THE PEDAGOGICAL USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES FROM NURSING STUDENTS' PERSPECTIVES

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ABSTRACT

One of the top concerns of educational policies around the world is the use of digital tools in the teaching and learning process. In Morocco, the integration of technology into nursing education is taking on an increasingly prominent role, particularly after the introduction of the LMD (Licence-Master-Doctorat) system. This study investigates students' perceptions regarding the pedagogical use of digital technologies. A cross-sectional study was conducted between April and June 2022. The data were collected through a questionnaire distributed to 539 nursing students, of which 225 questionnaires were returned and analyzed. Our results show that the smartphone and laptop computer are the most commonly used technologies by students to access the internet. The majority of the students (87.11%) agree with the integration of information and communication technologies (ICTs) for pedagogical purposes. Nevertheless, 52% of students are unsatisfied with their teacher's pedagogical use of ICT. Our research adds to a large body of knowledge about the use of ICT in higher education. However, additional research is needed to investigate the integration of educational technologies in greater detail with the aim of enhancing student learning.

Keywords: *technology integration, ICT, nursing students, higher education, students' perceptions*

INTRODUCTION

In the current world, information and communication technologies have evolved to serve as the fundamental educational building block (Bester et al., 2021). A few decades ago, the primary objective of education was to impart knowledge to students based on behaviorism theory. As new approaches to education have emerged, the form of education has also changed, and technology is largely considered a means to facilitate this pedagogical change (Fossland & Tomte, 2020; Jayatilleke & Shah, 2020).

Policymakers and academics are increasingly

of the opinion that the old paradigm of the university is no longer appropriate for the 21st century. Undeniably, the way young students learn is changing, and the way instructors teach them must change as well. This notion is further supported by the knowledge that current generations of young people are receiving degrees that leave them unprepared for the requirements of employment in the 21st century. Therefore, with the aim of enhancing the teaching and learning process, integrating technology into education can be considered a "possible saving grace." (Selwyn, 2014).

The variety of digital technologies used for teaching and learning is quite diverse, and it may include hardware like laptop computers, mobile phones, televisions, and electronic readers as well as software like social media networks, office suites, online forums, videos, and many others (Loughlin, 2017; Staddon, 2020).

Traditional classroom lessons do not offer a quick, flexible learning environment, quick evaluations, or greater engagement. Technology and digital learning tools can fill this gap (Haleem et al., 2022). According to many studies, computer-mediated instruction is just as effective as face-to-face instruction and, in some cases, may be more effective in terms of active learning when the number of students in the class prevents critical teacher-student interactions (Coomey & Stephenson, 2001; Hamann & Wilson, 2003).

Information and communication technologies (ICTs), in particular computer and internet technologies, offer new approaches to teaching and learning rather than just improving on what teachers and users already do (Alamri & Alamri, 2019; Hara et al., 2016; J. Lee & Choi, 2017; Loughlin, 2017; Staddon, 2020). ICT can improve the quality of education by increasing user motivation, facilitating the acquisition of basic skills, facilitating higher order thinking skills, and improving the training of teachers. Using digital technology can also enhance collaboration by allowing resource creation and sharing, or just by encouraging basic communication among students, which will unavoidably lead to peer feedback and reflection (Alamri & Alamri, 2019; Hara et al., 2016; Lee & Choi, 2017; Loughlin, 2017; Staddon, 2020). In the same perspective, Donelly et al. (2011) stated that students feel less bored and more motivated to pay attention when information is being given in classes where ICT tools and ICT-based activities are successfully employed (Donnelly et al., 2011).

ICTs have been recognized for the value they can add to the teaching and learning experience, but how they are used varies greatly between topic fields, degrees of study, delivery methods, and institutions (Henderson et al., 2017; Selwyn, 2014). It has also been noted that if they are not effectively and purposefully incorporated into learning experiences, ICTs can be a distraction and an ineffective addition to classroom teaching. The subject to be taught, the type and number of students, and the desired learning outcomes are all factors that experts in the area advise taking into account when choosing the proper ICT equipment and applications (Abbott, 2000; Koehler & Mishra, 2009; Maharaj-Sharma & Sharma, 2017).

In nursing education over the past several years, there has been an increase in the use of technology, transforming how educators provide content and engage students. By incorporating technology into the teaching and learning processes, nursing institutions are changing paradigms to promote active learning and learner-centered approaches (Williamson & Muckle, 2018). However, the research on its integration into nursing education settings has shown few results (Williamson & Muckle, 2018).

In Morocco, the integration of technology into nursing education is increasingly taking a prominent place in the higher institutes of nursing professions and health techniques since the introduction of the LMD system, which brings this training into the realm of higher education. With the sudden global outbreak of COVID-19, the importance of integrating digital tools into education has been even more emphasized. However, the incorporation of ICT into teaching practices is not an easy task and often presents some challenging difficulties for both students and educators. Additionally, a policy for integrating ICT into nursing education has not been put into practice. Furthermore, the quantity of studies in the Moroccan context is relatively limited. Informal feedback from students and educators reflects some positive and negative aspects of the process.

According to Margaryan et al. (2011), stakeholders in higher education should look at the technologies students use and how they perceive them to guide policy and practice around

the use of technology for educational purposes (Margaryan et al., 2011). Being the main target population of the educational process, students must be at the center of the integration of information and communication technologies in teaching and learning practices. Therefore, investigating students' perceptions regarding the pedagogical use of digital technologies is necessary. Such an examination will certainly be instructive to determine the status, extent, and direction in which evolution should proceed in the Moroccan context. To this end, the present research investigates how nursing students perceive the pedagogical use of ICT in two nursing institutes in the southeast Moroccan region of Draa Tafilalt.

MATERIALS AND METHODS

Study Design, Participants, and Sampling Method

This is a cross sectional study conducted between April and June 2022 at two higher education institutes of nursing professions and health techniques in the southeast of Morocco. Students of Errachidia and Ourzazate institutes were targeted in our study. We used a census sampling method based on the selection of all students enrolled in the second, fourth, and sixth semesters of the professional bachelor's degree cycle, which were open during the study period (N = 539).

Data Collection

Data were collected by means of an anonymous, self-administered questionnaire that was developed by various reviews of the literature (Cohen et al., 2022; Henderson et al., 2016, 2017). The questionnaire was divided into three sections: Part 1 includes information about the personal characteristics of the sample, including gender, age, option, origin, and level of study; Part 2 is devoted to digital access and skills among students; and Part 3 focuses on nursing students' perceptions of the academic use of ICT, such as their preferred course delivery type, attitude, and level of satisfaction.

Prior to conducting the study, two nursing educators were given the instrument to evaluate its content validity. Twenty-two nursing students from other nursing institutes participated in the pre-experimental process to assess the questionnaire's clarity and detect potential ambiguities.

Data Analysis

Following the data collection via the questionnaire, a database was created using an Excel table, which was then subjected to statistical analysis using SPSS version 25.0. Quantitative variables were expressed as mean ± standard deviation. Qualitative variables were expressed as frequencies and percentages. For the association between qualitative variables, the Chi-square test was applied. The statistical significance level was set at $P < 0.05$.

Ethical Considerations

Before gathering data, the following ethical guidelines were respected and disclosed to the respondents: (a) receiving the administration's permission before starting the study, (b) explaining the study's purpose to the students who took part in the survey, (c) maintaining participants' anonymity, (d) obtaining their consent, and (e) guaranteeing the confidentiality of the data.

RESULTS

Out of 539 student nurses who were the study's target population, 225 responded to the questionnaires, representing a 42% response rate. Table 1 provides the sociodemographic details of the study participants.

Table 1:
Sample Characteristics

| Variables		N	Percentage (%)
Gender	Male	53	23.6
	Female	172	76.4
Age (means+ SD)		19.87+1.28	
Academic level	S2	108	48.0
	S4	37	16.4
	S6	80	35.6
Origin	Rural	109	48.4
	Urban	116	51.6
Access to internet	Yes	199	88.4
	No	26	11.6

Our results show that the majority of students were female (76.4%). The average age of the sample was 19.89 years. The table above shows that 35.6% of the students were in Semester 6, while the students in Semester 4 and Semester 2 represent

16.4% and 48.0%, respectively. Concerning origin, 51.6% of nursing students were from urban areas, while 48.4% were from rural areas. We note that 88.44% of the nursing students had access to the internet, while a smaller proportion of them (11.66%) did not.

Students Perceived Digital Skills

The results of our study show that smartphones and laptop computers were the most commonly used technologies by students to access the internet with 86.7% of students using their smartphones and 49.3% using laptops. Tablets and desktop computers were rarely used by students (see Figure 1).

Figure 1.

Technologies Used by Students to Have Access to the Internet
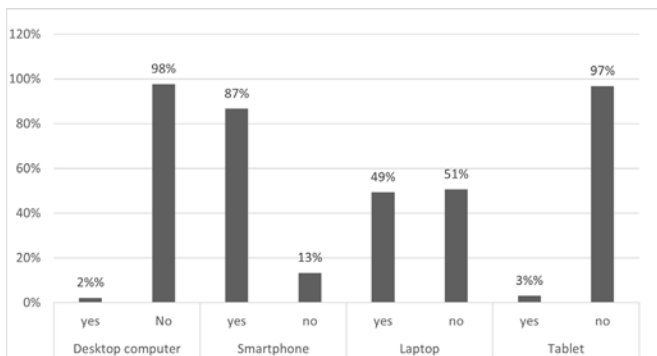
The student's level of competence with computers and multimedia tools was satisfactory: 55.1% of students had a medium level, 27.6% had a high level, and only 17.4% reported a low level of ICT-related competency. Moreover, a significant proportion of students (72.9%) claimed that the computer tools within the training institution were inaccessible. In addition, according to our data, 70.2% of the respondents had not attended an ICT training course.

Students' Perceptions of the Pedagogical Use of ICT

The majority of students (90.4%) indicated that their educators use ICT in their teaching work, with PowerPoint (76%), MS Word (59.1%), online educational platforms (LMS) (48.9%), and social networking (44%) as the most frequently used technologies. With regards to their attitude, most of the students (87.11%) were in favor of the integration of ICT for pedagogical purposes.

According to our findings, almost half of the students (48.9%) preferred a hybrid (mixed) course delivery. Traditional face-to-face teaching was preferred by 40% of the respondents, and 10.7% tended towards fully online teaching. Nevertheless, 53.8% of students were not satisfied with their educator's pedagogical use of ICT, and 72.977% of the participants reported having difficulties using digital tools. When faced with technical difficulties, students turned to their classmates for assistance, with a proportion of 67.6%, while just 16% of the students overcame the ICT technical difficulties on their own. Teachers were less likely to be requested by students for technical support.

Association between Some Key Variables in the Study

A statistically significant association was found between gender, study level, urban/rural

Table 2.

Percentages of Students Having Difficulties in ICT Usage According to Participants' Gender and Origin. (N=224)

			Student Gender		X^2	*p* value	Origin		X^2	*p* value
			Male	Female			Rural	Urban		
Facing difficulties in using ICT	Yes	N	30	134			86	78		
		%	18.3%	81.7%			52.4%	47.6%		
	No	N	23	37			22	38		
		%	38.3%	61.7%	9.768^a	.002	36.7%	63.3%	4.377^a	.026
Total %		N	53	171			108	116		
		%	23.7%	76.3%			48.2%	51.8%		

Table 3.
Students' Satisfaction with Educators' Pedagogical Use of ICT According to Their Year of Study (N=217)

		Academic level			Total	X²	*p* value
		S2	**S4**	**S6**			
Students' satisfaction with educators' pedagogical use of ICT	Very Dissatisfied	8 (29.62%)	4 (14.8%)	15 (55.6%)	27	33.838[a]	.000
	Dissatisfied	32 (34%)	26 (27.7%)	36 (38.3%)	94		
	Satisfied	55 (66.3%)	4 (4.8%)	24 (28.9%)	83		
	Very Satisfied	9 (69.2%)	0 (0%)	4 (30.8%)	13		
Total		104	34	79	217		

origin, and a student's perceptions of the usefulness of technological tools. As indicated in Table 2, more female students (81.7%) had greater difficulties with the use of ICT in courses than male students (18%). The chi-square test showed that the relationship between gender and difficulty of use was statistically significant: $X^2 = 9.768$ $p < 0.002$.

Our findings show an association between student origin and ICT use difficulties. Students from rural areas (52.43) were more likely to experience technical difficulties with digital tools than urban students. Statistically, the chi-square test showed that this relation is significant with $X^2 = 4.377$, *p* value = 0.02 (see Table 3).

When it comes to the correlation between students' level of satisfaction regarding ICT pedagogical integration and their academic level, we see that students at low levels were more satisfied than those at a higher level. The chi-square test indicated a highly statistically significant link between the two variables ($X^2 = 33.83$, *p* value = 000).

DISCUSSION

Technology use in education is advantageous, but it is vital to take other aspects into account, such as student preferences and adaptability, that may affect a student's readiness and capacity to engage in meaningful learning experience (Williamson & Muckle, 2018). Understanding students' perspectives on the pedagogical use of information and communication technology (ICT)

is crucial to determining whether or not ICT integration in higher education settings is successful (Venkatesh et al., 2014).

The results obtained in this study reveal that almost all the students (88.4%) have access to the internet and access it most often with a smartphone followed by a laptop. The use of fixed computers and tablets is rare. These results tend to agree with those found in the recent literature (Hailegebreal et al., 2022; Williamson & Muckle, 2018). In the same respect, the study conducted by Harerimana and Mtshali (2019) indicates that the majority of nursing students (89.3%, n = 134) reported possessing cellphones, followed by laptops (78.7%, n = 118), tablets (47.3%, n = 71), and desktop computers (22%, n = 33). These findings demonstrate that learners prefer handheld electronic devices over desktop computers, and, as stated by Redjimi and Kadi (2020), students prefer the smartphone as an "all-purpose" tool (Harerimana & Mtshali, 2019; Redjimi & Kadi, 2020).

When it comes to students' digital skills, our results show that their self-assessed level is satisfactory: 55.1% of students have a medium level, 27.6% have a high level, and only 17.4% report a low level of ICT-related competency. These findings are in line with those of similar studies (Guennoun & Benjelloun, 2016; Harerimana & Mtshali, 2019; Williamson & Muckle, 2018). Nevertheless, a significant proportion of students (72.9%) claim the computer tools within the training institution are

inaccessible, and 70.2% of learners have not benefited from training in the use of ICT. All of these considerations constitute real barriers to the effective pedagogical use of digital tools. In Africa, the main obstacle encountered in the use of ICT in education lies in the lack of access to different technological tools (Ngamo & Karsenti, 2008). In fact, nursing students must be supported to develop digital skills corresponding to the different phases of their careers for two reasons: first, to acquire ICT skills relevant to academic study, and second, to present the ICT skills relevant to practice and the clinical environment, which is getting more and more digitized (Wilkinson et al., 2013).

The results obtained from the questionnaire reflect the students' opinions and show that the majority of students (90.4%) indicated that their educators use ICT in their teaching practice, with PowerPoint (76%), MS Word (59.1%), online educational platforms (48.9%), and social networking (44%), as the most frequently used technologies. These results tend to agree with those of Penaflor-Espinosa (2020), which shows that faculty members in a private university in Korea make heavy use of technological resources and equipment such as laptops, email, and PowerPoint. However, it appears that educators, according to students' views, more frequently use technologies that can be associated with passive pedagogies or provide teacher-centered instruction rather than student-centered instruction. In fact, the role of the teacher in the integration of ICT is unquestionably of greater importance. What is more, teacher characteristics may be more relevant than the availability of technological infrastructure (Gil-Flores et al., 2017).

With regards to their attitude, most of the students (87.11%) favor the integration of ICT for pedagogical purposes. This finding is largely consistent with the favorable attitudes and perceptions of students toward technology reported in the literature (Alamri & Alamri, 2019; Cai et al., 2017; Kennedy & Dunn, 2018; Lee et al., 2019). According to the findings of a study that was performed among nursing students, 89.3% (n = 134) of the nursing students had a favorable perception of technology in nursing education (Harerimana & Mtshali, 2020). In the Moroccan context, 84% of university students, representing a variety of academic fields, have a very favorable attitude toward the use of ICTs in scientific courses (Guennoun & Benjelloun, 2016).

Another key finding of our research is that most students reported having difficulties in using digital technologies. Further, 53.8% of students are not satisfied with their educator's pedagogical use of ICT. This result is at odds with those found in similar studies suc as Alamri and Alamri (2019) and Guennoun and Benjelloun (2016).

Gender, academic level, training session attendance, and urban/rural origin were all found to influence students' perceptions. As indicated in Table 2, female students (81.7%) have more difficulties with the use of ICT in courses than male students. The chi-square test showed a statistically significant association between the two variables: $X^2 = 9.768a$, p value = .002. Men might demonstrate greater confidence while using technology for educational purposes (Venkatesh et al., 2014; Yau & Cheng, 2012), but Yau and Cheng (2012) show gender disparities in computers are socially formed and unrelated to a learner's natural ability. This can be also explained by the impact of gender stereotyping, which labels technology and computing as male-dominated fields of study or even allows female students to avoid choosing computer-related courses at a higher education level (Hwang et al., 2009).

In addition, students from rural areas are more likely to face difficulties in using digital tools than urban students. As such, it seems that residential background can influence student usage of technological devices in an educational context. In a recent study, researchers demonstrated that the possibility of using ICT by a student from an urban area is 1.85 times higher than that of a student from a rural area [AOR = 1.85, 95% CI = 1.08, 3.16] (Hailegebreal et al., 2022). This difference between students can be attributed to the unequal distribution of computer tools between rural and urban areas, which makes students from rural areas less accustomed to using them.

Study level and student satisfaction with ICT pedagogical integration shows a statistically significant association (x = 33.83, p value = 000). Students with lower study levels are more satisfied than students with higher levels. A similar study, conducted among a sample of nursing students, indicated that first year students positively perceived the role of technology 6.7 times more than other levels (OR

= 6.710, 95% CI: 1.33–33.63, p = .021; Harerimana & Mtshali, 2020). Newer students may be excited about and engaged with the introduction of new technology, as opposed to upper-level students who are less focused on technology and more focused on preparing for postgraduation activities (Raman, 2015; Williamson & Muckle, 2018).

This is one of the few studies on ICT integration carried out among Moroccan nursing students, so some limitations apply to this study and should be considered. First, our study is conducted in just two nursing institutions. The constraints of the research methodology are another limit, as we adopted a quantitative method whereas a mixed method would have given a more comprehensive approach to understanding the phenomenon under study. Further to this, we based our study, in some variables, on student declarative statements. The involvement of students, the target of our study, remains less important and does not exceed our expectations.

These results bring to mind the COVID-19 pandemic, when all campuses were shut down to prevent infection and ensure the continuation of instruction. In Morocco, this closure resulted in an unplanned and rapid shift toward the usage of online education technologies. Because of the difficulties that students and teachers are experiencing in Morocco, as this study has found, the pandemic situation revealed a certain number of challenges that make it difficult to fully take advantage of the opportunities presented by these technological tools. In the light of these findings, Moroccan educational authorities must promote ICT use among both students and teachers by providing basic and continuing training for nursing educators, ensuring accessibility, revising and implementing digital skills in nursing curricula, enhancing students' motivation, and considering students' perceptions and attitudes toward ICT. To achieve that, a clear policy for integrating information and communications technology into nursing education should be developed and put into action.

In light of these findings, future research must concentrate on how ICT integration might be made even more effective, perhaps by adopting a framework to support the integration of technology into the curriculum and promote pedagogical approaches that are in line with nursing curriculum objectives.

CONCLUSION

For better or worse, digital technologies are a crucial component of what nursing education is today and what it will be in the future. Therefore, one of the priorities of education policies around the world is the use of digital tools in the teaching and learning process.

Our findings contribute to a broad body of research that has examined the use of ICT in higher education, and it sheds light on nursing students' perceptions of the pedagogical use of ICT and how different perspectives might affect students' perceptions. However, additional research needs to be conducted to look into the integration of educational technologies in detail with the aim of enhancing student learning.

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