and contributes to higher academic performance (Lin et al., 2017; Moreira et al., 2022). It is therefore imperative that students develop these skills in order to be adequately prepared to face the challenges of their academic and professional careers (Cassiano et al., 2023; Vuorikari et al., 2022).

METHOD

Considering the aims of this article, we opted for a quantitative, non-experimental, correlational and descriptive approach.

Participants

The sample consisted of 211 students enrolled in the first cycle of studies (bachelor's degree) in the field of humanities and social sciences at a university in the south of Portugal.

Of the 211 participants, 35 were male (16.6%) and 176 were female (83.4%). Regarding the distribution of students according to age (mean [M] = 19.91; standard deviation [SD] =

1.693), the majority were between 18 and 20 years old, with the 19-year-old age group being the most represented (n = 53), followed by the 20-year-olds (n = 49). A total of eight students indicated that they were 17 years old, while twenty-seven students stated that they were over the age of 23.

The students were distributed across five different courses: psychology, education and training sciences, languages, literatures and cultures, languages and intercultural communication, and cultural heritage and archaeology.

The psychology course was the most represented, with a total of 90 participants (42.7% of the total sample). In terms of the distribution of students according to year, 42 students (56.6%) responded as being in their first year, 10 students (16.1%) in their second year, and 38 students (51.4%) in their third year.

Subsequently, the education and training sciences course was undertaken by 48 participants (approximately 22.7% of the total sample size), representing the second course with the highest level of response. The respondents were distributed as it follows: 21 students responded in the first year (28%), 16 in the second year (25.8%), and 11 in the third year (14.9%).

A comparison with the responses to other courses revealed that the languages, literatures and cultures course was the least represented, with a total of 13 responses (6.2%). The distribution was more concentrated in the second year, with 10 students (16.1%), while in the first year there was only one student (1.3%) and in the third year, two students (2.7%).

The languages and intercultural communication programme had 33 students (15.6% of all respondents). It is notable to say that no first-year students responded to the survey. In the second year, 14 students (22.6%) responded, while in the third year, 19 students (25.7%) responded.

Finally, the cultural heritage and archaeology course had a total of 27 students (12.8%). The majority of respondents were enrolled in the second year (12 students, 19.4%), followed by the third year (4 students, 5.4%) and the first year (11 students, 14.7%).

Measures

In order to collect data, a 21-item scale was employed, corresponding to the 21 competences of the European digital competence framework for citizens, also known as DigComp (Lucas et al., 2022).

It should be noted that this scale was developed and adapted for the Portuguese population by Lucas et al. (2022) and is entitled "DigComp-based digital competence assessment tool". The scale comprises five sections, namely:

(1) information and data literacy,

(2) communication and collaboration,

(3) creation of digital content,

(4) security, and

(5) problem-solving.

For each item, respondents were presented with five possible answers, with the first option receiving 0 points and the last option 4 points, resulting in a maximum total score of 84 points. The responses were organised according to six levels of digital proficiency, classified into three categories (basic, intermediate, and advanced) and numbered from A1 to C2 in accordance with the common European framework of reference for languages and DigComp (Lucas et al., 2022).

Table 1. Frequency and percentage of students at each level of digital proficiency

Level of proficiency[a]	Frequency (n)	Percentage (%)
C2	0	0.0
C1	7	3.3
B2	57	27.0
B1	121	57.3
A2	24	11.4
A1	2	0.9

[a] A1-A2: Basic level; B1-B2: Intermediate level; C1-C2: Advanced level

As the scale in question did not allow us to collect data on all the variables involved, additional sections were incorporated in order to collect information on the students' academic success.

Procedures

In order to use the scale, we began by requesting authorisation from the scale's authors, who readily gave their consent and showed an interest in having access to the results at a later date.

Data was collected using the *Microsoft Forms* platform during the months of May, June, and September.

The survey was distributed via email to students at the institution by the director of an organisational unit, who forwarded it to the students´ institutional email address. It should be noted that this procedure was duly authorised by the person responsible for data protection and by the Ethics Committee of the Higher Education Institution where we carried out the research.

Given the nature of this study, we employed both descriptive and inferential analytical techniques.

Firstly, a descriptive analysis was employed to calculate frequencies, percentages, Ms, and SDs of the variables under study.

In a second phase, we employed inferential statistics to ascertain whether there was a correlation between the level of digital proficiency, the frequency of DT utilisation and the degree of academic success. This was carried out by performing linear regression analyses.

For this purpose, we used the IBM SPSS statistics programme, version 29.

RESULTS

Students' Digital Proficiency

In order to find out whether DT is being employed in an efficacious manner and to guarantee that students are deriving benefit from the associated advantages, as previously mentioned, a descriptive analysis of their level of digital proficiency was conducted.

Table 1 presents the principal findings pertaining to digital proficiency.

Table 2. Frequency (n) and percentage (%) of students in each dimension of the scale

Level of proficiency[a]	Dimension 1[b]		Dimension 2[c]		Dimension 3[d]		Dimension 4[e]		Dimension 5[f]	
	F (n)	P (%)	F (n)	P (%)	F (n)	P (%)	F (n)	P (%)	F (n)	P (%)
C2	0	0.0	37	17.5	24	11.4	11	5.2	19	9.0
C1	32	15.2	14	6.6	31	14.7	21	10.0	42	19.9
B2	97	46.0	113	53.6	38	18.0	53	25.1	68	32.2
B1	56	26.5	47	22.3	47	22.3	82	38.9	57	27.0
A2	21	10.0	0	0.0	35	16.6	35	16.6	20	9.5
A1	5	2.4	0	0.0	36	17.1	9	4.3	5	2.4

[a] A1-A2: Basic level; B1-B2: Intermediate level; C1-C2: Advanced level. [b] Information and data literacy. [c] Communication and collaboration. [d] Digital content. [e] Security. [f] Problem-solving. F: Frequency; P: percentage.

The majority of students are at level B1 (n = 121), which corresponds to an intermediate level of proficiency and is the most represented. Level B2 is the second most prevalent (n = 57). In the view of Lucas et al. (2022), this level is still regarded as intermediate. However, students at this level demonstrate slightly above-average digital proficiency and are able to utilise DT for a range of purposes and in diverse contexts.

Additionally, it was observed that level A1 was represented by a mere 2 students, while level A2 was represented by 24 students. This suggests that some respondents possess a fundamental level of digital proficiency. This result is consistent with the findings of Azad and Semiyari (2020), who emphasised a tendency among students to overestimate their digital skills.

With regard to the remaining levels, it was found that only seven students had attained level C1, and that no student had reached the most advanced level, C2. This phenomenon has also been observed by Alvárez-Flores et al. (2017), who have noted that despite students' frequent consumption of technology, they do not develop the requisite skills to perform tasks that demand a higher degree of complexity.

The M score obtained by the participants (B1 and B2) suggests that the students are capable of independently and flexibly carrying out well-defined, non-routine tasks in accordance with their specific requirements. The students demonstrated a level of digital proficiency that exceeded the basic level, yet they occasionally required assistance from a more advanced individual to complete specific tasks.

Digital Proficiency According to the Dimension of the Scale

Table 2 reveals significant discrepancies between the assessed dimensions, which warrant further investigation.

In relation to the initial dimension, namely "information and data literacy", it was evident that the majority of students were situated at intermediate levels, particularly at B2 (n = 97), followed by B1 (n = 56). These results appear to suggest that the majority of respondents demonstrate an adequate comprehension of the principles of information and data management, or even a more advanced understanding, given the presence of 32 students at level C1. Nevertheless, a number of students remain at the introductory levels (A1–n = 5 and A2–n = 21), indicating that they encounter challenges in this domain.

On the other hand, in the second dimension "communication and collaboration", we identified a more varied distribution. Although there is a higher concentration of students at intermediate levels (B1–n = 47 and B2–n = 113), we noticed the presence of students at more advanced levels, especially at level C2 (n = 37). There were no students at A1 or A2 levels, showing that students have a strong command of this area. The high digital proficiency in this area has been reinforced by other authors such as Azad and Semiyari (2020) and Arranz et al. (2017), who found high digital proficiency among students, particularly with regard to communication, given the central role that digital communication plays in their activities.

The "digital content creation" dimension exhibits the greatest degree of heterogeneity when compared to the other dimensions. The student cohort spanned the full range of proficiency levels, from the lowest (A1 and A2, n = 71) to the most advanced (C1 and C2, n = 55). This diversity indicates that the creation of digital content appears to be an area in which students exhibit varying degrees of proficiency. Similarly, Alvárez-Flores et al. (2017) identified a limitation in the exploitation of digital resources and creativity, which is also reflected in the present study. These findings indicate that, despite the students' familiarity with DT, there is still a deficit in the development of production-related skills, which are fundamental to optimising the technology's potential.

A comparable distribution is observed for the "Security" dimension, with students represented at all levels of digital proficiency. As with the previous category, the highest concentration of students is at intermediate levels, particularly at level B1 (n = 82). Additionally, a notable proportion of students demonstrated proficiency at the initial levels, particularly at A2 (n = 35), while a minority exhibited advanced capabilities at C1 (n = 21) and C2 (n = 11) levels. Similarly, Lucas et al. (2022) reached the same conclusion, with the highest percentage of students at the intermediate level (B1) and only a small percentage of students attaining the higher levels.

The distribution of the "problem-solving" dimension is comparable, with the majority of students (n = 57 and n = 68) exhibiting intermediate levels of proficiency (B1 and B2, respectively). It is also noteworthy that this dimension, in conjunction with the second dimension, exhibits a considerable proportion of students at the most advanced levels (C1 and C2). The lowest proficiency levels, A1 and A2, were observed to have a low frequency of students, with only 5 and 20, respectively.

As emphasised by Vuorikari et al. (2022), this dimension is of particular relevance in the context of education and professional practice, as it enables students to effectively address challenges in digital environments and adapt to the rapid pace of technological change. Digital proficiency in this

Table 3. Academic success rate[a]

	Frequency (n)	Percentage (%)
Very low (less than 35)	27	12.8
Low (35–44)	46	21.8
Medium (45–54)	43	20.4
High (55–65)	70	33.2
Very high (more than 65)	25	11.8

[a] To calculate the composite variable academic success, we used the following formula: Mean (ZApplicationGrade + ZCourseUnitscompletedwithsuccess – ZCourseUnitsinarreas) + 10 * 50

dimension is fundamental to ensuring that students can navigate digital environments effectively and find solutions to various problems (Vuorikari et al., 2022).

In general, the results indicate that although the majority of students demonstrate intermediate or relatively satisfactory digital proficiency levels, there are areas where a considerable number of students still exhibit basic digital skills, specifically in the domain of digital content creation. Conversely, in all dimensions except the first, students are represented, to a greater or lesser extent, at the most advanced level.

Academic Success

As previously stated, the methodology employed in this study was based on indicators such as the higher education application grade, the number of CUs completed and the number of CUs in arrears. These indicators reflect a traditional, objective view of success, as previously discussed by Araújo (2017) and Gray and Bunte (2022).

Table 3 illustrates the distribution of students according to their level of academic success, with the number of students (n) and the percentage (%) in each academic success category highlighted.

The results demonstrate that the students are distributed across the various categories of academic success. It is noteworthy that 70 respondents were classified as exhibiting a high level of academic success, followed by 46 exhibiting a low level and 43 exhibiting a medium level.

At the upper and lower extremes of **Table 3**, 25 and 27 students, respectively, demonstrated a notably high or low level of academic success.

Relationship Between Level of Digital Proficiency, Frequency of Use, and Degree of Academic Success

The linear regression model proved to be significant only for the variable "frequency of DT use", explaining 3.1% of the variance in the degree of academic success ($F [1.209] = 6.63$, $p = .011$). The regression coefficient for the frequency of DT use was statistically significant, indicating a positive relationship ($B = .297$, $t [209] = 2.58$, $p = .011$; $\beta = .175$), although weak. These results suggest that an increase in the frequency of DT use is associated with an increase in academic success.

As we expected, these results are in line with other studies consulted (e.g., Beluce et al., 2019; Cassiano et al., 2023; Moreira et al., 2022), indicating that DT, when used for educational purposes, promotes greater student engagement, contributing not only to the development of skills such as autonomy and critical thinking, but also to academic success (Moreira et al., 2022; Ota & Dias Trindade, 2020).

However, we cannot fail to reinforce the statements made by Velazco et al. (2021) in light of these results, which emphasise the importance of using technology correctly and responsibly, even for educational purposes, because only in this way can we enjoy the advantages inherent in its use, contributing to academic success.

CONCLUSION

The objective of this study was to measure the level of digital proficiency among university students and to examine its association with academic success.

As asserted by Moreira et al. (2022), digital proficiency scores are relatively low and require enhancement to enable effective navigation of digital environments. This discrepancy indicates a necessity for the promotion of a more strategic and purposeful utilisation of DT for educational and personal development purposes, a practice that appears to be lacking among those who are considered "digital natives" (Prensky, 2001). This also reflects the excessive focus on the utilisation of DT for leisure and entertainment activities, as previously observed by Arranz et al. (2017).

A comparison of the results across the board reveals a consistency with the findings of the study by Lucas et al. (2022), which also identified a higher concentration of students at the B1 and B2 levels. This indicates that intermediate levels of proficiency are more prevalent among university students, suggesting a deficiency in the development of more advanced skills.

The heterogeneity of digital skills and the lack of respondents at the most advanced level of digital proficiency indicate the necessity for the development of pedagogical strategies aimed at improving critical and information evaluation skills, particularly in light of the growing importance of information and data literacy in the context of higher education (Santos & Serpa, 2017).

With regard to the level of academic success, the indicators employed provided an objective perspective on student performance, enabling the identification of distinct levels of success (Araújo, 2017; Gray & Bunte, 2022). The results of the analysis indicate that most students were in the medium and high levels of academic success, suggesting that the respondents demonstrated satisfactory academic performance.

Furthermore, a positive, albeit weak, correlation was identified between the frequency of DT utilization and the level of academic achievement demonstrated by students. The findings indicated that a higher frequency of DT use for educational purposes was associated with a higher level of academic success.

These results reinforce the idea that the frequency of DT use can contribute to academic performance. However, as highlighted by authors such as Alvárez-Flores et al. (2017), the quality of DT use plays a decisive role. However, most of the students surveyed still don't seem to use technology in a way that maximises its potential for educational purposes, limiting the positive impact on their performance (Lucas et al., 2022; Moreira et al., 2022).

Limitations

Despite the modest contribution of this study, we recognise its limitations, especially because the methodology used limits the understanding of the qualitative aspects of the constructs addressed. In this sense, in future research, we suggest using qualitative or mixed approaches that can explore the perceptions and motivations between these two variables, providing a broader view of this reality. Another limitation relates to the sampling technique (non-probabilistic and by convenience), which did not allow the results to be generalised.

Considering more diverse samples that include students from different scientific areas and higher education Institutions, from the different education subsystems, would allow for a comparative analysis and greater robustness to the results.

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Ethics declaration: This study was approved by the Ethics Committee at the University of Algarve on 4 April 2024 with approval code 35/2024. The informed consent process was integrated into the survey: participants were required to read a detailed description of the study's objectives, procedures, and their rights (including the right to withdraw at any time) and to indicate their consent before proceeding. Participation was entirely voluntary. Confidentiality and data privacy were maintained by collecting responses anonymously, ensuring that no personally identifiable information was recorded. All data were stored in a secure and protected database accessible only to the research team and used exclusively for academic purposes.

Declaration of interest: The authors declare that they have no competing interests.

Availability of data and materials: All data generated or analysed during this study are available for sharing when appropriate request is directed to corresponding author.

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