DIGITAL EDUCATION IN NURSING (DEN) HANDBOOK

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Digital Education in Nursing

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PROJECT DIGITAL EDUCATION IN NURSING-DEN

The COVID-19 pandemic during 2020-2022 has changed significantly and in the otherwise changing healthcare and education systems, the integration of digital technology has entered and emerged as a transformative force, revolutionising the way nursing education is delivered, experienced and embraced. As the demand for skilled and adaptable nurses continues to increase, so does the need for innovative educational methods that equip nursing students with the knowledge and competencies necessary to excel in this dynamic field.

This handbook serves as a comprehensive guide to the field of digital education in nursing, offering educators, administrators and practitioners a roadmap for harnessing the potential of technology in the pursuit of excellence. With a firm understanding that the art and science of nursing remain at the heart of care, this handbook explores, both in theory and in practice, how digital tools can enhance, enrich and extend traditional educational methods.

We, who have worked with the project Digital education in Nursing DEN with the support of Erasmus + funding, have had the opportunity to explore the digital area of the educational work in nursing. We have had opportunities to discover and investigate, together with students, possible useful methods and have had the opportunity to strengthen our international cooperation through this work. Furthermore, we have had opportunities to present the results of our work at various national and international conferences and to prepare two scientific articles through the DEN project, for publication in international journals.

In a world where change is constant and innovation is paramount, this handbook aims to be a guiding light for those seeking to harness the power of digital education in nursing. As we embark on this journey, let us embrace technology not as a replacement for tradition, but rather as a dynamic partner in shaping the nurses of tomorrow. We hope that this handbook can help all of us, including other colleagues, to further develop a more attractive education system with digital opportunities for nurses throughout Europe and beyond.

Enjoy reading!

Ann-Cathrine Bramhagen and Vedrana Vejzovic, project coordinators

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CONTENTS

THE AIM OF PROJECT ACTIVITIES AND A BRIEF OVERVIEW OF THE CONTENT

The overarching goal of the "Digital Education in Nursing" (DEN) project, supported by the Erasmus+ programme, was to modernise the existing nursing curriculum by creating digital modules that transform traditional lectures and examinations into innovative forms of education.

The project spanned 28 months, running from July 2021 to October 2023, involving five higher education institutions from Sweden, Slovenia, Croatia, Serbia and the Republic of North Macedonia. Key project outcomes were achieved through five transnational project meetings, two Teaching, Learning and Training Activities, as well as numerous online partnership meetings. The culmination of the project's findings was showcased at a conference held in May 2023 in Zagreb, providing a platform to share and discuss the project's achievements and insights.

The onset of the pandemic necessitated a rapid shift from traditional academic nursing education to digital formats, leaving educators with little time to adapt their pedagogical approaches. Recognising this challenge, our project aimed to provide support to lecturers, helping them transition from traditional pedagogical methods to more digital approaches, ensuring the maintenance of the high quality required in nursing education. Traditional teaching methods, which are no longer adequate for today's digital landscape, risk negatively impacting students' achievement of learning objectives and limiting their success in examinations.

The primary objectives of our project were to empower lecturers at the five participating higher education institutions in delivering high-quality digital education, with a specific focus on:

- Building teachers' capacity for implementing both blended and online teaching and learning,
- Developing digital pedagogical competences among teachers to enable the delivery of high-quality digital education,
- Creating and utilising high-quality digital content, including innovative online resources and tools,
- Facilitating the sharing and exchange of experiences, expertise and resources, with collaborative efforts aimed at creating digital courses of mutual interest,
- Collaborating on digital technology utilisation by engaging various providers and experts in educational technologies with relevant pedagogical practices.

Our project promises enduring benefits not only for partnership organisations, but also for other higher education institutions. We are dedicated to revitalising, modernising and infusing flexibility into nursing education curricula through innovative approaches.

Moreover, we're committed to sharing our findings and compiling them in the present handbook. We hope that this will empower other higher education institutions to leverage the outcomes and insights derived from our project, fostering wider advancements in nursing education across institutions.

FIGURE 1: The participants at 1st Teaching, Learning and Training Activities in University of Novi Sad, June 2022

Embarking on the Digital Education in Nursing project, we recognised the imperative to fortify our theoretical foundation in digital education. In the initials papers is presented, our journey by delving into the evolutionary trajectory of digital technology within nursing education. From its nascent use of electronic resources to the contemporary landscape featuring virtual simulations, online courses and immersive learning experiences, we explore the transformative path that has positioned us on the cusp of a new era.

To deepen our comprehension of employing pedagogy in digital education for nursing, we furthered our investigation by scrutinising the experiences of our five partner organisations

during the Covid-19 pandemic. This exploration was conducted through a combination of quantitative and qualitative methodologies, offering a comprehensive overview.

Central to the success of digital education is the meticulous design of engaging and effective online learning environments. The paper carefully breaks down the principles of instructional design principles, explores strategies for fostering interactivity and underscores the integration of multimedia to seamlessly amalgamate technology and pedagogy.

With the collected data, we are leading a key shift in assessment and instructional methods in nursing education, which are undergoing digital transformation. The results are presented scrutinises cutting-edge approaches to assessing and teaching student understanding and skill acquisition in the digital world.

As technology progresses, so do challenges related to access, inclusivity and data security. The book present valuable insights into ensuring universal access to digital education for all students and emphasises the paramount importance of ethical considerations in this evolving landscape.

Figure 2: The participants at 2nd Teaching, Learning and Training Activities in Faculty of Health Science Celje, Slovenia

COMPARISON OF THE PARTNERS ORGANISATIONS UNDERGRADUATE NURSING STUDY PROGRAMMES AND THE STUDY PROCESS PERFORMANCE DURING THE COVID-19 PANDEMIC

Katja Esih, Mojca Poredoš, Bojana Filej, Olja Vori, Gordana Panova, Gordana Kamceva Mihailova, Tamara Štemberger Kolnik

Summary

This analysis compared curricula and digital integration during COVID-19 in the partner organisations involved in project DEN, across three EU and two non-EU countries. Data, collected via questionnaires with open-ended questions in the first half of 2022, revealed comparable programme lengths and credit weights, except for one partner institution with a longer programme. All organisations effectively employed digital methods during the pandemic. In conclusion, the partner institutions' programmes align in duration and credit allocation, with one exception. This analyse did not assess faculty qualifications. All institutions adapted to digital teaching during the pandemic, continuing its use post-pandemic.

All undergraduate study programmes in the field of nursing within the EU are required to be developed in accordance with the European Directives (2005/36/EU and 2013/55/EU). These directives enable nurses to attain a diploma that holds validity across all EU countries. Countries outside the EU are not obligated to adhere to the EU Directive while structuring their nursing education programmes. Amid the coronavirus pandemic, the higher education institutions engaged in the project needed to transition from conventional teaching methods to digital instruction. This shift led to the introduction of numerous innovations in the learning process. This paper presents a comparative analysis of nursing curricula in three EU countries and two non-EU countries, focusing on their adaptation to digital teaching methods. A case study was conducted involving a sample of five higher education institutions that offer nursing programmes and are participants in the DEN project. The primary objective of this study was to compare curricula and the incorporation of digital platforms into the learning process, particularly during the COVID-19 pandemic. These findings served as the foundation for shaping the activities of the DEN project. In order to collect data, a questionnaire comprising open-ended questions was designed and subsequently distributed to all partnering institutions. Data collection took place during the initial six months of 2022. The nursing degree programmes were found to be comparable between the five partner institutions, with only one partner institution having a longer and more credit-weighted programme. All partner institutions made effective use of digital learning opportunities to ensure a smooth learning process during the coronavirus pandemic. Most of the study programmes of the participating partner organisations are comparable in terms of the number of years of study and the number

of credits that students achieve at the end of their studies. Only one faculty runs a longer programme with more credits. We did not compare the professional qualifications of the providers of the nursing programmes. During the coronavirus pandemic, all institutions had to adapt and introduce digital teaching methods, which are still being upgraded and used after the end of the pandemic.

Key words: nursing, digital technology, digital platforms, teaching methods.

Theoretical background

The professionalisation of the nursing profession was undoubtedly shaped by Florence Nightingale, who was a pioneer of modern nursing. In 1859, Nightingale founded the first school for nurses and published her first influential book, "Notes on Nursing", which became a foundational text in nursing education at the time. She laid the foundation for the development of the path in the establishment of nursing schools around the world. The aim of establishing the first school and developing subsequent ones was to professionalise nursing and provide structured education for nurses (Karimi & Masoudi Alavi, 2015). In 1921, the General Nursing Council was established in England with the aim of setting criteria for the protection of the public in the practice of nursing and to ensure high quality nursing care (Attenborough, 2021). The General Nursing Council has worked towards the unification of nursing education and the regulation of the nursing profession. Regulation helped to raise the standards of nursing education and practice and gave nurses a more influential voice in the healthcare system. Regulation of the profession is not a new concept and has been used to regulate many other professions such as medicine, law and accounting. Professional regulation is the protection of the public by which the law ensures that professionals meet certain standards of education, training and ethical conduct, promotes the interests of professionals by ensuring that they are respected in the workplace and protects their rights (Attenborough, 2021). Uniform education ensures that all professionals in a regulated field meet the same standards of knowledge, skills and competencies. This helps to maintain a consistent level of quality throughout the profession and to increase public confidence in the services provided. Given the rapidly evolving technology in healthcare and the marked increase in the population's need for health services, it is essential to have regulated education for the health professions, which also includes the nursing profession. Nursing education ensures: the better understanding and experience of nursing and care delivery, an increase in the quality of health services, key changes at the level of the management system and a reconceptualised role for nurses in a reformed health system (Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine, etc., 2011), Unified education can facilitate structured and continuous professional development. It encourages professionals to stay up-to-date with the latest advances in science, the best

practice and research in their field, leading to quality services and patient outcomes. Nursing education should serve as a platform for continuing lifelong learning and include opportunities for a smooth transition to higher levels of education. Nurses should be educated alongside doctors and other health professionals both during their studies and throughout their careers (Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine et al., 2011), enabling good, interdisciplinary cooperation from the time of education onwards. Achieving a high level of education in the regulated professions is key to greater competence, innovation and competitiveness. These advancements mutually benefit both professionals and the broader society that they diligently serve.

The Bologna Education Process that was launched in 1999 established the European Higher Education Area in order to facilitate student and staff mobility, to make higher education more inclusive and accessible and to make higher education in Europe more attractive and competitive worldwide. The Bologna Process encompassed a series of reforms aimed at creating a single European Higher Education Area (EHEA) (Humar & Sansoni, 2017) and it represents the major milestone in the reorganisation of the education system across Europe and in different professional fields of education. It has also radically contributed to the harmonisation and attempted unification of nursing curricula. The EU Directive (European Commission, 2005), although it proposes guidelines (2013/55/EU), leaves room for interpretation in the field of higher education of nurses, as it uses the uniform terminology of "European nursing education system and does specifically define the minimum of prerequisites of prior education for entry to a nursing programme and the necessity to provide certain content that must be provided within the programme of study. These recommendations, which are not precisely defined, allow for different forms of nurse education in the countries of the European Union (Humar & Sansoni, 2017), where all nurses obtain a diploma that allows them to be employed in all countries that are part of the European Union. The education of nurses in countries outside the European Union is not bound by the European Directive, which guides the education of regulated professions, and therefore the education of nurses is not carried out according to the same standards.

The problem of the shortage of nurses in the clinical setting, unpredictable situations such as the coronavirus pandemic, the decreasing opportunities to learn from patients in the clinical setting and the digitalisation of society are all reasons why nursing education is experiencing a boom in the use of digital technologies in teaching approaches. Digital technology has been slowly making its way into nursing teaching since the early 1980s with applications including basic word processing, database management and simple simulations. Computers were primarily used to support administrative tasks and facilitate communication (Andrade et al., 2020).

Between 1990 and 2000, technology advanced, nursing-specific educational software started to emerge. It included interactive software and CD-ROMs that provided students with simulations and case study applications, allowing them to practice clinical skills and make decisions in a controlled digital environment (Antonsen & Hofstad, 2022). Simulations replaced real-world experiences with experiences in a simulation environment where students could practice and explore different aspects of a particular practical skill. Accordingly, simulation-based learning represents a useful approach to developing the knowledge, skills and attitudes of healthcare professionals, while protecting patients from unnecessary risks (Antonsen & Hofstad, 2022). Simulation as a learning method is based on the pedagogical theory of adult learning, with an emphasis on the concepts of David A. Kolb based on experiential learning (Kolb & Kolb, 2009) and Donald Schön based on experiential learning, thinking about action and thinking in action (Karlsaune et al., 2022).

Platforms such as Blackboard, Moodle and Canvas emerged in the early 2000s and continue to evolve today in order to enable students to take online courses and deliver learning content that can be delivered remotely. This allows students to access lectures, assignments, discussion forums and other learning opportunities, providing greater flexibility in learning (Sharma & Arora, 2020). This was followed by the use of virtual reality (VR) and high-definition simulations to expose students to realistic clinical scenarios, improving critical thinking and decision-making skills (Fogg et al., 2020). We should not forget the period of the great boom in the use of mobile devices, which led to the development of mobile applications and e-learning platforms. These tools have also enabled nursing education to quickly access healthcare references and interactive study materials (Day-Black & Merrill, 2015).

The aim of these work package within the DEN project was to compare the undergraduate nursing study programmes and the study process performance during the COVID-19 pandemic in the higher education institution involved in the DEN project.

Methodology used in the DEN project

Five higher education institutions participated in the DEN project: Malmö University, Malmö, Sweden; University of Applied Health Sciences, Zagreb; Croatia; Goce Delcev University, Stip, The Republic of North Macedonia; University of Novi Sad, Novi Sad, Serbia; Faculty of Health Sciences in Celje, Slovenia, all provide a nursing programme at undergraduate and postgraduate levels. Three of the higher education institutions had to take into account the European Directive (2005/36/ES, 2013/55/EU) (a requirement for countries to join the European Union) when designing their curricula, two of the partner institutions are outside the EU and therefore do not have to comply with the European Directive. In the initial phase of the project, we wanted to analyse the curricula of the partner institutions involved, as the focus of the project was on teaching methods. It was important to determine whether all

partner institutions have comparable curriculums. In the second part of the analysis, we were interested in how the partner institutions approached the delivery of lectures, seminars, laboratory exercises and clinical training during the coronavirus pandemic, with a focus on the integration of digital platforms in the teaching and learning process.

Data collection instrument

The analysis was carried out using a questionnaire with open-ended questions to the teachers involved in this project. The collected data included a description of the undergraduate and postgraduate study programme, the presentation of the study content by year and by hours for lectures, seminars, laboratory exercises and clinical training. There were also questions regarding the use of digital platforms, tools for on-line lectures and the used methods for knowledge testing and assessment during digital education.

Sample

The sample included five higher education institutions offering nursing undergraduate study programmes. All partners involved have undergraduate degree programmes, but not postgraduate nursing degree programmes. Two are under the auspices of the Faculty of Medicine and three are under the auspices of higher education institutions for health studies. Three of the partners are in the European Union, which means that the programs have to comply with the EU Directive to be comparable within the EU. The data obtained have been categorised by content and are presented in the Results section.

Results

In Table 1, we present a description of the study programmes of the higher education institutions involved in the DEN project, showing that the programme of the University of Novi Sad is the longest (240 ECTS and for years), the University of Malmö study programme has the fewest courses (only 9), which are more structured. All programmes include a theoretical part in the form of lectures, seminars and practical training, in the form of laboratory work in specialised laboratories and on-site simulations, and practical training in the clinical workplace.

Table 1: Basic information about the Bachelor's Nursing Study Programmes

Faculty of Health Sciences in Celje (Slovenija, SLO)	Goce Delcev State University Štip (The Republic of North Macedonia, RNM)	University of Applied Health Sciences, Zagreb (Croatia, CRO)	University of Novi Sad (Serbia, SRB)	Malmö University (Sweden, SWE)

Professional Study Programme in Nursing - undergraduate (higher education first - cycle vocational study programme) - 3 academic year (180 ECTS) - Full-time and part-time study adjusted to employed students - diploma exam	Professional Study Programme in Nursing undergraduate - (first-cycle; vocational study programme) - 3 academic years (180 ECTS), - full-time and part-time study - final paper (not graded)	Professional Study Programme in Nursing - undergraduate (first-cycle; vocational study programme) - 3 academic years (180 ECTS), - full-time and part-time study - final paper (not graded)	Nursing - undergraduate (first-degree academic study programme) - 4 academic years (240 ECTS) – paper + defending the thesis	Nursing - undergraduate (higher education first-cycle vocational study programme) - 3 academic year (180 ECTS) - full-time study - degree project → divided into 6 semesters with a total of 9 courses.
Lectures and seminars (in line with the EU directive) - Practical training → lab work + practical training in clinical workplace – 2,300 hours of clinical work; direct contact with the patients	Lectures - Practical training of nursing skills → lab work + practical training in clinical workplace (at the primary, secondary, and tertiary healthcare institutions, and social care institutions)	Lectures - Practical training of nursing skills → lab work (specialised, fully equipped on-site laboratories and simulation classrooms with the latest high-fidelity simulators) + practical training in clinical workplace	Lectures - Practical training of nursing skills → lab work + practical training in clinical workplace (at the primary, secondary and tertiary healthcare institutions and social care institutions)	Lectures (the theoretical sections; on campus at Malmö University) - Practical training → lab work (laboratory work performed in modern specialised classrooms (clinical training centre - KTC) + practical training in clinical workplace (Skania University hospital at Malmö, Treleborg or Ystad).

In Table 2, we present a description of the digital platforms introduced by the participating higher education institutions to overcome the limitations of socialising during the coronavirus pandemic. Different tools for on-line meetings (Zoom, Microsoft Teams, Google meet, Skype) and e-classrooms (Moodle, Canvas platform, SOVA platform) were used for e-lectures and meetings with students. It was emphasised that it is easy to get lost among all the digital tools, but at the same time, teacher's pedagogical approach, his knowledge and the capabilities of a using the technology should be taken into account. Different options were chosen for the knowledge testing and the assessment, e.g.: Quiz within Moodle (SLO, CRO, SRB), oral exam via ZOOM (SLO, SWE) or the Microsoft Teams platform (CRO) and a digital exam on the Canvas platform (SWE). In the Republic of Serbia, the legislation does not allow students to take exams online. Students can only take colloquiums online. In Serbia, teachers used continuous monitoring processes and different tasks to check student knowledge before they were able to assess the knowledge on site.

Table 2: Implementation of the study process during a pandemic - the used platforms and the knowledge testing and assessment

	Faculty of Health Sciences in Celje (Slovenija, SLO)	**Goce Delcev State University Štip (The Republic of North Macedonia, RNM)**	**University of Applied Health Sciences, Zagreb (Croatia, CRO)**	**University of Novi Sad (Serbia, SRB)**	**Malmö University (Sweden, SWE)**
E-lectures:	ZOOM Uploading different materials for students: Moodle	E- lectures: Microsoft Teams and Zoom. - Moodle	E-lectures: Microsoft Teams and Zoom. - Moodle	The SOVA platform - Microsoft Teams, - Google Meet - Skype	E-lectures: ZOOM - Uploading different materials for students: the Canvas platform. Either as recorded lectures (video films) or as a performed lecture.
Assessment	Moodle quiz in combination with oral exam via ZOOM	With questionnaire randomly online	Moodle Quiz activity - oral exams via Microsoft Teams	Following the Faculty legal acts, the formal knowledge assessment was conducted online - Moodle quiz, - the summative assessment on-site (orally and practically) according to a defined plan.	Written assignment (individual paper) - group presentation of a topic important to the course - digital exam on the Canvas platform - oral examine on ZOOM (practice studies).

Discussion

In European Union member states, nursing education is seamlessly integrated into the higher education framework, culminating in the attainment of a nursing degree, which confers the status of a registered nurse. Typically, the duration of study programmes within higher education nursing institutions spans three to four years. This educational model has transcended the EU borders, as nursing degree programmes in non-EU nations are similarly structured within universities or colleges. However, it is imperative to underscore potential challenges that may arise in non-EU countries where study programmes do not adhere to the European Directive. In such instances, nursing education might still be offered through vocational schools or specialised nursing institutions. Graduates from these programmes receive a diploma or certificate that does not possess equivalence to a degree granted by a higher education institution, as recognised under the European standards. Among the

participating partner institutions, all of them offer degree programmes with at least 180 credits completed in three years. The Faculty of Novi Sad runs a longer Bachelor's programme, evaluated with 240 credits. At the time of enrolment in a higher education programme, all higher education institutions involved in the project require that the young people have completed their education at the level of one of the secondary education programmes. In the EU, nurses have access to a range of postgraduate education options, including specialised master's degrees in nursing, advanced practice programmes and doctoral studies. It is important to stress that nursing education and health systems are subject to continuous change and improvement. It is essential to acknowledge that the gathered data holds limitations in its capacity to evaluate the excellence of individual study programmes within the DEN project's participating faculties. As highlighted by Lewallen (2015), a comprehensive assessment of study programme quality requires an ongoing evaluation from various standpoints, encompassing the perspectives of administrative staff, educators, and students. Factors such as material resources and programme outcomes play pivotal roles in this assessment. While the designed curriculum undeniably contributes to this evaluation, it's just one facet among many (Lewallen, 2015). Research pertaining to the quality of nursing study programmes tends to emphasise the evaluation of instructional delivery and student viewpoints, rather than direct programme-to-programme comparisons (Lewallen, 2015). For instance, Falk et al. (2016) affirmed that student's express readiness to learn before and after theoretical lectures, followed by practical laboratory sessions and clinical training, which they regard as indicators of high-quality educational content delivery. The integration of digital technologies in nursing education holds significant potential to enhance the quality of study programmes. When coupled with effective pedagogical practices, these technologies forge innovative and collaborative learning environments that nurture student autonomy and active engagement (Conceição & Taylor, 2007). In the second part, we analysed the use of digital technology in the teaching process in nursing. The use of digital technology in nursing education varies across institutions and regions. Often, the development and use of digital technology is linked to the financial capacity of each institution and technological possibilities, such as internet connectivity. In the case of the partners involved in the project, we pfound that they used physically and financially accessible digital platforms for knowledge delivery during the pandemic, but did not expand the possibilities offered by newer digital technologies such as virtual reality, integrated telemedicine and telehealth, the use of artificial intelligence and advanced simulations. All partner institutions, regardless of the available technology, have effectively adapted teaching during the coronavirus pandemic.

Conclusion

The analysis conducted served as the foundation for the ongoing work on the project. It played a crucial role in helping us grasp the similarities and disparities in digital operations among partner organisations during the pandemic. Furthermore, it highlighted the necessity

for a more comprehensive analysis before we can advance with collaborative international efforts within the project. As a result, we carried out two separate studies to explore the experiences of both teachers and students in relation to digital work during the pandemic. The subsequent section will provide an overview of the findings from these studies.

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CHALLENGES OF USING DIGITAL TECHNOLOGY FOR TEACHING NURSING IN THE FUTURE: RESULTS OF FOCUS GROUPS OF TEACHERS AND STUDENTS

Bojana Filej, Vedrana Vejzović

Summary

Education using digital technology includes a multitude of different educational approaches, concepts and methods. In the past, nursing education was based on the traditional method of teaching and learning. With the rapid transition to teaching and learning with the help of digital technologies during the epidemic, both teachers and students faced different experiences and challenges. The research is based on a qualitative research method. Data were collected through semi-structured interviews of focus groups of teachers (n=28) and students (n=30) from four countries that participated in the DEN project. The interviews were recorded and transcribed, followed by a qualitative analysis of the text. With regard to the posed research questions, we set ourselves two main topics (categories): "experiences with the transition from the traditional way of teaching / learning with the use of digital technology" and "challenges for the use of digital technology in the pedagogical process", in which we combined four subcategories (personal experience, use of digital technology, digital competence, pedagogical process). Verbatim statements of the participants were added to the codes. We found that teachers have a lower level of digital competence than students, and both groups are convinced that distance learning is less effective, since students need to acquire not only theoretical knowledge, but also practical experience for high-quality implementation of nursing care. Therefore, they are of the opinion that the best method of education in the future would be a hybrid method.

Key words: experience, challenges, teachers, students, nursing care, education

Theoretical background

The pandemic, which in 2019 and 2020 stopped the world for a moment and changed people's lives (Kranjčević-Ščurić et al., 2021), was a threat, but also a challenge, which further accelerated the use of various information and communication technologies also in nursing education (Loureiro et al., 2021). Compared to education in other fields, the traditional "face-to-face" method of education, both theory and practical skills in the clinical environment, was most often used for the education of healthcare professionals (Prosen et al., 2022), which indicates that nursing education is very specific, especially when we talk about digital teaching methods in a clinical environment (Meum et al., 2021). Basilotta-Gómez-Pablos et al. (2022) described digital education as a process of teachers teaching and students learning using digital technologies and as a multitude of different educational approaches, concepts

and methods. Many different digital technologies and different platforms for teaching and learning certainly had existed before the epidemic, but it was the epidemic that accelerated their use (Loureiro et al., 2021). The transition from the traditional way of (face-to-face) education to education using digital technology was fast, so many mistakes were made, which were criticised by both teachers and students (Jowsey et al., 2020).

The experiences of teachers regarding digital teaching that they had gained during the pandemic contributed to the recognition of the advantages of digital teaching, which brings them challenges regarding the use of digital technology in the future as well. They concluded that e-learning, on the one hand, enables the exchange of current information, is cost-effective for both teachers and students, and on the other hand, means a large financial burden for the education system itself (Naveed et al., 2020), as well as a large financial outlay for students' parents (Bdair, 2021). For example, Langegård et al., (2021) described the experiences of nursing students in transitioning from traditional university based learning to distance learning using digital tools. They emphasized that distance learning is indeed a challenge for students, but it is necessary to plan the educational process differently, to adapt it, to give clear instructions for the use of digital tools (Langegård et al., 2021) to establish guidelines for teaching and assessment in order to guarantee quality of the learning process (Bdair, 2021).

The digital competences of teachers depend on their personal characteristics, such as age and gender, on the attitude towards technology, on the available infrastructure and management support in educational institutions (Cattaneo et al., 2022). Considering the age of digital technology users, Tangül & Soykan, (2021) found a significant difference in digital competence between different generations. Younger people are therefore more digitally competent than older people, which means that students are more digitally competent than their teachers.

The fact is that traditional teaching and learning is different from digital learning, but neither method is better or worse, they are simply different (Hampton et al., 2020).

With the research, we wanted to find out the experiences of teachers and students with the digital method of teaching and learning at the faculties of nursing in four countries (University of Applied Sciences, Zagreb, Croatia; Faculty of Health Sciences in Celje, Slovenia; Universities in Novi Sad, Serbia; Republic of Macedonia Goce Delčev State University Štip, Republic of North Macedonia; and Malmö University, Malmö, Sweden) which participated in the Erasmus+ Digital education in nursing project (DEN).

Methodology

The research is based on a qualitative research method, which allows the researcher to describe the research problem in detail and when we want to obtain information directly from

those who are facing the subject of the research (Sandelowski, 2000). In collecting data, we used an inductive approach and the method of text analysis. Data were collected through semi-structured interviews of focus groups of teachers and students. With the permission of the participants, we recorded the interviews and then transcribed them in a paraphrased (verbatim) form. In order to conduct the interviews, we asked two starting questions both higher education teachers and students: What were your experiences with the transition to the use of digital technology in teaching and learning? What challenges do you see in the use of digital technology in nursing teaching and learning in the future? In addition to the starting questions, sub-questions also appeared in view of the dynamics of the interview process.

28 teachers participating in the nursing study program and 30 full-time and part-time students participated in the research. Higher education teachers were on average 45.46 years old and had 14.66 years of work experience in education. The average age of the students was 25.1 years.

We conducted the interviews in the month of April 2022. After reading the records several times, we carried out open coding, the resulting codes were then meaningfully classified into subcategories (subtopics) and then into categories (topics). Verbatim statements of the participants were added to the recorded codes.

All focus group participants were informed of the purpose and goals of the research before the start of the interview and gave their informed consent to participate in the focus group. With this, they allowed quotations from interviews. In order to ensure the anonymity of the participants, real names have not been used.

Results

Regarding the posed research questions, we set two main topics in advance: “experiences with the transition from the traditional way of teaching /learning with the use of digital technology” and “challenges for the use of digital technology in the pedagogical process”. Table 1 shows the thematic concept.

Table 1: Schematic representation of themes, sub-themes and teachers' and students' codes

Teachers' perspective			**Students' perspective**		
Category (topic)	Subcategories (subtopics)	Codes	Codes	Subcategories (subtopics)	Category (topic)
Experience with the transition from a traditional	Personal experience	Feelings (stress, anger, fear, worry, fatigue)	Satisfaction with the online mode of study	Personal experience	Experience with the transition from a traditional
			Fear of using digital technology (forced to transition, stress,		

way of teaching to teaching using digital technology			relaxation, walks)		way of teaching to teaching using digital technology
		Change in lifestyle (lack of social contacts, sedentarism, time adaptation of the implementation of the pedagogical process to the needs)	Loss of contact between students (student life, getting to know each other, socialising)		
			Loss of interaction with teachers (unresponsiveness, different level of engagement of lecturers)		
	Use of digital technology	Lack of digital competences (lack of knowledge of digital technologies, use of different digital platforms)	Lack of knowledge of teachers to use digital technology (screen sharing, disorganisation, monotony of lectures)	Use of digital technology	
		Adaptation of the home environment (space, computer, internet connection)	Adapting to the use of different digital technologies		
		Support and help with the digital teaching method (relatives, colleagues, IT specialists, educational institution)	Online study is less effective: lower motivation (doing other work, scrolling on the phone, cameras turned off, lack of interactivity), less concentration (distractions from the environment, learning just before grading)		
		Preparation of teaching materials (films, recording of lectures, quizzes)			
		Student motivation (covered screens, difficult communication and discussion, greater number of consultations, individual work of students, actual presence of students)	Poorer knowledge, inability to learn skills (uncertainty in the clinical environment)		
			Taking exams: disadvantage (short time for answers, disproportion between the number of questions and time), advantage (immediate result)		
		Examination (on-the-spot, written and or oral)			
Challenges	Digital	Additional, further and	Transferring the use of	Digital	Challenges

for the use of digital technology in the pedagogical process	competence	continued education	digital competences to the clinical environment (documentation, robots, tele-medicine, tele-health care)	competence	for the use of digital technology in the pedagogical process
		Expert support for the competent use of digital technology	Use of a single digital platform throughout the learning process		
	Pedagogical process	Hybrid method: online implementation (lectures, consultations), face-to-face implementation (seminar exercises, cabinet exercises, clinical training, exams)	The possibility of consolidating knowledge with modern digital technology (watching movies, repeatedly listening to lectures, kahoot quizzes)	Pedagogical process	
		Organisation of the implementation of the online pedagogical process (size of groups, time for consultations, presence of students, cameras on, webinars)	Time adjustment of the online implementation of the pedagogical process (active participation)		
			Increased attendance at lectures, saving time		

Personal experience

Both teachers and students expressed the different feelings that accompanied the rapid transition from the traditional way of teaching and learning to the digital way. Most often, the main feeling was anger due to the need for rapid changes, adaptations and fear of using digital technology, as many encountered it for the first time.

We had to adapt overnight, nobody had a choice. I did not have time to get scared, I was adapting to the situation (teacher - T).

Everything was new to me because I'm not a computer type. Honestly, I was scared because I'm not very familiar with technology. It seemed to me that someone suddenly pulled the brake, like when you suddenly stop the car and then nothing happens (student - S).

Focus group interviewees, both teachers and students, emphasized the lack of interpersonal contact caused by the use of digital technology for teaching and learning. They had to change their way of life. Students missed student life and socialising, they did not know each other at all. Contacts between teachers and students were curtailed.

We didn't see each other every day and we were very happy when we met again. My social life was completely different. We sat a lot and worked 24 hours a day, I asked myself if I needed it (T).

The interaction with the professors was completely lost, I missed the "live" word. Some teachers were more, others less responsive. I had to sit and listen. I didn't feel like I was a student. I was at the university twice and if you ask me now where it is, I don't know. The real charm of studying was lost, as we all locked ourselves in our houses in front of screens (S).

Use of ICT

We found that most of the teachers had no previous experience with digital technology, some of them used it for the first time. Most of them needed help in using it, which they offered to each other, and at some faculties they were also helped by IT specialists. Help from family members was also welcome. The use of digital technology in the domestic environment required adaptations of space and technology. Some students had no problems with the transition to a digital way of education and the use of digital technology, and were also critical of the teachers from this point of view. They pointed out that they had to adapt to different digital platforms, as these could differ from subject to subject.

I arranged a place in the basement. I had to improve my internet connection. I bought a bigger TV because the computer screen was too small for me (T).

*It wasn't such a problem for me, because I've grown up with this technology. I work a lot on the computer. The professors didn't know how to share the presentation, so even we did it for them. We had lectures via Zoom, the exam via Skype, the conference was held via Teams, all materials, dates for seminar exercises, and deadlines for submitting seminar papers were in Moodle (S).*method of carrying out the pedagogical process, to which the students also had to adapt. Both of them had to put a lot of effort into the changes, the teachers especially in motivating students and establishing interactive communication. Students individually decided whether they would have the cameras on or not.

You sit in front of the box and talk to yourself. You never know who is listening to you on the other side, who is even present and not just connected (T).

You have to be present with your head if you want to learn something, concentration depends on various things. The films were very useful, I watched them many times. It's all about motivation, some have it, but otherwise it has decreased (S).

The exams were held orally or in writing via the Internet. The teachers had to prepare a set of questions and technically adapt the exams for remote implementation.

How to prepare the answers to the questions in order to get the desired knowledge? The students immediately had automatically entered grades. One student could not connect to the exam, so she had to take the exam again (T).

My brain likes that someone offers me the answers. If you want to read the questions really thoroughly and then answer them, I think there was not enough time. Exam scores were a result of speed rather than actual knowledge. You cannot go back to questions (S).

Some students were of the opinion that online study was less effective, as some were also doing other work while listening to lectures. They were aware that they had a lack of knowledge, especially in acquiring manual skills, which will be shown in the future in the clinical environment. They were aware that it was their job to work with the patient, whom they had to get to know in order to determine their needs. The teachers found that the students had a hard time concentrating and staying still.

In the lecture hall, you can monitor how the students understand the material, with squares, if they are even black, it is more difficult. I identify gaps in students' knowledge. There is no depth of knowledge and no linking of knowledge either (T).

It's true that you could do something quickly on the fly. Then a dog came along. I didn't always have a peaceful environment when someone wanted something and I had to sit and listen. It is not the same if the lecturer explains live, when they point out where we should focus our attention and shows it. It is vitally important to get to know a person live, to know how they breathe and think. An online lecture cannot offer you this (S).

Digital competence

Some teachers did not have any knowledge about the use of digital technology, so they did not know how to effectively integrate technology into the pedagogical process, which naturally led to technical problems and a lack of student participation. Those teachers are aware that in order to acquire digital competence, additional, further and continued education is necessary and that they need the help of experts for this.

Several students mastered digital technology, as they are aware of the importance of digital competences for everyday work in clinical practice and in everyday life, as all development trends are aimed at the development of a digital society.

I encountered this method of education for the first time. It was science fiction to me. It was not possible without education and it will not be possible in the future either. I have to learn a few more things that I'm even more ignorant about (T).

Digitisation is a plus for me. We are young and we have no problem with that. We already had information science in secondary school. Hospitals are introducing everything digital to make the work of nurses easier and better. Robots will be there soon (S).

Pedagogical process

The teachers are most in favour of the hybrid method of education, as well as the students, because they realise that they cannot acquire the skills necessary to perform nursing procedures, interventions and the communication skills they need to work effectively with patients. They see educational materials in the form of films only as a tool for both teaching and learning nursing. However, both are aware of the importance of organising the pedagogical process, as it is very difficult to transfer a classic lecture to a purely online format. They both realised that by implementing the pedagogical process online, they save the time they need to get to and from the faculty, that there is a greater attendance at lectures, and that it is possible to attend them even when sick or even travelling.

Online studies must be conceived in a completely different way. The webinar is intended for interaction with students, everything else is done by the students themselves. There was a greater attendance at lectures. Saving travel time, avoiding traffic jams (T).

I think it all has its pros and cons. The classical pedagogical process is more laborious, but it is irreplaceable with any other form. I agree to have a specific time to contact the teachers. You can travel and study. I was in Paris and at a lecture (S).

Discussion

With the research, in which both teachers and students participated, we found that they experienced the transition from the traditional way of education to education using digital technology in different ways. Due to the rapid transition, for which they had not been prepared, neither in terms of knowledge nor technology, the teachers experienced great stress, fear and anxiety. While only some students experienced fear of using digital technology, others who mastered the technology were satisfied with online studies. Both groups felt a lack of social contacts, the students also felt a lack of real student life and interaction with teachers. The teachers showed a lack of digital competence, so they needed help in the implementation of the pedagogical process, which was also provided by the students during the lectures themselves. The teachers had to change the way of carrying out the pedagogical process, they also had to change the teaching materials, and they also faced the problem of student motivation. Students were of the opinion that online studying is less effective, that there is no interactivity, that they also do other work during lectures, which reduces their concentration and that they have less knowledge. In particular, they missed the acquisition of skills for carrying out nursing interventions, which are otherwise acquired in cabinet exercises, as teaching aids such as films and recordings were not sufficient. They were aware that they were also not acquiring knowledge for professional and empathetic communication with patients. Different authors come to similar conclusions in their research. For example Bdair (2021) notes that the implementation of e-learning in the pedagogical process has certain basic requirements, such as infrastructure and user education. His research showed

that teachers used different digital technologies in lectures, due to the lack of standard platforms, and educational institutions also used different online modalities to otherwise take full advantage of the learning experience and help both students and teachers to engage in this new educational environment.

Due to major changes, teachers had to help each other, they needed technical and professional help and additional training (Sinacori, 2020). The author also states that teachers are aware of the need for education in the future as well. In the research, the authors Sinacori (2020), Chan et al., (2021) and Bdair, (2021) identify the problem of online study and the use of various digital technologies, the lack of interpersonal contacts, interaction and dialogue between teachers and students, because interaction can help to make the teaching process more effective. Interaction between students can help them to reduce the learning gaps that have arisen, and above all to remove the feeling of isolation and lack of contact. Bdair, (2021) also found that students with online education did not achieve the required level of knowledge, but otherwise they were positive about distance learning. They also felt that repeatedly listening to lecture recordings helped them achieve higher grades.

Chan et al. (2021) found that there is a significant positive relationship between experience with digital technology, satisfaction and motivation. Izzeddin (2021) also notes that students often faced a lack of motivation, attention and feedback when studying at a distance. They highlighted the problem of online study as unsuitable for developing practical competences and manual skills. On the one hand, students are more flexible in coordinating their participation in e-education, and on the other hand, the classical way of education enables better interactions with teachers as well (Chan et al., 2021). The authors (Hampton et al., 2020) emphasise that online education is more advantageous for students, as they can more easily coordinate their personal and professional obligations. Jun Xin et al., (2021) emphasise that learning with the help of digital technology is possible anytime and anywhere, and note that students want to use the most modern digital technology for learning, which provides them with flexibility in “dynamic” workplaces in the future. E-learning enables students to study and learn using freely available cutting-edge technology, without conventional teaching approaches (Naveed et al., 2020). The use of digital technology, of course, has brought great challenges to all teachers, students and educational institutions for its use in the future. Various authors (Ferri et al., 2020, Ilomäki & Lakkala, 2018) highlight the following challenges:

- The basic condition for the use of digital technology in the pedagogical process is to ensure **equal access to digital technology** for all students, so that there is no inequality in education.
- **Educational institutions** must provide sufficient technological **infrastructure** and provide **assistance** to ensure the smooth implementation and use of digital tools.

However, the fact is that acquiring digital technology can be expensive and certain educational institutions cannot provide it.

- It is necessary to ensure the **digital literacy** of both teachers and students, as not everyone had the opportunity to acquire digital competences through education and/or training. Therefore, teachers were limited in terms of effective use and integration of digital technology in the pedagogical process. Students, however, faced difficulties in using digital technology in learning.
- Digital technology needs to be **integrated into curricula**, and it also must be coordinated with pedagogical goals and teaching strategies.
- Digital technology provides access to a wealth of information, but not all of it is accurate and reliable. Therefore, it is necessary to develop critical thinking skills in students in order to **recognize quality and credible sources**.
- It is necessary to ensure and maintain the **relationship between teachers and students**.
- Digital technology can also be a source of **student distraction and misuse** of technology during the pedagogical process.
- The use of digital technology in education enables the collection and storage of a large amount of data about students, so it is necessary to ensure **data security and privacy.**

These are just some of the challenges that need to be addressed in the order to achieve effective use of digital technology in education. Research into these challenges is ongoing, but there is still much we do not know. In order to understand the challenges, we can begin to develop solutions that will ensure that digital technology is used as much as possible in the educational process.

Conclusion

The development of digital technology has brought new challenges to society as well as the opportunities that digital society offers. The challenge for education systems is to train people for future workplaces. However, we must be aware that the digital competence of a teacher is a broader concept, as teachers must have, in addition to knowledge, skills and competences in the field of digital technology, pedagogical knowledge in order to be able to effectively use digital technology in the learning process. When integrating digital technology into the pedagogical process, the listed challenges emphasise the need for careful planning, adequate training and thoughtful implementation in order to ensure its effectiveness and positive impact on educational outcomes.

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THE CONCEPT OF DIGITAL EDUCATION IN NURSING

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Summary

In this chapter, given the increasingly frequent use of the term digital education, current definitions are presented, followed by the classification of the application of technologies in education. As there is no precise classification of digital technology in education in the literature, we roughly divided them into communication platforms, collaborative and distance learning platforms, digital tools for skills evaluation and tools for increasing the interactivity of teaching. For all digital platforms and tools, the essential characteristics, methods and advantages of using them, as well as their disadvantages, are shown.

Key words: communication platforms, collaborative and distance learning, digital clinical competence evaluation, nursing education.

Theoretical background

The term digital education is increasingly being used, but often without a clear understanding of what the term means. It is sometimes used interchangeably with technology-enhanced learning (TEL) and e-learning or online learning. However, each of these terms arguably reflects a different stage in the evolution of digital education (Mcilwhan, 2019). Digital education is conducted at least partly, in, with or through digital technologies. This deliberately broad definition could encompass the use of technology in traditional classrooms, blended learning (which combines online and face-to-face instruction) and education that takes place entirely online (Allan, 2019). Given that there are many, and sometimes unorganised, definitions of digital education in the literature, Car et al. (2019) developed their definitions and conceptual framework by analysing the literature, creating standard operating procedures and conducting more consultations, discussions and meetings with experts in the field (Textbox 1).

The constant advances and rapid rate of technological change create challenges and opportunities in nursing education. The more nurse educators use technology, the more they recognise its positive effects on student learning and engagement and its connection to 21st-century skills. Nurse educators must be prepared to adopt existing technologies and explore emerging technology tools. Technology is helping teachers to expand beyond linear, text-based learning and to engage students who have a variety of learning preferences. Technology in nursing education has evolved from its role in "computer classes" to a wealth of versatile learning tools that change how faculty demonstrate concepts, guide students' learning, assess

progress and increase access to nursing education. However, nurse educators should not use technology in courses simply for the sake of innovation, but rather they should integrate appropriate technology based on pedagogical approaches that support the best practices and improve students' ability to learn (De Gagne, 2022). Unfortunately, there is no precise classification of digital technologies used in education in the literature. Therefore, for this handbook, and based on literature data, we roughly divided digital technology in education (platform, systems and tools) into:

1. Communication platforms – Twitter, Facebook, Podcast, Zoom, MS Teams, Google Meet

2. Platforms for collaborative and distance learning - Moodle, Canvas, Padlet, Kahoot, YouTube

3. Digital tools for skills evaluation – eOSCE, vOSCE

4. Tools for increasing the interactivity of teaching - video materials, escape rooms, simulation centres and tools.

Textbox 1. Definitions of digital, traditional and blended education

Digital education (electronic learning or digital learning) is teaching and learning through digital technologies. It is an overarching term for various educational approaches, concepts, methods and technologies. In addition, specific pedagogies and instructional methods, contexts of provision and technical affordances of hardware and software can further characterise digital education. Modalities of digital education could range from the basic conversion of content into a digital format (e.g., a book into a PDF or HTML format) to the complex deployment of digital technologies (e.g., mobile education, serious games, virtual patients and virtual reality).

Traditional education is the act of any teaching and learning based on non-digital educational material (e.g., textbook or model) or in-person human interaction (e.g., teacher or other learners). Traditional education in-person human interaction can also include non-digital and digital educational aids such as images, charts, maps, objects, boards and videos.

Blended education is the act of teaching and learning, which integrates aspects of traditional and digital education. Blended education can take on diverse formats depending on the type and share of digital and traditional education employed in the blended educational approach. The digital component of blended learning includes online learning as well as the use of other digital education modalities. Nonetheless, education delivered via in-person human interaction supported by digital educational aids (e.g., images, charts, maps, objects and boards) is considered traditional and not blended education.

Communication platforms in nurse education

Twitter (www.twitter.com), launched in 2006, is a microblog where users post short comments, or "tweets," 140 characters or less online under a username. Tweets can either be public or private, depending on the settings designated by the user. Other Twitter users can follow posts based on the sender, keywords or hashtags. Twitter can be used to facilitate active, interactive and reflective learning. It is also a viable platform for metacognition, forcing users to be brief and to the point – an essential skill in thinking clearly and communicating (Lopez et al., 2018; Skiba, 2008). Accordingly, reflective learning can be developed using Twitter by adopting cognitive learning theory principles, as it allows students to become involved in reading, commenting and discussing other students' tweets. While fostering collaboration and community, Twitter fosters active learning, supports reflection and higher levels of thinking and promotes interactions among students and faculty. In addition, the limited character count on Twitter encourages students to be concise and does not overburden students with lengthy text, which encourages the completion of assignments (Ros & Myers, 2017). Nurse educators can use Twitter to notify students of a class cancellation quickly and easily, remind them of an upcoming assignment or offer short take-home points from a lecture or professional conference. Students can also use Twitter to ask nurse educators questions about course content or assignments or offer a real-time reflection on a learning activity such as a simulation. By using Twitter rather than e-mail, all class members reap the benefit of seeing the tweet and the educators' responses. Although interaction can also be accomplished through e-mail, students tend to access Web 2.0 communications more frequently than e-mail and demonstrate a preference for social media applications. In addition, in education, nurse educators can use it to publish research and be connected to the broader scientific community or sign up as "followers" of interesting sources and news (Ros & Myers, 2017). Within a specific nursing course, students may be required to post a certain number of times on

Twitter using a course-specific hashtag. These tweets may be comments, questions or content reviews. This specific Twitter feed provides students in that course with a collection of course materials for study. Twitter, as a microblog, also can be used as a platform to discuss simulation experiences or answer discussion questions (Mistry, 2011; Ros & Myers, 2017). An example of using Twitter as a teaching tool is a Critical Care course where students were exposed to short video clinical scenarios and were encouraged to "tweet" short messages about the development of the patient's condition presented in the video and answer specific questions posed by the educator. At the end of the course, it was found that using Twitter as a teaching and learning tool allows for a gradual transition of learning from simple to complex scenarios and supports students' critical thinking and clinical decision-making (Mistry, 2011).

Facebook (www.facebook.com) was created in 2004 by Mark Zuckerberg at Harvard University. Although the network was initially limited to students, it later became a global phenomenon, a worldwide social networking and social networking site accessible to anyone with an e-mail address. It is an excellent social medium for nursing education because 90% of 18-29-year-olds are actively engaged on Facebook, allowing students to learn using cooperative learning strategies (Lopez & Cleary, 2018). Facebook is a social media network where users create a profile and connect with acquaintances to create a virtual network of "friends". Facebook users can post photos, videos, status updates or web links on their profile that a friend can see on their "News Feed". To see an individual's or group's posts on Facebook, the user must be connected in the virtual Facebook network as "friends", although anyone with a Facebook account can access everyone's public Facebook profiles. Facebook can be integrated into nursing courses to increase the fidelity or realism of case studies or simulations. Facebook pages can be created for case studies or patient simulations hosted by a nurse educator. Students can then interact with this patient via Facebook by following his/her posts to collect data and asking and answering questions. This engagement helps students to apply theory safely, controlled and securely. Class Facebook groups can be created to allow students and nurse educators to interact in the virtual Facebook world through discussions and sharing photos or videos. Facebook can also serve as a platform for students to upload video projects, peer viewing and evaluation (Ros & Miers, 2017). As a learning tool, Facebook has the potential to enhance student learning itself (and deeply), and the use of Facebook groups for learning purposes has been confirmed to extend students' learning hours beyond face-to-face classroom teaching hours and extract study material from the university. Furthermore, collaborative Facebook groups can improve student achievement through positive interactions among group members, including mutual assistance, the sharing of educational materials and other learning-related activities (Davidovitch & Belichenko, 2018). Using Facebook has both advantages and limitations. The main potential Facebook limitations are ethical and legal issues, such as protecting personal privacy and the possibility of disseminating inaccurate information. Also, there is a need for site monitoring in order to prevent inappropriate comments (Lopez & Cleary, 2018).

Podcasts can be broadly defined as audio broadcast files that are available online for listening via several technology devices, including smartphones, mp3 players, personal computers, tablets and more. The development of podcasts began in the 1980s and was then called audio blogging (Hargett, 2018). There are several ways to make a podcast recording. Regardless of the recording method, using a good-quality microphone near the mouth while speaking is best. In that way, ambient noise will be reduced, creating a more precise recording. Distribution of podcasts can be either public or private, although public use requires proper formatting and publicly accessible server space. Complex formatting is not required if the files are only distributed for local use. The simplest distribution method uses a Learning

Management System (LMS) document-posting feature. In nursing education, podcasting is used as a pedagogical tool to deliver teaching material by supplementing traditional face-to-face lectures with audio-visual content. Nurse educators can use podcasts to prepare students before the class or replace classroom lectures or discussions, which is part of the flipped classroom strategy. This digital delivery mechanism allows information to be more accessible by offering remote access online. Students can subscribe to web services to stream podcasts or download files to a mobile or desktop computer. Podcasting is becoming a viable educational solution for many nursing students, who are mostly a new generation with different digital literacy skills and desire methods to engage in interactive and student-centred curricula. It can also be used to support different learning preferences, such as self-directed and peer-to-peer learning, and can be disseminated through several online channels, mainly social media (Hargett, 2018; O'Connor et al., 2020). An integrative review of podcasts in nursing education determined that after listening to podcasts, students gained better knowledge and a better understanding of the subject of study, skills (communication, critical thinking and stress management) and improved confidence in performing clinical skills. Therefore, podcasts will likely be used more regularly in the future. It is likely to become mandatory for all teaching resources to be made available through podcasts to provide students with more diverse learning material and methods, especially during a pandemic, when students must be taught remotely (O'Connor et al., 2020).

Zoom Video Communication Inc. is an online video conferencing platform. It has been extensively used in educational institutions since the COVID-19 pandemic forced nurse educators to move to online modes of instruction (Vandenberg & Magnuson, 2021). Videoconferencing is a synchronous channel of communication that supports the transformation of interactive voice, video and data between two or more groups of people. The synchronous model enables nurse educators and students to communicate in real-time from different physical locations, avoiding the lower level of interaction and engagement caused by delayed feedback in asynchronous communication. Zoom's free version supports unlimited one-to-one and 40-minute group meetings with up to 100 people per meeting, so students are forced to quit the group meeting after 40 minutes (Correia et al., 2020). Research in distance nursing education has shown that videoconferencing systems provide real-time interaction, enable instant feedback, promote learner-centred engagement and offer new opportunities for collaboration in distance education. Functions such as recording sessions, sharing screens and files, breakout rooms and polling are all attractive features for nurse educators trying to replicate traditional classroom settings (Vandenberg & Magnuson, 2021). In addition, the current technology offers high-quality images, sound and connection, while the time delay between sound and picture is reduced to 300 ms. Therefore, videoconferencing can be used as an effective teaching and communication tool in synchronous distance education. Moreover, due to the multimedia capabilities of web-based videoconferencing

technology, nurse educators and students can express themselves using audio, visual and verbal communication with others.

In that way, they could reduce the ambiguity caused by text-only communication and enhance psychological engagement, potentially leading to a performance level in collaborative tasks comparable to face-to-face communication (Correia et al., 2020). Therefore, videoconferencing in distance education can create an environment closer to the physical classroom to support learning. Now, nurse educators and students have more experience using these systems for learning and teaching and in their personal lives. Barriers associated with Zoom reported by students and nurse educators can be divided into technological and psychological. Technological barriers include poor internet connectivity or a lack of equipment, while psychological barriers include increased stress or anxiety (Vandenberg & Magnuson, 2021).

MS Teams is a software programme that functions as an online hub for collaboration and communication and is initially intended for business collaboration. It is part of Microsoft's Office 365 suite of integrated tools, even though it is a standalone app for desktop and laptop computers and smartphones. It comprises channels that offer the following benefits: real-time chatting, voice and video calling, interactive video meetings/conferences and presentations, cloud capability for storing and sharing (including uploading and downloading) files/documents and creating and sharing content, sharing links and planning tasks and notifying about activities or events (Chaka et al., 2022). Meetings on MS Teams can hold up to 250 participants per meeting. The maximum time for each meeting depends on who is in the meeting and the type of authentication they use to join the meeting. If the number of participants exceeds 250, users can change to a Live event, which permits up to 20,000 people to join in the same event. Each live event can last up to 16 hours (Correia et al., 2020). MS Teams also has integrated tools such as OneNote Class Notebook, Edu Class Note and Edu Staff Note (Microsoft, 2022). Additionally, it has inbuilt features like channels and tabs and functions such as mentions and threads. Some of the purposes served by these features and functions are:

- Channels are features that users can utilise to structure their communication in terms of either topics or types of conversations.
- Tabs are a function linking apps, files and services. Two examples of tabs are Files (for documents shared within a channel) and Posts (messages posted).
- Mentions: prefaced by the symbol @, followed by a person's name, mentions are used for messaging or alerting other users.
- Threads: these are a series of messages resulting in threads. The Reply option can respond to messages within a thread; voice and video meetings can be scheduled within threads.

Based on the mentioned features, it is possible to claim that MS Teams is a device-neutral digital collaborative communication hub with a built-in suite of related tools that complement each other to varying degrees. So, that makes it an all-in-one collaboration platform that lends itself well to educational purposes (Chaka et al., 2022).

Platforms for collaborative and distance learning

Moodle is a learning platform based on an open-source learning management system (LMS), development and distribution of digital teaching, face-to-face and online resources. The author of this platform is Martin Dougiamas from Curtin University in Western Australia. Moodle must first be installed onto the central server, and then the administrator configures the settings to allow access via usernames and passwords. Users can access the platform online because it is web-based and there is no need to install anything. As one of the most popular academic resources, Moodle is used in many educational institutions worldwide. What makes Moodle a unique platform is the ability to expand and customise the existing system. Opening the Moodle plugins directory, we come across over 1,700 valuable tools and plugins that can be divided into two types of Moodle tools:

- resources - which we can use to present information to our students, and
- activities – which can be used to build community and provide a formative and summative assessment (Dougiamas, 2003).

The combination of these tools enables the integration of a wide range of resources, from chats, forums and online booklets, the ability to form different types of questions, exercises and lecture notes to multimedia resources such as graphics, video, audio, PowerPoint, Flash applications and others (Männistö et al., 2020). Moodle is a platform that allows us to build a customised and secure learning environment with interactive online courses on a private network. In this way, students can attend online classes and/or courses under teacher control or on their flexible schedule. Also, this platform offers the possibility of integrating games with multimedia elements into learning courses, known as gamification in Moodle. Games are educational, helping students to engage by providing different teaching methods that stimulate their participation (Dougiamas, 2003; Männistö et al., 2020). Various tasks and evaluations during the students' knowledge check can be completed directly in Moodle via the grade book plugin. The platform also has a permanent, open communication channel through forums, messaging, chats, comments, blog posts and discussions for students and teachers to communicate outside of the classroom. The great thing about Moodle is that it is free to access anytime, so there is no need to constantly worry about being busy with discussions and questions. In addition, it allows users to continue when they have time. In this sense, Moodle, through its tools, encourages collaboration and teamwork among students, allowing them to collaborate, share ideas and ask/answer questions if necessary. Moodle offers mobile e-

learning, which is compatible with many devices including smartphones, tablets and laptops (Araya, 2021). In nursing education, most studies have shown that in terms of developing professional knowledge and skills, Moodle-based electronic LMSs can be more effective than traditional face-to-face teaching. One of the advantages is reflected in students' better learning achievement and the development of their abilities (Männistö et al., 2020). In addition, benefits have been observed in sharing knowledge in order to achieve consensus, collaboration and interaction. Furthermore, due to time efficiency requirements and flexibility in educational institutions, using Moodle-based LMS allows students a more flexible and self-planned learning process, promoting their independence and increasing their self-teaching effectiveness and learning achievement. In addition, the Moodle platform provides students with various learning materials and tools, which arouse their interest and help them understand complex information (Jones et al., 2021).

Moreover, interactive tools such as e-mail, posts, virtual meeting rooms and chat rooms improve communication between students and teachers (Männistö et al., 2020). Finally, platforms can provide students with more information through web links and create a safe environment to discuss, share information, transfer new knowledge and express their opinions in an open atmosphere (Araya, 2021). Moodle-based LMSs grounded in social constructivism theory are new learning environments that can effectively promote active student interaction and facilitate individual contributions for the benefit of the group (Männistö et al., 2020). Various LMS and related tools increase student engagement, motivation, collaboration, performance, retention and critical thinking (Araya, 2021; Jones et al., 2021). However, Moodle also has certain disadvantages. Namely, to use Moodle, access to a computer and a continuous Internet connection are needed to use the LMS system. One of the main issues with Moodle is unexpected technical problems, such as an unstable internet connection (Jones, 2021). As a result, interruptions lead to anxiety and negative attitudes of students and teachers towards using Moodle. Perhaps the biggest drawback of Moodle in nursing education is reflected in the lack of direct contact between students and teachers, especially during the acquisition of practical skills but also during studying and taking exams.

Padlet is free software that is based on online collaboration and represents the interactive platform used for collaborative learning by allowing posts to be displayed on a virtual wall (https://padlet.com). Post can include documents, questions, comments, images and video and audio clips, which students can access any time they want. The virtual wall is a whiteboard where students can "pin" many types of files (word documents, images, audio files, videos). The creator of the wall has control over the wall's content, design, appearance and privacy. Many posts on the wall can be arranged in different layouts, freeform or grid. The wall creator can also control who can access the walls by making changes to the privacy settings by providing visitors with a QR code, links and/or passwords for the walls or making the walls public (walls can be "discovered" by internal or Google searches). Wall links/addresses can

be personalised. In addition, the creator can control what visitors can do on the wall, read what is on the wall, write and edit their posts or view, upload, edit and approve other people's posts. Another feature of Padlet is that it allows any number of writers to post a comment or upload a file simultaneously. The installation on the pallet wall will be seen in real time. Like any other web tool, activities on Padlet require an internet connection (Dunbar, 2017). As the main Padlet advantages, the following facts are reported: access to the https://padlet.com platform is effortless, there are no registration requirements and it is possible for any device (laptop, phone or tablet) connected to the Internet. The use of Padlet in teaching promotes a quick response or the exchange of students' opinions during discussions, which makes it very effective in identifying individual lack of knowledge or correcting misunderstood understanding (Fisher, 2017; Dianati et al., 2020). In addition, Padlet allows participation on multiple occasions without time limits, making it possible to learn the content of each session numerous times and improve their knowledge. Allowing students to hide their identity was evaluated as a favourable move as students highlighted this as one positive aspect of the activities that Padlet enables (Tsumura, 2022). Also, Beitz (2019) states that students emphasise that the transparency of questions and comments contributes to their collaborative learning by enhancing their understanding of course content. According to literature data about nurse educators' opinions, the most significant disadvantages of Padlet are related to tools, connectivity, navigation and accessibility to the Padlet walls. Students state that access to walls is often very demanding because there are usually too many links to open, connect and navigate. Also, specific difficulties have been observed when it comes to accessing Padlet via smartphones (Dianati et al., 2020)

Kahoot is a free game-based learning platform that allows students to create interactive quizzes. This interactive tool uses elements of learning through play, music and timing to promote competitiveness and motivational engagement of students for formative learning in various educational settings (Castro et al., 2019). Quiz questions can have two to four options with one or more valid answers. Video and audio clips, illustrations/pictures can be included in the quiz, which can contribute to the interactivity and realism of the content. It is also possible to choose a time limit for answering each question (from 20 seconds to 4 minutes). A Kahoot quiz lasts between fifteen and thirty minutes. To enter a particular quiz, students need to generate a game PIN, which is entered on the player's home page. Before starting the quiz, nurse educators can select an option that allows students to take an individual or team approach. Previous research on Kahoot as a learning tool based on online games in various health disciplines such as pharmacy, medicine and nursing (Terri et al., 2019; Bryant et al., 2018; Aktekin et al., 2018) has indicated several advantages. Students emphasise greater motivation and engagement in the learning experience of individual courses. Increased awareness of academic achievements and understanding of the content covered were also observed (Castro et al. 2019). Kahoot quiz is characterised by its visual identity, which makes

it very attractive to students because an attractive appearance encourages their motivation and involvement (Aras et al., 2021). Previous research has documented increased awareness of academic achievement and understanding of the content covered through game-based learning. Kahoot is suitable for creating short quizzes, although it is not suitable for more in-depth tests of students' knowledge (Aktekin et al., 2018, Aras et al., 2021).

YouTube, which was launched in 2005, is one of the most popular internet applications, where anyone with an internet connection can upload, share and watch videos through a simple and integrated platform. YouTube is the world's second most popular search engine and social media platform. In 2020, YouTube had over 2.1 billion users, resulting in over a billion hours of video content watched daily and over 500 hours uploaded every minute. According to published statistics, over 95% of the Internet population regularly communicates with YouTube in 76 languages from more than 88 countries. Mamlin et al. (2016) predicted that social media platforms, such as YouTube, will be widely used for sharing health information in patient education and the public and for sharing, editing and commenting on educational information. YouTube has proven to be a valuable educational resource, representing a visual model that includes both theoretical and practical knowledge that could be used for teaching purposes. Academic institutions can also use YouTube to form their own "channels" where teachers and students can make videos for courses and learning. Among health sciences/biosciences, students increased access to YouTube as the primary source of video resources in accessing numerous courses' contents. For example, 98% of students used paediatrics and oncology videos and 92% agreed that the channel helped them learn anatomy (Chang et al., 2022). Nursing students reported high satisfaction with the concise nature of the educational videos, ease of access and use and the ability to view the videos in various settings to supplement clinical experiences and consolidate their learning. YouTube also has easy-to-use feedback tools (Osman et al., 2022; Chang et al., 2022). Students can comment on videos to review or discuss content, share additional resources, ask and answer questions via the forum and indicate support for content or comments using the "like" feature. A significant advantage is that YouTube offers a visual approach to various diseases by showing their clinical manifestations and equipment or the application of prescribed drug therapy that students may not encounter during their regular clinical exercises (Giroux et al., 2022). Students mainly accessed YouTube videos that are focused on clinical skills such as venipuncture, cannulation, urinary catheterisation, decubitus wound assessment or oral care. Given the emphasis on modern education being innovative and creative, incorporating YouTube into student education is an innovative, valuable tool for keeping students' attention (Osman et al. l, 2022). Most millennial students are familiar with YouTube. It is easily accessible and offers a vast online collection of patient scenarios and content related to nursing education, which is especially important when clinical slots are unavailable, as was the case during the COVID-19 pandemic. Literature data on YouTube's disadvantages in

student education often highlight concerns about issues such as the credibility of video content in terms of its validity and the time required to search for appropriate content (Osman et al., 2022, Chang et al., 2022). YouTube search results are based on popularity, relevance and view history, not content quality, creating a problem for students increasingly exposed to unverified and partially misleading content.

Digital tools for clinical competence evaluation

Since being first described in 1975 by Harden, the Objective Structured Clinical Examination (OSCE) and its more current variations – "**Electronic Objective Structured Clinical Examination** (eOSCE)" and "Virtual Objective Structured Clinical Examination (vOSCE)" are increasingly being adopted by nursing educators to evaluate students' clinical competencies, knowledge and skills (Harden et al., 1975; Khan et al., 2013). OSCE is a widely used and well-established objective assessment method in nursing education. This method uses standardised scenarios to evaluate students' clinical skills, and their performance is assessed by trained evaluators using a standardised scoring system, predominantly in a physical 'face-to-face' setting. During the assessment, students usually rotate through predefined stations and complete the required clinical task within a set time limit while being evaluated by an examiner in real-time (Bouzid et al., 2022). The examiner can physically be present in a room or monitor the student remotely via video surveillance systems or other means. To digitalise the OSCE process and facilitate all of the advantages of digital technology, the "Electronic Objective Structured Clinical Exam (eOSCE)" solutions began to emerge. eOSCE represents a digital adaptation of the traditional OSCE that uses electronic platforms to evaluate simulated clinical scenarios. eOSCE can be delivered through various electronic devices, such as laptops, tablets and smartphones, and provides real-time scoring and feedback. In addition, it allows easier access and the sharing of information, improves efficiency, removes the need for physical storage of paper copies, eliminates the need for manual data verification for unreadable missing scores, provides data redundancy, allows significant analytical insight and reduces the organisation's environmental impact. Despite the advantages, it is essential to note that some platforms require specific operating systems, thus potentially incurring high up-front costs and in some cases, internet access and advanced knowledge of the application. (IML, 2023)

Virtual Objective Structured Clinical Examination vOSCE, remote OSCE, WebOSCE or teleOSCE (Donn et al., 2020), is a clinical assessment method that uses remote communication tools and/or virtual reality to create realistic clinical scenarios and assess students' skills. vOSCE can be delivered through virtual reality headsets or standard computers and tablets, depending on the format. Even though the concept was initially described in the early 2000s, primarily through pre-recorded video material and texts that students would use to acquire clinical skills; today this is facilitated by remote communication

tools, such as Zoom, Skype, Microsoft Teams, Google Meet and others. Besides its use in evaluation, vOSCE was shown to be effective in helping students learn (Prettyman et al., 2018) and could be considered a viable alternative to face-to-face clinical examinations (Donn et al., 2020; Desai et al., 2022)

Tools for increasing the interactivity of teaching

The use of **video materials** in nursing education has become increasingly popular in recent years, with the widespread availability of technology enabling the creation and sharing of videos more easily. Video materials can provide an effective way to teach complex procedures and techniques, as well as to promote patient education and enhance communication between healthcare providers and patients. (Cardoso et al., 2012; Hansen et al., 2011; Holland et al., 2013). One of the main advantages of using video materials in nursing is their ability to enhance education and training, with multiple studies stating improved performance outcomes, student confidence and satisfaction in comparison with traditional methods (Hibbert et al., 2013; Holland et al., 2013; Lee et al., 2007). Videos can be used to illustrate complex concepts, demonstrate procedures and provide real-world examples that help students and nurses understand key concepts and develop essential skills. They can also be used to supplement traditional classroom and clinical instruction, providing additional opportunities for learning and reinforcing key concepts. Additionally, videos can be accessed anytime and anywhere, making them a convenient resource for nurses and nursing students who need to review or refresh their knowledge (Chan, 2010.) Despite these advantages, there are some potential drawbacks to using video materials in nursing education. One of the main concerns is that videos may not always provide a complete or accurate picture of a particular procedure or clinical scenario. This can be particularly problematic if videos are used as the sole source of information without being supplemented by additional instruction or hands-on training. Sometimes, videos may also be outdated or may not reflect the current best practices, leading to confusion or errors in patient care.

In addition, instructional video materials available on publicly available platforms, such as YouTube, are not subject to peer review and can be freely published by anyone. According to some authors, up to 69% of clinical skills-related material on YouTube is of poor quality. Therefore, a thorough evaluation of each source is recommended before recommending or including publicly available video materials (Duncan et al., 2013; Clifton & Mann, 2011). Another challenge associated with using video materials in nursing is ensuring that they are accessible and effective for all learners. This can be particularly difficult for students who have disabilities or who learn best through hands-on, experiential learning. Additionally, videos may not be effective for all learners, and some students may find them less engaging or stimulating than other instructional materials.

In recent years, **Escape Room** (ER) has become increasingly popular in providing engaging and immersive learning experiences. However, the use of ER in nursing education is a relatively new development, and it can provide a dynamic and interactive learning experience that enhances critical thinking, communication, teamwork and problem-solving skills (Edwards et al., 2019). According to one of the most frequently cited definitions, ER is a game where players discover clues, solve puzzles and perform tasks in one or more rooms to achieve the goal in a limited time - escape from the room. The puzzles represent all of the problems, challenges and activities, while the "room" is the space (on-situ or online) in which the ER is realised. In the on-site educational ER, the "room" is most often a faculty classroom where there are subjects concerning the topic and the planned outcome of the ER, corresponding to those from a natural professional environment, as well as various padlocks and locks that open when the puzzle is solved. Time limits: the included timer during nursing ERs simulate time limits from a natural environment and are in line with their future professional tasks, where they are expected to make correct decisions and adequate solutions in a limited time (Hawkins et al., 2020; Milutinović & Simin, 2022). A valuable benefit of incorporating ER in nursing education is active engagement in learning. Instead of simply listening to lectures or reading textbooks, students must use their knowledge and skills to solve complex problems within a simulated environment. This hands-on approach can help students to better retain information and develop a deeper understanding of the subject matter. Also, ER requires players to think critically and use problem-solving skills to solve puzzles and escape from the room. In a nursing education context, this translates to developing the critical thinking and critical thinking skills that are essential for clinical practice. Therefore, by practising these skills in a low-stakes environment, students can develop the confidence and competence necessary to apply them in real-world situations (Reinkemeyer et al., 2022; Tavares, 2022). Furthermore, nursing practice often involves working in interdisciplinary teams, and using escape rooms can help prepare students with this aspect of their future careers. In addition, using ER can help to improve communication skills, as players must communicate effectively to solve puzzles and complete the game. Finally, the immersive and challenging nature of escape rooms can help to improve student engagement and motivation. Nursing education can often be dry and tedious, but using ER can help break up the monotony and provide a fun and engaging learning experience. This approach can help to improve student satisfaction with their education and ultimately improve learning (Reinkemeyer et al., 2022; Tavares, 2022). A common barrier identified for using ER in nursing education was the faculty's time demand or commitment to design and conduct the experience (Reinkemeyer et al., 2022).

Simulation tools has become an increasingly important component of nursing education and training. This technique involves creating a realistic, immersive environment that allows nursing students and practitioners to practice and refine their skills in a safe and controlled

setting. In recent years, simulation has been adopted across various nursing specialities and has proven to be an effective way of improving patient safety, increasing competence and confidence and enhancing the overall quality of care. Several studies have demonstrated the benefits of simulation in nursing education (Lin, 2015; Luctkar-Flude et al., 2015). Using simulation, students can develop clinical skills, learn decision-making and improve communication skills with patients and other healthcare providers. In addition, simulated scenarios allow students to practice responding to unexpected situations in a safe environment, which enhances their problem-solving abilities and prepares them for the challenges they may face in the clinical setting. Furthermore, simulation-based training has improved communication (Lee et al., 2021) and teamwork (Foster et al., 2018) among healthcare providers, which is essential for providing high-quality patient care. In addition to improving clinical competence and teamwork, simulation has been shown to reduce errors and improve patient safety, provide the opportunity to practice highly complex and sometimes rarely performed skills in a safe environment and provide opportunities for repetitive practice (Gcawu et al., 2022). Despite the numerous advantages, simulation technology can involve a high initial cost, depending on the fidelity and complexity of the simulator's procedure, as well as the possible perceived lack of realism that some students report (Luctkar-Flude et al., 2015).

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LEVERAGING SIMULATION AND INTERACTIVE VIDEO

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Summary

In this chapter, we focus on the production and use of high-quality educational video material. The text is arranged into three parts; introduction and theoretical background, the creation of educational video material and the incorporation of video material in different methods of teaching. In the first part of the introduction and theoretical background, we present the advantages and shortcomings to using video materials and draw on the insights from The Cognitive Theory of Multimedia Learning, focusing on its application in relation to the video materials. In the second part, we present the important aspects of video production. We especially focus on the key aspects of the process of creation of video material and the use of questions as a mean to guide students' attention and support their interaction with video material. Further, we also draw attention to the importance of making video material accessible to students with diverse educational needs. In the third part, we present two examples of incorporation of video material in two different teaching methods, asynchronous hybrid flipped learning and synchronous online workshop, which was done as a part of the project DEN. We highlight the advantages and possible pitfalls of both chosen methods.

Key words: video material, preparation of video material, use of video material, flipped learning, synchronous online learning.

Theoretical background

Video materials are and have been used for some time in healthcare and other areas of education. The use of videos can empower learners and teachers; help to solve certain challenging situations and create an opportunity for learning in diverse environments. It can be an important tool and teaching technique that exists at the intersection of digital and »analogue« pedagogy. Teachers can integrate videos into different teaching methods, e.g., flipped learning, group work, project work, lectures, demonstration, etc. There are many benefits to using video material, since it promotes motivation for learning and enjoyment of the course as well as contributes to the quality of knowledge, due to more in-depth processing of the content (Fee & Budde-Sung, 2014; Stone et al., 2020).

Taking into consideration the quality of knowledge, video material facilitates more in depth understanding of specific topics, promotes better memorisation of material, offers new perspective on the content and encourages practical application of theory (Fee & Budde-Sung, 2014). Stone et al. (2020) for example emphasised the overall benefit of clinical skills for student learning when introducing video podcasts into nursing curricula. Partly because video

podcasts are delivered in a simulated environment without other external factors that may present complexities in a real-world clinical setting. Using video material can actually enhance skills performance and competency of students (Masters, 2005; Park & Cho, 2021; Stone et al., 2020). Watching videos or excerpts from films and discussing the topic is not only a good learning tool to deepen professional content and improve memorisation, as film clips help learners to create mental images of concepts that can be retained and recalled to working memory when the material needs to be remembered (Masters, 2005), but it also helps to develop nursing students' communication skills (Keser & Acar, 2017). Keser and Acar (2017) highlight the importance of non-verbal communication that nursing students can learn from videos. Some skills such as effective listening, making eye contact, touching and observing the non-verbal expressions of patients and healthcare professionals can be learned by observing these skills either in practice or through videos.

Likewise, using video material also through multiple dimensions promotes motivation (Fee & Budde-Sung, 2014; Masters, 2005; Park & Cho, 2021; Stone et al., 2020). One of the main motivating factors can be the material itself, especially, when it’s aesthetic, interesting, of an appropriate length and allows for greater individualisation (e.g., students can watch the videos at their own pace, at the time of their choosing, etc.). The latter also enables the better meeting of individual and generational needs of a contemporary student, especially regarding the time coordination and balancing different commitments (Masters, 2005; Park & Cho, 2021; Stone et al., 2020). Further, video materials also increase motivation to learn about the topic (Fee & Budde-Sung, 2014), students' satisfaction regarding the study process and achievements and confidence in relation to skills development (Masters, 2005; Park & Cho, 2021; Stone et al., 2020).

However, in order to achieve optimum results, when using video materials, we should be mindful of the insights offered by The Cognitive Theory of Multimedia Learning (Mayer & Moreno, 1999; R. Mayer & Mayer, 2005). The theory is based on three main assumptions (Davis, 2020;

Mayer & Moreno, 1999; R. Mayer & Mayer, 2005): the dual-channel assumption, the limited capacity assumption and the active-processing assumption. In line with the dual-channel assumption, deeper learning occurs when information is presented in both channels, visual–pictorial and auditory–verbal channel. Accessing the material through two channels aids the sense-making process and allows the students to better understand the presented content. Video materials used in lectures usually by default incorporate both channels and enable the students to process the presented information in depth and more wholesomely (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005).

According to the limited capacities assumption, creators should aim to manage the intrinsic load, foster generative processing and minimise extraneous load in order to ensure the most

optimal learning experience and results (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005). With video materials we can successfully manage the intrinsic load, since students can control the pace of presentation (the segmenting principle) and are presented with visual (video, pictures) and auditory (narrated, spoken text) information simultaneously (the modality principle). The segmenting principle can be additionally addressed by special consideration to creating coherent strands of meaningful content, which allows more adequate processing (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005). Another way of addressing the intrinsic load is to establish appropriate prior knowledge before beginning a multimedia lesson (the pre-training principle). People learn more deeply from a multimedia message when they know the names and characteristics of the main concepts prior to watching a video (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005). When fostering generative processing, in addition to simulations use of words and pictures (almost default incorporated multimedia principle), creators should also use more approachable, conversational language (the personalisation principle) and human voice rather than artificial voice (the voice principle) to enhance learning (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005). To minimise extraneous load the video should be coherent and include only relevant information (the coherence principle), while redundant information should be avoided (the redundancy principle). Information in a video should be presented congruently considering time and space, which means simultaneously rather than successively (the temporal contiguity principle), and in near proximity (the spatial contiguity principle). Also, attention should be directed to important information by an advance organiser or highlighting (the signalling principle).

In line with the active-processing assumption, teachers should keep in mind that learners actively build mental representations in an attempt to make sense out of their experiences. Students need to engage in active cognitive processes in order to develop quality knowledge (e.g., identifying and selecting relevant material, organising materials into visual and/or verbal models, integrating new models with prior knowledge). That is why the quality of learning does not only depend on the video material, but also on instructional techniques accompanying the video material, which guide the learner's cognitive processing of the presented material and also cognitive and metacognitive strategies applied during individual study (Davis, 2020; Fee & Budde-Sung, 2014; Mayer & Moreno, 1999; Mayer & Mayer, 2005).

Therefore, in order to achieve optimum results we have to be careful about what kinds of videos we choose or produce. Video material should be easy to understand and follow, it should be of an appropriate length, interesting and relevant to the topic and should add something new to the lecture (not just repeat what was already learned) (Fee & Budde-Sung, 2014). Further, Stone et al., (2020) highlighted the importance of addressing the technical

constraints, combining video material with other pedagogical approaches and integrating it with lectures or course content. For example, during the DEN project we held a live workshop in which we carefully incorporated video as one of the methods used. However foremost, the video material should be of high quality regarding image and audio content. The speech in the video material should be clear and or appropriate speed (significantly slower) (Jakšić Ivančič; Fricelj; & Košak Babuder, 2020).

Regarding making video material more accessible to students with diverse educational needs, it's important to follow some additional guidelines (Davis, 2020; Jakšić Ivančič, Fricelj & Košak Babuder, 2020). Before presenting video material to students, we should provide some basic information about the video, e. g. why this video is important, the main topic of the video and how long it will take the student to watch the video. This information should also be provided when video material is used for individual study, since it enables students to watch it outside lectures, both in advance and after. Students should have an option to pause, rewind or fast-forward the video and adapt the volume. This would offer them control over how they process information (Jakšić Ivančič, Fricelj & Košak Babuder, 2020).

Used video material should enable access to the material through two channels – video and audio – at all times, which is why it is important to use subtitles, transcriptions and descriptions of the content and other aids. Some students strongly benefit from subtitles, especially if speech is slurred or a lot of back noise is present in the video. A transcription of a video or an implementation of a video recording of the sign language interpretation of the text can serve as an important support to students with diverse educational needs, more specifically deaf students or those with hearing disorders. On the other hand, blind students or those with visual processing disorder need a short but precise description of visual aspects, especially in footage where spoken language is not present, e.g., footage of landscape, demonstration of something (for more information see: Jakšić Ivančič, Fricelj & Košak Babuder, 2020).

Preparation of video material

High-quality video features high-quality content and good technical execution, both of which are supported by carefully planning, which is the first phase in creating a video. Planning is usually followed by preparation and distribution of the material, while the process should end with thorough evaluation. Throughout the entire process, but especially during the evaluation that was thoroughly done as a part of the DEN project, we were conscious of The Cognitive Theory of Multimedia Learning assumptions and principles (Mayer & Moreno, 1999; R. Mayer & Mayer, 2005).

When planning, creators of video material should first choose a topic where they have a deep understanding of the subject matter, choose a learning goal and think about their audience. Knowing the topic and the audience enables them to find the right angle of presentation for

the topic to make the video relevant and useful, while goal setting guides the rest of the video creation process. For the DEN project live workshop, our goal was to evaluate different types of video material in terms of their effectiveness for knowledge acquisition for a group of students. This is also the time to decide on the video format (animation, live-action, screencast, etc.), the length of the video and the budget (Fastiggi, 2022; Vyond, 2023). We should be very careful to ensure that the videos are of an appropriate length, since video engagement declines with time. The length of the video should change accordingly to our goal, what we want to present with a video and our audience. Only 38% of viewers will watch videos that are between 5 and 30 minutes long, while only 26% of viewers will watch 30 to 60 minutes long videos (Fishman, 2023).

During the DEN project, we have tried to follow as closely as possible the recommendations for creating good video material. Preparation of the video material started with writing a script, which should enclose everything that happens in a video, what was spoken and written text, imagery and other components of the video. Also, we kept in mind that we should tell a story with our video. That means that the video should have a clear beginning or introduction, a middle section where most of the content is presented and an ending with a short summary. You should not waste time on lengthy introductions or conclusions. The text and the narrative should be relatively simple, without unnecessary or redundant information. Prepare a detailed speech plan and practice it. Speak clearly and be conscious of your vocal cues and body language. Carefully consider how you can explain concept through imagery and motion, since video is primarily a visual medium. Ensure good visibility and show only the most important parts of the process, procedures and instruments. Choose the right tempo (not too fast, not too slow) and use simple transitions between frames (Fastiggi, 2022; Vyond, 2023).

It is a good idea to equip videos with cues or signals for important information (signalling or cueing) in order to direct learners' attention (deKoning et al., 2009; Lawson et al., 2006). You can highlight important information by using on-screen text (i.e., two or three key words), a symbol that draws attention to an area of a screen (i.e., an arrow) or apply a change in colour or contrast. During the DEN project, in order to direct attention and achieve greater interactivity, we used questions, task or links. Questions can help students to get the most out of an educational video, because questions help them to focus their attention, provide additional tool to process the information and monitor their own understanding. We can add questions to any part of the video, at the beginning, in the middle or at the end. We used all three options in the DEN project.

Questions used at the beginning of the video material or even before starting to watch a video are called guiding questions. Lawson et al. (2006) reported that students who received guiding questions before watching scored significantly higher on the video-related questions than those in the control group. Interactivity can be increased by incorporating different tasks,

assignments, questions or other types of extensions by using different tools and plug-ins such as H5P and OVE tools. Plug-in H5P, for example, enables us to prepare an interactive video recording by adding additional descriptions, explanations or questions. Increasing the amount of interaction of the student as well as time spent with the learning materials leads to better learning outcomes and higher learner achievement (Vural, 2013).

At the end we planned to make a thorough evaluation of the process of preparing the video and its use. The information can serve us as a basis for future improvements during the process of preparation and the material itself.

As a part of the DEN project we conducted a qualitative and quantitative evaluation of the planning, preparation and dissemination of the videos as well as of video materials, used as a part of flipped learning during the COVID-19 pandemic. We evaluated the process of planning and preparation of the video material by conducted a group interview with video content creators, who were also nursing university teachers. We analysed the data using the SWOT analysis.

Here we present the strengths, weaknesses, opportunities and threats, which appeared or are related to the process of video preparation (we will focus on the strengths, weaknesses, opportunities and threats of dissemination and usage in the next sub-section of this chapter).

The group of teachers, some of who were also involved in the DEN project, who prepared the videos, decided to create them because of the questionable quality of the existing videos available to them. They pointed out that the existing videos often featured mistakes and could often be used more as a presentation of bad practices, and further just showed part of the procedure. As a result, the strengths of the newly produced videos were no mistakes in the conduct of the procedure, comprehensive and holistic presentation of procedures (from the approach to the patient onwards), and the possibility for self-improvement through self-reflection for the filmed content creator. Nevertheless, there are still some shortcomings in the existing recordings. Many the shortcomings were of a technical nature (e.g., voice lag), and also one of more difficult procedures highlighted a lack of understanding.

Further, during the evaluation process the presented teachers reflected on some shortcomings of the preparation phase, especially that they were underprepared and not systematic enough. We could address these weaknesses with thorough preparation, in depth reflection and a high-quality script. Also, videos could be further improved by intervision, supervision or peer review, which make it possible to rectify errors.

Teachers also pointed out some opportunities that arose from the use of video materials. The video material allowed them to show specific details, different skills and situations and the actual behaviour of patients in certain situations, as some videos featured real patients. In addition, by creating our own video material, we can use the videos for other purposes (e.g.,

advertising). However, we should also pay attention to some circumstances that teachers pointed out to us. Video content offers less flexibility for individuals and their needs, fewer opportunities for practitioners to show multiple versions of a procedure, share positive and negative experiences, highlight good and bad practices and possible procedure complications. In addition, recordings are not permanent and need to be updated and reviewed for relevance. If the material changes or the performance of certain procedures is improved, the video material should be re-recorded. Also, we need to be aware that with recordings, students do not have the same contact with the work, the patient and the equipment as they do with live exercises that they can observe. In the classroom, it is easier to observe students and show them the entire procedure directly. We could address the threats with regular intervision, supervision or peer review to ensure high-quality and up-to-date teaching materials and combine different pedagogical methods for face-to-face or distance learning. We can also influence student engagement and motivation by including questions in the videos or providing follow-up questions and links after the video. We can further improve accessibility by adding subtitles for the spoken language or descriptions of the video material.

Incorporating video material in lectures

The use of recordings is an effective, valuable, innovative and relatively simple strategy to integrate into different teaching methods. Videos can be used both as preparation for a lesson or as a tool for revision of the content covered, the performance of nursing procedures and interventions. Students can use videos or film clips to learn independently, to enhance their understanding of nursing knowledge or to memorise important information. With video material we can target the content of the subject area covered in lectures or laboratory exercises (classroom teaching). It can also be used for test preparation and test delivery. Furthermore, it allows teachers to build on their teaching methods.

However, simply presenting students with the best videos is not enough. Students must be active during their learning process and interact with the video. If students are not active during learning, they will not process the information in-depth and will not memorise it. We can achieve greater interaction, more in-depth learning and greater motivation and satisfaction by incorporating tools for interactivity and giving students more control over the way they watch the video, e.g. selecting important sections to review, going back over sections when desired, etc.

Teachers use videos in face-to-face and distance learning, in synchronous or asynchronous delivery of the course. However, we should bear in mind that synchronous delivery acts as an additional motivational and protective factor, as it allows interaction with the lecturer and other students in the course. In the following section, we present use of videos in one asynchronous method (flipped learning) and one synchronous method (workshop) of teaching.

Example of flipped learning method

Video content can support flipped learning, in which students watch or learn content outside of synchronous meetings and use face-to-face (or online synchronous) classes for in-depth discussions, questions and problem-solving. The benefits of flipped learning are that students are independent from other students and teachers and more flexible during their preparation and can adjust the viewing time and manner to themselves (asynchronous). This enables them to take control and responsibility of their learning. Students come to face-to-face exercises prepared and equipped with prior knowledge, which allows for more in-depth learning and work during the classes in person. However, there are some downsides to this method, such as students coming to the lectures unprepared or underprepared, which means that teachers cannot continue with the lecture as planned and students cannnot keep up with the assignments. Oh et al. (2018) validated the use of flipped learning using videos or excerpts from films in the field of informatics in nursing. Students' knowledge improved significantly with this flipped approach, and students reported that they were eager to receive this type of instruction.

How did we do in the DEN project?

We used videos as a part of flipped learning during the COVID-19 pandemic, when teachers faced the possibility of live lessons and demonstrations of individual procedures. We prepared 12 different videos, each of them showing one procedure, as independent material for individual study, revision and the consolidation of knowledge before laboratory exercises. Laboratory exercises are a key part of nursing training, as students are pre-trained there to carry out nursing activities in the clinical setting. Laboratory exercises take place in specialised nursing classrooms. In addition to linking theory to practice, laboratory exercises develop students' holistic approach to patient care and teamwork. Teachers encouraged students to watch the videos before taking part in laboratory exercises, which were carried out in smaller groups (a teacher and two students) and in a more narrow time window. Students studied the videos at home and came to the laboratory exercises in the nursing classrooms equipped with prior knowledge, which they deepened and built on during the exercises.

As part of the DEN project we evaluated the experience of teachers and students with flipped learning in laboratory exercises and carried out in-depth group interview with the teachers who created the videos. Furthermore, we analysed the data gathered with a group interview using the SWOT analysis. Here we present the strengths, weaknesses, opportunities and threats, which arose or are related to dissemination and usage of videos in the flipped learning.

Using videos was the best option to present the correct method of performing the procedure during COVID-19 pandemic, when teaching could not take place in person. Teachers saw many advantages in using videos. They especially pointed out better consolidation, renewal of

the knowledge and more control over the learning process for the students, since students had the option to look at the videos at any time, in any way and as many times as they wanted to. Students could also use the video material for other subject or later in their studies when they want to repeat the learned procedures. Teachers pointed out that students who watched the videos had better knowledge of procedures and the materials needed for procedures compared to students who did not watch the videos. The former group were also faster when doing procedures in in-person setting compared to the later.

However, teachers also highlighted certain disadvantages to using videos. The greatest disadvantage being not being able to monitor if the students actually watched the videos before exercises, how many videos they watched, how many times they watched the videos and how thoroughly they watched the videos. Teaches suggested that we could overcome these disadvantages by preparing a quiz, a test or some questions that a student should answer sufficiently well as a prerequisite for joining the exercises in person. This would also offer information about the knowledge level to teachers. Furthermore, teachers also highlighted videos as a good tool to better demonstrate the procedures in other forms of work.

We also sought the opinion of students during the DEN project. We asked the students to fill out questionnaires regarding the videos and their use in flipped learning. A total of 24 students out of 61 enrolled in the subject that year (39.4%) responded to our invitation. In general, students reacted positively to videos, even though a third of the responding students reported that this method of studying did not suit them. Nevertheless, almost all of the students found the recordings to be extremely useful as a basis for laboratory exercises in the simulation classroom and useful for work in the clinical setting. The students complimented the high clarity and informativeness of the videos and the precision with which the procedures were depicted in the videos.

All of the students who responded to our questionnaire reported that they watched each video at least once, while half of them watched each video three times or more. They watched videos showing more difficult procedures more often. The way in which the recordings were viewed depended more on the student than on the recording. Most of the students were active while watching videos. They adapted the viewing method to the individual video (26.1%) or only reviewed parts of videos (43.5%), e.g. the parts that they had not memorised, did not understand, were crucial for the procedure or more difficult to carry out. However, a significant number of students reported just watching videos from the beginning to the end (30.4%), which could signal lower activity while learning or inexperience with using videos as a learning tool.

Most of the students liked flipped learning. They particularly appreciated the acquired knowledge and clear and unambiguous information regarding the organisation of learning.

They also rated the teachers' work as high quality, valuing their knowledge and experience, encouragement and communication and the quality of the demonstration of the procedures.

However, the students commented on the length of face-to-face lectures, which they would prefer to be longer.

DEN´s online synchronous international workshop based on the use of video

The student's engagement is strongly related to interaction (Shaw, 2020). Students can interact with course content, other participants or the teacher. Shaw (2020) suggests that we increase the interaction with the content by presenting content in more than one format, encouraging students to generate their own content, offer an opportunity to discuss and reflect on the content and use self-tests to allow students to check their understanding of content. Interaction with other students, which creates a sense of community, can be enhanced by group work, encouraging discussions and content-based conversation. Interaction with the teacher can be supported by creating a welcoming, friendly atmosphere and personalised contact with students (Shaw, 2020).

During the DEN project, we tried to incorporate all of the above suggestions in an online workshop for students, in which we carefully incorporated different forms of teaching (individual and group work) and teaching methods (e.g. discussion, quiz, demonstration) and combined them with the use of video materials. This is in line with the Stone et. al (2020) review, which demonstrates that video technology teaching methods and traditional teaching methods used in conjunction with each other create the most positive learning environment.

The workshop that was part of the DEN project and took place during one of our meetings was led by two instructors and it brought together 16 students of both genders, from Croatia, Macedonia, Slovenia, Serbia and Sweden. The groups were premade, participants came from different countries and institutions that collaborated on the DEN project and did not previously know each other. The workshop started with a short introduction to the workshop from lecturers and an »ice-breaker« activity, which included a presentation of all collaborating students and their countries. It was followed by a test of prior knowledge and an individual viewing of three videos without embedded questions.

After watching the videos, students were invited to join a short panel discussion regarding the video materials. Additionally, we incorporated a short YouTube video, which presented the importance of active learning even while watching the video. This was followed by the first group assignment, during which groups had to prepare a limited number (3) of questions for each video and present their ideas to other groups.

A short break followed. After the break, students watched the videos again individually, this time with embedded questions. We used H5P plug-in to incorporate questions directly into videos as part of the DEN project. In the event that a student does not correctly answer a question, the recording automatically returns to the predefined part of the recording that provides the correct answer, allowing for effective reinforcement and revision. Afterwards,

they formed the same groups as before and compared and discussed the experience of watching the videos without and with integrated questions. The students also shared collective insights in joint discussion. At the end of the workshop, we retested the students' knowledge and asked them to collaborate in an evaluation of the workshop. They also submitted the results of both group assignments. The workshop was performed online with the help of Zoom and Moodle, however, it could also be implemented in person or with different programmes.

In general, the participants were extremely satisfied with the workshop that was part of the DEN project. They were highly engaged and motivated due to the methods used, recognised the quality of the used materials and significantly improved their knowledge of the chosen topics. Furthermore, during group discussions the students complimented the informative nature of the videos, recognised the importance of the questions in the videos for focusing attention, and highlighted the benefit of the option to rewind and look at the key information again. On the other hand, the students pointed out that the negative aspect of the videos with incorporated questions was that the recording would go back to the beginning if an answer was incorrect. Furthermore, they were particularly concerned about the automatic evaluation of the correctness of the answers, which did not detect all of the possible answers or penalised the students for misspelling words. The comparison of results of the prior knowledge test and retest at the end of the workshop showed an important decrease in the amount of time needed to answer the same number of questions and an increase in knowledge. The strengths of the workshop as recognised by the students were the participation of students from different countries, the use of effective, useful and interesting materials and the ongoing assessment of knowledge. On the other hand, students cited technical difficulties stemming from poor connectivity, different nursing doctrines in different countries and the length of the workshop as the disadvantages of the workshop.

As revealed by this evaluation of different methods of using video material, it is not important simply that we use high quality video material, but also that we use the material in an appropriate way. It is important that students are active, engaged and interact with the material during the learning process, because that is the best way for them to construct knowledge.

Conclusions

As shown in the DEN project, the use of video may be an effective, valuable and innovative technique, which is relatively easy to integrate into different teaching methods. It allows teachers to build on the way they have been teaching and it can be used as part of flipped learning, test preparation or assessment. Students can use the videos or video excerpts to learn independently, to understand basic nursing knowledge and to target the content of the subject

area covered in lectures or laboratory exercises. In addition, they can effectively reinforce and test their knowledge in the case of embedded questions.

It is important to use high quality video material when educating future nurses or other healthcare workers, since the video material must show the correct procedures, without any errors in content. To ensure the high quality of video material, we must approach creation systematically, as shown in the DEN project. We must pay attention to the clear, accurate and meaningful presentation of content and the technical aspects of video material (e.g. the display on devices of different sizes, individual device data load, etc.), while also accounting for the characteristics of the cognitive processing of students. Furthermore, we should also pay attention to the accessibility of the learning material not just regarding availability, which can be achieved through digitalisation of the learning process.

We should keep in mind that the preparation of high-quality educational video material is no easy task, but rather a demanding and relatively time-consuming process, which demands a lot of effort and knowledge. Even more, especially in nursing we should keep in mind that using video material is just a technique, which should be used by the lecturer to support course goals or for individual consolidation of knowledge and combined with in person practical work.

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ESCAPE ROOMS IN DIGITAL NURSING EDUCATION

Dragana Milutinović, Dragana Simin

Summary

In this part of the chapter, the application of Escape Rooms (ERs) as an innovative educational strategy in the digital education of nurses is presented. First, an account of the development and implementation of ERs in the educational environment is presented. Next, the basic concepts and design models of Educational ERs (EERs) are presented. In particular, the possibilities of applying digital technologies in EER are explained. Digital Escape Rooms (DERs) in the DEN project is a part of the chapter in which all steps of the implementation of the Digital EERs that were created during the project are presented. The evaluation of the DEERs workshop is the final part of the chapter, which provides data on the evaluation of student experiences during participation in DEER created during the project.

Key words: digital teaching platform, nursing education.

Theoretical background

Today's nursing students, as digital natives, appreciate and readily accept the application of innovative teaching strategies that promote active learning, such as Game-Based Learning, (GBL) (McEnroe-Petitte & Farris, 2020). For students of this generation, working in small groups, computer simulations, GBL and other creative teaching strategies in a digital format can significantly help to develop communication and teamwork skills (Chicca & Shellenbarger, 2018). Kinder and Kurz (2018) highlight the clear advantages of these strategies in nursing education because they attract many students, encourage their engagement and stimulate them to learn. They also note that students with different personalities can "play the game" together, respecting the abilities of each individual, which significantly contributes to the development of group cohesion. The elements of GBL are today the basis of many innovative strategies that complement the traditional approach in nursing education. For example, the Escape Room is a growing game in nursing education (Yaqi et al., 2021; Reinkemeyer et al., 2022).

The development and implementation of Escape Rooms

The phenomenon of Escape Room (ER) games has a short history in the entertainment industry (Taradlsen et al., 2020). The first well-documented ER was recorded in 2007 by the company SCARP (Japan) on ER, which was designed as a single-room game for 5-6 players (Nicholson, 2015). After that, interest in the game overgrew, first in Asian countries and then worldwide. The inspiration for the new ER comes from different genres such as live-action role-playing, point-and-click adventure games, puzzle games, interactive theatre, haunted

houses, etc. (Taradlsen et al., 2020). According to one of the most frequently cited definitions, ER is a game in which a team of players discover clues, solve puzzles and perform tasks in one or more rooms to achieve the goal in a limited time – escape from the room (Nicholson, 2015, p. 1). Where the puzzles represent all the problems, challenges and activities, while the "room" is the space (onsite or online) in which the ER is realised (Nicholson, 2015; Makri et al., 2021; Yaqi et al., 2021). Since ER as a recreational game has become globally popular in the last decade, it has also inspired many teachers to apply it in the classroom (Brown et al., 2019; Gentry et al., 2019; Taradlsen et al., 2020; Veldkamp et al., 2020; Makri et al., 2021; Yaqi et al., 2021). Based on video games and personal experiences in recreational ERs, enthusiastic teachers started implementation in the educational environment, and EERs are one of the rare bottom-up phenomena (Veldkamp et al., 2020).

Educational ERs (EERs) can be defined as a teaching method that requires students to participate together in games that are explicitly designed to acquire knowledge from a specific domain, develop skills or change behaviour so that they can achieve a particular goal (e.g. participants must escape from a physical or virtual room, solve a mystery, find a hidden item, prevent a disaster, break into a vault, etc.) by solving puzzles related to specific learning objectives in a limited period (Fotaris & Mastoras, 2022).

The concept and design of Educational Escape Rooms

Unlike recreational ERs, which are created to appeal to the broadest possible audience, EERs are developed for a specific target group with well-defined learning objectives (Veldkamp et al., 2020). As a result, teachers – as educational developers, create EERs that have the potential to bring additional benefits to the student. Furthermore, teachers strive for high success rates because success creates positive student learning experiences (Taradlsen et al., 2020). EER is one of the innovative teaching methods that include elements of gamification. It is conceived as a team activity in which the participants are "locked in a room" and given a scenario where they must solve puzzles to "escape from the room" (Gutierrez-Puertas et al., 2020). A team of student-players cooperatively discover clues, solve puzzles and complete tasks in a given time to progress in solving challenges and achieve a specific goal that allows them to "escape from the room" (Guckian & Evenson, 2020; Gutierrez-Puertas et al., 2020). Unlike many screen-based games that rely primarily on hand-eye coordination or board games that rely on strategy and luck, ER activities are designed so that thinking activities are used to solve challenges (Nicholson, 2015). The concept of ER as an educational game includes many elements of an active learning strategy, combines problem-based learning and promotes the application of clinical skills, teamwork, communication skills and critical thinking (Adams et al., 2018; Wynn, 2021). In addition, EERs, as a form of experiential learning, allow students to learn by doing, i.e. to experience a problem or question and find the correct answer based on their decisions (Anguas-Garcia et al., 2021). All activities within

EERs are called puzzles and use a simple game loop: a challenge, a solution and a reward (Veldkamp et al., 2020). The "room" is the space in which EERs are realised and it can be either an on-site or online environment (Nicholson, 2015; Makri et al., 2021; Veldkamp et al., 2020). In on-site EER, the "room" is most often a faculty classroom where subjects are located, which corresponds to those from a real professional environment in relation to the topic and the planned outcome of the EER (Brown et al., 2019; Veldkamp et al., 2020). Each escape room has a different background and objective, usually related to finding a certain item.

In order to overcome the escape room, students need to find objects and clues that, through thinking and logic, help them to move forward in the story and open locks and doors to escape from the room (Gómez Urquiza et al., 2022). The solutions to the puzzles are primarily numerical codes (numbers), words, and sensory traces that lead the "players" (students) from puzzle to puzzle until solving the last puzzle and "escape from the room" (Makri et al., 2021). The puzzles in EERs can be categorised as follows:

a) Cognitive - which uses the thinking skills and logic of the player

b) Physical - requiring manipulation of artefacts to overcome a challenge

c) Metacognitive - generally the last puzzle in the game where the final code or solution is derived from the result where the escape key is located (Veldkamp et al., 2020).

According to the method of organising activities in EERs, identified by Nicholson (2015), three of the four methods have a simple structure (Figure 1). According to Nicholson, these are: open (players solve different puzzles at the same time), sequential (solving one puzzle unlocks the next) and path-based structure (puzzles are solved in several paths). Combining simple structures creates a complex structure, e.g., in the shape of a pyramid (Nicholson, 2015).

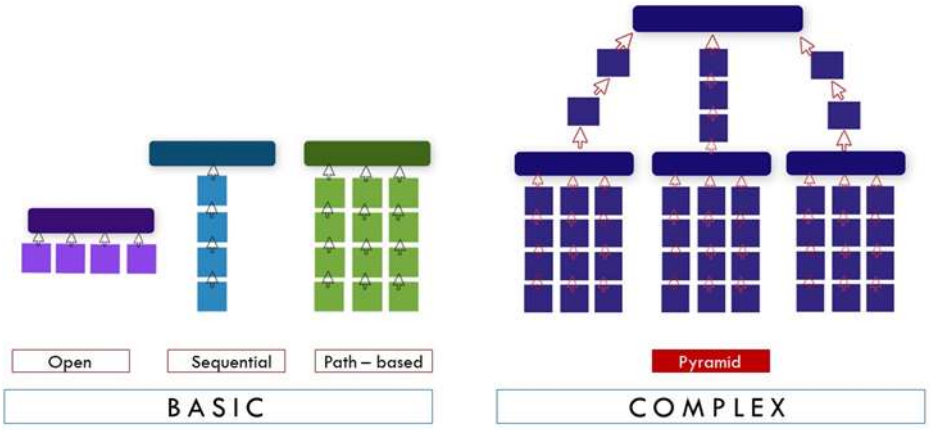


Figure 1. Puzzle structures in EERs (adapted from Nicholson, 2015, p 17)

The sequential path dominates in the organisation of medical EERs, puzzles are arranged in a sequence and students solve the puzzles in a particular linear order (Veldkamp et al., 2020). This sequence requires fewer instructions for students, making it easier to design EERs while not diminishing their educational impact. At the same time, this organisational method makes it easier to monitor the progress and performance of all students (López-Pernas et al., 2019).

EER activities can be conducted with online or on-site face-to-face learners, and students can complete them synchronously in groups or asynchronously as an individual (Casler, 2022). The characteristics of EERs in terms of the number of team members (groups) are very different. However, based on most studies analysed by Veldkamp et al. (2020), the optimal team size is 3 to 6 students. Smaller group sizes might better maintain student engagement and facilitate learning (Kubin, 2020). Conversely, due to the team's loss of communication and organisation, teams with larger numbers of students often fail to escape from the room in the allotted time (Veldkamp et al., 2020).

According to literature data from 20 to 120 minutes, the time limit for solving all puzzles is generally explained for EERs by the concept of the ER game and not by the educational aspect. On the contrary, in medical EERs, time is highly valued from this aspect because time-limited teamwork "saves lives" (Veldkamp et al., 2020). Time limits, the included timer during nursing ERs, simulate time limits from a natural environment and are in line with their future professional tasks, where they are expected to make correct decisions and adequate solutions in a limited time (Brown et al., 2019; Gómez-Urquiza et al., 2019).

Based on experiences in creating EERs, López-Pernas et al. (2019) suggests to teachers that the workflow design should consist of nine phases: making a decision on how to incorporate EERs into the subject, where several factors must be taken into account, such as the

specificity of the subject, the profile of students and available resources (staff, equipment, facilities, time, etc.).

1. Identifying the specific learning objectives that the EERS should cover.
2. Deciding on the type (against established learning objectives) and number (against planned time EERs) of puzzles.
3. Defining an engaging narrative compatible with the subject content to be covered in the EERs.
4. Designing and creating puzzles, clues, keys, codes and other resources necessary to perform EERs.
5. Testing each puzzle.
6. Simulating complete EERs in the conditions and environment where they will be realised.
7. Correcting EERs based on simulation output.
8. Evaluation – after the realisation of EERs with the anticipated participants (in order to improve EERs activities).

The use of digital technology in Educational Escape Rooms

Digital technologies in EERs can be used to monitor student progress; search and interpret information (e.g., medical records); support narration and enhance immersion with video; structuring the game, which facilitates the teacher's work. This is especially important when the groups are large; an example is a combination of technologically mediated validation of answers linked to unlocking a code (Veldkamp et al., 2020).

Smartphone technologies, 3D applications, 360 videos, QR codes, Google Forms, social media platforms, virtual cameras, video conferencing, video tutorials, mobile devices and tablets are some of the digital objects and elements that are incorporated into the various puzzles of the DEER activities. All of these digital tools make learning more effective by promoting students' opportunities for online communication, social interaction and cooperative gamified-oriented activities between each team of students (Makri et al., 2021).

Digital Educational Escape Rooms (DEERs), synonyms are virtual EERs and online EERs, is a virtual rooms where the players use technology to open a series of digital locks usually made from online forms or password-protected documents. It can be conducted individually or in groups, and it is the preferred EER type when large numbers of students must play simultaneously (Makri et al., 2021; Fotaris & Mastoras, 2023).

Physical distancing during the COVID-19 pandemic has encouraged teachers to plan an activity based on EER principles of active and collaborative learning using digital video conferencing platforms like the Zoom® platform (Cunha et al., 2023).

Many DEERs use Virtual Reality (VR) and Augmented Reality (AR) technological tools that are designed for serious purposes in educational settings. VR and AR are necessary tools, especially for building social interactions between players, teamwork in EERs and cultivating interactions within a network (Makri et al., 2021).

Also, many elements of on-site EERs in a digital form (a short film to present the case, audio recordings, interactive images, a QR code to access puzzles or solutions, crosswords, etc.) can make these EERs even more attractive as well as economical due to cost savings with a more cost-effective innovative teaching method (Makri et al., 2021).

Blended/hybrid format EERs imply the application of digital and physical resources (López-Pernas et al., 2019). For example, digital puzzles can require players to understand, write and execute codes in real time, allowing for more complex challenges to test and improve skills, while physical puzzles are beneficial for enhancing immersion and student engagement during EERs (Makri et al., 2021). In addition, hybrid EERs overcome the logistical challenges of EER implementation related to space, equipment and group size, as traditional on-site EERs require the participation of 3 to 6 students, which makes their application in large study groups difficult (Cain, 2018).

Educational Escape Rooms in nursing education

A recent study that dealt with an integrative review of the ER application showed that this innovative strategy was effective and well-accepted in various areas of nursing education (Reinkemeyer et al., 2022). EERs have been applied to nursing students in Adult nursing 1 (Gómez-Urquiza et al., 2019), Community care (Anguas-Gracia et al., 2021; Powers et al., 2022), Anatomy (Molina-Torres et al., 2022), Pediatric care (Kubin, 2020), Cardiovascular care (Morell & Eukel, 2021), Emergency care – urosepsis (Brown et al., 2019), Clinical care of older patients with acute kidney injury (Wynn, 2021), etc.

EERs may help faculty to meet the need for new and innovative ways of engaging nursing students. EERs activities are well accepted by students, allow faculty to assess clinical decision-making and other skills and help identify learning gaps (Casler, 2022). At the same time, using EERS improves the acquisition of knowledge, skills and attitudes and promotes critical thinking (Gómez-Urquiza et al., 2019).

Digital Escape Room in the DEN project

Previous positive experiences with on-site EERs were the foundation for creating digital EERs within the DEN project. Using several digital tools, the on-site ER was digitised and placed on the e-learning platform (SOVA) of the University of Novi Sad within the previously created course Digital Education in Nursing (Figure 2, Figure 3).

Figure 2. Home page of the DEN course on the SOVA platform

Figure 3. DEERs in DEN-introductory instructions

The work of the SOVA platform was initially developed within the Erasmus+ programme and is based on the Moodle platform. In creating digital EERs, the lesson module option was used, enabling independent learning of new content, implementation of different scenarios and simulation of decision-making exercises to correct learned material with different questions (Moodle™, 2022). Furthermore, this module allows the teacher to organise the lesson based on the chosen answer. If the student answers the question correctly, they move on or are returned to the previous page, i.e., redirected to the page that "helps" them to solve the puzzle.

The content of this ER's puzzles spanned multiple areas of Fundamentals of nursing. After the instruction on the course's home page, where the ER was placed, the students solved six puzzles of different designs, and the timer started counting down from 45 minutes (Figure 4)

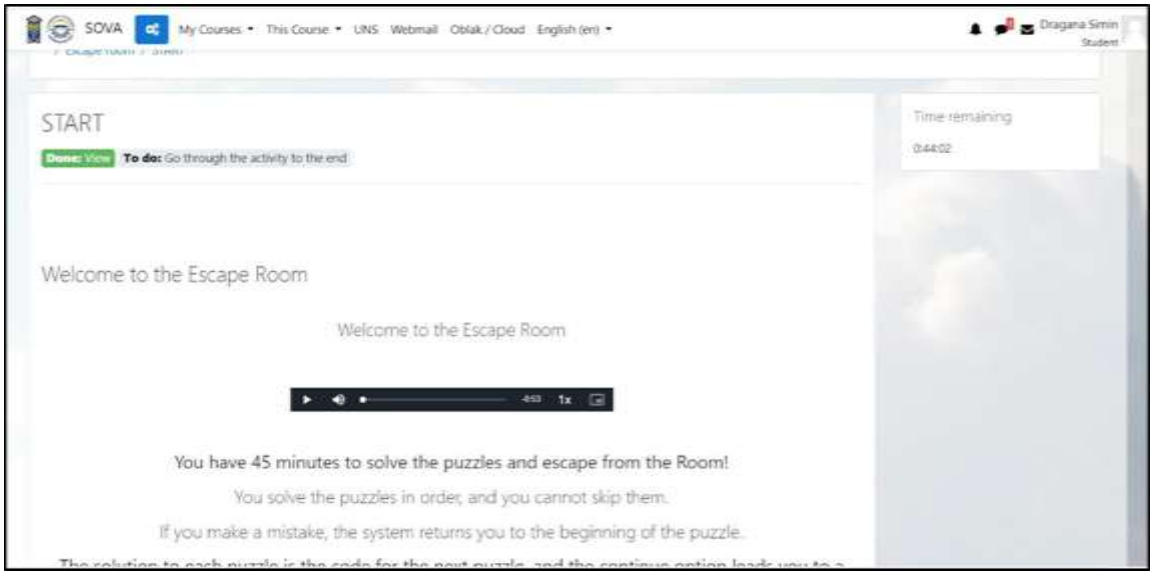


Figure 4. DEERs in DEN-introductory instructions

The first puzzle required matching the definition of healthcare to its author (picture in the frame). Again, the simplest digital tools were used to create this puzzle, audio recordings and text materials converted to PDF format (Figure 5). Choosing the correct author of the definition, the number below her picture, unlocked the next puzzle.

Figure 5. DEERs in DEN - first puzzle

In the second puzzle, where the students needed to estimate the risk of pressure ulcers based on data from the documentation, interactive animated content was created using multiple tools within the Genially web platform. By using the advantage of the platform, interactive approaches were developed for this and most of the following puzzles to relate the content as closely as possible to problems from the natural clinical setting. Figure shows the layout of the interactive image (Braden scale, nursing and medical history, physical examination).

Each document was opened by clicking on the marked fields and each record was paged by dragging the cursor (up and down). The resulting code was the key to unlocking the next puzzle.

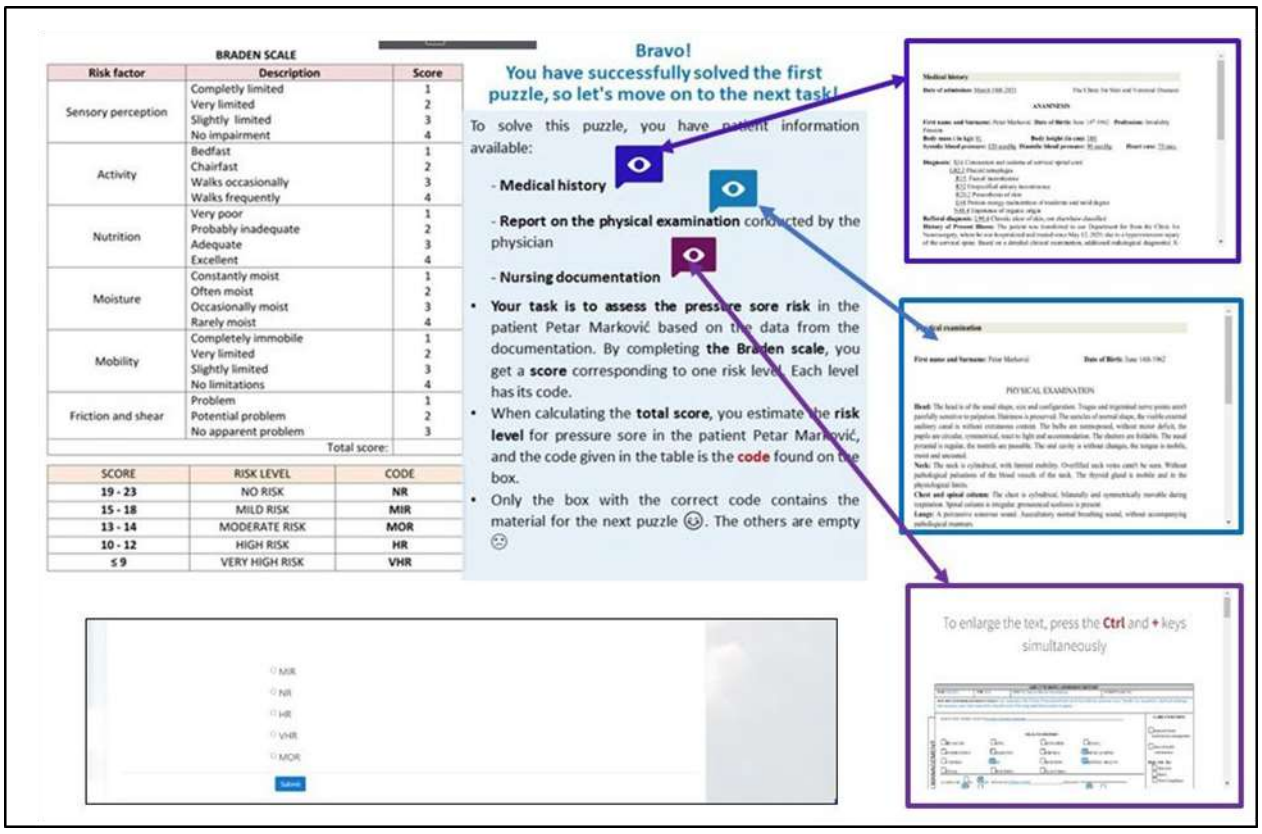
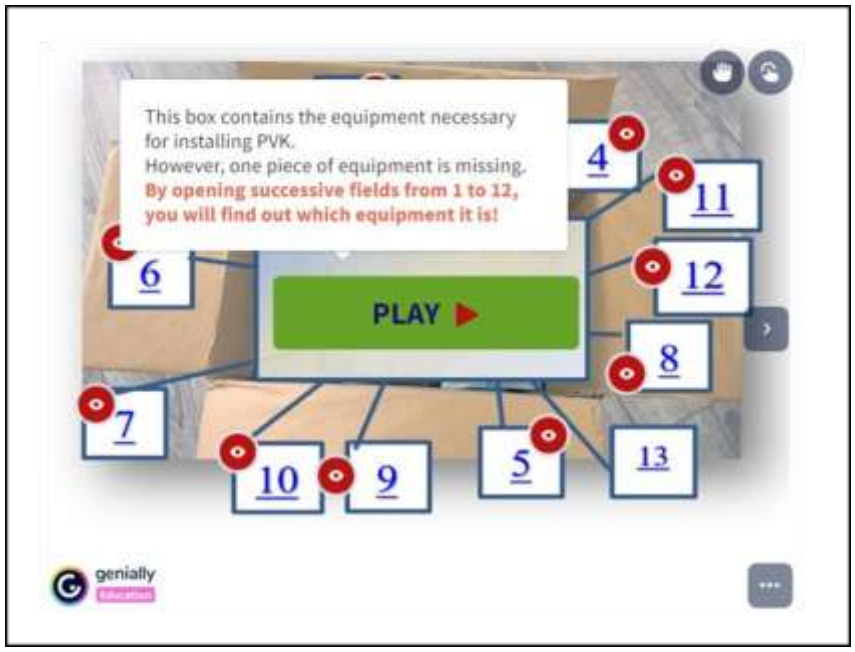


Figure 6. DEERs in DEN – interactive box for one nursing intervention

This puzzle features a material box for one nursing intervention (Figure 6). However, one essential piece of equipment is missing. So, students have to find the task card and when they solve it they get the "missing part". The following puzzle is designed as multiple-choice questions. After successfully matching the answers in the fifth puzzle, students were given the following instructions by clicking on the start option on the interactive image: Based on the

letter they found in the previous task, they were expected to open each indicated field from the back of the patient's head to the soles on the diagram model. Then, based on the description of the skin damage and the illustration, they should recognise the type of skin damage. According to the legend, they received a number for each field (the same damage may occur on two different body parts). Matching the numbers in the correct order (from the occiput to the toes) generates a six-number code that unlocks the next puzzle (Figure 7).



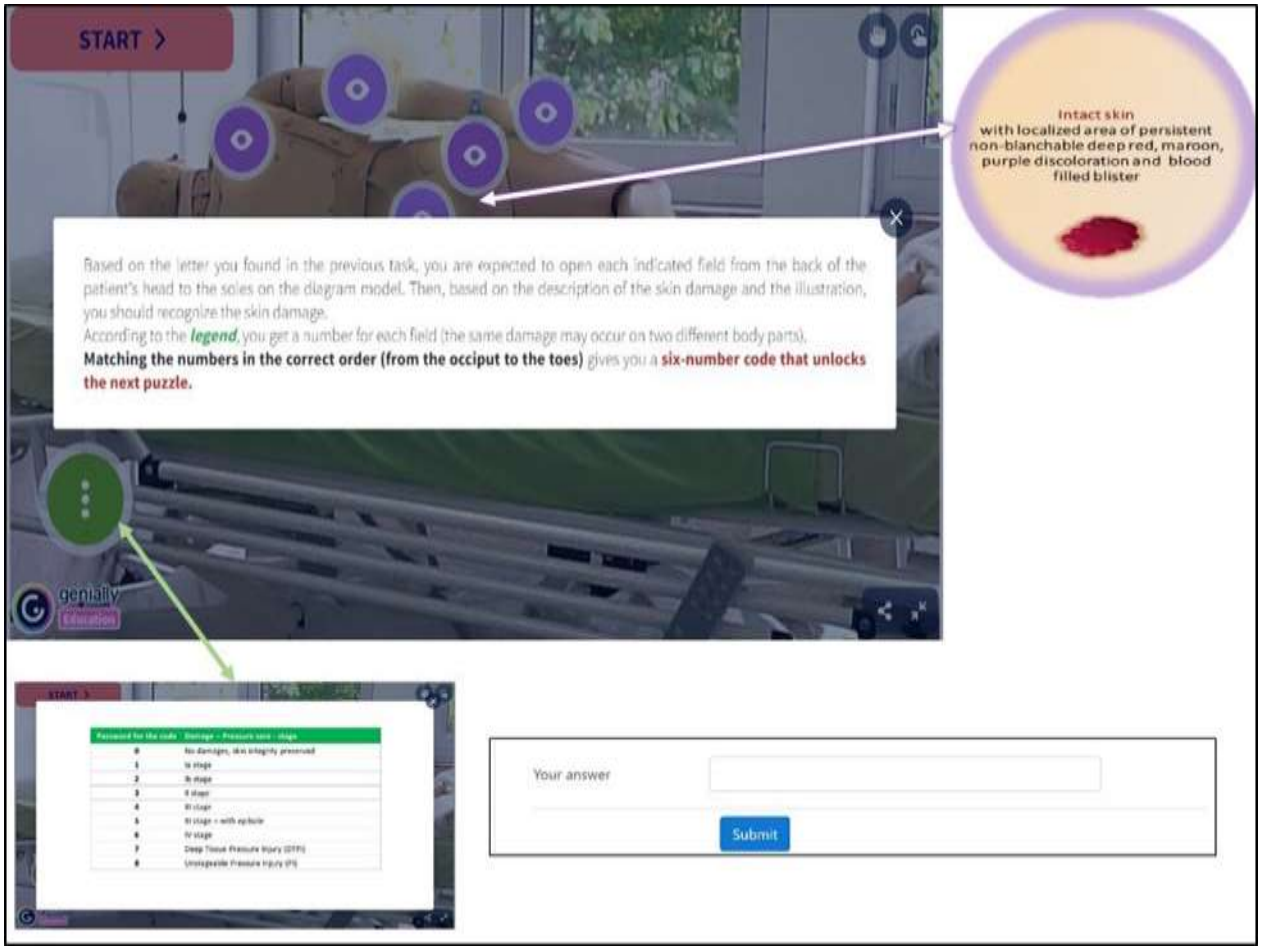


Figure 7. DEERs in DEN – interactive image in the fifth puzzle

To solve the sixth puzzle, students were expected to look at the patient's documentation in which the doctor prescribed a therapeutic dose of the drug, which was lower than the available dose of the pharmaceutical drug in the hospital ward. The number based on the calculation was the code that unlocked the final puzzle as a crossword puzzle. We used a crossword game integrated into the SOVA platform as a tool to implement the final puzzle (Figure 8). Since this tool is dynamic, each group of students received a visually different appearance of the crossword puzzle.

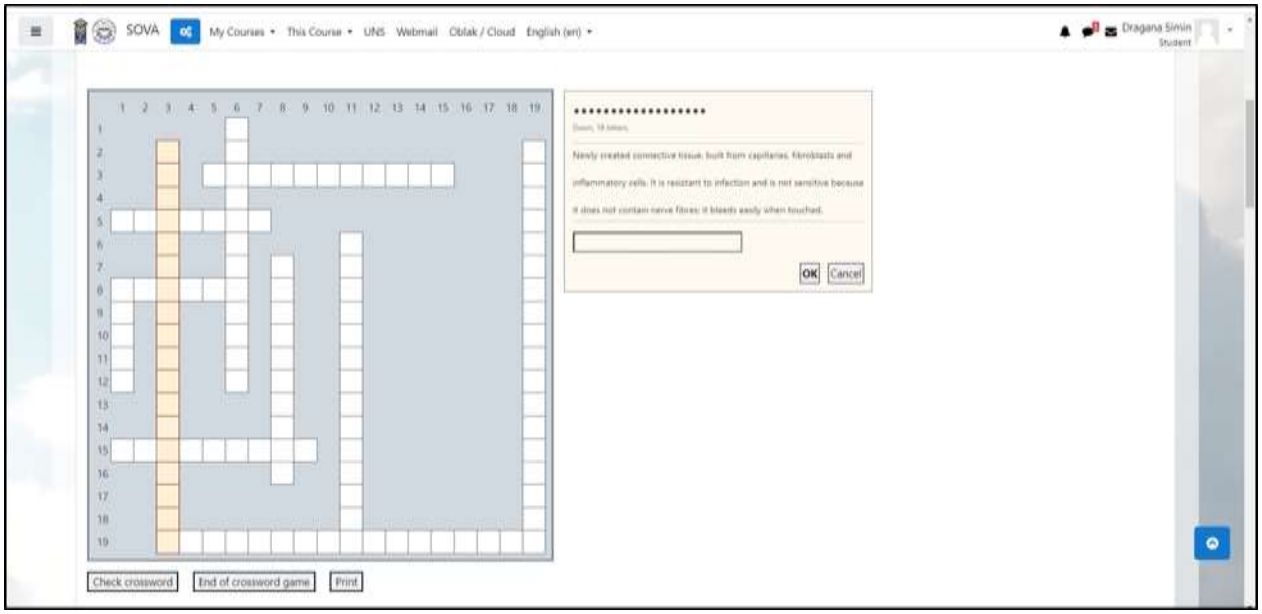


Figure 8. DEERs in DEN – crossword

After marking or entering the code in all puzzles, the parameters were set so that the student had to go back one step if the answer was incorrect. In doing so, the student received additional instructions, read the text and/or listened to the audio track and solved the puzzle again, although the timer did not stop.

A workshop on the practical application of Digital Escape Rooms prepared by the University of Novi Sad representatives was held in Celje (December 1, 2022). These DEERs used two digital platforms: SOVA and Zoom® (Figure 9).

Figure 9. Practical application DEERs in DEN

Through the Zoom® online platform for connection, all students (3–5 from each partner institution in the project) were provided with basic information and technical instructions regarding the Escape Room as a teaching method. After getting to know each other in order to strengthen group cohesion, six groups of three students from different educational institutions were formed via the breakout room option. The group leaders received an access link on the SOVA platform to solve the task.

At the same time, teachers from all partner institutions had the opportunity to follow the performance of the groups by "entering the rooms" on Zoom®. The live presentation of the EERs gave them even better insight into the effectiveness of the digital tools we used to create this ER (starting from the most superficial audio recordings, text materials converted to PDF format, to very complex interactive animated content).

Evaluation of the DEERs workshop in the DEN Project

After the time limit had expired, the students evaluated DEERs verbally and then via a questionnaire.

In the oral evaluation, the students answered the question of their general opinion about the experience during DEER: very interesting; enjoyable; very fun; very good; great work; great game; great type of learning. The general opinion of students is that in addition to enjoying themselves, this experience showed them a different way of e-learning. When solving the

puzzle, they had the opportunity to use their previous knowledge and learn something new in the field of puzzles and how to approach solving problems. The students especially expressed their satisfaction with the concept of working on the Zoom platform (breakout room) and the principle on which the groups were formed: very nice international group, good cooperation even though they are in a team for the first time; better than if they worked only with colleagues from their own country; I have learned a lot from my colleagues from other countries. The students were delighted with the teamwork and collaboration aspects while solving the puzzles. Some students noticed that they did not have to use Google answers because some colleagues from their group showed excellent knowledge. Regarding the challenges experienced during the workshop, students mentioned: technical problems with my computer; issues with my internet connection; language barrier because I studied the material in my language; we used different instruments to assess the risk of pressure ulcers. The crossword as the final part of these DEERs, according to the statements of the students, formed the most difficulties for them: the questions were not straightforward; when the answer consisted of two words, it was not indicated whether the words were written together or separately; the terms were different from what I was learning. When asked what they would change in DEERs, the students answered: I would not change anything; I have no idea; all questions are clear and exciting except for the crossword puzzle; I would change the crossword; my computer and internet connection.

In the second part of the evaluation, the students evaluated their experience of learning through DEERs by filling in the questionnaire the Gameful Experience Scale (GAMEX), which was developed by Eppmann et al. (2018). The questionnaire was purposely created in MS Forms (the link was sent to each student by email). The GAMEX consists of 27 items that measure the game experience. These items are divided into 6 dimensions: enjoyment, absorption, creative thinking, activation, absence of negative effects and dominance. The responses used a Likert-type scale from 1 (never) to 5 (always). Each item is measured on a Likert-type scale ranging from 1 (never) to 5 (always). The mean score for each of the GAMEX dimensions was over 3, with the exception of Absence of negative effects (Table 1). The lowest mean score of 2.44 ± 1.46 was found for the absence of a negative effect.

Table 1. Mean and standard deviation for each dimension of the GAMEX

Dimensions	M	SD
Enjoyment	4,43	0,59
Absorption	3,62	1,46
Creative thinking	4,13	1,07
Activation	4,08	0,86
Absence of negative effects	2,44	1,46
Dominance	3,67	0,88

M=Mean; SD=Standard deviation

The distribution of students' responses for the components of each dimension of the GAMEX scale is detailed in Figure 11.

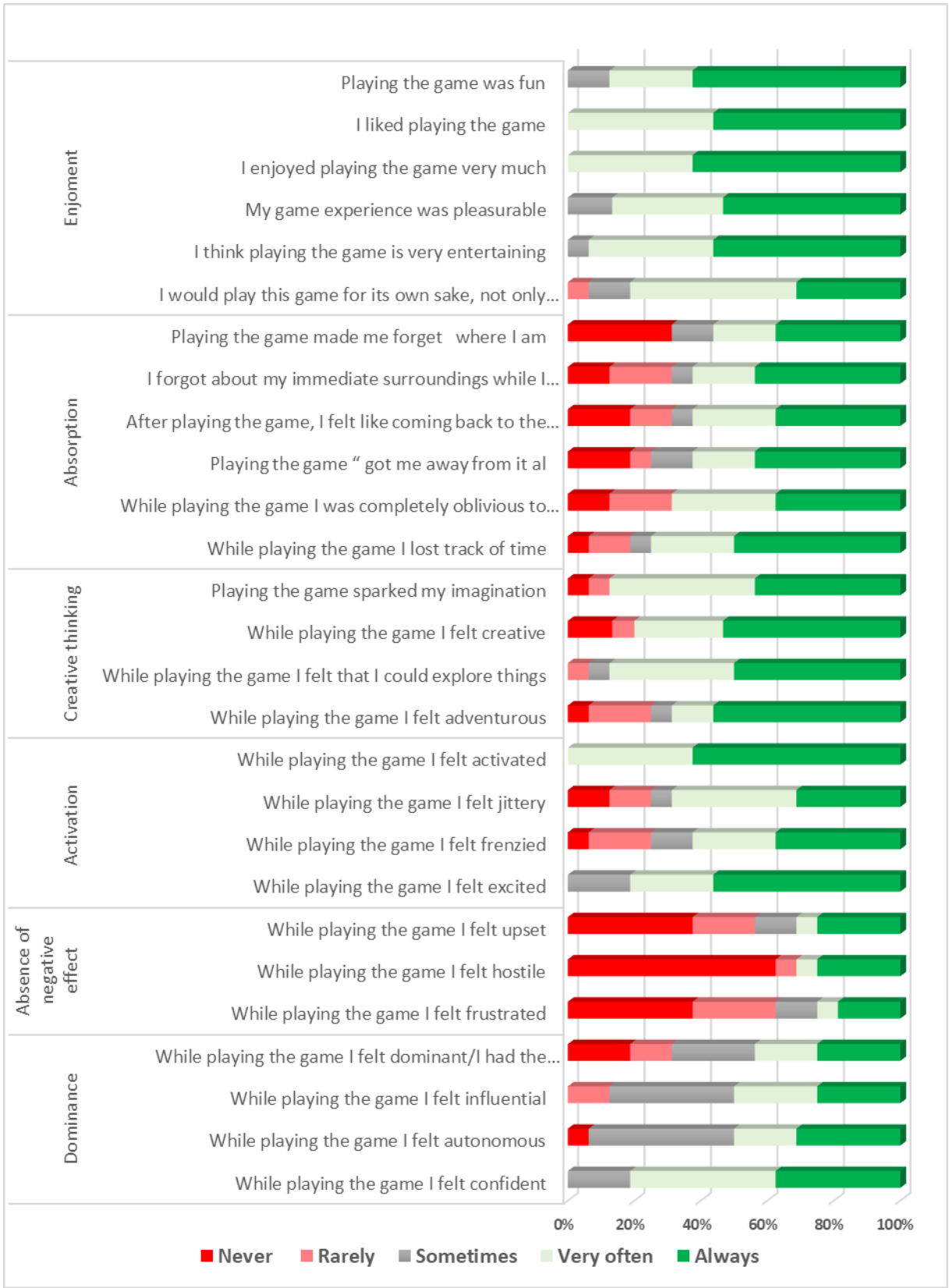


Figure 11. Distribution of students' responses for the components of each dimension of the GAMEX scale

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USING THE DIGITAL TOOL PADLET IN NURSING EDUCATION

Ann-Catrine Bramhagen, Pia Dahav, Elisabeth Renmarker, Vedrana Vejzovic

Summary

In this part, we provide a description of how we used and evaluated the digital tool Padlet. This tool was chosen because it can be used like a bulletin board, which can provide space for collaboration between students, lecturers or by a single user. After receiving the results from the analysis conducted on the experiences of digital teaching during the pandemic, we realised that both students and teachers lacked clarity regarding information and a clear instructional plan that defined the teaching goals. The idea of using and testing Timeline, which can be found in Padlet, showed that it was a viable tool for introductions to meetings during the project. Furthermore, we used it as an introduction with various tests for teachers during Workshop 1, which was a preparation for Step two. Step three involved introducing and testing different parts of the programme with students in both smaller and larger groups, which subsequently led to an evaluation.

Key words: Padlet, digital tehnology, nursing teachers.

Theoretical background

Padlet is a digital tool that can be used like a bulletin board, which can provide space for collaboration between students, lecturers and colleagues. However, it can also be used by a single user. Padlet is multimedia that is adapted so that it can be used for integration of text, images, video, sound and other elements including web pages, and there are several different board formats and backgrounds that you can choose from https://padlet.com. Padlet can be created by anyone almost without effort. For example, lecturers can create a Padlet for their own teaching and students can create one based on their own needs or to collaborate with each other.

Padlet and collaborative learning

Collaborative learning with peers was performed in line with Vygotskys` "*The zone of current development*", (ZCP). Vygotsky (1978) distinguishes between what a student can achieve through individual problem solving and what students can achieve in collaboration with other fellow students with different levels of knowledge. According to Vygotsky, when a student works on a task on their own, there is no development and therefore no learning. The student then remains within the original learning zone (ZCP). In Vygotsky's "*The zone of proximal development* (ZPD), the student is challenged to collaborate with other students with tasks that are beyond their current competencies. Vygotsky believes that the students' own thoughts are structured and developed when they have the opportunity to formulate their thoughts orally or in writing (Vygotsky, 1978). By using Padlet in collaborative learning, students can

formulate both. The potential of using Padlet as an adequate pedagogical method can enable students to increase their knowledge. Students learn from each other and exchange knowledge, experiences and receive feedback immediately (Amiti, 2020) (Figure 1).

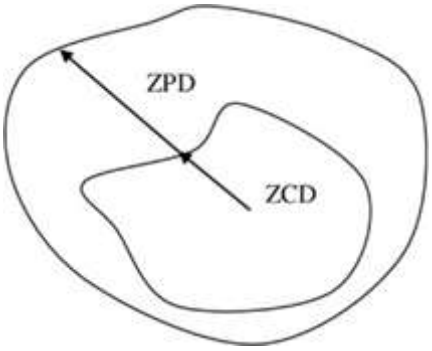

Figure 1. The Zone of current development (ZCD) represents the level that a learner can reach through independent problem solving and the ZPD as the potential distance the learner could reach with the help of a more capable peer (Vygotsky,1978).

Template Timeline in DEN project

Upon analysing the responses obtained from both quantitative and qualitative assessments of the experiences related to digital education during the pandemic, it became evident that there was a notable absence of clear, well-defined steps to be undertaken by both students and educators. Consequently, the decision was made to initiate the implementation of Timeline, which is an available feature within Padlet, to provide a more lucid presentation of the forthcoming educational activities. This strategic choice was established during the second meeting conducted in Croatia as a hybrid meeting. The utilisation of Timeline served as an initial introduction to various programmes and activities, allowing participants to familiarise themselves with the tool. This approach effectively generated an early interest and enthusiasm for testing and further exploring the capabilities of this tool. Timeline was used during the whole project, with the aim of chronically placing the content and topics along a single horizontal line. This provided a clear plan on how the activities were going to be structured and when each topic was going to be covered (Figure 2).

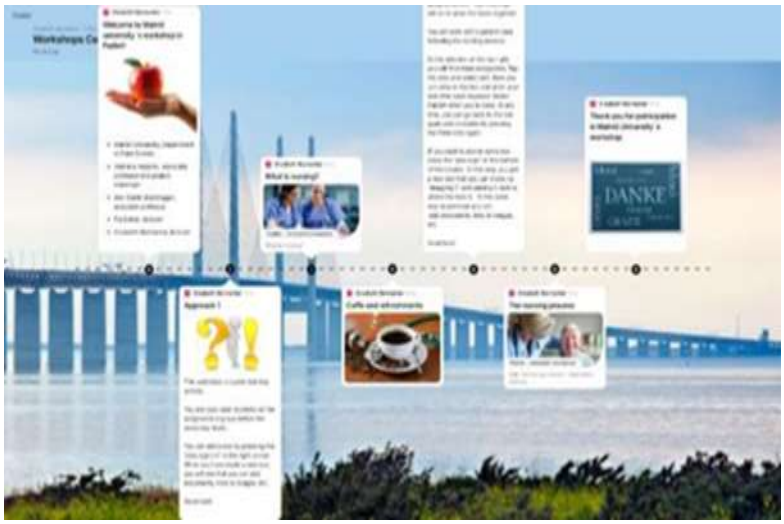

Figure 2. Timeline. Presentation before a workshop

Template Canvas- teachers in the DEN project

The following introduction of the tool took place during the initial workshop, where the 'Canvas' template was presented, tested and subjected to verbal evaluations by teachers representing all partner organisations. Teachers received comprehensive written and oral briefings regarding forthcoming tasks, along with materials booked for processing during the Padlet workshop, which was scheduled the previous day. These preventive measures invited teachers to formulate questions and considerations prior to starting collaborative work in smaller groups. Earlier on, a shared area of interest had been selected, fostering enthusiasm and dedication among participants.

Despite detailed preparations and planning, there were initial technical obstacles, characterised by slow connections to various computers, which disrupted the training at its onset. However, once the technical issues were optimised, the work proceeded seamlessly without further interruptions. This incident underscored one of the potential challenges associated with the digital tool's usage, albeit not exclusively attributed to Padlet alone.

In the initial workshop involving teachers, the focus was on analysing the assigned materials extracted from a specific section of a book using the qualitative content analysis by Burnard`s (1996). The workshop facilitator secured participants with comprehensive guidance on workshop preparation, including the overarching objectives and instructions for engaging with qualitative content analysis.

These instructions precisely described what needed to be analysed and clarified the purpose and expected results of the analysis. Concretely, the task involved carrying out a qualitative content analysis of the selected text in order to capture and describe the emotional nuances of

the content. To facilitate this process, the teachers were organised into four groups of five participants each. These groups trained to collaborate on the analysis using Padlet. An example is shown in Figure 3.

Figure 3. Canvas. Qualitative content analysis

The teacher involved in training found ´Canvas´ to be user-friendly and quickly grasped the skills required to insert images and various other elements. They also acquired proficiency in organising data and creating open codes. These open codes were cross-referenced with the original text to ensure accuracy and consistency in meaning. It proved intriguing for them to witness how crucial information emerged during the analysis process, highlighting the most significant aspects of the text.

Several comments from the teachers showed their interest in the tool and its potential application in their own teaching practices. They appreciated how the tool offered a comprehensive overview and actively engaged all participants. Additionally, they recognised the advantage of revisiting ´Canvas´ at their accessibility.

Template Canvas-students in the DEN project

In the second workshop, students representing various partner organisations (forming an international group) utilised the ´Canvas´ template as part of their collaborative training efforts. Appropriately in advance of the workshop's planning phase, students were provided with comprehensive verbal and written instructions by their respective organisations regarding the expectations placed upon them. Furthermore, students had the opportunity to seek clarification from responsible educators both prior to, and during their engagement with Canvas. Before commencing their work, students underwent an introduction to the tool and

conducted initial tests to familiarise themselves with its functionalities. For this particular exercise, the assignment was centred on the field of nursing, which is a subject that all students possessed some level of experience in. An example of the assignment included the followingsteps:

> Step 1: Individually write down personal perspectives on what nursing meant to them.
>
> Step 2: Describe and discuss a situation where they had been engaged in nursing activities.

Like the teachers, the students quickly grasped the usage of the digital tool and found it to be beneficial to visualise various contributions. The learning process proved to be interactive, fostering the exchange of experiences. Despite being geographically dispersed across different countries, the students found ´Canvas´ to be a practical instrument for reflecting on nursing and various related scenarios. Additionally, they recognised the value of its accessibility at different times, enabling them to revisit and engage with the template to further their reflections. This presented picture shows how students work together with assignments during this workshop (Figure 4).

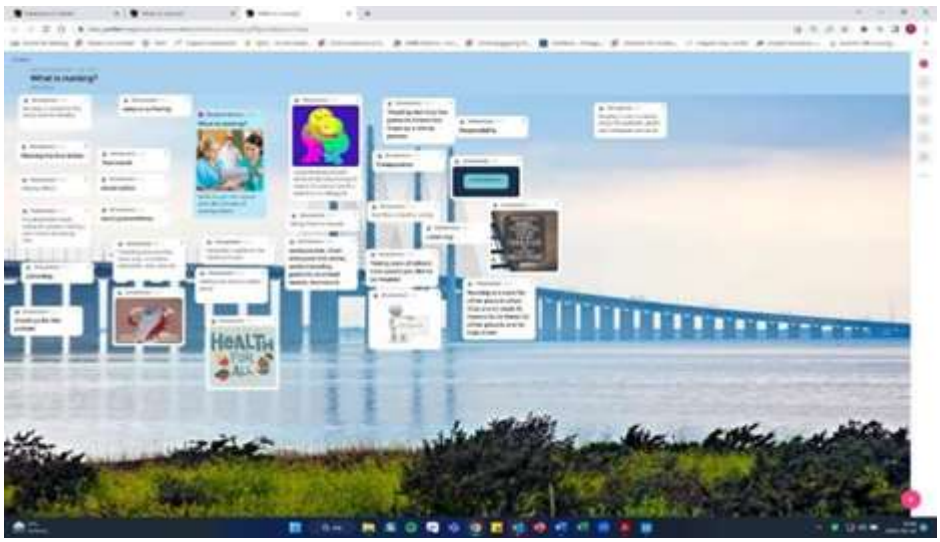

Figure 4. The students work during this workshop

Template Shelf in the DEN project

In this workshop, the students´ worked together with the nursing process using the template "Shelf" (Figure 5). The students were divided into smaller groups – 4–6 students in each group – and a patient case was presented. Next, the students were given instructions on how to approach the patient case. The task was to identify problems, risks, resources, set nursing

diagnoses and goals based on the measurements and values to determine nursing assessments, discover how to implement them as well as evaluate and decide how and what to document. During the assessment with the nursing process the students used their critical thinking skills. The establishment of a dynamic relationship between the nurse and the patient is central in the nursing process. Therefore, Orlandos´ theory of nursing (1990) is important because the theory focuses on the patient's needs. The patient case was presented in SBAR (Park, 2020), which is an international reporting tool. All students took part in the other groups' assessments, which provided additional knowledge. All groups´ presentations where the basis for the subsequent discussion.

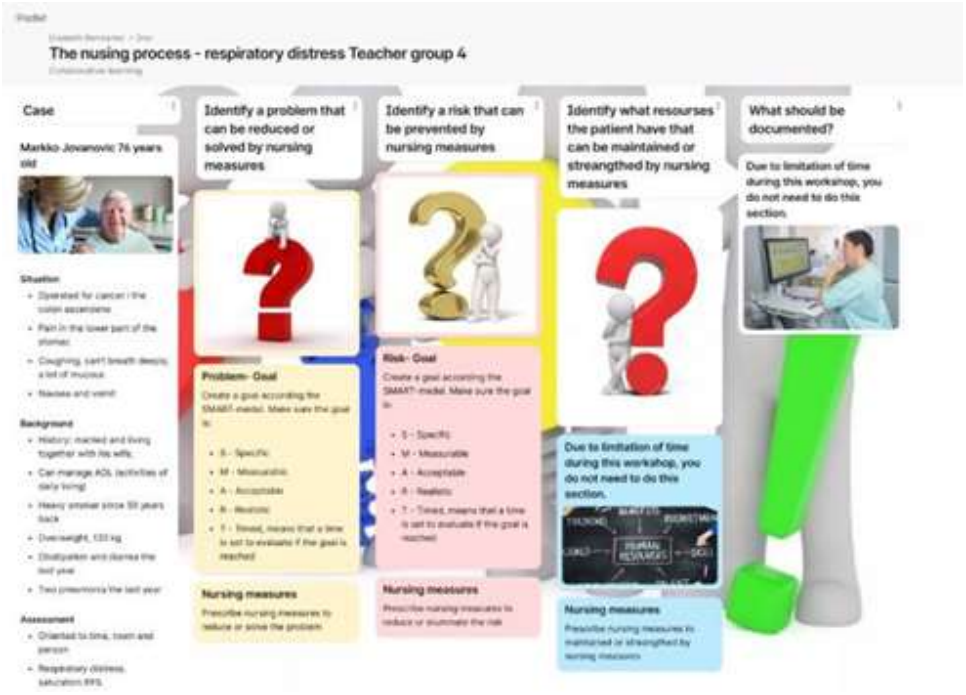

Figure 5. Shelf. The nursing process

The students were very engaged during the workshop and worked together to identify patients' problems, risks and resources. They set goals and actions and evaluated whether the goals were achieved. The students found Padlet to be an easy, useful and enjoyable tool to use. It was also beneficial to work in peers groups and the students saw the advantage of keeping the Padlet workspace available so that they had the option of returning to it if they wished. SWOT-analysis can be used as a planning tool where you try to find strengths, weaknesses, opportunities and threats during a strategic review. During the DEN project we used the template "Shelf" to conduct a short SWOT-analysis of using Padlet from the perspective of lecturers (Figure 6).

- **S**trengthes – the possibility to cooperate can be used synchronically and non-synchronically, while it is easy to remake and integrate with other platforms.
- **W**eaknesses – instruction needed on how to use Padlet, it takes some time to learn in the beginning and the limited numbers of free Padlet applications.
- **O**pportunities – expanded teaching methods and a quick opportunity to create a nice presentation.
- **T**hreats – bad internet connection and the cost if you need many Padlet applications.

Figure 6. Shelf. SWOT-analysis of using Padlet.

The students` evaluation of using Padlet during the workshop:

Question: What do you like about using the Padlet application as a teaching accessory?

The students appreciated Padlet for its interactive collaboration, quick answer sharing, topic visibility and the engaging way it aids studying. It keeps them stay focused, is well-organised with clear instructions and offers diverse features like questionnaires, flexible formatting, pictures and anonymity. Padlet facilitates interactive brainstorming, grants easy access to information and simplifies review.

Question: What did you dislike about using the Padlet application as a teaching accessory?

The feedback regarding potential dislikes is generally positive, with some users mentioning a slight learning curve initially. Overall, users found Padlet easy to use and enjoyed its features.

Question: What would you change about the workshop if you could?

Participants expressed a desire for more time, clearer task instructions and a slightly longer duration. Some suggested new groups for each task, improved spelling and addressing minor language issues. However, most participants found the workshop interesting, enjoyable and well-prepared.

Evaluation of the workshop (0 Strongly disagree – 5 Strongly agree)

- I liked the workshop in general (4.5)
- The workshop was informative. I learned something new (4.1)
- I liked the teaching methods used in the workshop (4.5)
- The presenter was well-prepared (4.5)
- I enjoyed the workshop and would apply again (4.5)

***Evaluation of individual work (0 Strongly disagree – 5 Strongly* agree)**

- I was motivated for individual work (3.6)
- I did my best while cooperating in teamwork activities (4.4)
- I did my best while cooperating in joint discussions (4.3)

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DIGITAL TOOLS FOR ASSESSING THE ACQUISITION OF PRACTICAL KNOWLEDGE BY NURSING STUDENTS USING THE OBJECTIVE STRUCTURED CLINICAL EXAMINATION

Martina Smrekar, Vesna Turuk, Boris Ilić

Summary

The Objective Structured Clinical Examination (OSCE) is designed to evaluate students' clinical competence and skills required for their future professional activity in a standardised and objective manner. Electronic OSCE (e-OSCE) is a digital technology-enhanced assessment. It provides an online platform where trained evaluators assess students' performances during OSCE using electronic devices with electronic Google forms of OSCE exam, instead of paper-based sheets; e-OSCE is an online marking tool.

Key words:

Theoretical Background

Nursing education plays a crucial role in preparing future nurses to deliver high-quality care in diverse healthcare settings. Objective Structured Clinical Examination (OSCE) is a widely used assessment method in nursing education (Chan, 2023). It is designed to evaluate students' clinical competence and skills required for their future professional activity in a standardised and objective manner (Smrekar et al., 2017). OSCE typically involves multiple stations, each presenting a specific clinical scenario that requires the student to demonstrate their skills, knowledge, decision-making abilities, clinical reasoning and communication skills. In a traditional OSCE, students rotate through different stations, where they encounter simulated patients, mannequins or standardised actors (Gormley, 2011). Each station focuses on specific skills or competencies and is assessed by trained evaluators using a standardised checklist. The evaluators observe and score students' performance based on predetermined criteria.

OSCE has long been recognised as a valuable tool in nursing education to provide a standardised evaluation of students' clinical performance ensuring that they meet the required competencies before entering clinical practice (Malau-Aduli et al., 2022). OSCE can evaluate skills in all three domains of learning – affective, cognitive and psychomotor.

Traditional face-to-face OSCEs, however, have certain shortcomings. Considerable resource investment (human resources, time, materials) are required to administer an OSCE (Luimes & Labrecque, 2018). Several important issues have been linked to this method, including illegible handwriting, missing students' details, lost assessment sheets, individual manual calculation inaccuracy, data entry errors and time consumption (Yousef et al., 2022). Additionally, students often receive delayed feedback on their performance, which frustrates

most students and often leads to a negative impact on the learning process (Alshammari, 2020).

In recent years, rapid technological change has driven innovation in teaching strategies (Wang et al., 2023). According to Meum (2021) the design and development of digital technologies in higher education has been driven by strategic needs, professional development and technological capabilities. Accordingly, the use of digital technologies during the past decades has led to an increased availability of knowledge and teaching resources (Meum et al., 2021). Recent advancements in digital technology have opened up new possibilities for nursing education, including the introduction of electronic OSCEs (eOSCEs) and virtual OSCEs (vOSCEs). According to Alshammari (2020), previous studies on OSCE demonstrate that electronic systems are effective and favoured by educators, compared to traditional approaches (Alshammari, 2020).

Electronic Objective Structured Clinical Examination (e-OSCEs)

Electronic OSCE (e-OSCE) is a digital technology-enhanced assessment. It provides an online platform where trained evaluators assess students' performances during OSCE using electronic devices (Besar et al., 2021) with electronic Google forms of OSCE exam, instead of paper-based sheets (Shorbagi et al., 2022). e-OSCE is an online marking tool. Electronic software facilitates the storage and analysis of results thereby offering considerable time savings (Meskell et al., 2015). The essential organisational elements required for e-OSCE are: the availability of an online platform, a stable internet connection and an adequate number of computers, laptops, tablets, smarthphones, headsets, microphones and cameras (Shorbagi et al., 2022). eOSCEs offer several advantages over traditional OSCEs:

- captures and automatically calculates marks for each item (Besar et al., 2021)
- provides alert the examiners to complete the scoring (Besar et al., 2021)
- provides less time spent, paperless and money-savings (Besar et al., 2021)
- the use of electronic Google forms, instead of paper-based sheets, for evaluations saves time spent on adding, auditing and aggregating marks for each student (Shorbagi et al., 2022)
- ease of use and low rate of error (Hochlehnert et al., 2015)
- reducing possible errors and post-examination workload correlated with moving marks into electronic files (Alshammari, 2020)
- recordings of all stations of e-OSCE provided us a permanent digital repository of the entire exam with the opportunity to review any missed or incomprehensible event (Besar et al., 2021)

There are certain challenges with implementation of eOSCE (Snodgrass et al., 2014):

- a general distrust of technology by educators

- a financial cost for essential organisational elements required for e-OSCE
- concerns about losing data, selection of the correct student, saving and storing the correct data for each student
- the potential for the system to shut down during an examination

Electronic OSCE examinations can be deployed using several different methods. One of the most approachable and cost-effective methods would include Microsoft and Google Forms or similar online services, which allow users to create a digital form with all the elements of OSCE exam (Figure 1). This method will require Internet access during the evaluation and will provide examiners with a simple statistical insight on the examined group.

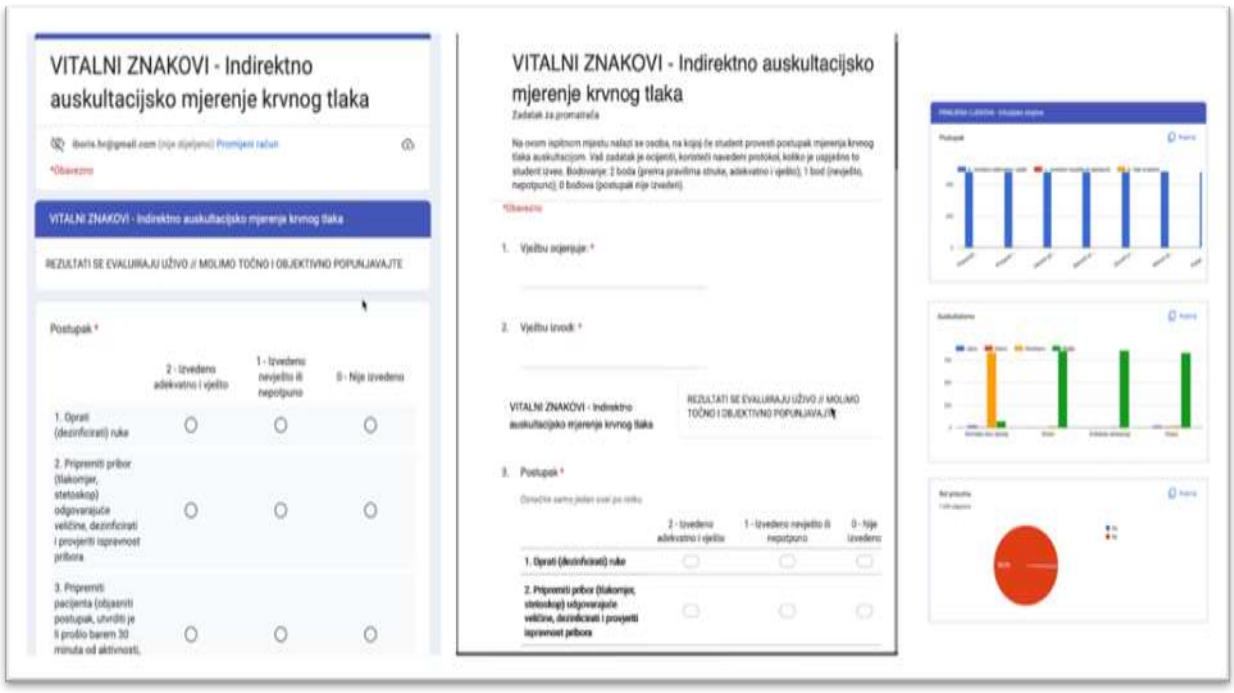

Figure 1. OSCE Exam using Google forms, with aggregated report. Source: B. Ilić, archive

Alternately, more complex, robust and sophisticated examination systems, such as eOSCE® (Figure 2), are available and widely used in the educational environment. Although the mentioned software solution is provided free of charge by the Institute of Medical Education, University of Bern, Switzerland; it is worth noting that it currently only supports Apple devices, requiring the use of a macOS device to create the exam and iPad devices to download a dedicated application via AppStore and conduct the exams. According to its authors, the eOSCE® platform has been used in summative exams since 2014, at medical faculties of various sizes; while since 2015 it is being the tool of choice for the National Exams in Switzerland (The Examic® EOSCE®).

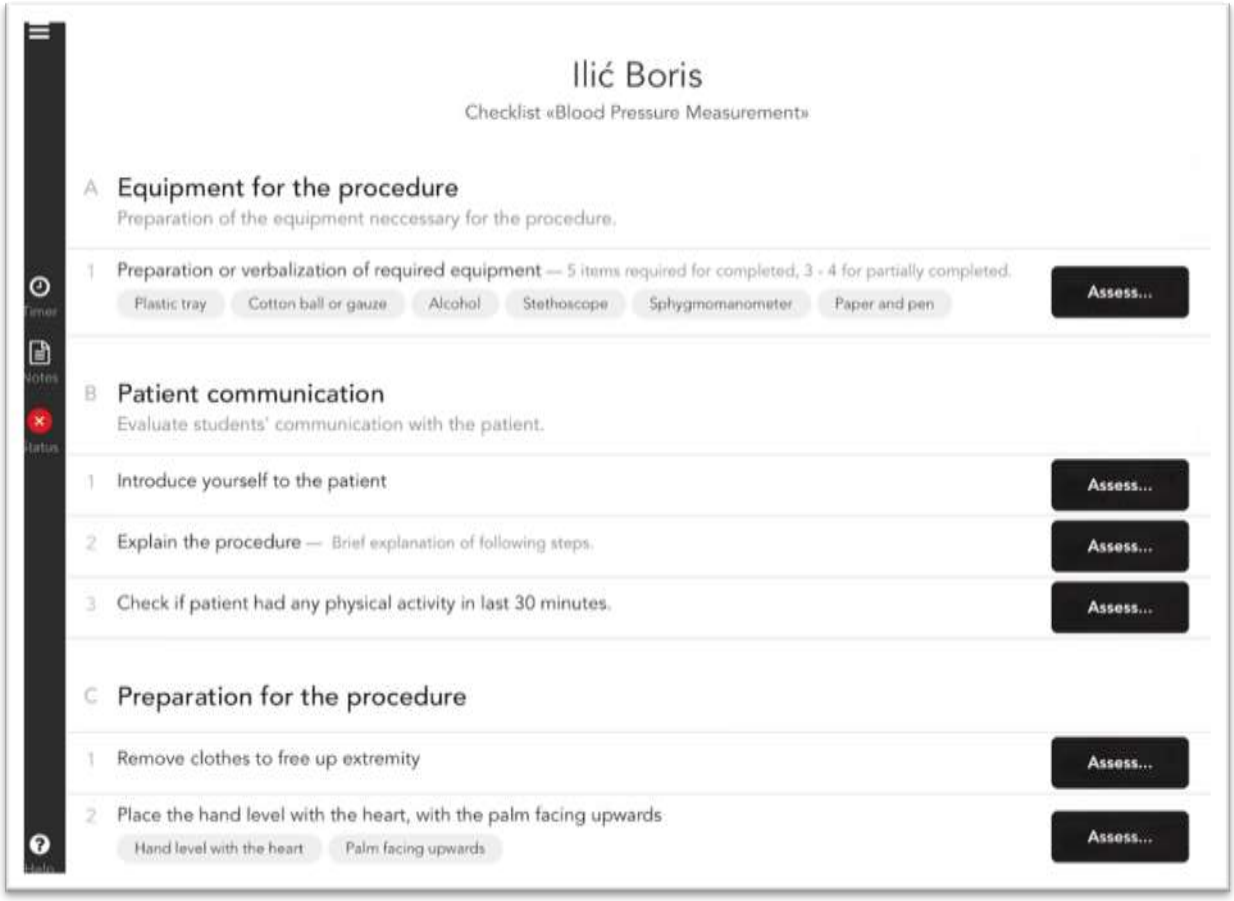

Figure 2. eOSCE® exam, using OSCE-Eval application on iPad. Source: B. Ilić, archive.

1) The eOSCE® platform consists of three separate applications (Figure 3): 1) OSCE Editor (macOS 10.14 or later) – used to prepare and export examinations and results after exam has finished;

2) OSCE-Eval (iPad with iOS 12 or later and AppStore access) – allows examiners to conduct the exam; 3) OSCE-Track (iPhone or iPad with iOS 12 or later) – allows administrators to track the progress of the exam in real time (The Examic® EOSCE®).

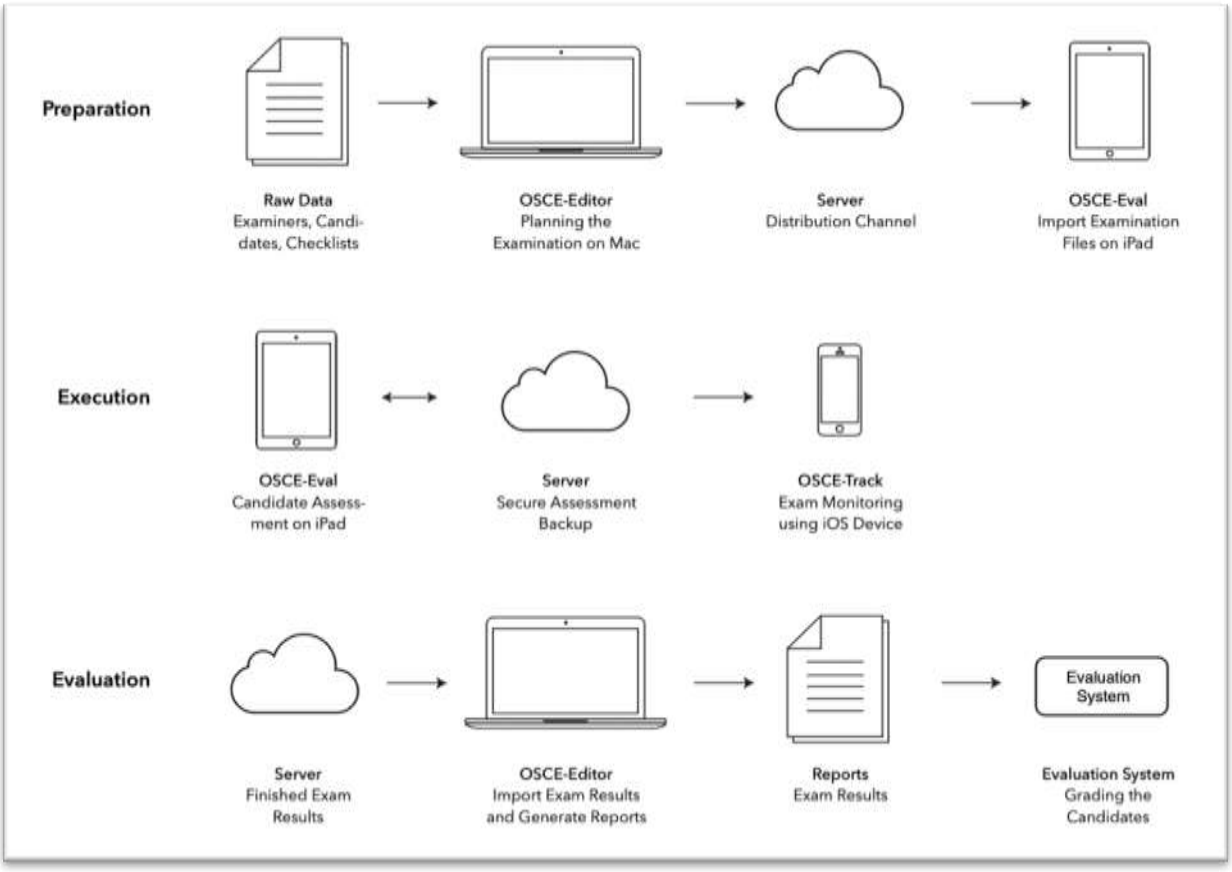

Figure 3. Workflow of preparation, execution and evaluation of eOSCE® exam. Source: https://eosce.ch)

Some of the further advantages include ability to distribute created exams to examiners' iPads remotely, via a server provided free of charge by the developers; the ability to print exams in paper form if necessary; unlike Microsoft or Google Forms, active Internet access is not required during the examination; it enables the scheduling and rotation of candidates, examiners and stations; timing the exams; comprehensive reports, etc.

Virtual Objective Structured Clinical Examination (vOSCE)

Virtual OSCEs have emerged as an innovative approach to replicate real-life clinical scenarios in a virtual environment. This technology-driven approach enables educators to replicate real-life clinical situations and immerse students in a realistic and interactive learning experience (Chan., 2023; Grover et al., 2022). vOSCEs are delivered online using a range of designs (Saad et al., 2022). It often utilises video conferencing platforms, virtual reality (VR) simulations and computer-based scenarios, teleOSCE to engage students in clinical decision-making and critical thinking. It can be conducted over Zoom with students rotating through each discipline via Breakout Rooms (Kim et al., 2022). Developing scenarios

for vOSCEs involves creating virtual patient encounters that reflect real-life clinical situations. Virtual patients are interactive, online tools designed to exhibit realistic emotions, enabling students to practice empathetic communication and navigate challenging situations (Woodham et al., 2019). Integrating realistic cues, such as voice modulation and facial expressions, can enhance the realism of vOSCEs. As technology continues to advance, the realism and interactivity of virtual environments will improve, further enhancing the authenticity of vOSCEs. Successful implementation of vOSCEs relies on the availability of appropriate technology and infrastructure (Kim et al., 2022). This includes reliable internet connectivity, videoconferencing software, VR simulation platforms and a secure online assessment system (Blamoun et al., 2021). Educational institutions need to ensure that students and educators have access to the required technology and receive adequate training on its use. According to Blamoun et al. (2021) assessment endpoints need to be consistent, thus educational objectives need adaption to the virtual milieu. Thus, standardised patient training methodologies will require translation from in-person to the virtual environment (Blamoun et al., 2021). vOSCEs offer several advantages over traditional OSCEs in nursing education (Blamoun et al.,2021; Grover et al., 2022):

- accessibility and flexibility: vOSCEs eliminate the need for physical space and resources, making them accessible to students regardless of their location. This flexibility allows for more frequent assessments and reduces logistical challenges associated with organising traditional OSCEs.
- cost-effectiveness: vOSCEs can potentially reduce costs related to standardised patient training, logistics and administrative tasks, making them a cost-effective alternative to traditional OSCEs.
- standardisation and calibration: vOSCEs provide a standardised assessment process, ensuring that all students are exposed to the same scenarios and evaluation criteria. This standardisation improves the reliability and validity of the assessment.
- immediate feedback: vOSCEs can offer immediate feedback to students through automated scoring or real-time evaluation by instructors. Educators can track students' progress, identify areas for improvement and tailor feedback accordingly.
- vOSCEs allows students to learn from their mistakes, receive immediate feedback and reflect on their performance,
- exposure to diverse scenarios: vOSCEs can simulate a wide range of clinical scenarios, including rare or complex cases that students may not encounter frequently in clinical practice. This exposure enhances students' clinical reasoning and decision-making abilities.

While vOSCEs offer numerous advantages, they also present certain challenges and limitations (Blamoun et al., 2021):

- students and educators must possess the necessary technological competence to effectively navigate and engage with virtual platforms and simulations. Insufficient training or familiarity with the technology may hinder the successful implementation of vOSCEs.
- creating authentic and realistic virtual scenarios can be challenging.
- implementing vOSCEs requires a robust technical infrastructure, including stable internet connectivity, videoconferencing platforms and VR simulations.

vOSCEs offer a valuable tool for assessing students' clinical competencies and enhancing the learning experience. Through careful implementation, standardisation and continuous improvement, vOSCEs can contribute to improving the quality of nursing education and preparing students for successful clinical practice.

According to Meum et al. (2021) digital technology has been widely used in the education of healthcare professionals in general, although it has a special significance in nursing to bridge the gap between theory and practice. Therefore, it is necessary to prepare future generations of nurses to be active participants in information and communications technology (Fischer-Suárez et al., 2022). The introduction of new technology in education not only involves technical skills in using new digital tools, but it must also be adapted to professional needs in accordance with the educational programme (Meum et al., 2021). Digital tools add value to learning because students feel comfortable with digital learning and face-to-face interaction activities (Fischer-Suárez et al., 2022).

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DIGITAL COMPETENCES OF HIGHER EDUCATION TEACHERS IN THE FIELD OF NURSING: CHALLENGES AND NEEDS IN THE MODERN EDUCATIONAL ENVIRONMENT

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Summary

Digital technology is becoming an increasingly important element in nursing teaching. It facilitates student learning through access to vast amounts of up-to-date information, interactive learning opportunities in simulation classrooms, the possibility to study remotely in emergency situations, access to visual aids to facilitate performance and learning and other important advantages. It is essential that higher education teachers adapt and introduce digital technology in their teaching and that it is introduced as part of the nurses' competences in the learning process. A set of competences was offered, which were formulated by experts in the field of nursing education according to the perceived needs. The Delphi study was carried out in four rounds. In the last round, a wider set of teachers in higher education nursing programmes evaluated the developed definitions of digital competences of higher education nursing teachers. Six categories of digital competences for higher education nursing teachers were developed. The competences cover the areas of professional engagement, digital resources, teaching and learning, assessment, facilitating learners and empowering learners. An important factor is the possibility of using digital technologies and an extended range of software options for teaching. Another important factor influencing the use of the above is the possibility of professional support from IT experts, ongoing training and the ethical stance of the teacher who is using digital technology.

Key words: nursing education, digital competencies, teachers.

Theoretical background

In the modern era of the digital revolution, nursing and education face constant change and new challenges. Digital technologies have become a key tool in the delivery of nursing care and have enabled the development and advancement of health education (Meum idr., 2021). In this context, it is crucial that higher education teachers, who are key knowledge and experience holders, develop relevant digital competencies that enable them to successfully design and implement modern educational approaches. Adapting to new technologies and pedagogical practices can present a number of challenges for Higher Education Institutions (HEIs). While these advances can enhance the learning experience for students, they can pose significant obstacles for teachers. Higher education nursing teachers are required to have teaching and research skills, with additional competencies in leadership, management and international networking. Contemporary trends necessitate the introduction of different

teaching methods and the use of digital technologies to deliver knowledge (Erdem et al., 2019). Moreover, they are expected to have experience in nursing practice with a broad knowledge gained in a clinical setting (Mikkonen et al., 2018; McAllister & Flynn, 2016). Effective teaching in such contexts requires specialised skills related to curriculum development, teaching strategies and methods, as well as evaluating teaching (Cangelosi, 2014) and research (Jackson idr., 2011; Mikkonen idr., 2018). Furthermore, focusing on the use of digital technologies becomes essential as they are not only helpful for teachers to impart knowledge to students, but can also be an excellent tool for addressing evolving challenges in higher education, such as increasing diversity among students, shortages of teachers and clinical mentors, and concerns about the quality of studies and the demanding nature of students (Männistö idr., 2020). The use of digital technologies in delivering knowledge requires higher education teachers to not only understand the content, but to also understand how to present it in an appropriate digital environment for both collective and individual learning, while taking advantage of the unique opportunities of online learning environments (Conceição & Taylor, 2007). Integrating new technologies and pedagogical strategies often demands a great deal of time and effort. Teachers may struggle to balance their existing workload with the need to learn and implement innovative practices and effectively navigate and use digital tools. This alone can be time-consuming and daunting, especially for teachers who have been teaching for many years without relying heavily on technology (Somyürek & Coşkun, 2013). Despite these challenges, the integration of new technologies and pedagogical practices offers opportunities for HEIs to create more engaging, inclusive and effective learning environments (Ligita idr., 2022; Mokoena-de Beer & Moloko, 2022). With ongoing professional development, institutional support and a willingness to embrace change, educators can successfully navigate these challenges and improve the educational experience for their students.

In this paper, we aim to examine the main competences that higher education teachers need to develop in order to successfully integrate digital technologies into their educational practices. This includes the ability to manage digital tools, select the appropriate technology for specific educational goals, support students in developing digital competencies and think critically about the ethical and privacy issues related to the use of digital technologies (European Commission, Joint Research Centre, 2017). Despite the importance of digital competencies in education, little has been written in nursing education about the competencies and needs of nurse educators and clinical mentors in this area (Jobst idr., 2022). The European Framework for the Digital Competence of Educators: DigCompEdu (European Commission, Joint Research

Centre, 2017) outlines digital competences for primary and secondary school teachers that are comparable to those of higher education teachers. However, as nursing involves not only theoretical content but also practical work in simulation classrooms and clinical training, the

use of digital technology presents a particular challenge for higher education teachers in this field. At the onset of the project, a comprehensive evaluation was undertaken. This included an assessment of teaching methodologies an in the COVID-19-time landscape, an analysis of the current ICT tools employed and insights gathered from focus group outcomes. This review revealed that both students and educators encountered challenges in effectively utilising these tools. Recognising this gap in digital proficiency, our project team embarked on a quest for pertinent literature to offer guidance on the basic skills required for educators to harness ICT tools in the teaching process. Our research yielded no existing recommendations within the domain of competencies in higher education nursing programmes. In response to this knowledge gap, we have taken the initiative to incorporate the development of digital competencies specifically tailored for educators in higher education nursing programmes as a pivotal component of our project activities.

The aim of this study was to match the digital competences of teachers developed by a group of experts in the DigCompEdu project (European Commission, Joint Research Centre, 2017) with the needs and opportunities of higher education teachers in nursing. By identifying and addressing these specific challenges, we can better equip nursing educators to thrive in the digital world of education.

Methodology

A qualitative study was conducted using the Delphi method for data collection. The Delphi study was carried out in the second half of 2022 and the beginning of 2023. It aimed to create and classify definitions of digital competences for higher education teachers in the nursing profession. The study consisted of four phases. In the first part, the study involved three stages. In the initial phase, selected higher education teachers from five countries, who had used digital technology during the COVID-19 pandemic, reviewed the proposed definitions of digital competencies. They supplemented these definitions with meaningful content from the field of nursing education. In the second phase, the same teachers re-evaluated the definitions, considering the proposed additions and provided their confirmation or suggested further amendments. The third phase involved the experts ranking the proposed competencies based on their importance. Moving on to the fourth phase, a broader group of higher education teachers, specifically those involved in nursing programme implementation at five participating faculties, participated in the Delphi study. The aim of this phase was to validate the digital competences that were formulated in the first three phases. The average age of the participating university teachers was 53.4 years and they had, on average, 12 years of experience as university teachers. Digital competence for higher education teachers in the field of nursing refers to their ability to effectively use digital technologies and tools in an educational context. Participants emphasised the importance of being familiar with various

digital platforms, programmes and applications relevant to nursing as well as their ability to use those tools to support students in learning and skill development.

Results

We present a set of competencies approved by higher education teachers in the field of nursing, ordered by importance and accompanied by corresponding definitions. These competencies are grouped into six thematic areas, each with subcategories that provide readers with a clear understanding of the meaning of each competency. In the third step of the Delphi study, university teachers ranked trainees based on their perception of the importance of each competency. The ranking of competencies in the results differs only slightly from the ranking of competencies in the using literature (unknown reference). Notably, in the final section, university teachers valued the "facilitating learners" competence more highly than the "empowering learners" competence, which they ranked last. The significance of "Professional engagement" in nursing is the most important competence, encompassing a broader professional utilisation of digital technologies by higher education teachers for student learning, clinical mentors and others, as well as for their own individual professional development. This set of competencies also entails collaboration among professionals, fostering both professional growth and the exchange of experiences in using digital technologies.

Definitions of competencies for higher education nursing teachers

Professional engagement is directed at the broader professional environment, i.e. educators' use of digital educational technologies in professional education and nursing interactions with colleagues, nursing students, clinical mentors, relevant stakeholders and other interested parties, for their own individual professional development and for the collective good of the organisation, the improvement of professional efficiency, easier communication with colleagues and collaboration using digital technologies.

- **Organisational and communication engagement**: Using digital technologies to enhance organisational communication with nursing students, educators, colleagues, clinical mentors, the local learning environment, patients and third parties. Contribute to the joint development and improvement of organisational and communication strategies by following ethical rules to improve the study and nursing process.
- **Professional collaboration**: Using digital technologies to engage in collaboration with other educators, clinical mentors, members of the healthcare team, sharing and exchanging knowledge and experiences and collaboratively innovating and interlinking pedagogical methods and clinical practices.
- **Reflective practice**: Individually and collectively reflecting on the self-reflection of educator, student and others involved in the study process, critically assessing and

actively developing their own digital pedagogical practice and their educational community.

- **Continuous digital professional development**: Using digital resources and tools for the lifelong learning, personal, career and professional growth of teachers.
- **Digital resources**: "Digital Resources" addresses the competencies needed to effectively and responsibly use, create and share digital resources for learning, teaching and following professional guidelines in nursing education.

In the competency »Digital resources«, we have included definitions that define digital literacy skills, which cover both the use of computers and related technical equipment and the use of a variety of teaching methods using a wide range of tools that the teacher can choose to prepare learning units.

Definitions of digital resources

Digital resources address the competencies needed to effectively and responsibly use, create and share digital resources for learning, teaching and following professional guidelines in nursing education.

- **Selecting digital resource**: To identify, assess, select and adjust the digital resources means being able to optimise and facilitate teaching and learning in nursing. The pedagogical approach is used and the group of participants is guided by the consideration of the specific pedagogical approach and learning objective, when selecting digital resources and planning their use.
- **Creating and modifying digital resources**: Creating and/or modifying digital resources means to modify and build on existing openly-licensed resources and other resources where this is permitted. In order to create or co-create new digital educational resources, the specific learning objective, context, pedagogical approach and the learner group of participants are considered when designing digital resources and planning their use.
- **Managing, protecting and sharing digital resources**: Managing, protecting and sharing digital resources means being able to organise digital content and make it accessible to students, clinical mentors, patients and other educators based on effectively protecting sensitive digital content. To respect and correctly apply privacy and copyright rules. To understand the use and creation of open licenses and open educational resources, including their proper attribution.

The competency »Teaching and learning« involves understanding how to effectively use digital tools and resources to enhance nursing education and optimise the learning experience for students.

Definitions of teaching and learning

Teaching and learning are dedicated to understanding, recognising, managing and orchestrating the use of digital technologies in the nursing learning process.

- Teaching: To plan for and implement digital devices and resources in the teaching process, in order to enhance the effectiveness of nursing teaching interventions in favour of increasing the effectiveness of the teaching content. To appropriately manage and orchestrate digital teaching interventions. To experiment with and develop new formats and pedagogical methods for instruction.
- **Guidance**: This is needed to be able to use digital technologies and services to enhance interactions with nursing students, individually and collectively, within and outside of the learning session and clinical setting. Using digital technology to offer fast and targeted support and assistance. To experiment with and develop new forms and formats that offer support to the nursing study process.
- **Collaborative learning**: Using digital technologies to encourage and improve student engagement to use digital technologies as part of a collaborative task, as a means of improving communication, collaboration and cooperation when creating knowledge in the nursing field.
- **Self-regulated learning**: Using digital technologies to support self-regulated learning processes, i.e. to enable nursing students to plan, monitor and reflect upon their own learning, provide evidence of progress, share insights and inventing creative solutions in the nursing field.

Knowledge »Assessment« can also be carried out using digital technologies, so higher education teachers need to be familiar with the methods and possibilities of developing effective tools for assessment, reflective learning or monitoring students' achievements in theoretical work and clinical training.

Definitions of assessment

Assessment: This considers the use of digital strategies to enable and enhance assessment in nursing education.

- **Assessment strategies**: The use of digital technologies for formative and summative assessment increases the diversity and appropriateness of assessment formats and approaches in nursing education.
- **Analysing evidence**: To generate, select, critically analyse and interpret digital evidence on student activity, performance and progress, in order to facilitate teaching and learning in nursing education.
- **Feedback and planning**: Using digital technologies to provide targeted and timely feedback to nursing students. To adapt teaching strategies and provide targeted support, based on the evidence generated by the used digital technologies. To enable

nursing students to understand the evidence provided by digital technologies and use it for decision-making.

Promoting students' digital competence refers to the specific pedagogical skills needed by nursing educators to promote the digital competences of nursing students. The fifth digital competency for supporting learners emphasises empowering nursing educators to use digital technologies effectively to enhance the learning experience of nursing students, address individual needs and promote active and all-inclusive participation in their education.

Definitions of facilitating learners

Facilitating learners: digital competencies detail the specific pedagogical competencies that are required to facilitate nursing students' digital competence.

- **Accessibility and inclusion**: Ensure access to digital resources and activities for all nursing students, including those with special needs. Consider and respond to nursing students' (digital) expectations, abilities, usage skills and misconceptions, as well as contextual, physical or cognitive limitations in their use of digital technologies.
- **Differentiation and personalisation**: Using digital technologies to address nursing students' diverse learning needs, by allowing students to advance at different levels and speed and follow individual learning pathways and objectives. To empower nursing students, clinical mentors and other stakeholders with whom nursing educators cooperate in use of digital technologies.
- **Actively engagement learners**: Using digital technologies in the framework of pedagogic strategies that promote transversal skills of nursing students, deep thinking and creative expression, active and creative participation in the course. To start learning in new, real-world contexts, which involve learners in practical activities, scientific investigation or complex problem solving or in other ways increase nursing students' active involvement in complex subject matters.

In brief, »Learner empowerment« in digital technologies enables nursing educators to monitor the development and implementation of student-centred teaching and learning strategies in nursing education. By promoting information literacy, digital content creation, communication and collaboration skills, responsible use and problem-solving skills, nursing students are better equipped to succeed in an increasingly digitalised learning environment.

Definitions of empowering learners

Empowering learners focuses on the potential of digital technologies to track development in the transfer of student-centered teaching and learning strategies in nursing education.

- **Information and media literacy**: To incorporate learning activities, assignments and assessments that require nursing students to articulate their information needs; to find information and resources in digital environments; to organise, process, analyse and interpret information; and to compare and critically evaluate the credibility and reliability of information and its sources.
- **Digital content creation**: To incorporate learning activities, assignments and assessments which require nursing students to express themselves through digital means, and to modify and create digital content in different formats. To teach nursing students how copyright and licenses apply to digital content, how to reference sources and attribute licenses.
- **Digital communication and collaboration**: Digital communication and collaboration involves the use of learning activities, tasks and assessments that require nursing students to use digital technology effectively and responsibly.
- **Responsible use**: Taking measures to ensure nursing students' physical, psychological and social wellbeing while using digital technologies. To empower nursing students to manage risks and use digital technologies safely and responsibly.
- **Digital problem solving**: To incorporate learning activities, assignments and assessments which require nursing students to identify and solve technical problems or to transfer technological knowledge creatively to new situations.

Discussion and conclusion

The presence of digital technologies in everyday life has led to profound changes in almost every aspect of life: communication, work, leisure, organisation of life and access to knowledge and information. These technologies have influenced the way individuals think and behave. Children and adolescents are already encountering and growing up in a world where digital technologies are ubiquitous, so they do not and cannot know anything else. However, this does not mean that they are born with the skills needed to use digital technologies effectively and responsibly (European Commission, Joint Research Centre, 2017). Therefore, in order to achieve the high level of digital competences that teachers need to use digital tools effectively in the education of new generations of children and adolescents, it is necessary to learn and complement the knowledge of higher education teachers. To facilitate the understanding and updating of digital skills, teachers should link digital age skills to their professional practice and to the knowledge acquired in practice (Lázaro-Cantabrana et al., 2019; Demissie et al., 2022). In the professional field of nursing, integrating professional knowledge and digital competences means taking into account the specificity of this type of study, which requires, in addition to theoretical content, learning in a clinical setting or in a simulation classrooms where students acquire practical professional skills. It should not be forgotten that the knowledge of the possibilities presented by digital technology is quickly and surely being translated into the healthcare system, so it is essential

to embed the learning of the use of digital technologies, not only for teachers in terms of teaching but also for students as a professional skill. Egbert et al., (2018) highlight that knowledge of the use of digital technologies is important for all nurses, not just for a few specialists, as digitalisation in nursing cuts across nursing management, information technology management in nursing, quality management in healthcare, clinical nursing and in interprofessional care coordination. The professional aspect identified in the first set of competences captures these components and adds reflective practice as a way of effective learning using digital technologies. As predictors of the use of digital technologies by higher education teachers. Demissie et al., (2022) identify teacher training, teachers' attitudes towards technology, teachers' technological and content knowledge, technological-pedagogical knowledge and technological-content knowledge. The introduction of digital technologies in education has changed the paradigm of the entire education system. The teacher is no longer just a deliverer of knowledge, but is also a co-creator of information, a mentor and an evaluator (Haleem et al., 2022). Authors Haleem et al., (2022) also highlight that there is an urgent need for support for higher education teachers in the form of frequent training, support from IT experts and the possibility of using different IT and software to support different teaching methods. The use of digital technologies in nursing education has a special place in the ethical aspect, which covers the use and distribution of sensitive personal health data. Especially when digital technology is used to process or learn from patients in the clinical environment and the learning requires the use of health information. Koohestani et al., (2019) point to the use of mobile phones and the use of social networks for nursing teaching purposes, especially in the clinical setting, where they stress the importance of being aware of the use of personal data and the ethical considerations and responsibilities of both the teacher and the students in the case of possible violations of such legislation. Naik et al., (2022) focus on the ethical aspect of the use of AI in healthcare, highlighting the fact that there is no current legislation on the ethical dilemmas of its use, leaving the ethics of its use up to the user of the tool. In the competences, we have specifically highlighted the ethical use of digital technologies, which includes both the teacher's knowledge of the boundaries and the role model for transferring the ethical use of digital technologies for nursing students. The use of digital technologies in nursing education, as well as in the clinical setting, will soon become a reality. It is necessary to introduce different technologies and useful methods for the digital delivery of knowledge in nursing, as this will better adapt to the needs and knowledge of the coming generations, the shortage of staff in the clinical environment and in the teaching process, the easier accessibility of distance learning and others. Last but not least, the use of digital technologies also contributes to sustainable development, as the introduction of digital presentation options, the use of electronic resources for learning and the possibility of easy teamwork in the preparation of various learning projects without the use of means of transport have reduced the use of pencils and paper and other materials.

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OPORTUNITIES AND CHALLENGES IN DIGITAL EDUCATION

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The DEN project has shown that we could use digital tools significantly more than we did before the COVID-19 pandemic and that they have contributed to educational quality. However, the digital divide concerns significant socio-economic factors. It has been made clear that students who come from less privileged socio-economic backgrounds are more likely to struggle with the financial constraints that limit their access to necessary technology. For these students, the cost of acquiring the necessary devices and securing a reliable Internet connectivity can be a significant burden, limiting their participation in digital education. On the other hand, the possibility of having an element of digital teaching could benefit precisely the disadvantaged student group, as travel times had been significantly reduced, among other things. As technology advances and digital education becomes increasingly integrated into educations, it is paramount to acknowledge and address these issues. With the DEN project, we have been given the opportunity to implement strategies that could bridge the digital divide between our partners' organisations. While these challenges were formidable, they also offer opportunities for institutions and policymakers to develop innovative solutions that may ultimately benefit many students, regardless of their socioeconomic circumstances.

Within the digital education landscape, inclusivity and diversity represent two critical dimensions that demand special attention within the framework of the Digital Education in Nursing (DEN) project. To promote inclusivity and meet the demands of a multicultural student population, addressing the issue of cultural sensitivity in digital education is essential. This entails designing educational materials and methods with regard to various backgrounds and perspectives.

The socioeconomic diversity among students is an unlimited resource that can enrich the learning environment. However, this requires educational programs to recognise that a one-size-fits-all approach is insufficient. Instead, digital educational materials should be designed with the understanding that different ways. Learning varies includes providing examples and scenarios that reflect diverse norms and values, as well as making teaching methods adaptable and inclusive of different learning styles. To ensure inclusivity, it is crucial to also acknowledge the challenges faced by students with disabilities in digital education. These students may require specially adapted materials and teaching strategies to fully benefit from their education. Accessibility is the key to ensuring they are not disadvantaged. This involves offering materials in various formats that are compatible with screen readers and other assistive devices. Using websites and platforms that adhere to accessibility standards. Additionally, teachers and education administrators should be aware of the needs of students with disabilities and be prepared to adapt their teaching methods, if necessary, to include these students in the learning process. By actively addressing sensitivity and special needs in digital education, the DEN project can create an inclusive and diversity-promoting learning environment that benefits all students and meets the high expectations of a modern and equitable education. This requires an awareness of the unique needs and perspectives of each individual in the student population and a willingness to adapt instruction to meet those needs.

In conclusion, this chapter underscores the importance of addressing the challenges related to access and inclusivity in digital education. By ensuring equitable access to technology and promoting inclusive and ethical practices, nursing education programs can create a learning environment that benefits all students, regardless of their background or circumstances. The case studies and best practices discussed here serve as valuable examples for educators and institutions to learn from and implement in their own digital education initiatives.