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Preservice teachers' experiences of observing their teaching competencies via self-recorded videos in a personalized learning environment

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We investigated how preservice teachers observe and analyze their competencies through self-reflection and video-learning community strategies and how self-recorded videos influence their microteaching experience. We aimed to improve preservice teachers' competencies in light of the Saudi National Professional Teaching Standards. Semi-structured interviews were conducted, and a thematic analysis was performed to extract themes identifying preservice teachers' experiences and perceptions. The results indicated that the use of self-recorded videos can influence the microteaching experience and help identify development gaps, analyze weaknesses and strengths, and reflect upon them. The results showed that preservice teachers hold positive perceptions and experiences of self-recorded videos to improve their Saudi National Professional Teaching Standards competencies via self-reflection and video learning community. Furthermore, personalized learning principles benefit preservice teacher training programs through self-reflection and self-analysis without coach intervention. This study presents discussions, implications, and recommendations that are relevant to both researchers and practitioners.

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Introduction

Preservice teacher (PT) training programs worldwide have adopted microteaching video recording as a mixed reality learning environment (Amobi, 2005; He & Yan, 2011; Ismail, 2011; Önal, 2019). This innovative approach combines physical objects with digital visualization to create an immersive and interactive learning experience (Quint et al., 2015). The use of mixed-reality simulated classroom technology has been implemented in PT education programs with the aim of providing repetitive experiential learning opportunities (Ersozlu et al., 2021). By reviewing their own microteaching recorded videos and engaging in reflective practices, PTs can foster their teaching skills and deepen their learning engagement and motivation (Ke et al., 2016). Notably, the use of video recording tools minimizes psychological issues associated with anxiety and shyness that may arise during peer-to-peer role-play scenarios (Donnelly & Fitzmaurice, 2011). Furthermore, the ability to repeatedly view their recorded videos allows PTs to observe themselves uninterrupted, without immediate feedback and evaluation from coaches or classmates (Alexander et al., 2012; Ananthakrishnan, 1993). The integration of simulation technologies and microteaching effectively reduces the variability and complexity of the teaching experience, bridging the gap between PTs and real-life application by optimizing situated learning and reflective practice approaches (Griffiths, 2016; Ledger & Fischetti, 2020). Ultimately, microteaching offers a valuable opportunity for PTs to master teaching skills and develop their self-efficacy (Griffiths, 2016).

This study adopted microteaching to improve PTs' competencies and practices, and identify strengths, weaknesses and the zone of proximal development (ZPD) for such competencies (Arnesen et al., 2019; Saban & Çoklar, 2013; Vygotsky, 1978; Wolper, 2016). Microteaching enables PTs apply their teaching competencies and facilitates their practice in a real-world context (Allen & Eve, 1968; Remesh, 2013). Many studies have identified several strategies and techniques to improve PT competencies, one of which is microteaching video recording (Alexander et al., 2012; Önal, 2019; Remesh, 2013). This study, therefore, investigates how PTs experience SRVs of their microteaching to observe and analyze their competencies through Self-Reflection (SR) and the Video-learning Community (VLC) in light of the Saudi National Professional Teaching Standards (SNPTS).

The current study focused on SNPTS' *professional practices* domain, which includes: (1) teaching preparation, planning, and implementation; (2) development of interactive and supportive learning environments; and (3) evaluation and assessment practices (see Appendix B). We used a *teacher professional development platform* (Edthena) to provide PTs the opportunity to record and upload videos of their microteaching and then use SR or VLC to observe and analyze the recordings. To achieve innovative and creative teaching preparation practices, we implemented personalization principles, including personalized instructional goals, learning interests, personal learning choices, learner control and independency, and personalized assessment and evaluation (Ainley et al., 2002; Bray & McClaskey, 2016; Sota, 2016; Watson & Watson, 2017), through which PTs can identify their development gaps based on their learning needs and interests during microteaching (Arnesen et al., 2019; Saban & Çoklar, 2013; Vygotsky, 1978; Wolper, 2016; Alamri et al., 2020; Alamri et al., 2021) and without intervention from their teaching coaches. Therefore, the following research question was formulated:

1. How do PTs experience SRVs of their microteaching to observe and analyze their competencies via SR and VLC strategies in light of the SNPTS?

Theoretical framework

This study draws on microteaching theory and practices to support knowledge and skill acquisition, which can be transferred to the PTs' prospective teaching profession (Hargie, 1982). Personalized learning principles and theories to map how PTs experience their learning and training within microteaching is another important dimension of the framework. They were implemented to aid PTs in leading and tailoring the learning process to their needs and interests rather than a one-size-fits-all learning environment (Ainley et al., 2002; Bray & McClaskey, 2016; Sota, 2016; Watson & Watson, 2017; Alamri et al., 2020; Alamri et al., 2021). Three dimensions of the national teaching standards were considered in this study to determine the needed competencies that PTs should master during preparation programs. The observation and analysis of the recorded videos increase the knowledge transfer (Goeze et al., 2014), thus enhancing the chance to master the targeted teaching competencies. We adopted this framework to promote the use of personalized learning principles to develop the optimal learning environment for PTs and help them reap maximum benefits from microteaching practices (see Fig. 1).

Literature review

Microteaching. Microteaching has been widely used in PT training programs to practice teaching in a simulated environment or in real classroom settings (Amobi, 2005; He & Yan, 2011; Ismail, 2011; Önal, 2019), where its history can be traced to the 1960s (Allen & Eve, 1968). Microteaching has many definitions, such as it is "a scaled down teaching encounter in class size and time" (Allen, 1966, p. 1) and "a system of controlled practice that makes it possible to focus on specific teaching behavior and to practice teaching under controlled conditions" (Allen & Eve, 1968, p.182). The utilization of microteaching has a dual purpose: It serves as a platform for participants to learn by observing their peers and allows them to observe themselves through the video (Donnelly & Fitzmaurice, 2011). In a microteaching setting, PTs prepare lesson plans on a topic, and then they execute them whether in a simulated environment (e.g., with classmates) or real teaching setting to practice and refine their teaching behaviors and skills based on feedback from classmates or coaches (Ananthakrishnan, 1993; Önal, 2019; Ledger et al., 2019). Microteaching is usually conducted through a cycle of planning, teaching, criticizing, re-planning, reteaching, and re-criticizing (Peker, 2009). This cycle is usually conducted by focusing on one teaching skill or competency to achieve mastery (Ostrosky et al., 2013; Peker, 2009; Remesh, 2013), where PTs record videos and observe targeted segments for improvement. Önal (2019) found that microteaching helped PTs obtain feedback and improve their reflective skills. In their comparison study, Setyaningrahayu et al. (2019) demonstrated that PTs who used videos were more particular and analytical in their teaching practice reflections, whereas the group that relied on memory-based reflection tended to reflect generally and descriptively.

Professional teaching standards. The SNPTS, launched in 2017 (Education & Training Evaluation Commission, 2017), includes the following teaching standards: (1) teaching preparation, planning, and implementation; (2) development of interactive and supportive learning environments; and (3) evaluation and assessment practices. These standards are part of the professional practices domain and include 14 competencies that PTs must master before graduation (see Appendix B). Saudi Arabia requires colleges of education to prepare PTs based on the SNPTS and ensure mastery of competencies specified under each standard to

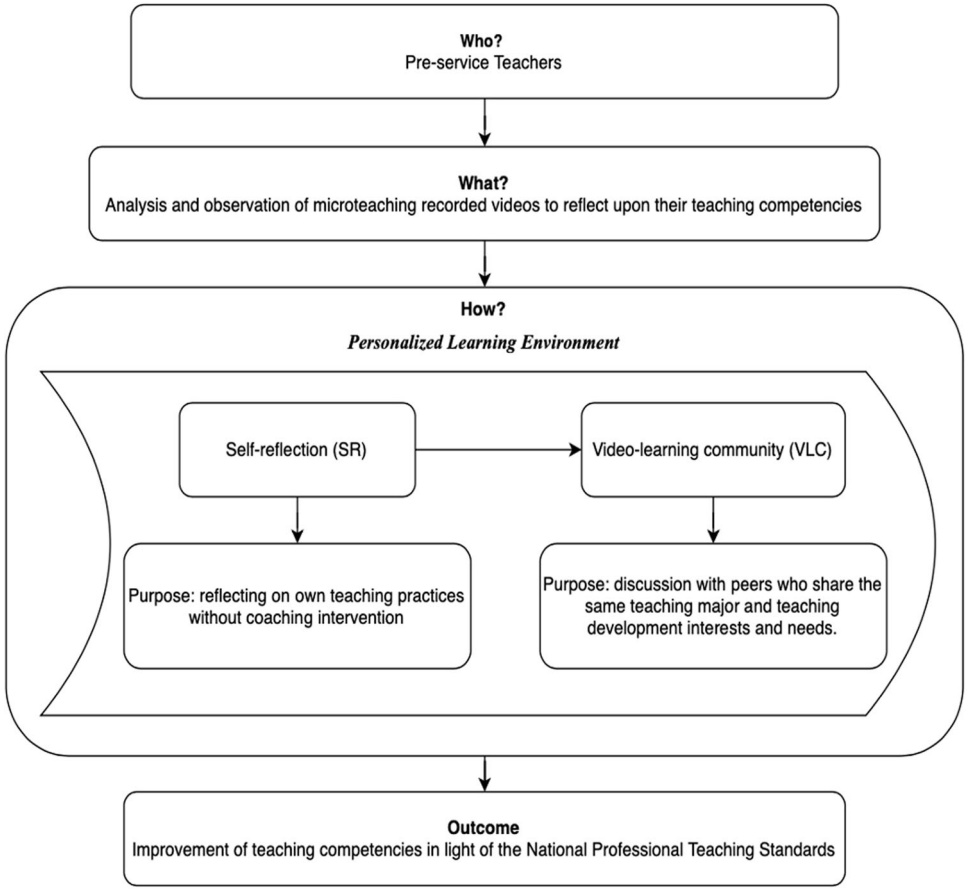

Fig. 1 Theoretical framework diagram. A theoretical framework is proposed to enhance the utilization of personalized learning principles in order to establish an optimal learning environment for preservice teachers. This framework aims to facilitate the PTs' ability to derive maximum benefits from microteaching practices, achieved through the process of observing and analyzing recorded videos.

be ready for the teaching field (Education & Training Evaluation Commission, 2017) (see Appendix B). Such preparation includes microteaching in a real classroom setting for one semester to acquire real-world practical experiences. The SNPTS, developed based on scientific research and domestic and international experiences, is comparable with the best international teaching standards to achieve the best teaching preparation practices and improve PTs' teaching quality and outcomes.

Analysis and observation of recorded videos. Learning from video observation is crucial in PT preparation programs (Alexander et al., 2012; Rosaen et al., 2008). Here, PTs observe and analyze their teaching and self-evaluate to identify errors, issues, or gaps to improve their teaching practices in an analytical environment (Borko et al., 2008; Cherrington & Loveridge, 2014). Recent studies show that analyzing one's own recorded videos of teaching had a strong positive effect on teachers' professional visions and assists in identifying gaps for improvement (Gold et al., 2021). Geller and O'Donnell (2017) describe video observation as a strategy that transfers standard classroom observation to virtual platforms to observe oneself or partners. This strategy helps identify their current teaching competency and determine areas requiring improvement and professional growth (He & Yan, 2011). Video observation helps teachers identify and detect issues in their teaching practices and facilitate easier and closer evidence-based examination to present these issues to other teachers. Studies have revealed that video recordings and observation helped PTs gain feedback and improve their reflective skills (Alexander et al., 2012; Ananthakrishnan, 1993; Borko et al., 2008; Borko et al., 2011; Setyaningrahayu et al., 2019).

Alexander et al.'s (2012) PT case studies found that observing video recordings can improve PTs' instructional performance and teaching behaviors and increase their performance and awareness of targeted instructional behaviors. For Geller and O'Donnell (2017), video observation includes teachers in the process of teaching, recording, and observing, which help them identify their errors. Video observation is contrary to in-person observation, where teachers only receive constructive feedback from others (Ananthakrishnan, 1993). Video observation can be effectively conducted through two strategies: SR and VLC (Geller & O'Donnell, 2017).

Self-reflection. In SR, PTs first plan how they will video-record themselves (e.g., the subject and duration). SRVs primarily aim to obtain a clear picture of one's teaching practices, then consequently undergo self-reflection (Cherrington & Loveridge, 2014). In this strategy, teachers decide what to focus on, determine the times that will be recorded, and then observe and self-reflect on professional development goals. Geller and O'Donnell (2017) recommended that video recordings should be approximately 30 minutes long. After planning and recording, teachers view the recordings on a platform and comment on identifying teaching patterns and behaviors and areas of improvement. Teachers can adopt this strategy and continue recording the same instruction to determine gaps and track their own improvement areas (Geller & O'Donnell, 2017). Therefore, this study adopted this strategy to provide PTs the opportunity to record and observe videos on a

platform and then reflect on their teaching practices without intervention or participation. PTs are then asked to generate ideas to refine their teaching practices and improve toward the mastery of SNPTS competencies.

Video-learning community. In group reflection or VLC, PTs share and discuss their areas of improvement with a group of classmates with the same teaching majors and teaching development interests and needs. VLC focuses on collective learning for teacher groups instead of individual teacher development. Reflections from multiple classmates with different views on teaching would maximize the benefit and quality of reflection, promoting PTs' teaching practices (Beisiegel et al., 2018; Borko et al., 2008; Borko et al., 2011; DuFour & Eaker, 2009; Geller & O'Donnell, 2017). PTs were invited to analyze a partner's video recording, comment on their strengths, and provide recommendations to address weaknesses (Saban & Çoklar, 2013), bolstering PTs' professional development (Ananthakrishnan, 1993). In action, a PT group establishes a purpose and professional goals that need improvement; the group then records videos and provides comments and recommendations (Geller & O'Donnell, 2017). This learning community usually consists of six to eight PTs. The PTs are encouraged to identify the vital parts of the videos so that classmates can focus on them instead of analyzing them randomly. Finally, the community decides whether to stay within the same purpose of the video recording or move to the next. Consequently, the community learns together and evaluates and monitors their learning (Borko et al., 2008; Borko et al., 2011; DuFour & Eaker, 2009; Geller & O'Donnell, 2017).

Personalized learning environment. Personalized learning (PL) is a learner-centered environment based on learning theories, such as Bruner's constructivism for supporting autonomous, active, and independent learners; Vygotsky's social interaction, contextualization, and ZPD; and goal settings (Watson & Watson, 2017). PL replaced the traditional learning environment, which relied on instructors and fixed learning goals (Redding, 2014). This study implemented PL principles, including personalized instructional goals, learning interests, personal learning choices, learner control and independence, and personalized assessment and evaluation (Ainley et al., 2002; Bray & McClaskey, 2016; Sota, 2016; Watson & Watson, 2017), to help PTs identify learning goals and direct their learning based on their needs and interests. We adopted the Department of Education Office of Educational Technology's (2016) definition of PL:

Personalized learning refers to instruction in which the pace of learning and the instructional approach are optimized for the needs of each learner. Learning objectives, instructional approaches and instructional content (and its sequencing) all may vary based on learner needs. In addition, learning activities are meaningful and relevant to learners, driven by their interests, and often self-initiated. (p. 7).

PTs determine their learning goals, identify competencies for development, and then record videos using SR or VLC and observe and analyze them to enhance the targeted competencies (Arnesen et al., 2019).

Methods

Research design. We adopted a qualitative research design to investigate how PTs experience SRVs of their microteaching, where they observe and analyze their SNPTS competencies through SR and VLC. We developed an in-depth interview protocol based on the aforementioned SNTPS standards and competencies, focusing on PTs' preparation. We also thematically analyzed the interviews, and examined how PTs perceived their observation and analysis via SR and VLC to improve their teaching competencies.

PT education in Saudi Arabia is a four-year program that culminates in the award of a Bachelor of Education degree (RCQE, 2017). The program comprises two phases, namely a general education phase and a professional education phase. The general education phase is intended to provide students with broad-based education in liberal arts and sciences, requiring them to take courses in Arabic, Islamic studies, English, mathematics, science, and social studies (RCQE, 2017). The general education phase aims to equip students with a comprehensive understanding of the world, preparing them to address the challenges of teaching in a diverse and rapidly evolving society, thereby enhancing their effectiveness as teachers. The professional education phase, on the other hand, is designed to prepare students to become competent teachers by providing them with the necessary knowledge and skills regarding teaching methods, curriculum development, assessment, and educational technology. The professional education phase's goal is to enable PTs to plan, deliver, and evaluate instruction effectively, thereby contributing positively to their students' learning outcomes.

Moreover, Saudi Arabia's PT education program mandates students to complete a teaching internship in addition to their coursework (Ministry of Education MoE (2018); KSU, 2020). This teaching internship provides students practical experience in the classroom and is typically carried out during the final semester of the program. Students are assigned to a mentor teacher and work alongside them in the classroom, aiming to apply the knowledge and skills learned in the program. The teaching internship's goal is to help students become more confident and effective teachers by offering them the opportunity to practice teaching (KSU, 2020). Upon successful completion of the PT education program, graduates are qualified to teach in public schools within Saudi Arabia (KSU, 2020).

The Ministry of Education in Saudi Arabia oversees the accreditation and quality assurance of PT education programs. The ministry has established standards and guidelines for the program's curriculum, faculty, facilities, and resources. The aim is to ensure that PTs receive a high-quality education that prepares them to meet the demands of the teaching profession and contribute to the development of the education system in Saudi Arabia (Education & Training Evaluation Commission, 2017).

Research context. This study was conducted at eight different schools in Riyadh, Saudi Arabia. The PTs were enrolled in a teacher preparation program in an educational college of a university in Riyadh. This program produces approximately 150 PT graduates every semester. The PTs in this program are required to microteach for a semester in real school settings as part of their preparation program before school deployment.

Before their deployment, we introduced all PTs to the procedures and strategies for self-recording and sharing videos through Edthena, which provides features and tools for analysis, observation and reflection to identify the development gaps in their teaching competencies. PTs diligently adhered to the "Photography Regulations inside Schools", a comprehensive set of guidelines that stipulated the necessity of seeking prior approval from the school principal for any video recording within the school premises. Additionally, they ensured the acquisition of written consent from parents for recording their children during school events and activities, as outlined by the Ministry of Education (MoE) in 2019.

The PTs were guided to identify competencies that they thought required improvement based on their own needs and interests rather than it being determined by their teaching

coaches. Then, the PTs were required to observe, analyze, and self-reflect on their videos to identify their weakness and strengths; based on this, plan the next video recording. The PTs were also asked to share their videos with colleagues to obtain peer feedback. To implement community learning, the PTs were encouraged to share their videos with all groups (assembled by teaching majors) and conduct synchronous (virtually and face-to-face) and asynchronous (platform forums) group discussions.

Microteaching video recordings were implemented to encourage PTs to learn and practice their teaching competencies in an analytical environment (Borko et al., 2008). The videos were used only by the students to evaluate themselves and identify gaps requiring improvement. During the implementation phase, we explained that the videos were only for their own observation, analysis, reflection, and peer evaluation but not for assessment by their teaching coaches or school monitors.

We used Edthena, which has features and tools that allow PTs to upload and analyze their videos and write comments and notes within the video segments. The PTs evaluated their teaching competencies in the platform and video analysis, wrote reflections about their microteaching, and avoided merely watching the videos without further analysis. They were required to write their reflections to transition toward the next teaching competency.

This study implemented procedures to achieve SR and VLC goals in PTs' program settings. First, the PTs planned their video segment recording individually (with coaches or colleagues) and decided on the targeted competencies to be focused on in video segments. Second, during their teaching practicum, the PTs diligently produced 5–10 min videos. These videos either featured themselves, following the necessary authorization from the school principal, or the entire classroom, for which they similarly secured permission from the school principal and obtained written consent from parents.

Third, they individually decided whether to use the video for SR or VLC. Finally, the PTs uploaded the video on the platform for video observation and analysis.

During SR, the PTs used the platform's features and tools to analyze their SRVs and comment on their performance without others' (coaches' or colleagues') scrutiny. This provided the PTs the opportunity to record and watch the videos without intervention and improve themselves rather than being evaluated by others (coach or colleagues) (Geller & O'Donnell, 2017). In this strategy, the video and its analysis served as a mirror for self-evaluation and self-monitoring of teachers' development. Meanwhile, in VLC or group reflection, the PTs uploaded and shared their SRVs with others for feedback and evaluation. The PTs group decided on the video segment that will be recorded and the competencies that require development. After uploading the video, the partners evaluated and provided feedback and reflections on the targeted competency. Receiving feedback from the learning community can benefit PTs and promote their teaching practices (Geller & O'Donnell, 2017). Notably, coaches are neither involved in these procedures and strategies, nor do they decide the development gaps for the PTs; the process was completely independent, aiming to provide personalized and individualized learning experiences that meet PTs' learning interests, needs, and choices (Alamri et al., 2020; Alamri et al., 2021).

Edthena platform. Edthena is a cloud-based platform designed to enhance teachers' practice through video-based coaching and collaboration. It provides teachers with a platform to record, share, and receive feedback on their teaching. Additionally, Edthena offers a range of resources and tools, such as lesson plans, standards alignment tools, and professional development opportunities, to support teachers' professional learning and improve their instruction. Edthena's video coaching platform also helps teachers identify areas for improvement and make changes to their practice. Edthena has been adopted widely by teachers in all 50 US states and in over 100 countries worldwide. The platform has received praise from educators and education leaders alike, who have recognized its effectiveness in improving teachers' practice and promoting student learning.

In this study, PTs utilized either the recording features provided by the Edthena platform or their own cameras to record videos of their teaching. These videos were then uploaded to the platform while adhering to the relevant uploading procedures. Once uploaded, the PTs were given the option to select one of the two provided strategies: the SR and VLC strategies.

In the SR strategy, PTs used the features and tools the platform provided to code, reflect upon, and comment on their own videos. These tools helped PTs identify areas of strength and in need of improvement.

In the VLC strategy, PTs shared their videos with their coaches and colleagues, who provided feedback and comments. This collaborative process allowed PTs to receive input from multiple perspectives and learn from their peers. The platform facilitated this process by providing features and tools to enable collaboration and communication among PTs and their colleagues.

In both strategies, the PTs engaged in analysis and reflection to improve their teaching competencies. The platform's features and tools supported this process by providing PTs the means to reflect upon their teaching practice and receive feedback from multiple sources.

In accordance with the *Evidence of Practice: Playbook for Video-Powered Professional Learning* (Geller & O'Donnell, 2017), a training package was developed to facilitate the Edthena platform's utilization, along with implementation of the SR and VLC strategies. The playbook provided instructions for integrating these strategies with the platform. Preceding the implementation phase, training sessions were administered, and ongoing technical and pedagogical support was rendered throughout these strategies' implementation.

Participants. The participants were PTs from different backgrounds and majors, including English as a second language, computer sciences, and art education. The participants' average age was 23.8. The PTs were enquired about their technology background and mastery of the basic ICT skills, and only two participants indicated advanced ICT skills, whereas the rest held moderate-level ICT skills. Most participants recorded two videos and shared them through the platform. Seven participants had positive perceptions of SRV, while only one participant had a negative perception of SRV. Furthermore, all the participants had positive perceptions of the benefits of using SRV to improve teaching skills (see Table 1). Seven participants enrolled in the educational college with great intention to become teachers, and only one participant enrolled to become an interior designer. Most participants were motivated to become teachers.

Data collection. We conducted data collection during the 2019–2020 academic year. The participants were invited to participate in this study interview during the final weeks of the semester, and all preservice teachers had the opportunity to participate in this study. Semi-structured interviews were developed based on the national teaching standards to examine how preservice teachers (PTs) experience SRV of their microteaching by observing and analyzing their teaching competencies through SR and VLC strategies (see Appendix A). The teaching standards were based

Table 1 Interview participants' demographics.

Interviewees (Pseudonym)	Age	Teaching major	ICT background	Number of videos recorded	Perception toward SRV	Perception toward benefits of SRV to improve teaching skills
Ali	24	ESL	Advanced	2	Positive	Positive
Mutab	24	Art Education	Moderated	2	Positive	Positive
Majed	24	Art Education	Moderated	2	Positive	Positive
Abad	24	Computer Science Education	Moderated	2	Positive	Positive
Abdullah	24	Computer Science Education	Moderated	2	Positive	Positive
Ahmed	23	ESL	Moderated	2	Positive	Positive
Abdulaziz	Unknown	Computer Science Education	Moderated	2	Negative	Negative
Khaled	24	Computer Science Education	Advanced	2	Positive	Positive

on the aforementioned three SNTPS standards. The interview also included exploratory and motivational questions that allowed PTs to express themselves freely regarding the observation and analysis of SRV. We conducted the interviews in face-to-face settings, and audiotaped and transcribed the interviews verbatim. Both researchers conducted interviews simultaneously to ensure that all the interview questions and prompts were captured, which can enrich the interview data. Each interview lasted for approximately 30–50 minutes, and IRB approval was obtained prior to data collection.

Data analysis. We followed a qualitative research design using the thematic analysis approach. First, we audiotaped and transcribed the interviews to prepare for coding, categorizing, and theme identification (Boyatzis, 1998; Braun & Clarke, 2006). In the coding and categorizing procedures, we followed Saldaña's (2016) three coding cycles. We conducted the first coding cycle using sentence-level coding to understand the data and deepen the analysis procedures. Here, we applied a deductive coding approach to analyze the themes that are connected to the research questions and interview questions and prompts (Braun & Clarke, 2006). For instance, the participants were asked to share their thoughts about SRV use to support their observation and analysis, and SRV's contribution to their improvement based on the SNPTS. Then, deductive coding was conducted to identify the factors and themes and organize them based on the research questions and SNPTS. Second, an inductive coding cycle was conducted to extract themes that emerged from the data and were not included in the research and interview questions (Braun & Clarke, 2006; Saldana, 2016). Thus, these themes are identified as emerging themes in the results section. Finally, the third coding cycle was conducted to conclude and verify the themes and results found in this study (Saldana, 2016). The codes were documented and analyzed, and both researchers discussed each code until we reached a consensus and established consistency to ensure the validity and dependability of the results. Each code and theme were included only if enough participants' quotes were determined and included in the analysis procedures (see Table 2).

Data trustworthiness. To ensure data trustworthiness, peer debriefing meetings were conducted regularly to raise our understanding and avoid bias during data collection, analysis, and interpretations (Onwuegbuzie & Leech, 2007) We employed the videos shared by the participants on the platforms to confirm the findings of the interview data and prove their claims regarding their teaching competencies and practices. We also used thick descriptions of the SNPTS, interviews, and participants to establish the transferability of the findings to similar contexts.

After the analysis phase, a member-checking approach was applied to share the results with participants and ensure the results' credibility. To ensure the consistency and reliability of the findings, we followed a semi-structured interview protocol (Appendix A) to collect data. Then, two researchers conducted all eight interview analyses and compared the findings to reach a consensus. Both researchers participated in the third coding cycle to finalize the findings.

We audiotaped, transcribed verbatim responses, included positive and negative findings, and incorporated direct participants' quotes to ensure the study's dependability. To establish confirmability, an interview protocol was developed based on the SNPTS, and the protocol was peer-reviewed by two volunteer "learning design and technology" professors; revisions were made based on their review. Subsequently, to ensure face and content validity, the interview was piloted with two volunteered experts to test the interview times and identify any issues that could cause major problems during the actual interviews.

Interview questions were translated into Arabic as it was all the participants' first language. Both researchers translated the interview, and other two expert professors reviewed and approved the translations. Data were analyzed and documented in Arabic, and the participants' responses were translated into English.

Results

Research Question 1. *How do PTs experience SRVs of their microteaching to observe and analyze their competencies via SR and VLC strategies in light of the SNPTS?*

We used PL so that the PTs could identify their learning needs and interests. We asked the participants about their experiences of video recording their microteaching to report how they observed and analyzed their competencies based on the SNPTS. We performed a deductive qualitative analysis based on three themes: teaching preparation, planning, and implementation; development of an interactive and supportive learning environment; and evaluation practices (see Appendix B). The study results revealed that the participants held positive experiences of self-recording their microteaching. Seven out of eight participants indicated that the SRVs helped them improve their teaching competencies to achieve better teaching practices and meet the SNPTS (see Table 2).

Teaching preparation, planning, and implementation. This standard includes five competencies that PTs should master before their deployment to teaching (see Appendix B). Generally, the interview results showed that SRVs contributed to improving PTs' targeted competencies under this standard.

Table 2 Alignment of SNPTS standards, competencies, PTs' perceptions of SRVs, and learning outcomes.

RQ	Standards (SNPTS)	SNPTS competencies	Strategies' contribution to the improvement of PTs' competencies during microteaching	Learning outcomes	Data sources
RQ1	1. Teaching preparation, planning, and implementation	Teaching lesson preparation	- SR contributed positively (4 out of 8 participants)	- Positive	Interviews
		Using various teaching methods and strategies	- SR contributed positively (4 out of 8 participants)	- Positive	Interviews
		Using learning resources and instructional technologies	- SR contributed positively (1 out of 8 participants)	- Positive	Interviews
		Development of common curriculum priorities, values, and skills	- SR contributed positively (4 out of 8 participants) - VLC contributed positively (1 out of 8 participants)	- Positive	Interviews
		Development of students' critical thinking and innovation skills	- SR contributed positively (4 out of 8 participants)	- Positive	Interviews
	2. Development of interactive and supportive learning environments	Setting high performance expectations	- Both strategies did not contribute	- No Evidence	Interviews
		Student behavior management	- Both strategies did not contribute	- No Evidence	Interviews
		Development of an attractive learning environment	- SR did not contribute - VLC contributed positively (1 out of 8 participants)	- No Evidence - Positive	Interviews
		Effective management of teaching time	- SR contributed (3 out of 8 participants)	- Positive	Interviews
		Applying a range of verbal and nonverbal communication skills to enhance learning	- SR contributed (7 out of 8 participants) - VLC contributed positively (2 out of 8 participants)	- Positive	Interviews
	3. Evaluation practices	Development and implementation of evaluation and assessment tools	- SR contributed (6 out of 8 participants) - VLC contributed positively (1 out of 8 participants)	- Positive	Interviews
		Students' engagement in the evaluation processes	- SR contributed (1 out of 8 participants)	- Positive	Interviews
		Utilization of evaluation and assessment results	- SR contributed (1 out of 8 participants)	- Positive	Interviews

The SNPTS states that teachers must master the *teaching lesson preparation* competency. The results showed that the participants benefited from the SR of their recorded videos as it improved their preparation for teaching lessons. SRVs were perceived as helpful in lesson planning and enhancing participants' ability to adjust their plans when they commit teaching errors. Mutab said, "I took a day and came back [to the self-recorded video] to observe the video. I noticed a weak point during my teaching. The lesson introduction was not related to the lesson."

The SNPTS requires teachers to master *using various teaching methods and strategies*. The interviews indicated that the participants showed improvement in this competency. Abad said, "I will continue [using self-recorded video], and I would record an instructional video and use flipped classroom strategy."

The results also indicated that the participants benefited from rethinking their teaching strategies. Ahmad said, "I tell myself that it will be better if I use a group activity in this lesson instead of lecturing." Furthermore, the SRVs helped the PTs in reconsidering their teaching strategy to create more effective educational situations. However, one participant was concerned about changing his teaching strategy because of the subject matter's nature and its effect on students' daily schedules.

According to the SNPTS, teachers must master *using learning resources and instructional technologies*. The interviews showed that one participant's SR of their SRVs positively helped him use learning resources and consider trying new teaching and learning tools, such as videos. Abad said, "I gave a two-minute video to my students and asked them to draw conclusions about certain content. Then, I taught it to them through discussion." Meanwhile, the other PTs did not provide any evidence that SRVs helped them improve on this competency. We observed that SRVs did not assist PTs in improving their technology integration because most of them had moderate proficiency in that aspect.

The SNPTS requires teachers to master the *development of a curriculum's common priorities, values, and skills*. The results indicated that participants' SR of their SRVs improved their teaching practices regarding a curriculum's common priorities, values, and skills and helped them cultivate values within the curriculum. Khaled said, "After observing the first video, I realized that I should promote the value of greetings among my students. Therefore, I recorded a second video for a lesson to promote the value of greetings by using Scratch."

To obtain feedback, we implemented VLC to encourage students to share their videos with their colleagues. The interviews showed that sharing these videos with the Edthena learning community helped in disseminating different ideas among participants to enhance curriculum values and skills. Mutab said, "One of my colleagues asked for my permission to use one of my lessons to promote a certain value after he saw the video that I recorded."

The SNPTS states that teachers should be proficient in the *development of students' critical thinking and innovation skills*. The results showed that the SRs of some participants in the SRVs improved their teaching practice regarding this competency. Three out of eight participants indicated that the SRVs helped them evaluate and monitor their teaching practices and learning activities to enhance students' critical thinking and innovation skills.

Development of interactive and supportive learning environments. This standard included five competencies outlining the development of interactive and supportive learning settings (see Appendix B). We explored whether the SRVs helped develop PTs' competencies in providing interactive and supportive learning environments during their microteaching. The interviews showed the value of SRVs in improving the targeted competencies under this standard.

The SNPTS requires teachers to master *setting high performance expectations*. Some participants indicated that the SRVs did not help them set high goals and expectations because the school policy prevented them from recording the whole classroom to observe students' performance. Others mentioned that as students liked and enjoyed the courses (e.g., arts and computer), the PTs did not need to set high expectations and goals as students were already motivated and engaged. Therefore, the participants did not find SRVs to be a valuable strategy for improving their skills for setting high performance expectations.

According to the SNPTS, teachers must develop *student behavior management*. The PTs performed video observations to encourage themselves to consider how they deal with students' positive and negative classroom behaviors. According to the participants, the SRVs did not help them develop or improve this competency.

The SNPTS states that teachers must master the *development of an attractive learning environment*. The results revealed that the SR in SRVs did not support this competency. However, most participants showed sufficient skills in designing and developing an engaging learning environment. However, some participants benefited from VLC when sharing their SRVs with the Edthena learning community to show strategies for motivating and engaging students.

The SNPTS expects teachers to master *effective management of teaching time*. According to the interviews, the SR in SRVs helped the PTs develop this competency. Three out of eight participants stated that the SRVs effectively helped them manage their teaching time.

The SNPTS requires that teachers master *applying a range of verbal and non-verbal communication skills to enhance learning*. The interviews showed that the SR in SRVs supported this competency. We found that seven out of eight participants benefited from using microteaching videos in evaluating, monitoring, and improving their verbal and non-verbal communication. Ahmed said, "When I saw the video, I noticed that I spend a lot of time discussing a topic. I should give my students the chance to talk." Ahmed also stated, "Yes, when I saw the video. I realized that I should raise my voice when talking, and in some situations, it was better if I lowered my voice. Re-watching it [SRV] has benefits." The participants also indicated that the SRVs served as a mirror through which they observed their miscommunications, language use, and nonverbal communication. Khaled said, "When I watched the recorded video, I realized that I can respond to situations differently. Sometimes, I should respond more humorously and other times, the response can be natural." Sharing the SRVs with colleagues through VLC also helped participants improve their body movement. For instance, Khaled said, "Sometimes when I saw the recorded video, I discovered that I turn my back toward my students, so the movement must be equal for all students. This comment was also provided by one of my peers."

Evaluation practices. This standard includes four competencies covering major evaluation practices (see Appendix B). We investigated three of them, and whether the SR of SRVs helped improve PTs' evaluation skills during their microteaching. We excluded the development of assessment reports because the SRVs do not apply here.

The SNPTS requires teachers to master the *development and implementation of evaluation and assessment tools*. The results showed that six out of eight participants sufficiently met this standard. In addition, Ahmed said, "Yes, sometimes I print

conversations and ask students to practice role-play to ensure that they practice speaking and to evaluate their speaking level … Other times I use peer evaluation." One of the participants showed the ability to use technology as an evaluation tool. Ali said, "I used [the] Roulette Game to randomly choose students' names and ask them to answer a question within two minutes." According to the interviews, five out of eight participants indicated that the SR of SRVs supported their self-monitoring and self-improvement in evaluation tool development and implementation. Furthermore, two out of eight participants stated that the SR of SRVs helped them self-evaluate and self-monitor their strengths and weaknesses in evaluation methods for students. Abad said, "Video helps me see that I did wrong. So, it always showed me my mistakes, and it is better than being evaluated by my professor." Additionally, discussing SRVs with colleagues through VLC helped the participants obtain positive feedback, evaluation, and assessment methods. Mutab said, "Yes, I am getting better. We always discuss the recorded videos in a group and compare which evaluation method is more appropriate."

According to the SNPTS, teachers must master *student engagement in the evaluation process*. The interviews showed that SRVs minimally contributed to the PTs' improvement regarding this competency. Seven out of eight participants did not provide any evidence that their SR of SRVs developed their engagement with students during the evaluation process.

The SNPTS states that teachers should develop their *utilization of evaluation and assessment results* to promote the learning process. This requires teachers to use evaluation results and statistics to improve their teaching practices and achieve better student learning outcomes. The interviews revealed that SRVs did not help the PTs' improve this competency. Seven out of eight participants did not provide any evidence that their SR in SRVs improved their use of evaluation results to enhance the learning process. (See Table 2).

Discussions and implications

We intended to explore the PTs' microteaching experiences using SRVs to self-reflect on their SNPTS competencies. We implemented two strategies for video observation and analysis: SR and VLC (Geller & O'Donnell, 2017). We followed personalization principles to provide PTs the opportunity to identify their learning gaps based on their needs and interests within the SNPTS framework (Arnesen et al., 2019; Alamri et al., 2020; Alamri et al., 2021).

This study contributes to the literature by exploring the benefits of using the SRVs through SR and VLC strategies and the Edthena platform, which provides the PTs with video analysis tools and a virtual space to share their videos with colleagues. When the participants were informed that the video recordings were for SR or VLC and within a PL environment, they liked the idea, were receptive to recording more videos, and enjoyed the process. We told the participants that the videos would not be assessed by the school administration or their teaching coaches, which was a major issue. All participants appreciated the idea of using SR and VLC for self-evaluation, and particularly enjoyed conducting SR to improve their teaching practices (Cherrington & Loveridge, 2014). In this study, SR and VLC were helpful for most participants.

This study also strengthens the literature by discussing the potential of SRVs to improve teaching practices based on national teaching standards. Our results show that SRVs and the two strategies (SR and VLC) can improve PT competencies. Specifically, these strategies were found to improve 11 out of the 14 targeted teaching competencies. The three competencies that were not perceived to be improved (setting high performance expectations, students' behavior management, and effective management of teaching time) are difficult to address using video recordings and independently through a PL environment (Arnesen et al., 2019; Alamri et al., 2020; Alamri et al., 2021). Indeed, when the PTs trained for these competencies, they needed to be observed by their teaching coaches to ensure they developed these skills. To acquire these competencies, the PTs must use better-designed and better-implemented video recordings and observations during their microteaching.

Further, this study discussed the potential of implementing PL principles in PTs' training and practice via SR and self-analysis without intervention from their coaches (Alamri et al., 2020; Alamri et al., 2021). This study is unique as it focuses on personalization principles to investigate microteaching to improve PTs' competencies (Ainley et al., 2002; Bray & McClaskey, 2016; Sota, 2016; Watson & Watson, 2017). We focused on allowing students to identify their development gaps and work diligently toward closing these gaps and addressing their teaching weaknesses (Saban & Çoklar, 2013) instead of providing a traditional microteaching environment that relies on coaches' assessment. This study provided the PTs with a personalized and independent environment that responds to their learning needs and interests (Alamri et al., 2020; Alamri et al., 2021). The PTs showed positive attitudes and perceptions toward this environment and preferred the independence and personalization approach over the traditional one. All participants successfully identified the ZPD gaps in their learning and improved their teaching practices based on individual observation (Arnesen et al., 2019; Alamri et al., 2020; Alamri et al., 2021).

Additionally, the PTs held positive views about the videos as they helped them evaluate, reflect on, and identify their development gaps. They also enjoyed the Edthena platform, which facilitated their analysis of the videos and their written reflections instead of traditional reflection and note-taking. The participants also found that the tools helped them share their videos with colleagues and obtain constructive peer feedback (Ananthakrishnan, 1993; Önal, 2019; Ostrosky et al., 2013).

In this personalized learning environment, the role of faculty members serving as coaches for the PT education programs is pivotal in facilitating PTs' learning. These coaches act as guides, mentors, and facilitators, offering personalized support and guidance to PTs as the latter navigate their learning journey. Coaches in personalized learning environments work in tandem with PTs to identify their learning needs, interests, and strengths, and to tailor learning experiences accordingly. Moreover, they aid PTs in setting goals and tracking progress, as well as provide continuous feedback and support to facilitate the PTs' attainment of learning objectives (Ainley et al., 2002; Bray & McClaskey, 2016; Sota, 2016; Watson & Watson, 2017; Alamri et al., 2020; Alamri et al., 2021).

Teaching preparation, planning, and implementation. While examining the PTs' experiences of video recording their microteaching to improve teaching preparation, planning, and implementation, we found that the SR strategy contributed positively to PTs' improvement in the five competencies under this standard. The PTs found the SR strategy to be helpful because it allowed them to review their teaching practices and behaviors and improve based on the identified learning gaps. The SR was perceived to play a role in improving the following PT competencies: teaching lesson preparation and planning; use of various teaching methods and strategies; development of common curriculum priorities, values, and skills; and advancement of students' critical thinking and innovation skills. When the PTs observed and

analyzed the videos, they noticed errors in their lesson plan preparations and teaching strategies (Geller & O'Donnell, 2017; Savaş, 2012). Furthermore, without intervention from their coaches, they identified these mistakes and corrected them in the next lesson independently, within an analytical and PL environment (Alamri et al., 2020; Alamri et al., 2021; Borko et al., 2008), which was this study's focus. They also observed their independence in using one teaching method and attempted to vary them in the next lesson. This study examined how these processes improved the PTs' ability to monitor their learning progression and enhanced their teaching competencies, helping them obtain their teaching certificate.

We also found that the VLC positively contributed to the PTs' improvement in one out of five competencies included in this standard. The VLC helped enhance the PTs' development of common curriculum priorities, values, and skills. The PTs benefited from each other when they shared the videos with their Edthena VLC. The participants indicated that they focused mostly on the shared priorities, values, and skills within a curriculum more than any other competencies. They also believed that the VLC strategy was helpful because it allowed them to obtain peer feedback and learn different teaching ideas to further improve on this competency without intervention from their coaches. Overall, the VLC can be implemented to increase communication and interaction among PTs.

However, the VLC was not perceived to help improve PTs' preparation of teaching lessons, utilization of different teaching methods and strategies, use of learning resources and instructional technologies, and development of students' critical thinking and innovation skills. This might be because the participants did not share the video segments that targeted these competencies.

Development of interactive and supportive learning environments. We found that the SR helped PTs improve on two out of five competencies under this standard. The SR was considered advantageous for effective teaching time management and applying a range of verbal and nonverbal communication skills to enhance learning. The PTs benefited from the SR by adjusting their instructional practices during their teaching time. Furthermore, the SR also seemed to be an effective strategy that allowed the PTs to evaluate their own verbal and non-verbal communication skills. Additionally, the PTs found that the strategy helped them observe how they communicated with their students verbally and non-verbally without any outside evaluation. Within the PL environment, the PTs also assessed their own verbal and non-verbal communication. Most of them considered this benefit as essential because it revealed their teaching gaps and errors, which later allowed them to enhance their instructional practices and avoid issues associated with their verbal and non-verbal communication skills.

However, the PTs did not perceive SR as helpful in improving how they set high performance expectations, manage students' behaviors, and develop an attractive learning environment. Some PTs indicated that they were not able to set high performance goals and expectations because the school policy prevented them from recording the whole classroom to observe the students' learning performance; moreover, the students did not need high performance expectations as they already liked and enjoyed the courses and were motivated (e.g., arts and computer).

Thus, the PTs needed to develop student behavior management skills. We examined whether the SR of SRVs can help PTs improve this competency so that they are ready to handle students' behaviors during their teaching. However, the results showed that SR was not considered an adequate strategy to develop or improve student behavior management.

Most participants did not view the SR of SRVs as helpful in their development of an engaging learning environment because they were already confident in designing and developing such an environment and did not need to analyze their video segments regarding this competency.

Meanwhile, the VLC helped the PTs improve their development of an attractive learning environment and application of verbal and nonverbal communication skills to enhance learning. They benefited from sharing their videos with colleagues using the VLC, which facilitated their understanding of designing and developing motivational learning environments for students (Ananthakrishnan, 1993; Borko et al., 2008; DuFour & Eaker, 2009; Geller & O'Donnell, 2017; Saban & Çoklar, 2013;). The PTs also found that the videos were a powerful tool for observing how their colleagues developed an engaging learning environment and interacted with learners (DuFour & Eaker, 2009; Geller & O'Donnell, 2017).

Evaluation practices. We found that SR positively influenced PTs' improvement in the three competencies under this standard: development and implementation of evaluation and assessment tools, students' engagement in the evaluation processes (one participant), and utilization of evaluation and assessment results (one participant). Some participants stated that the use of videos through SR can improve their ability to assess students' learning. Some participants held positive perceptions about the SR of SRVs and believed that these videos facilitated their development and implementation of evaluation activities and tools. They also perceived that this strategy served as a mirror to evaluate the students' engagement in the evaluation processes. SR allowed the PTs to change their mindset regarding the development and implementation of evaluation tools. This strategy allowed them to ponder on the true purpose of the assessment, eliminating unnecessary aspects. In other words, SR was the best strategy to help the PTs see how their perspective and thinking have evolved. For example, assessment may only target a particular knowledge area, such as retention. The results indicated that SR is a powerful strategy that can modify how the PTs think about measuring students' learning.

Meanwhile, most participants did not consider the VLC to be useful in empowering their evaluation practices as they mostly preferred to execute their self-evaluation independently via SR. Nevertheless, we found that the VLC was helpful for one participant, who mentioned that discussing his video segments with colleagues supported their development and implementation of evaluation and assessment tools. He believed that the VLC was a beneficial strategy for comparing other colleagues' assessment and evaluation methods as well as obtaining insights that address their learning and development gaps (DuFour & Eaker, 2009; Geller & O'Donnell, 2017).

Conclusion

This study investigated PTs' experiences when using SRVs, and observed and analyzed them through two strategies, SR and VLC, during their microteaching based on the SNPTS. We implemented personalization principles that allow PTs to identify their development gaps based on their learning needs and interests (Alamri et al., 2020; Alamri et al., 2021) within the SNPTS framework. We used Edthena and instructed the PTs to record videos and upload them on the platform for SR and self-analysis using the platform's features or share them with colleagues through VLC and obtain feedback on their microteaching practices.

Through a qualitative research design, we found that SRVs are a powerful tool to support PTs' teaching preparation and

improvement of their teaching competencies. We concluded that the SR of SRVs is an effective strategy to facilitate PTs' learning and development, enabling them to identify their development gaps and weaknesses (Saban & Çoklar, 2013), and encourage them to independently improve their teaching competencies and practices. SR was effective in motivating the PTs to change their teaching behaviors. Moreover, PTs could benefit from the VLC by sharing the videos with a learning community with common learning interests and needs. Moreover, this study's results revealed several obstacles that might prevent PTs from recording themselves to observe and analyze their teaching competencies during their microteaching, including the school district policy for recording videos, school infrastructure, and difficulties in using Edthena.

This study concluded that most participants preferred the SR of SRVs because it was implemented through PL. We contributed to the literature by demonstrating that SRV is a powerful tool if implemented via SR and VLC during microteaching to improve PTs' SNPTS competencies and teaching practices. Furthermore, we also focused on the idea of using PL as an instructional strategy to help PTs independently evaluate their performance and identify their development gaps.

We suggest designing microteaching training environments that implement PL principles to allow the PTs to learn and develop based on their needs and interests. While PTs must work within the SNPTS framework, we recommend giving them the opportunity to become independent and active learners who can identify their learning needs and interests (Ainley et al., 2002; Arnesen et al., 2019; Bray & McClaskey, 2016; Saban & Çoklar, 2013; Sota, 2016; Vygotsky, 1978; Watson & Watson, 2017; Wolper, 2016).

Limitations and future recommendations. This study has the following limitations. First, the interviews were the only data source. We recommend adopting mixed methods to explore this research problem with multiple data sources. Second, this study depended on PTs' perceptions as the main data source, which might have produced biased results. Hence, we suggest conducting a content analysis to analyze the PTs' videos and explore their teaching practices and competency development. To study the effectiveness of these strategies and tools in PTs' professional development, we recommend the adoption of experimental studies. Third, PTs were unable to record the whole classroom because of school district policy restrictions, which might have negatively influenced the results of this study. To address this, we recommend replicating the current study after making alterations to the school district policy by allowing teachers to video-record the whole classroom to observe their professional development. Fourth, the lack of sufficient school infrastructure (e.g., internet access, educational technology tools) prevented the PTs from implementing innovative and creative teaching practices, strategies, and activities, and then video-recording them to strengthen their teaching practices in light of the SNPTS. Therefore, we recommend evaluating the schools' instructional technology infrastructure and readiness prior to recording videos for future research.

Availability of data and materials

The datasets produced and/or analyzed in the present study are not publicly accessible due to the university's policy regarding the privacy of participants. However, upon reasonable request, the corresponding author can provide access to the datasets utilized and/or analyzed in the study.

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Author contributions

Both authors contributed to writing the manuscript and conducted the interviews with the participants. H.A. wrote the literature review, methods, and discussion sections. A.A. analyzed and interpreted the qualitative data as well as writing the results section. All authors read and approved the final manuscript.

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Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

Ethical approval

The Subcommittee on Human and Social Research Ethics at King Saud University, to which the authors are affiliated, granted approval for this study. In order to ensure ethical standards were met, voluntary participation and informed consent were required. The participants were provided with a detailed explanation of the study's objectives and procedures.

Informed Consent

Participation in the study was entirely voluntary, and no pressure or coercion was exerted on the participants. Prior to their involvement in the study's interview, all participants explicitly provided their consent, underscoring the voluntary nature of their participation. They were also made aware that they had the freedom to withdraw from the study at any stage, without facing any negative consequences or penalties.

Additional information

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