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Co-creating digital educational resources to enhance quality in student nurses' clinical education in nursing homes: Report of a co-creative process

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Abstract

Aim: To report a methodological, co-creative approach for developing an interactive digital educational resource to enhance the quality of student nurses' clinical education in nursing homes and to elucidate the lessons learned from this approach.

Design: This study applied a co-design methodology that builds on participatory design principles.

Methods: Co-creating the digital educational resource included multiple sequential and interactive phases inspired by the design thinking framework. Workshops were employed as the primary co-creative activity.

Results: Seven separate homogenous or joint heterogeneous workshops were conducted with student nurses, nurse educators, registered nurse mentors and e-learning designers ($n=36$) during the active stakeholder engagement phases to inform the educational content, design and functionality of the digital educational resource. These were informed by, and grounded in, learning theory and principles.

Conclusion: Co-creative approaches in nursing education are an essential avenue for further research. We still lack systematic knowledge about the impact and benefits of co-created initiatives, stakeholders' motivations, barriers, facilitators to participation and the role of context in supporting effective co-creative processes to increase the quality of nursing education.

Impact: This paper demonstrates how digital educational initiatives to enhance quality in clinical nursing education can be co-created with key stakeholders through a novel methodological approach inspired by design thinking. To date, the methodological development process of co-created educational interventions has received limited attention and compared with the content and theoretical underpinnings of such interventions, has rarely been addressed. Therefore, this paper facilitates knowledge exchange and documents vital aspects to consider when co-creating digital educational initiatives incorporating multistakeholder perspectives. This promotes a stronger

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academic–practice partnership to impact and enhance the quality of clinical nursing education in nursing homes.

Public Contributions: Student nurses, nurse educators, and registered nurse mentors worked alongside researchers and e-learning designers in the co-creative process.

KEYWORDS
clinical nursing education, co-creation, design thinking, interactive digital educational resource, lessons learned, nursing homes, quality, stakeholder engagement

1 | INTRODUCTION

Researching student nurses' clinical placement studies in nursing homes helps to develop approaches to enhance students' learning experiences, stimulating their interest in caring for older people and encouraging them to view aged care as an attractive career option (Laugaland, Billett, et al., 2021, Laugaland, Kaldestad, et al., 2021). These goals are vital to meet the growing healthcare demands of an ageing population and the need for highly qualified nursing staff in nursing homes (Laugaland, Billett, et al., 2021, Laugaland, Kaldestad, et al., 2021). Therefore, university nursing programmes play a crucial role in developing and effectively utilizing clinical placements in nursing homes and preparing a workforce to meet future healthcare needs, especially those associated with an ageing population (Keeping-Burke et al., 2020). Co-creative frameworks can create space for mutual learning between students and staff, focusing on the challenges and opportunities in equipping nurses to meet the needs of ageing populations (Watson et al., 2020).

Co-creation and active learner involvement in the design and development of education garner growing attention in educational practice and research (Könings et al., 2021). Furthermore, it increases research impact (Greenhalgh et al., 2016). Co-creation refers to the collaborative generation of knowledge by academics working with other key stakeholders (e.g., student nurses, educators, clinical practitioners and designers) at all stages of an initiative, from problem identification to solution generation (Greenhalgh et al., 2016). Co-creation and co-design emerged from different fields, and nuance in the meaning and application of these concepts depends on the area where they are applied. We view and apply co-creation as an overarching construct that includes co-design for guiding initiatives, as Vargas et al. (2022) suggested. This study involved co-creating an interactive digital educational resource with student nurses, nurse educators and registered nurse mentors alongside researchers and e-learning designers to enhance quality in first-year student nurses' clinical placements in nursing homes.

This interactive digital educational resource targeted individual, relational, collaborative and procedural aspects by supporting and enhancing several quality dimensions: (a) registered nurse mentors' supervision and assessment competencies; (b) student nurses' reflective thinking skills and learning experiences; (c) nurse educators' educational roles and (d) tripartite communication and collaboration. The digital educational resource did not aim to replace traditional face-to-face mentoring; instead, it was intended as a supplementary resource for delivering knowledge in an interactive and flexible environment, enabling student nurses, registered nurse mentors and nurse educators to access and acquire pedagogical and context-specific educational knowledge effectively. This supports successfully bridging theory, goal-oriented supervision and clinical learning in first-year student nurses' placements in nursing homes (Laugaland et al., 2020). The interactive component was intended to allow for more efficient information flow and dialogue, facilitating and strengthening the stakeholders' collaboration during student nurses' clinical placements.

Previous research has reported that registered nurse mentors need extensive educational preparation and support to ensure that they have the pedagogical competencies necessary to foster student learning and development in clinical practice, especially within nursing homes (Frøiland et al., 2021). Using part-time nurse educators in clinical education in nursing homes requires a substantial investment of resources to prepare teachers for their roles; however, this process often lacks a systematic approach, leading to high variability in the quality and assessment of students' learning (Aase et al., 2022; Laugaland, Billett, et al., 2021). Reflective thinking skills are an essential generic competence required for student nurses' development as reflective practitioners; this is essential for safe, effective and skilled nursing practice (Dyson, 2018). Targeting these quality dimensions using technology-enhanced learning may improve students' learning experience and outcomes in clinical education, leading to better clinical practice and patient care (O'Connor et al., 2022).

Digital technology provides opportunities for innovative pedagogy, facilitation of learning and teaching and organization of higher education, including nursing education (Gause et al., 2022). A recent integrative review (Gause et al., 2022) reported that technology is used in clinical and classroom nursing teaching to complement learning, with a recent notable increase in clinical settings. Digital educational resources have supplemented learning in clinical placements and enabled more regular mentoring (Heinonen et al., 2019). Furthermore, digital educational resources have been highlighted as suitable for registered nurse mentors who face workload, time and support system challenges. This is because online learning increases flexibility and accessibility and offers an alternative way of providing competence-enhancing courses (Wu et al., 2018). A systematic review addressing digital collaborative learning in nursing education (Männistö et al., 2020) revealed that digital learning environments

facilitate nursing students' independence and self-direction, promote problem-solving and reflective thinking skills and enhance motivation. Digital technology promotes using diverse learning materials and tools, such as videos, multimedia and texts, which can arouse interest, help students understand complex information and provide further information via Weblinks. Additionally, interactive tools like email and chat rooms can facilitate dialogue (Männistö et al., 2020).

Considering educational stakeholders' unique expectations and perceptions is crucial in developing powerful learning environments and educational resources (Könings et al., 2014). A co-creative approach featuring the voices of end users is essential to identify digital educational solutions compatible with the specific needs and contexts of clinical placement in nursing homes and ensuring student-centred design (Dugstad et al., 2019). Active stakeholder engagement makes innovations more likely to be compatible with needs, values, contexts and norms and be successfully implemented in practice (van Dijk-de Vries et al., 2020). However, previous studies have emphasized the need for further research to strengthen the evidence base for this new approach within nursing education (O'Connor et al., 2021). A systematic literature review (O'Connor et al., 2021) emphasized that the methodological development process of co-designed interventions is often not described or explained in detail. Describing the development processes of co-created interventions in clinical nursing education may provide opportunities for more significant critical appraisal of interventions and facilitate knowledge exchange (French et al., 2020; O'Connor et al., 2021). Therefore, this study sought to report the methodological development process of an interactive digital educational resource target to enhance the quality of clinical education in nursing homes. The following research question guided our study:

> How can a digital educational resource be co-created to enhance quality in first-year students' clinical placement studies in nursing homes?

Based on current knowledge of digital educational resources' efficacy (Gause et al., 2022; Männistö et al., 2020), this study assumes that a flexible, interactive digital educational resource can enhance the quality of clinical nursing education, optimizing students' learning outcomes and professional development.

2 | METHODS

2.1 | Design

This study is part of a larger research project called "Improving quality in clinical placement studies in nursing homes (QUALinCLINstud): the study protocol of a participatory mixed-methods multiple case study design" (Laugaland et al., 2020). This study applied a co-design methodology, an approach that builds on the principles of participatory design (Vargas et al., 2022), which implies that the

key to co-creating the interactive digital educational resource lies in actively involving the end users in the development process. This will help meet their needs (Vargas et al., 2022). The Standards for Quality Improvement Reporting Excellence in Education (SQUIRE-EDU) were used to meet this study's goal. These guidelines build on the SQUIRE guidelines. They were chosen because they aim to increase systematic efforts to describe and improve the spread of innovations with the potential to improve and advance pedagogy in higher nursing education (Ogrinc et al., 2019).

Considering the diversity of stakeholders involved in clinical placements, we sought to sample a broad range of participants to provide comprehensive insight into the co-creative process. The co-creative process involved the content and design of the digital educational resource being co-developed with registered nurse mentors, student nurses, nurse educators and e-learning designers and researchers. The co-creative approach does not entail a specific description of how to involve the stakeholders in the development process; instead, it allows researchers to choose the best methods to arrive at an in-depth understanding and inform improvements.

2.2 | Frameworks and theoretical underpinnings guiding the co-creative process

This study drew inspiration from a design thinking framework developed by the Hasso Plattner Institute of Design at Stanford University to guide the co-creative process. In this design thinking framework, the design thinking process comprises five phases: empathize, define, ideate, prototype, and test (Hasso Plattner Institute of Design at Stanford University, n.d.). The results section will elaborate on the details of these phases and how they were operationalized in our study. Notably, findings from the empathize phase have been reported and published elsewhere (see section: Phase 1). In this study, we only considered how the empathize phase informed the subsequent and more active forms of stakeholder engagement during the defining, ideating and prototyping phases facilitated through workshops. Workshops have been proposed as an ideal setting for co-creative activities because of their potential to provide space for the egalitarian flow of ideas and joint development of concepts and solutions (Akoglu & Dankl, 2019).

We used Ileris's (2003) concept of learning rooted in the socio-constructivist learning paradigm as the pedagogical framework guiding the co-creative process, including the digital educational resource's content, design and functionality. Illeris' concept of learning is based on the premise of three dimensions of learning and competence development: (1) functionality, referring to the learning content; (2) sensitivity, stressing the importance of the individual's incentive for learning (e.g., motivation, emotion, and volition); and (3) integration, focusing on interaction with fellow learners or the environment. Furthermore, we used the pedagogical principle of constructive alignment (Biggs, 2014) as a critical theory for aligning the learning goals, learning supervision processes and assessment tasks co-created for the interactive digital educational resource. Figure 1
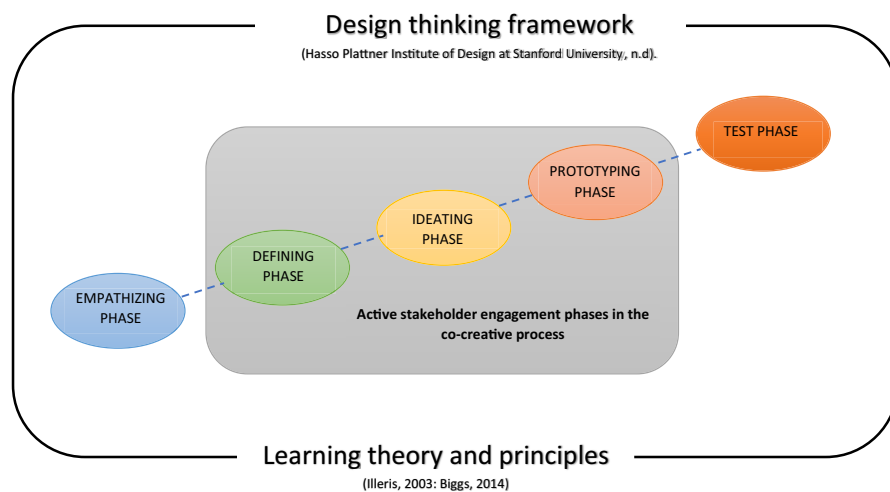
FIGURE 1 Theoretical frameworks guiding the co-creative process of developing the interactive digital educational resource.

illustrates the theoretical frameworks guiding the co-creative process and displays the active stakeholder engagement phases in the development of the interactive digital educational resource, the core focus of this study.

2.3 | Setting

The study recruited student nurses and nurse educators from a higher educational institution in the Western region of Norway. Registered nurse mentors were recruited from two publicly funded nursing homes in a city-based municipality. The research team consisted of academic nurse educators representing experienced qualitative researchers and educators with clinical and educational experience in the nursing home context, including formal geriatric competence and competence in supervision. The team facilitated the workshops and worked collaboratively with e-learning designers during the co-creative process. The first author facilitated all the co-creative workshops, the third author acted as a note-taker and the final author assisted in the workshops by clarifying questions and facilitating dialogue. The note-taker did not actively participate in the workshops but focused on mapping group dynamics and capturing critical discussions among the participants.

The co-creative process to establish the interactive digital educational resource was conducted over 22 months (June 2019–April 2022). The COVID-19 pandemic occurred during the development of the resource, meaning that methodological adjustments had to be made. This prolonged the co-creative process by almost a year.

2.4 | Context

In Norway, clinical education in nursing homes often represents the student's first encounter with patient care because nursing home placements are undertaken in the first academic year. A mentorship model is often applied during student nurses' clinical placements in nursing homes. One or two students are allocated to a registered nurse in a nursing home ward. Mentorship is regarded as an integral part of nurses' work, although they do not receive financial compensation, and there are no formal mentorship requirements. Therefore, nurses play a dual role: supervising students and delivering high-quality patient care. In this model, the nurse educator focuses on the cooperation between the nurse mentor and the student, supporting the student's integration of theory with practical learning and fulfilling learning outcomes (Saarikoski et al., 2013). This means that the nurse educator's supervision also includes responsibility for assessing and grading the student's achievements. Nurse educators do not provide hands-on supervision in the care of patients. In this model, supervision is given by both the registered nurse mentor and the nurse educator, and the frequency of supervision can vary. An essential component of this model is the support of students' learning and professional development. The clinic employs mentors, and the university employs nurse educators. In this study, eligible student nurses were enrolled in a three-year bachelor programme in nursing covering 180 European Credit Transfer System points. The placement period in nursing homes lasted for 8 weeks.

2.5 | Recruitment

The recruitment of participants was guided by a purposive criterion-based sampling strategy to maximize variation (Patton, 2015). For registered nurses, we aimed for diversity in gender, age, work experience, mentoring experience and cultural and linguistic background. In Norwegian nursing homes, immigrant nurses comprise up to 43% of the nursing staff (Jacobsen et al., 2020), highlighting the importance of including their perspectives. Inclusion criteria were used to select student nurses with experience of clinical placements in nursing homes and nurse educators with experience overseeing first-year students in clinical settings and the ability to share experience-based knowledge (e.g., Patton, 2015). In addition, we aimed to recruit nurse educators who had been involved in theoretical teaching before clinical placement in nursing homes and part-time nurse educators. This was because these groups constitute a high proportion of staff in educational roles in nursing home placements (Laugaland, Billett, et al., 2021).

Approval was obtained from the dean at the included higher education institution and the participating nursing homes' management teams. Information meetings were held for second-year student nurses and relevant nurse educators with an open participation request. A follow-up email was sent to eligible nurse educators to invite them to participate in the study. Nurse educators and student nurses did not receive compensation for their participation, which relied on their intrinsic motivation and willingness to participate.

During the information meetings, the stakeholder groups were informed that participation would involve minor pre-workshop preparation, attendance, and active participation in up to four 2–3h workshops, where they would be asked to share their experiences and ideas with key stakeholders (i.e., students, educators, registered nurse mentors). The students were asked to participate for the duration of the co-design development process, which was initially planned to last for 1year. However, the research team found it challenging to recruit student nurses, many of whom were concerned about extra workload (beyond their formal educational commitments and assignments). A lack of allocated time was cited as the main reason for non-participation. Therefore, snowball sampling was applied, in which three enrolled students assisted with recruitment by encouraging fellow second- and third-year students to participate (e.g., Creswell, 2012).

Information meetings were held at the participating nursing homes to familiarize the registered nurses with the study, objectives, methods and planned procedures. These meetings aimed to establish a good relationship with the eligible target group. Registered nurse mentors were recruited with assistance from two co-researchers in the two nursing homes involved in the wider study (Laugaland et al., 2020). Participants were compensated for their time in agreement with nursing home management at the study sites. Participation frequency and stakeholder engagement varied among the stakeholder groups due to various forms of absence, such as sickness, unexplained drop-out and competing or unexpected work tasks. The COVID-19 pandemic further complicated these challenges. The research team continuously had to recruit and include new participants. Targeted stakeholder groups were recruited through snowball sampling with assistance from participating student nurses, nurse educators and co-researchers (experienced registered nurses) working in the nursing home setting. Participants were recruited through snowball sampling and received information about the study from the research team before consenting to participate.

2.6 | Characteristics of workshop participants

Seventeen registered nurses were recruited from the two participating nursing homes in the active phases of the co-creative process. Ten student nurses and 9 nurse educators from the included higher education institution also participated ($n=36$). The 17 registered nurse mentors included 14 women and three men aged between 25 and 60years. Mentorship experience varied from 1year to approximately 20years, with an average of 6years. Of the enrolled registered nurse mentors, 50% were immigrant nurses. The enrolled student nurses

comprised eight women and two men aged 20–29. Six student nurses were second-year bachelor students, and four students were third- and final-year students. Half of the students were student representatives in their class of study. All nurse educators were women aged 38–66years. Their duration of experience overseeing students in clinical placements in nursing homes ranged from 2 to 23years. One nurse educator was employed part-time, and two-thirds of the nurse educators taught theory during the student nurses' first academic year. Only two registered nurse mentors, four student nurses, and two nurse educators participated throughout the co-creative process's active parts (i.e., defining, ideating, and prototyping phases).

2.7 | Ethical approval and considerations

The Norwegian Centre approved the study for Research Data (grant number 489776). All participants in the co-creative process provided informed written consent and were informed about their right to withdraw from the study at any time. The students were made aware that participation or non-participation would lead to any advantages or disadvantages during their education programme. The study received financial support from the Research Council of Norway (grant number 273558). Participants' characteristics are not reported to protect the anonymity of the participants and educational institutions. The IP address was logged but not processed further on the interactive digital educational resources website. Therefore, no other personal data were collected or processed by the research team or the university, ensuring that General Data Protection Regulation was complied with (https://personvern.nettopuis.live/digivis-en/). Ethical considerations related to COVID-19 will be elaborated on when the co-creative process is described.

3 | RESULTS: THE CO-CREATIVE PROCESS

Co-creating the interactive digital educational resource involved multiple sequential phases following the overall study protocol (Laugaland et al., 2020) and the Stanford design framework, from which the study drew inspiration. Table 1 outlines the various phases, their distinct role (e.g., purpose, desired outcome) and the stakeholders' level of engagement. The more active phases of engagement in the co-creative process occurred during workshops; these will be elaborated on in further detail below. Table 1 also illustrates the adjustments made due to the COVID-19 pandemic.

3.1 | Phase 1: Empathizing through interviews and observations

In the empathize phase, research strives to understand and gain insights into the stakeholders' needs (Hasso Plattner Institute of Design at Stanford University). Interviews with student nurses, nurse educators and registered nurse mentors, as well as

TABLE 1 Overview of the co-design phases in co-creating the digital educational resource.

Co-design phases	Aim of phase	Activity	Stakeholder engagement	Time frame
Empathizing	Gain insight and empathy from key stakeholders to learn about which challenges they experience and what is important to them.	Individual interview and observations	A user panel with stakeholder representatives informed and validated the data collection tools and analysis. All key stakeholders (student nurses, nurse educators and registered nurse mentors) participated in interviews and observations.	June 2018–March 2019.
Defining	Complement and compare experienced placement challenges to inform the educational resource based on stakeholders' experiences.	Workshops	Active engagement was facilitated through individual workshops with student nurses ($n=6$), nurse educators ($n=8$) and registered nurse mentors ($n=12$).	June–September 2019.
Ideating	Ideating content and solutions to be included in the digital educational resource.	Workshop	Active engagement was facilitated through a joint workshop with stakeholder groups ($n=24$) (student nurses, nurse educators and registered nurse mentors) and e-learning designers ($n=3$).	December 2019
Adjustments due to the COVID-19 pandemic				
Prototyping	Prototyping a partial part of the digital educational resource target to enhance mentorship practices.	Workshops	Active engagement was facilitated through individual workshops with registered nurse mentors ($n=7$) and student nurses ($n=6$).	October 2020
Pilot testing and evaluation	Test of the digital educational resource's partial prototype to refine and stimulate new ideas.	Interviews with pilot group participants	Focus group interviews with registered nurse mentors ($n=30$) and nurse educators ($n=9$).	February–April 2021
Adjustments due to the COVID-19 pandemic				
Refine prototype and solutions	Development of the full-scale educational resource.	Meetings with the research team and e-learning designers	The research team only worked with e-learning designers and collaborative partners. The outcomes of the previous phases, including the pilot testing phase, were used to guide the finalization of the design, content and functionality of the educational resource.	April 2021–January 2022
Pilot testing and evaluation	Pilot testing and evaluation of the full scale interactive digital educational resource.	Survey and interviews with pilot group participants	Individual interviews with nurse educators ($n=6$) and focus group interviews with student nurses ($n=23$) and registered nurse mentors ($n=16$).	February–April 2022

observations of mentorship practices (e.g., supervision and assessment), were conducted between June 2018 and March 2019 to gain insights, empathize and learn about the challenges faced by stakeholders during clinical placements. Findings from these studies have been reported elsewhere (see Aase et al., 2022; Dalsmo et al., 2022; Frøiland et al., 2021; Laugaland, Billett, et al., 2021; Laugaland, Kaldestad, et al., 2021). Inspired by Malterud (2012) first step (total impression) in systematic text condensation, we synthesized the findings from these studies from a "birds' eye" perspective before publishing them, as described in the overall study protocol (Laugaland et al., 2020). In this phase of the co-creative process, stakeholder engagement was ensured through a user panel involving second- and third-year student nurses, nurse mentors, and nurse educators, as described in the study protocol (see Laugaland et al., 2020). This panel assisted in ensuring the relevance and feasibility of the interview guide before data collection. The user panel also reviewed the preliminary findings to confirm and inform the findings and deductions. The collective findings from these studies were broadly categorized into issues related to pre-placement orientation, variability and a lack of pedagogical supervisory approaches, enriched learning activities, assessment, tripartite collaboration and quality assurance. The selection of these specific placement-related topics targeted previously identified challenges perceived by registered nurse mentors, student nurses and faculty staff, informing the content of the active co-creative process facilitated through the workshops.

3.2 | Phase 2: Defining problem areas through individual workshops

The define phase aims to determine specific, meaningful challenges (Hasso Plattner Institute of Design at Stanford University, n.d.), which, in this case, entailed clarifying and validating problem areas to be addressed in the interactive digital educational resource grounded in the applied pedagogical and theoretical frameworks (Biggs, 2014; Ileris, 2003). Therefore, separate but corresponding workshops were conducted with the various stakeholder groups to further compare and complement the clinical placement challenges identified in the empathizing phase. This involved arranging separate workshops with registered nurses (n = 12) from the two enrolled nursing homes and separate workshops with student nurses (n = 6) and nurse educators (n = 8). In total, four workshops were conducted between June and September 2019. The workshops with registered nurse mentors were conducted at the nursing home sites due to practical considerations. Workshops with nurse educators and student nurses were held near the participating higher education institution's campus. These separate workshops were considered essential to protect the vulnerability of learners (e.g., students), allowing problem areas to be thoroughly explored without being affected by power imbalances. They were also central to clarifying the ideating and solution phases of the co-creative process. Eligible participants were sent a clear agenda before the workshops via email, inviting them to reflect upon the challenges related to students' clinical placements in nursing homes they had experienced.

Each workshop lasted 2.5 h and began with a short presentation of the research project and workshop objectives. Initially, participants were invited to share their experiences of clinical placement challenges by choosing three to five inspiration cards. They were invited to place their cards on a poster with a short description under each card describing their key challenges. The inspiration cards aimed to evoke thoughts and emotions to complement previously identified challenges. Participants were then organized into smaller peer groups to create a safe space for everyone to have an equal opportunity to share their experiences (Könings et al., 2021). Identified problem areas from the empathizing phase were presented under various topics on the posters. Each had a problem statement and accompanying questions tailored to each target group. The workshop discussed six posters (see Table S1). The groups rotated, spending approximately 10 to 15 min at each station.

The posters were placed around the room to structure the opening discussions. The groups were invited to comment and add to the posters using inspiration cards containing various images and post-it notes. Three e-learning designers responsible for the design process participated in the workshops to familiarize the participants and gain an early holistic perspective of what the educational resource should address and include based on stakeholders' experiences.

Each workshop ended with a plenary session in which the facilitator summarized critical discussions to draw out the broadest possible range of problem areas identified by the participants. This was done to identify areas needing improvement and vital informational, contextual, and educational content to be included in the digital educational resource.

3.3 | Between phases 2 and 3

The research team worked actively and regularly met the e-learning designers between phases 2 and 3. The research team examined and synthesized the posters stating stakeholders' responses using the approach described by Braun and Clarke (2006), a theoretically flexible research method suited to a range of epistemologies. Based on the synthesized data, the research team proposed critical information and contextual and educational content (topics and headings) to be addressed in the digital educational resource. This process was undertaken in response to the identified key challenges. It considered the targeted quality dimension and was grounded in the study's theoretical and pedagogical frameworks (e.g., Biggs, 2014; Ileris, 2003).

3.4 | Phase 3: Ideation phase: Joint workshop with all stakeholders

In the ideation phase, solutions are generated to address identified vital challenges, providing foundations for building prototypes (Hasso Plattner Institute of Design at Stanford University, n.d.). We

arranged a joint workshop with registered nurse mentors ($n=9$), student nurses ($n=7$), nurse educators ($n=8$) and e-learning designers ($n=3$) in December 2019 to enable all key stakeholders to contribute to ideating the educational resource design, content and functionality related to key problem areas. A co-creative process requires direct group engagement in which key stakeholders are placed into the same ideation space and collectively collaborate toward a goal with mutual value (Rill & Hämäläinen, 2018). However, the goal of the joint workshop was not to reach a consensus on a solution but to empower stakeholders; this is central to all co-creating processes (Vargas et al., 2022).

The joint workshop lasted 3.5h and was conducted near the participating higher education institution's campus. The workshop started with lunch to ensure an open atmosphere and promote participants' well-being by ensuring that they were physically prepared to engage in the session and able to focus. This was followed by a presentation about the workshop objectives and desired outcomes, a summary of identified problem areas and proposed content to accommodate these. This was considered essential to ensure a shared understanding of the clinical placement challenges that the stakeholders perceived. It also allowed the participants to recognize that their previous input (from phase 2) was valued. The e-learning designers presented examples of online learning resources to facilitate creativity and ideas about solutions for the interactive educational resource. Participants were then placed into four smaller heterogeneous groups of 5–8 people. When possible, we placed two student nurses and two registered nurse mentors with a nurse educator in each group to minimize power imbalances (e.g., Könings et al., 2021). The e-learning designers involved in the study also participated in the groups to guide the discussions about potential technological solutions.

The joint workshop was run using a similar format to phase 2 to structure the workshop and productively handle topics and discussions. Each group worked with three predefined topics with related questions; participants were invited to reflect and comment on proposed content and ideate the resources to be included in the digital educational resource regarding contextual, motivational, and interactive aspects of learning (Ileris, 2003). There was a focus on discussions about resources to enhance supervisory approaches, learning activities, and assessment strategies to accommodate the predefined learning outcomes. This aimed to ensure the co-creation of an aligned pedagogy (e.g., constructive alignment) (Biggs, 2014). The workshop ended with a plenary session in which the various groups presented their thoughts and ideas to the whole group, and the facilitator summarized vital discussions.

3.5 | Between phases 3 and 4

The co-creative process needed to be downscaled between phases 3 and 4 due to the COVID-19 pandemic and related restrictions and concerns. The pandemic led to considerations about risks of exposure in joint workshops, increased work pressure and

strain for all stakeholders, including the research team, and ethical safeguards. Therefore, we had to support the development of the interactive educational resource by piloting an early prototype of the digital educational resource solely targeting quality dimension b – improving nurse mentors' supervision and assessment competencies. Between phases 3 and 4 (December 2019–October 2020), the research team worked exclusively on developing a partial prototype of the full-scale educational resource. The research team and e-learning designers reviewed, prioritized and balanced ideas, feedback and input from the joint workshops (i.e., the ideating phase) against the theoretical underpinnings and other considerations, including practical issues (e.g., time and resources to develop content, resources and digital functions to be included in the prototype).

3.6 | Phase 4: Prototyping a digital educational resource to enhance mentorship practices

In the prototyping phase, artefacts are generated to address critical challenges to get designers closer to the final solution. A prototype can be anything a user can interact with (Hasso Plattner Institute of Design, n.d.). Due to COVID-19 restrictions, we arranged separate workshops with registered nurse mentors ($n=7$) and student nurses ($n=6$) in October 2020. The workshop with registered nurse mentors aimed to present, discuss and obtain feedback on the language, design and content of a partial prototype of the digital educational resource to enhance mentorship practices before pilot testing (February–April 2021). A draft of the proposed content of this partial prototype was emailed to the registered nurse mentors before the workshop with an invitation to read and prepare comments and input to improve the workshop's efficiency. This workshop was compared with previous workshops organized with a plenary session that aimed to receive input for final adjustments and plan a pilot study. Three e-learning designers also participated in the workshop to present the design and functionality and assist with potential technical- and design-related concerns. The workshop lasted for 3.5h and was held near the university campus. The workshop with student nurses aimed to receive final input on assessment strategies and tasks incorporated in the partial prototype before pilot testing. This workshop lasted 2h and was held at the university.

3.7 | Between phases 4 and 5

Based on the participants' inputs, the research team worked alongside the e-learning designers to make final adjustments to the partial prototype (November 2020–January 2021). The partial prototype was finalized and named "DigiViS", a Norwegian acronym for digital supervision in nursing. DigiViS represents a digital educational resource target to enhance practices in registered nurses' mentorship of student nurses in clinical education in nursing homes.

3.8 | Phase 5: Pilot testing and evaluation to refine and spark new ideas

In the test phase, feedback is solicited from users about the prototype that has been created. This provides another opportunity to promote empathy for the people the prototype is being designed for. Information and data derived from the execution and evaluation of prototypes can enhance a programme's effectiveness and generate new ideas (Hasso Plattner Institute of Design, n.d.). To further inform the full-scale interactive educational resource, we pilot-tested and evaluated the usefulness of the DigiViS partial prototype with 30 registered nurses mentoring first-year student nurses across three nursing homes (February–April 2021). To ensure access to the DigiVIS resource, it was offered as an online WebLink that could be easily accessed from all types of digital devices (e.g., desktop computers, laptops and smartphones). Tablets were distributed to the enrolled participants to facilitate DigiVIS use. In addition, nine nurse educators were invited to test and evaluate the digital educational resource during the same time frame while overseeing first-year students in a clinical placement in nursing homes further to inform the full-scale interactive educational resource's development. The partial prototype's usefulness was evaluated using qualitative focus group interviews with pilot group participants. The pilot study aimed to evaluate the educational resource (DigiViS) and inform the final development of the full-scale interactive digital educational resource targeting all stakeholder groups (student nurses, nurse educators and registered nurse mentors) and quality dimensions (supervision and assessment competencies, student nurses' reflective thinking skills and learning experience, tripartite communication and collaboration). The pilot study and evaluation have been documented and reported elsewhere (Frøiland et al., in review; Laugaland et al., in review).

3.9 | Phase 6: Refine prototype and solutions

Due to COVID-19 restrictions and related consequences, the final development phase (April 2021–January 2022) involved the research team working only with e-learning designers and collaborative partners representing nurse experts and academics. This ensured content validity regarding national standards for nursing competency and established academic nursing literature. Considering the external viewpoints of collaborative partners who were not actively involved in the co-creative process was considered beneficial because their insight could help to reframe ideas (Rill & Hämäläinen, 2018). The outcomes of the previous phases in the co-creative process, including the pilot study addressing registered nurse mentors' and nurse educators' perspectives, were used to refine the educational resource's design, content, and functionality. A professional illustrator was hired to create suitable illustrations to accompany the educational resource content.

3.10 | Phase 7: Pilot testing and evaluation

The full-scale digital educational resource, named DigiQUALinPRAX, targeting all stakeholder groups and quality dimensions, was pilot tested and evaluated between February and April 2022 using quantitative and qualitative data with key stakeholder groups according to the study protocol (Laugaland et al., 2020). The DigiQUALinPRAX resource was integrated into Canvas, a web-based learning management system used by learning institutions, educators and students to access and manage online course learning materials and communicate about skill development and learning achievement (Sulun, 2018). All the stakeholders were given tablets during the pilot study to enable and facilitate resource use. Stakeholder engagement was ensured through involvement in pilot testing and evaluation. Based on the evaluation, the DigiVis and the DigiQUALinPRAX resource were revised to accommodate stakeholders' experiences and needs. The digital educational resources co-created in this study are now undergoing continuous evaluation toward successful implementation at the enrolled HEI because co-creation entails continual improvements of outputs or outcomes, creating a continual cycle (Vargas et al., 2022).

3.11 | The impact of COVID-19

The COVID-19 pandemic prolonged and restricted stakeholder engagement during the co-creative process. Following the study protocol (Laugaland et al., 2020), co-creating and finalizing the full-scale interactive digital educational resource should have involved a final workshop with all stakeholder groups. However, due to the COVID-19 pandemic and related national restrictions between phases 5 and 6 (i.e., 2021), it was impossible to carry out the final workshop because of the exposure risk. Digital workshops were suggested to continue the co-creative process. However, dialogue with stakeholder groups showed this was inappropriate because of various concerns. The enrolled students stated that this was undesirable or something they would prioritize due to extensive digital teaching and interaction during the pandemic. Furthermore, some students had graduated (due to the delayed and prolonged process), and the other students were in their final year of study (Graduation June 2021). They had lost interest and willingness to continue engaging with the study. Several participants reported that they could not prioritize further involvement with related activities during the demanding pandemic. Therefore, we acknowledge that the prolonged process and break due to Covid-19 restrictions affected the co-creative process; enrolled stakeholders may have lost momentum, interest and willingness to actively engage in co-creation.

4 | DISCUSSION

This study has three notable strengths. First, we used a robust co-creative approach based on design thinking methodology. Second,

the study involved integrating multiple stakeholder perspectives in the co-creative process. Finally, the co-creative process was informed and grounded in theoretical and pedagogical frameworks.

Although design thinking has gained popularity in higher education, it has not yet been widely applied in nursing education (Beaird et al., 2018). This demonstrates the novelty of the co-creative process described in this paper. A relatively recent review (McLaughlin et al., 2019) identified limited literature associated with design thinking in health professional education. Design thinking challenges educator-centred approaches and has been proposed as a methodology for building student nurses' creativity, problem-solving and empathy (Beaird et al., 2018), which are necessary to address healthcare's dynamic challenges. Although this study's co-creative process was affected by the COVID-19 pandemic, applying the design thinking methodology was beneficial. Combining design thinking with the stakeholders' skills and expertise helped us to generate more meaningful, effective and appealing content and design solutions that fit the marginal nursing home context (Jacobsen et al., 2020). These were more implementation-ready and had enhanced value for use by the wider stakeholder group (Roddy & Polfuss, 2020; Könings et al., 2021). Design thinking is a structured approach that efficiently and actively engages students and registered nurses as essential partners in an ongoing dialogue about the quality of clinical education in nursing homes. This could promote the more effective functioning of the educational and healthcare systems.

The integration of all critical stakeholders when co-creating digital educational initiatives in clinical nursing education also merits consideration. Co-creation is usually confined to activities at the classroom level and, as such, is typically limited to learning and teaching methods (Dyson, 2018). Consequently, co-created initiatives for clinical settings are underrepresented in the literature (O'Connor et al., 2022). This is surprising because 50% (90 ECTS) of bachelor nursing programmes involve clinical placements. The inclusion and active engagement of registered nurse mentors with diverse backgrounds allowed new perspectives and essential insights to emerge in the co-creative process, representing critical perspectives informing educational initiatives (Frøiland et al., 2023). Previous studies have emphasized the need to strengthen collaborations between academic educators and registered nurses in clinical settings to learn from each other's practice, reduce theory–practice divides and decrease the hierarchical separation between academic educators and clinical practitioners (Dev et al., 2020). Students' voices must also be empowered in higher education, including nursing education (Bovill et al., 2015; O'Connor et al., 2022). In our study, the student nurses represented important resources of various lived experiences and knowledge. They possessed the agency and transformative power to improve their educational experiences through co-creation (Lac & Cummings Mansfield, 2018). The active engagement of learners in educational design can support change and promote the professional development of educators and learners (Könings et al., 2014).

Furthermore, we applied both heterogeneous and homogenous workshops as primary co-creative activities. Workshops are often applied as strategies for stakeholder engagement in

co-creative processes. However, a systematic review on co-production, including co-design and co-creation in nursing education (O'Connor et al., 2021), indicates that workshop application in higher nursing education has been less frequently applied than other activities, such as individual and focus group interviews. The workshops facilitated efficient dialogue around learning, supervision, and assessment. They ensured the systematic mapping of problem areas and highlighted solutions. We gathered significant insight, and stakeholders were motivated and learned from each other (Frøiland et al., 2023; Laugaland et al. (in review). The homogenous workshops with various stakeholder groups conducted during phase 2 built trust and enabled thorough mapping of each stakeholder's problem areas without the effects of internal tensions or power imbalances, which can hamper effective contribution in co-creation processes (Könings et al., 2021). The heterogeneous workshops enabled all stakeholders to participate in discussions in which divergent viewpoints were aired openly (Frøiland et al., 2023; Laugaland et al., in review). To address hierarchy and power imbalances, our approach was informed by previous studies (e.g., Martens et al., 2020) suggesting that researchers must consider the nurse educator to student and registered nurse mentor ratio during heterogeneous workshops to ensure inclusiveness and facilitate valuable conversations and discussions. The scheduling, location, participant preparation and facilitation were also vital to the success of the co-creative process described in this paper. These experiences align with researchers' recommendations about co-design approaches to develop educational interventions for healthcare teams (Pallesen et al., 2020). The workshops were scheduled in close collaboration with the nursing home management teams to ensure their needs were considered when arranging times for registered nurse mentors' participation. Despite the challenges associated with the COVID-19 pandemic, the nursing home management allocated time for the nurse mentors to participate in the workshops because they recognized the value of their engagement. Stakeholder preparation was beneficial because it made the time spent together during the workshops more valuable and limited excessive inputs and time spent by the researchers. However, preparation material should be carefully selected to ensure relevance and a minimum workload; this might influence participants' willingness to participate and engage in co-creative activities (e.g., Dugstad et al., 2019). During the workshops, we learned that facilitation was essential for maintaining an open and inclusive environment. Therefore, the active use of inspirational cards and post-it notes kept the process informal and helped us to make the workshops more fun, prompting participants' creativity and innovation (e.g., McLaughlin et al., 2019).

This paper also described how the interactive digital educational resource co-creation was based on an aligned pedagogy (e.g., Biggs, 2014) in which learning and supervision activities and assessment strategies were tailored to enhance students' learning outcomes. A strong pedagogical framework is essential when designing educational technology-enhanced learning initiatives to support learning, competency development and other outcomes

(Deschênes et al., 2019; O'Connor et al., 2022). Previous studies emphasize that pedagogical theories can add a depth of understanding to this participatory approach and provide a robust evidence base for co-creative approaches in nursing education (O'Connor et al., 2021). The application of Illeris' (2003) learning theory was beneficial in guiding the co-creative process and outcomes. Illeris' theory ensured that the digital educational resource's design, content, and functionalities were consciously considered. Attention was paid to the content dimension, the affective, motivational dimension (design, functionality and ease of use) and the interactive dimension, all of which are essential for learning.

However, the co-creation of digital educational resources involved several challenges. Our experiences extend and confirm earlier research about the investment of time and resources in co-creation activities (e.g., Dugstad et al., 2019; Dyson, 2018), which might have been reinforced by the COVID-19 pandemic and led to a lack of continuity (e.g., fragmented participation). This creates challenges in upholding the momentum of the co-creative process (e.g., interest, willingness, and engagement). We also learned that it is vital to consider student nurses' timeframes, course of study, and duration when engaging them in co-creative processes. Furthermore, researchers should assess how continuity, interest, motivation and engagement can be sustained through co-creative processes. Based on our experience and in line with others, we recommend continuous evaluation of co-creative processes in nursing education to better account for, document, and learn from success factors and barriers (Iniesto et al., 2022; Muller-Schoof et al., 2023). It was also challenging to recruit participants, especially student nurses, to the co-creative process. Recruitment challenges have been previously reported in higher education research (Vadeboncoeur et al., 2018), highlighting that successful recruitment requires researchers to develop a thorough understanding of harder-to-reach populations (Savard & Kilpatrick, 2021). This can help researchers understand the motivators and challenges for recruitment requiring tailored recruitment strategies (Daly et al., 2019). Furthermore, we found that a lack of digital, design thinking or pedagogical competence may restrict the co-creation of digital educational initiatives in nursing clinical education. The inclusion and presence of e-learning designers in the active phases of the co-creative process was a critical success factor, especially during the ideating phase, where stakeholders' lack of digital competence harmed their creativity. Recruitment and competence-related issues must be addressed when planning and conducting co-creative approaches in nursing education.

5 | LIMITATIONS

This study involved some limitations that must be considered. First, the co-creative process described in this study was limited by a relatively small sample size and conducted at one higher education institution in Norway. Nevertheless, the co-creative process and issues raised are relevant internationally, particularly for nursing education

programmes involving participatory approaches and design thinking methodology activities to enhance clinical nursing education quality. Second, potential research biases must be acknowledged; the co-creative process was conducted by researchers with a nursing education background, which gave them a prior understanding of the context. The researchers who conducted the workshops were nurse educators at the same educational institution as the students. Nurse educators were also enrolled in the co-creative process, creating a dynamic of insider research (Floyd & Arthur, 2012; Unluer, 2012). The fact that researchers led the co-creative activities from the participants' institutions might represent a source of bias. It may have influenced the participants to speak less freely than they would have with an external research team leading the co-creative activities. However, previous research has also suggested that familiarity and established intimacy promote more efficient knowledge-sharing (Unluer, 2012). We attempted to control research biases by continually self-reflecting (Floyd & Arthur, 2012) and receiving input from nurse academics from other educational institutions who were not involved in the active co-creative process. Finally, the measures associated with the COVID-19 pandemic may have hindered the active involvement of stakeholder voices throughout the co-creative process, including amplification of some voices and restriction of others.

6 | CONCLUSION

The co-creative process discussed in this study represents a novel methodological approach within educational research in nursing and, more specifically, in the context of clinical education. This study sought to extend current knowledge about the methodological development processes of co-created educational interventions, providing an opportunity for a greater critical appraisal of interventions and the facilitation of knowledge exchange. Co-creative approaches and the application of design thinking methodology in nursing education are important avenues for further research. The relative novelty of design thinking in nursing education means that knowledge gaps must be explored. We still lack systematic knowledge about the impact of co-created educational initiatives, stakeholders' motivation, barriers, participation facilitators and the role of context and leadership in supporting effective co-creative processes and increasing the quality of nursing education. Furthermore, future research should compare countries, approaches and types of students and stakeholders to learn more about the individual and institutional determinants of co-creating educational initiatives, including digital learning resources. Ultimately, for co-creation to be effectively applied in nursing education, the broader political context of nursing and nursing education must be acknowledged.

AUTHOR CONTRIBUTIONS

Kristin Alstveit Laugaland: study design, conceptualization, methodology, active co-creative process, manuscript writing, funding acquisitions. Kristin Akerjordet: study design, conceptualization,

methodology, critical revisions for important intellectual content, funding acquisitions. Christina Frøiland: study design, conceptualization, methodology, active co-creative process, critical revisions for important intellectual content. Ingunn Aase: study design, conceptualization, methodology, active co-creative process, critical revisions for important intellectual content. All authors approved the final version of this paper.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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SUPPORTING INFORMATION

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