

Research article

Peer mentoring experience related to information and communication technologies. A qualitative study



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ABSTRACT

Introduction: Quality and inclusive education must include Information and Communication Technologies (ICT), which is a growing trend in educational environments since the COVID-19 pandemic. These technologies have transformed learning towards more collaborative and interactive models, but they also pose a barrier due to the lack of skills or knowledge about their use. This circumstance has been identified among some first-year nursing students.

Objective: The present study focuses on exploring the perception of students who participated in the experience of peer mentoring to improve adaptation to the use of Information and Communication Technologies.

Design and methods: The study employed a descriptive qualitative approach, relying on in-depth interviews and a focus group conducted with 29 students who participated in the project between 2020 and 2023. Additionally, sociodemographic data and information about Information and Communication Technologies were collected through a self-administered questionnaire.

Results: The findings indicate that mentors exhibited higher competencies than those being mentored, yet the experience was positive and satisfying for both, emerging as an effective strategy to facilitate learning. Another noteworthy result is the performance of younger students in the role of mentors, a fact that contradicts similar experiences.

Conclusion: In conclusion, peer mentoring emerges as a valid strategy for acquiring digital competencies and Information and Communication Technologies among first-year nursing students, fostering more inclusive learning environments.

1. Introduction

Mentoring has been defined as a professional collaboration between individuals working together on a long-term basis to support the personal and professional development of their partner. This support includes both career guidance and psychosocial support (National Academies of Sciences, 2019). The concept of mentoring can be described as a deliberate partnership between an experienced individual and a less skilled counterpart. The purpose is to achieve mutually agreed goals. This collaboration involves both individuals contributing to each

other's personal growth and development (Dorsey and Baker, 2004).

Mentoring has gradually developed various forms, one of which is peer mentoring (PM), defined by Vandal et al. (2018) as a partnership that occurs between two individuals who share a common activity. In the university context, peer mentoring can be considered as academic-personal relationship leading to student learning and socialization including the learning of leadership by the mentor (Napierkowski and Migliore, 2022; Tsang, 2020). The senior student (mentor) provides support to a new student (mentee) to facilitate their integration into the university community and to further their career development (Akinla

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et al., 2018; Henderson et al., 2020; van de Mortel et al., 2021). This strategy is presented as a good way to develop general and specific competences in a collaborative learning context (Alonso-García, 2021).

Previous studies have regarded PM as a positive influence on adapting to university life by fostering relationships between mentors and mentees (Joung et al., 2020). Additionally, evidence supports that PM facilitates communication between students and faculty and enhances students' social and academic self-perception (Akinla et al., 2018; Hur et al., 2018).

The PM experience has been shown to be beneficial for both mentors and mentees. For mentors, it enhances their professional development by improving their understanding and integration of the nursing role, and by developing their own clinical competence (Jacobsen et al., 2022). Mentors also benefit by developing their communication and leadership skills and by building their self-confidence (Hogan et al., 2017; Henderson et al., 2020; van de Mortel et al., 2021). PM has been described as an enhancer of mentor self-efficacy and commitment to the institution, improving clinical decision-making and time management skills (Choi and Yu, 2022; Christiansen and Bell, 2010; Mumba et al., 2021).

From the mentee's perspective, there is evidence that PM builds self-confidence, and makes them feel more comfortable and less anxious in clinical learning situations (Jacobsen et al., 2022). Furthermore, the sense of social isolation experienced by novice students on their first clinical placement was reduced by the active support of a peer mentor (Christiansen and Bell, 2010).

Other authors have suggested that PM contributes to mentees' sense of security (Behkam et al., 2022); to team-working skills (Akinla et al., 2018); communication and respect for each other (Jacobsen et al., 2022); the ability to prioritize, and emphasizing the importance of balancing work and family life (Arenas and Brisson, 2020). In terms of education, mentees have shown an awareness of their own learning responsibility and a predisposition to collaborative learning (Jacobsen et al., 2022).

PM had a positive impact on managing the programme requirements, and providing motivation to continue when these proved to be challenging (McKellar and Kempster, 2017); as well as reducing anxiety and increasing the effectiveness of their learning (Cornine, 2020; Kachaturoff et al., 2020). Improved career planning, reduced pre-exam stress and increased academic performance have also emerged as positive results from PM (Arab and Saeedi, 2024; Fallatah et al., 2018).

In nursing education, these benefits are enhanced when the pairing consists of final-year mentors and first-year mentees (van de Mortel et al., 2021). This is related to the fact that the barrier to successful development in the first year is not necessarily due to a lack of academic knowledge or skills, but to a need for social support and strengthening of interpersonal skills (Mumba et al., 2023).

2. Background

Information and Communication Technologies (ICT), considered as resources for processing and disseminating information based on advanced computing, telecommunications, and audiovisual technologies (Cobeña Napa et al., 2023), have been integrated into the methodologies used at university. ICT stimulate students' understanding and enhance learning opportunities. This is shaping into a pedagogical approach that involves both teachers and students in highly complex activities to enrich and intensify classroom learning (Vera et al., 2023). As a result, academics and students, and the learning spaces within which they operate, must adapt to new needs (Alonso-García et al., 2019; Duță and Martínez-Rivera, 2015; González-Zamar et al., 2020). The coronavirus pandemic accelerated this adaptation. The COVID-19 health crisis compelled universities to enhance their technological infrastructure for distance learning. In order to adapt to a sudden health crisis scenario, both educators and students had to move quickly to improve their digital skills (González-Pérez and Ramírez-Montoya,

2022; Zarei and Mohammadi, 2022).

ICT have brought a wide range of benefits to the learning process. ICT have provided the opportunity to create learning spaces that are not always managed by the teacher (Duță and Martínez-Rivera, 2015). This leads to a transformation of learning towards more collaborative, interactive, and student-centered models (Alonso-García et al., 2019; González-Zamar et al., 2020). ICT enhance communication between students. They allow students to share their individual opinions more easily and to enhance their contributions to the group. This promotes collaborative learning and increases motivation (Duță and Martínez-Rivera, 2015). In addition, the open, flexible, and interactive nature of ICT facilitates access to materials and self-training. In this way, training can be adapted to a wide range of situations. ICT can break down barriers to access and promote lifelong learning (Zarei and Mohammadi, 2022).

However, the use of ICT can also be a source of inequality among students, highlighting the student's socio-economic situation, which influences the availability of technological resources (Mairal-Llebot et al., 2023). Other barriers to ICT-based learning have been identified, such as technological competence, specific prior skills, and the age of both students and teachers (Bartolomé et al., 2018; Martín-Párraga et al., 2023). Therefore, the use of ICT may run counter to one of the fundamental Sustainable Development Goals (SDG-4) on quality education, in line with the 2030 Agenda: to ensure inclusive and equitable quality education for all.

Hence, it is essential to ensure that students are familiar with, and know how to use, the technological tools applied to teaching, or to provide alternatives for acquiring these skills. Otherwise, the use of ICT could jeopardize their learning process. For this reason in 2019, when a group of nursing professors from the University of Huelva became aware that a portion of first-year students entered the programme with deficiencies in their technological skills, a peer mentoring programme was proposed as a tool to enhance these competencies. The aim of this study was to explore the perception of students involved in this project, both mentors and mentees, regarding the experience of peer mentoring in enhancing adaptation to ICT.

3. Material and method

3.1. Design

Descriptive qualitative study following COREQ guidelines (Tong et al., 2007). Data were collected through 21 in-depth interviews and a focus group in July 2023, involving both mentors and mentees. This study is part of an educational research project on peer mentoring to improve adaptation to the use of information and communication technologies.

3.2. Description of the academic experience: peer mentoring programme

In 2019, it was noticed that a portion of first-year students had entered the programme with deficiencies in their technological skills. A mentoring programme was proposed as a tool to enhance these competencies in the use of ICT, involving students who were proficient in ICT in the learning process and those who were not. The "Companions Project: Peer Mentoring" was initiated during the 2020/2021 academic year and repeated in 2021/2022 and 2022/23.

The students participating in the programme differed each year, as it was offered to the new incoming first-year nursing students. An initial questionnaire was distributed to identify the real needs of each group of participants, and to ask whether they would be interested in participating as mentor or mentee on the programme, as well as requesting personal contact details. Informed consent was obtained to record these data and to use them exclusively for the purposes of this research. Similar ICT needs were identified in all groups, despite the diversity and heterogeneity of the participating students. The participants who acted

as tutors to the mentor-mentee pairs and the structure of the programme remained constant throughout the duration of the programme.

Mentor-mentee pairs were assigned, and a teacher-tutor was appointed. Additionally, a training session was conducted every week to address the deficiencies identified in content. As a resource for participants, a space was provided on the University of Huelva (UHU) e-learning platform where materials were made available for reference. An instant messaging group was created for the course, to maintain constant communication among key stakeholders. Three years after implementation, it was decided to gather feedback from students about their experiences with the programme.

3.3. Respondents and setting

The inclusion criteria were: being nursing students at UHU; participating in the “Companions Project: Peer Mentoring” during academic years 2020/2021, 2021/2022, or 2022/2023, in the role of mentor or mentee, and providing informed consent to voluntarily participate in the research. Specific criteria were established for participation in each role. To be a mentor, it was necessary to express a desire to play this role and to self-assign a perception of the level of digital competence equal to, or higher than, 7 (scoring from 1 to 10). On the other hand, to be mentored, this perception had to be equal to, or lower than, 5 (scoring from 1 to 10), with the expressed intention to participate in this role. According to these criteria, participants were assigned as mentor or mentee.

Participants were intentionally selected from among those who participated in the peer mentoring programme. The key informants were identified, including students who had entered university education through different pathways. To recruit participants, after the programme’s completion individuals were contacted by phone. They were informed about the purpose of the study and invited to participate in either in-depth interviews or in a focus group.

Students gave their consent to be contacted and to participate in the qualitative study at the beginning of their participation in the mentoring programme by completing a questionnaire and signing consent form. They were given the opportunity to change their personal details at any time or to withdraw their consent to be contacted. Contact details were handled in accordance with current legislation, and only the mentors responsible for the programme and the researchers had access to them, keeping them securely guarded.

The sample size was determined based on the participants in the project who agreed to take part, taking into account the information saturation obtained (Sandelowski, 1995).

3.4. Data collection

Quantitative sociodemographic and specific data on ICT were collected through a self-administered questionnaire, completed before participation in the mentor programme. The variables included were age, gender, way of admission, residence (urban/rural), additional responsibilities to the studies, family or work (yes/no), importance of new technologies (scale 0–10), perception of own level of digital competence (scale 0–10), considering the use of ICT in the educational environment to be stressful (yes/no), own perceived weaknesses in ICT, willingness to participate as a mentor/mentee. Participants were informed of the aim of the study and gave their consent for their data to be used for research purposes. Contact details were recorded separately from other data. Each participant was assigned an identification number, so that the database for the analysis was anonymized and did not allow the participants’ responses to be identified. Participation was voluntary and participants could withdraw from the study at any time if they wished.

For qualitative data collection, in-depth interviews and a focus group were used to gain an insight into the experiences, perceptions and meanings provided by the participants. A total of 21 individual in-depth interviews were conducted, with an average duration of 48 min (SD = 5.6). They were based on a pre-prepared script, adapted to both mentors

and mentees (Table 1). The focus group session, which lasted 50 min, was guided by one of the project leaders and included an observer who took field notes. A previous script allowed us to explore different points of view and to generate discussions in the group of students (Table 2). The interviews and the focus group were recorded in audio and subsequently transcribed verbatim for analysis. Consent was obtained from the participants to audio-record the conversations.

3.5. Data analysis

The data analysis was conducted according to the steps proposed by (Graneheim et al., 2017; Graneheim and Lundman, 2004). Two researchers listened to and transcribed the recordings of the interviews and the focus group word by word. The researchers read the transcripts independently a number of times to understand the data, developing coding. Initially, units of meaning were identified in relation to the students’ perceptions. The units of meaning were then coded. During several meetings of the research team, the codes were discussed, compared, unified and reduced in content and meaning in order to have a clearer structure. They were then grouped into categories. Finally, we explored how codes interacted with each other through cognitive networks obtained from co-occurrence analysis, both to categorise and to establish relationships between categories. This contributed to the final establishment of categories and dimensions. This approach enabled the identification, categorisation and gain of an enriched perspective of the peer mentoring experience in relation to the adaptation of ICT in nursing education.

3.6. Ethical considerations

The study was conducted strictly in accordance with current ethical and legal standards, in line with the principles established in the

Table 1
Guide of topics and questions addressed in the interviews.

Topic	Questions
The experience	Describe your experience in participating in this programme. How has it been your experience as a mentor/mentee? How have you felt in your role? What has participating in this programme meant for you on a personal and academic level? What is your opinion about the number of meetings and contacts with your mentor/mentee? What is your opinion about the organization and duration of the programme? Now that you know the project, would you participate again? Why? Would you recommend this experience to new colleagues in the next course? Why? Indicate the best and the worst of the programme. Imagine if you were to organise it next year, what changes or improvements would you make to the programme.
Mentor/mentee relationship	How was the relationship and climate created between you and your mentor/mentee? What is your opinion on the number of meetings and contacts with your mentor/mentee? What are the main facilities and difficulties you have encountered in finding time to communicate with each other? What is your opinion on the number of meetings and contacts with your mentor/mentee?
Contents (mentors only)	What did you think of the topics covered in the programme? Can you tell me about the facilities and difficulties in attending the sessions? What do you think about the adequacy of the received training to the needs of your mentees?
Tutors (mentors only)	What is your opinion on the relationship with your tutors? And on the means of communication and number of meetings-communications with them?

Table 2
Guide of topics and questions addressed in the focus group.

Topic	Questions
Overview	What was your experience of participating?
Relationships	How would you describe your relationship with your mentoring partner and mentor?
Organization	What is your opinion of the organization?
Highlights and suggestions for improvement	Is there anything you would highlight as positive, is there anything you think could be improved, which one(s)?

Declaration of Helsinki. Confidentiality and data protection were ensured in accordance with Organic Law 3/2018 on the protection of personal data.

The study was evaluated by the ethical health research committee of Huelva (code 0432-N-23), which determined that the subject matter and content of the project did not require approval from the committee governed by the guidelines of the International Conference on Harmonization – Good Clinical Practice (ICH-GCP) (12 May 2023).

4. Results

4.1. Participants' characteristics

We had a total participation of 29 students, with 15 serving as mentors (52.4 %) and 14 as mentees (47.6 %). The study included 89.7 % female participants, and the average age of mentors was significantly lower compared to that of mentees ($p < .01$). Most mentors had entered through a high school diploma (73.3 %); however, all mentees had entered through other entrance exams, such as those for mature students ($p < .01$). About 86.7 % of mentors reported having no work or family responsibilities, while 91.7 % of mentees reported having family and/or work responsibilities ($p < .01$). At the start of the project, mentors assigned a higher average rating to their digital competencies compared to mentees, using a scale from 0 to 10 ($p < .01$). Additionally, 100 % of mentees (14) perceived the use of new technologies as academically stressful, in contrast to 0 % of mentors who shared this perception ($p < .01$) (Table 3).

4.2. Descriptive analysis

The result was 16 categories, grouped into 4 dimensions, which are a reflection of the different topics of interest: programme management perception, lived experience, barriers and facilitators and areas of improvement (Table 4).

The relationship and relevance between the dimensions and categories are depicted in Fig. 1. Some exemplifying verbatim extracts from the participants in each dimension and category are reflected in Table 5. The main results of the 4 dimensions obtained are described below.

4.3. Perception of programme management

Five areas of programme management were identified: training, materials and resources, working methodology, meetings, and relationships with tutors, mentors, or mentees. Regarding training, the students perceived it as adequate and complementary. The materials and resources covered in the project were considered suitable to meet the needs of both groups. In terms of the working methodology, all comments were positive, with a perception of simplicity and organization consistent with the tasks assigned in the courses they were taking. Finally, meetings and relationships with tutors, mentors, and mentees emerged as one of the central themes in the perception of programme management. Students highlighted this as key to the project's success, emphasizing the availability and personal and academic closeness. The naturally emerging support relationship was found to be bidirectional.

Table 3
Sociodemographic characteristics and ICTs data.

	Mentors % (n)	Mentees % (n)	Total % (n)	p-value	
Age M(SD)	19.9 (3.7)	36.7 (8.8)	28.0 (10.7)	<.01 ^{a*}	
Gender % (n)	Women	46.15 (12)	53.8 (14)	89.7 (26)	.08 ^b
	Men	100 (3)	0 (0)	10.3 (3)	
Admission % (n)	Baccalaureate and entry exam	100 (11)	0 (0)	37.9 (11)	<0.01 [*]
	Others	22.2 (4)	77.8 (14)	62.1 (18)	
	Urban	47.8 (11)	52.2 (12)	79.3 (23)	
Residence % (n)	Rural	66.7 (4)	33.3 (2)	20.7 (6)	.41 ^b
	Additional responsibilities to the studies % (n)	No	86.7 (13)	13.3 (2)	
	Yes	14.3 (2)	85.7 (12)	48.3 (14)	
Importance of new technologies Scale 0–10. M(SD)	9.1 (0.5)	9.1 (1.0)	9.1 (0.7)	.46 ^a	
Perception of the level of digital competence Scale 0–10. M(SD)	8.2 (0.8)	3.5 (1.0)	6.0 (2.6)	<.01 ^{a*}	
Considers the use of ICTs in the educational environment stressful % (n)	No	100 (15)	0 (0)	51.7 (15)	<.01 ^{b*}
	Yes	0 (0)	100 (14)	48.3 (14)	

M = Mean; SD=Stándar Deviation; a = U Mann Whitney; b = Fisher test; * ≤0.01.

Table 4
Categories and dimensions.

ID	Category (code)	Frequency	Dimension (group of codes)
1	Training	14	Program Management Perception
2	Materials/Resources	14	
3	Work methodology	8	
4	Meetings	26	
5	Relationships (tutor/mentor/mentee)	83	Lived experience
6	Personal achievements	29	
7	Learning	21	
8	Motivations	12	
9	Socialization	21	Barriers/Facilitators
10	Subsequent relationship	13	
11	Recommendation	41	
12	Barriers	44	
13	Facilitators	265	Areas of improvement
14	Beginning of the intervention	23	
15	Organization	13	
16	Softwares/resources used	5	

4.4. Lived experience

The project has been a new experience, underlining the personal contribution it has brought to both roles, including feelings of satisfaction, assistance, camaraderie, learning, self-confidence, and friendship. This experience has also been a learning opportunity for the students, emphasizing personal learning, connections and relationships, academic learning, understanding theoretical content, and practical learning, referring to the applicability of knowledge. The motivations identified differ between the two groups. The mentor is primarily motivated by the desire to help, while the mentee is motivated by the need for assistance and support. This project has facilitated socialization and the creation of a bond that has led to lasting relationships. Participants unanimously

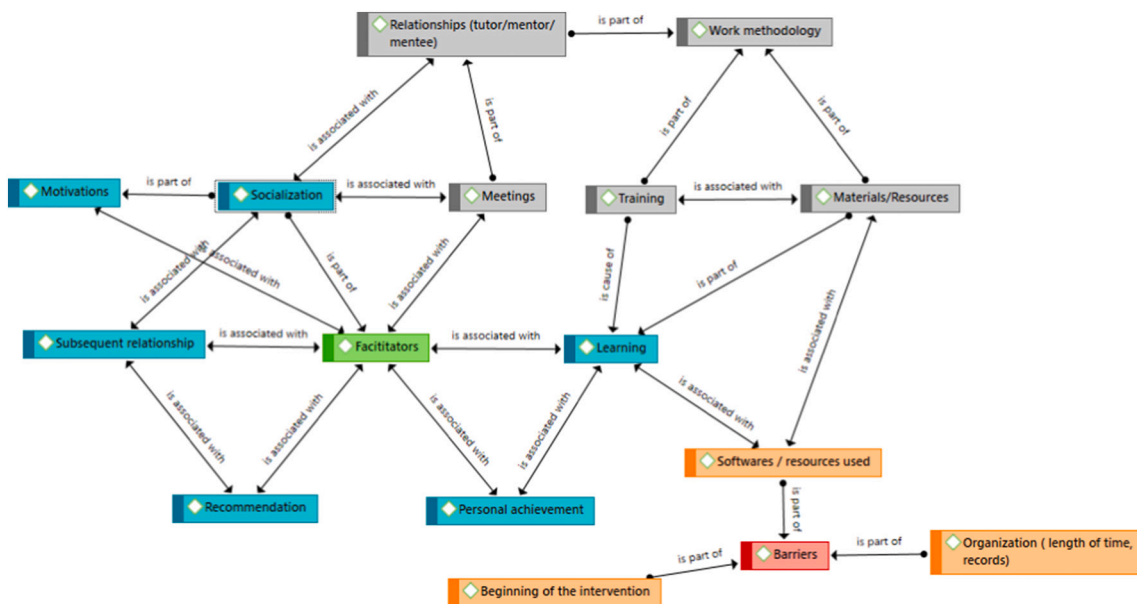


Fig. 1. Network of semantic relationships (distribution by code groups).

* Orange color codes belonging to the areas of improvement dimension.

* Red color codes belonging to the difficulties dimension.

* Green color codes belonging to the facilitating elements dimension.

* Gray color codes belonging to the organization dimension.

* Turquoise color codes belonging to the experience rating dimension. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

expressed the intention to reestablish the experience to other peers, and indicated they would repeat the experience if given the opportunity.

4.5. Barriers and facilitators

As barriers, participants mentioned the difficulty of coordinating due to the schedules of different groups of students, initial shyness when entering an unfamiliar environment, and deficiencies in ICT skills among the mentees. Additionally, students who participated in the 2021–2022 academic year faced the additional challenge of transitioning to virtual teaching due to restrictions caused by the global COVID-19 pandemic.

As facilitators, there were instances of solidarity among students, a valuable example of how empathy and mutual support can strengthen and foster an inclusive and enriching environment for everyone. The most notable facilitator was the coincidence of having face-to-face classes with their peer mentoring partner. The availability of the Moodle platform, with training content and explanatory videos, was considered a very useful strategy among students. The perception of positive feedback throughout the project’s development meant that no student dropped out of the programme.

4.6. Areas for improvement

As an area for improvement, the beginning of the initiative, organization, and the programmes/resources used were considered. Participants expressed the need to start the programme from the first day of teaching and extend it over time. They also faced difficulties in recording information about contacts and encounters. Students proposed training in other programmes such as bibliographic management and other digital resources they needed to handle in their coursework, which they found challenging. The voluntary offering of participants to share their project experience with new students in future courses also emerged. In the focus group, the opportunity to replicate this peer mentoring model in other areas, such as integrating national and

international students, connecting with the university community, or promoting diversity and inclusion, was identified.

5. Discussion

The peer mentoring programme for the development of ICT competencies has been evaluated very positively by both mentors and mentees, eliciting feelings of satisfaction, assistance, patience, camaraderie, self-assurance, and confidence. It has proven to be an effective strategy for facilitating academic and personal learning, as well as promoting socialization and interpersonal relationships by establishing lasting friendships, even after the programme’s conclusion.

In similar experiences, it is common for older students to take on the role of mentors (Miller et al., 2019). However, in our intervention, it was younger students who assumed this role.

Most current nursing students belong to Generation Z, described as proficient in ICT and capable of quickly adapting to technological innovations (Williams, 2019). They are digital natives, Internet users from a very young age, and reliant on technology in their daily lives (DiMaggio and Hudacek, 2020). Previous studies identify them as open-minded individuals who accept differences, with a high level of social awareness and sensitivity to injustice and inequality (Shorey et al., 2021). Therefore, given that the goal of our intervention was to equip students with ICT competencies, it makes sense for younger students to mentor their older counterparts.

The satisfactory results regarding the relationships between mentors and mentees are consistent with the study by So Hee and Yeojin (2023), where they identified that nurses from different generations, despite harboring different work values, have similar communication styles, helping to reduce the intergenerational gap and establish meaningful interpersonal relationships as in the present study. Stevanin et al. (2020) described positive feelings among nurses towards working with colleagues from different generations, with a higher predisposition among younger ones to connect with colleagues of another generation. Furthermore, there is evidence that nurses from different generations

Table 5
Direct quotes from the participants by category.

Dimension	Category	Verbatim	ID
Program Management Perception	Training	(...) Sufficient and relevant training to be able more or less to carry the course forward and acquire that knowledge	MT7
	Materials/Resources	With regard to the content, I saw that it was all good because it included all the necessary things to be able to help those people.	MT13
	Work methodology	(...) I didn't find the project burdensome because with each activity we did, we were adding something new to it	MT8
		(...) Truth be told, they have organized everything very well for us because they assigned us a mentor, and, a tutor	MZ13
	Meetings	(...) They begin this project and are available for you 24 h a day, 7 days a week (...) I speak from my experience, and I believe they are all the same.	MZ2-GF
		Well, right now that we are already in the practice phase	MT6-GF
	Relationships tutor/mentor/mentee	(...) they are the ones who help us	MT15-GF
		(...) you help others, and at the same time, they help you	MT9
	Personal achievements	(...) Realizing that I have helped another person (...) has been satisfying for me	MT9
		The best part is that, with support, I have gained a bit more confidence in myself	MZ6
	Learning	(...) I have seen myself get stronger and more secure	MT7
		(...) Continuing to understand and learn in the world of computers (...)	MT8
		(...) In addition to helping the other person, in the same experience, you also learn: it benefits both parties	MT3
	Lived experience	(...) I wanted to join because I have always enjoyed helping, and I have a good understanding of ICT (...)	MT3
		(...) For me, it was like finding something to hold onto in a shipwreck because the major drawback has been	MZ12
Socialization	(...) dealing with new technologies that I don't know how to handle	MT2	
	(...) I used to be a quite shy person (...) it helped me open up to others (...)	MT5	
Subsequent relationship	(...) and the truth is, now we are not just colleagues but good friends	MT5	
	(...) It has created an even stronger bond, and now it's not just at the mentor-mentee level, but also at a camaraderie level (...)	MZ12	
Recommendation	it makes me feel very calm, it gives me a sense of tranquility	MZ12	
	Yes, I would encourage anyone entering the first year	MT4	
	Well, I would recommend it to people like me, who are in	MT4	

Table 5 (continued)

Dimension	Category	Verbatim	ID
Barriers/facilitators	Barriers	their first year this year, people who are new to the area, to have a first contact with the university, and to see that it's not just about studying, that it's not just tough things (...)	MT15
		In the end, it's the schedule, I think, that can most hinder connecting with a person face to face	GF
		(...) At first, she was quite shy about asking me things and would remain in doubt for fear of bothering me (...)	MT4
		(...) The worst part was that, as it happened during the COVID year, well, it was not possible to maintain those relationships like we can have now, when we are all together, sharing more experiences together	MT7
		(...) We realized (...) that he could become a very good nurse, but it seems he won't progress because he struggles with new technologies, and that became apparent	MT1
		(...) I knew her from the small group, so we haven't had any problem meeting, nor (...)	GF
		(...) The fact that she is in my class group (...) I have her available at any time. I see that as much better	MT15
		(...) I think it's good that they are there on the virtual platform because you have it right there, and can see it at a glance (...)	MZ8
		(...) When I manage to help someone, it makes me very happy, and even though it's challenging, seeing improvement, recognizing what we have achieved, is an incentive to keep going	MT3
		The duration of the project is fine (...) but from my point of view, it should start on the same day as the first class because it gives more confidence to someone who comes in as lost as I was	MT4
		I think you should start in the first year, and I believe you should finish in the fourth year (...)	MZ6
		It has been a real burden to have to write (...) and digitize everything, (...) not having to record every meeting, or in other words, something simpler.	MZ9
		I think next year we could volunteer to explain it to the first-year students so they can be encouraged, perhaps that's better than if a teacher explains it to them.	MZ12
		"(...) Well, for example, I'm from out of town. If I had had a fellow student from Huelva, they could have guided me on	MT10

(continued on next page)

Table 5 (continued)

Dimension	Category	Verbatim	ID
	Softwares/resources used	<p><i>many things about the city or the university</i></p> <p><i>Incorporate into the project content, for example, Mendeley (...)</i></p>	MT2

share the same professional values of human dignity, equity, and responsibility, which facilitates closeness between them (Şenyuva, 2018). Intergenerational learning fosters positive attitudes towards older individuals and allows mutual growth through communication, the exchange of lived experiences, and the creation of connections that enable getting to know each other (Tuohy et al., 2023).

The peer mentoring experience proved to be very positive and satisfying, similar to previous similar experiences among nursing students (Joung et al., 2020; Wang et al., 2022). Participants valued the programme as a facilitator of learning, aligning with previous studies on the development of nursing competencies in clinical settings, thanks to the guidance provided by mentors and shared learning experiences (Carey et al., 2018). There is evidence that mentoring has supported the acquisition of academic knowledge and competencies, as well as interpersonal skills (Green, 2018), fostering self-confidence and professional performance among nursing students (Jacobsen et al., 2022).

The integration of ICT in nursing education has been shown to enhance the learning experience in terms of satisfaction, self-efficacy, and engagement (Ryan et al., 2022). Webb et al. (2017) did not report evidence of improved academic performance, however, it described enhancements provided by ICT in terms of learning flexibility, respect for personal learning pace, improved engagement, and time efficiency, as well as giving quick feedback on performance. Consequently, the acquisition of technological competencies through the peer mentoring programme in this study would explain the participants' satisfaction with improved learning.

A positive attitude towards the use of ICT in nursing education by students has been identified, although it can lead to frustration due to a lack of support (Nwozichi et al., 2019). Participants in Hensley et al.'s (2020) study expressed satisfaction with learning through online training programmes and the use of technologies in the field of nursing. However, students' technical competence has been signaled as one of the barriers to ICT-based learning (Webb et al., 2017), exacerbated by the limited availability of technical support and appropriate technologies, as well as time constraints for learning technology use (Naseem et al., 2019).

According to Cruz-Barrientos et al. (2023), the knowledge, regular use, and attitude of nursing students regarding ICT are good when it comes to basic programmes or interpersonal relationships but diminish for programmes related to education or learning. In this regard, the peer mentoring program employed proves to be an effective alternative for addressing these barriers.

The positive evaluation obtained could be influenced by the global COVID-19 pandemic, as the development of this research included the period of lockdown. This situation necessitated new methods to adapt to distance learning, and the use of ICT was essential to continue students' education. The incorporation of ICT in nursing education had to happen more quickly than desirable, generating difficulties in adaptation and high levels of computer anxiety among students (Papathanasiou et al., 2023). According to Černelić-Bizjak and Dolenc (2022), nursing students expressed satisfaction with their experience of distance learning during the lockdown in terms of accessibility to study materials, adaptation of theoretical classes, and quality of communication with academic staff. Online learning facilitated by ICT during the pandemic has also improved students' flexibility and comfort, self-directed learning, peer interaction, and cognitive skills such as critical thinking or problem-solving (Kor et al., 2022). In terms of attitudinal development,

students' satisfaction with online learning has been positively related to their professional engagement (Černelić-Bizjak and Dolenc, 2022) and has improved their attitude and understanding of the needs of older people (Kor et al., 2022).

Participants in this study expressed enrichment, both academically and personally, as a result of the interpersonal relationships established between mentors and mentees, creating a strong and enduring bond after the experience (Miller et al., 2019; Mumba et al., 2021; Wang et al., 2022). Joung et al.'s (2020) experience developed feelings of unity and belonging among participants by building bonds similar to familial relationships. The desire to extend the relationship after the experience aligns with the results of Wang et al. (2022) and underscores the long-term mutual benefit and positive impact on both participants. The evidence supporting peer mentoring as a valuable, enriching, and well-being-promoting relationship is extensive, explaining their desire for continuation (Kachaturoff et al., 2020).

As an area for improvement, the early initiation of the intervention emerged, supporting the findings of Li et al. (2021), who noted that nursing students, at the beginning of their educational journey, are significantly less satisfied with ICT-based learning. Therefore, interventions like the one in this study seem to be needed from the first days of university education.

5.1. Limitations

The study was conducted in a regional context, which implies that the generalization of the results should be approached with caution. Interviews and the focus group were conducted at the end of the programme, rather than at the end of each peer mentoring (PM) experience. This resulted in inequalities among participants regarding the temporal gap between the experience and data collection. Lastly, the participants' experience in the 2020/2021 course was influenced by the COVID-19 pandemic. These limitations highlight the need to address future research with a broader geographical focus and a longitudinal approach to assess its long-term impact.

6. Conclusion

Peer mentoring (PM) has proven to be a valid strategy for the acquisition of digital skills and Information and Communication Technologies (ICT) in first-year nursing students.

With experiences like these, students broaden the scope of their learning not only in digital skills and ICT but also in essential emotional and attitudinal competencies in nursing, such as patience, companionship, self-assurance, and self-confidence. In addition, the PM intervention promotes social skills and helping relationships, which are crucial for the future care relationships they will establish with patients. Furthermore, the experience in intergenerational relationships prepares students for future interactions with their colleagues in healthcare teams, and facilitates their integration into multidisciplinary health teams in both practical and professional settings.

Similar interventions can promote more inclusive learning environments where all students are on equal footing, possessing the necessary metacognitive skills in the current academic scenario, where new technologies play an indispensable role. Finally, this experience could be extended to other areas of action to address other inequalities, for example, the integration of mobility students into the university community.

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CRedit authorship contribution statement

María Jesús Rojas-Ocaña: Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization. **Macarena Romero-Martín:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Miriam Araujo-Hernández:** Writing – review & editing, Validation, Methodology, Formal analysis, Conceptualization. **Cristina Teresa-Morales:** Writing – review & editing, Validation, Software, Resources, Methodology, Formal analysis, Conceptualization. **Carmen Feria-Ramírez:** Software, Resources, Methodology, Formal analysis, Conceptualization. **Francisco José Mena-Navarro:** Validation, Methodology, Formal analysis, Conceptualization. **Elia Fernández-Martínez:** Writing – original draft, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

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