

Effect of Flexible Learning Modality On Nursing Orientation Of A Tertiary Hospital In The Kingdom of Saudi Arabia

Marianne Vireynato Laylo, RN

<https://orcid.org/0009-0009-1002-9804>

St. Bernadette of Lourdes College

Email Address: mariannevlaylo@kfshbnseduc.com

ABSTRACT

The orientation of newly hired nurses into their professional roles is a formative process that relies heavily on the efficacy of nursing orientation programs. Traditionally, these programs have been delivered through face-to-face classroom sessions. However, the advent of COVID-19 has created a pressing need to explore and use flexible, technology-driven learning modalities to protect healthcare personnel from potential infections, marking a major shift in educational methods. This study explores the impact of integrating technology through flexible learning modalities on the nursing orientation program in a tertiary hospital in the Kingdom of Saudi Arabia. The study used a descriptive correlational design with total enumeration sampling, including 201 participants for quantitative data and 22 for qualitative data. The synthesis of the qualitative and quantitative data suggests that integrating technology into the nursing orientation program positively affects participants' learning experiences and outcomes. Specifically, the qualitative insights complement the quantitative findings by providing a deeper understanding of participants' perceptions and experiences with technology, while the quantitative results validate technology's effectiveness in improving knowledge retention, satisfaction, and probationary performance among newly hired nurses. Overall, the combined analysis underscores the importance of leveraging technology in nursing education and training to improve outcomes and support nurses' professional development.

Keywords: *Flexible learning modalities, Nursing orientation, Technology integration, Tertiary hospital, Kingdom of Saudi Arabia, Staff nurse onboarding, Probationary performance*

INTRODUCTION

In healthcare, orienting newly hired nurses into their professional roles is a formative process that relies heavily on the effectiveness of nursing orientation programs. Traditionally, these programs have been delivered through face-to-face classroom sessions. However, the advent of COVID-19 has created a pressing need to explore and use flexible, technology-driven learning modalities to protect healthcare personnel from potential infections, marking a major shift in educational methods.

As Head of the Nursing Education Department, the researcher plays a central role in advancing nursing orientation and educational programs. With responsibilities that include developing and implementing curriculum, overseeing instructional methodologies, and continuously assessing and improving program outcomes, the researcher's position is integral to shaping the future of nursing education within the organization. In this capacity, the researcher has spearheaded the design of the General Nursing Orientation program, which serves as the foundational stage for integrating new nurses into the hospital's complex and dynamic clinical environment. The GNO program is a multifaceted curriculum designed to equip novice nurses with the core competencies and operational knowledge needed for their roles. This involves not only teaching critical nursing practices and principles but also cultivating the practical skills needed to navigate the many dimensions of patient care.

The GNO program reflects a concerted effort to balance theoretical instruction with practical, hands-on experience. It begins with an online, asynchronous learning module that lets nurses familiarize themselves with key concepts at their own pace. The program then transitions to a more interactive phase, where nurses engage in unit-specific orientation and become familiar with the particularities of their assigned clinical areas and the competencies pertinent to those units.

This research therefore sits at the intersection of technology and nursing education, arguing that the strategic use of online and flexible learning tools can enhance the orientation experience for nurses, thereby improving workforce readiness and patient care outcomes. Through the proposed study, the researcher aims not only to present a detailed analysis of the status quo but also to formulate enhancement guidelines that could serve as a beacon for similar healthcare settings embarking on educational transformation in a rapidly evolving global health paradigm.

Statement of the Problem

The main objective of this study was to investigate the effect of a flexible learning modality on the nursing orientation program of a tertiary hospital in the Kingdom of Saudi Arabia, with a specific focus on developing guidelines to improve the Nursing Orientation program. Specifically, it sought to answer the following questions:

1. What is the demographic profile of the nurses who participated in the study in terms of:
 - a. Age
 - b. Gender
 - c. Education level
 - d. Years of nursing experience
2. What is the effect of the use of technology in the nursing orientation program in terms of:
 - a. Knowledge retention
 - b. Satisfaction of newly hired nurses
 - c. Probationary performance of newly hired nurses
3. How do nurses perceive and experience the use of flexible learning modalities during their orientation program at a tertiary hospital in Saudi Arabia?
4. Is there a significant relationship between knowledge retention, satisfaction and probationary performance of newly hired nurses?
5. Based on the results of the study, what enhancement programs in the General Nursing Orientation can be proposed to the management of the researcher's current work setting?

Scope and Delimitations

The scope of this research is specifically bounded to encompass all registered nurses who completed the flexible learning modality orientation program during the calendar years 2020, 2021, 2022, and 2023, and who remain actively employed and assigned across various inpatient and outpatient clinical units within King Fahd Specialist Hospital—a tertiary government healthcare institution under the Ministry of Health in Buraydah, Kingdom of Saudi Arabia. By targeting this multi-year cohort across diverse clinical departments, the study provides a comprehensive, cross-sectional evaluation of nurses who navigated the shift from traditional onboarding to technology-mediated, flexible learning modalities during and immediately after the pandemic transition period.

Review of Related Literatures

Overview of Nursing Orientation Programs

This section examines the core objectives of nursing orientation programs, common challenges, and potential opportunities. It examines the importance of effective orientation in integrating new nurses into the healthcare system, addresses systemic challenges such as information overload, and identifies strategic opportunities to improve retention and job satisfaction. The impact of nursing orientation programs at international, national, and local levels represents a critical area of study. Nursing orientation programs primarily aim to integrate newly hired nurses into the healthcare system by equipping them with the knowledge, clinical skills, and psychological support needed to deliver safe, high-quality patient care. The literature consistently emphasizes the importance of structured orientation programs in supporting new nurses' successful entry into practice, promoting long-term retention, and increasing overall job satisfaction (Camp & Chappy, 2017). Additionally, Santisteban and Egues (2014) highlight comprehensive training modules and intentional mentoring relationships as essential components of an effective nursing orientation framework.

Significance of Flexible Learning Modalities in Healthcare Education

The healthcare landscape is constantly evolving, requiring healthcare professionals to adapt quickly to new medical technologies, updated treatment modalities, and evidence-based patient care approaches. Traditional classroom-based learning models often struggle to keep pace because of rigid scheduling constraints and geographical limitations. Flexible learning—encompassing online instruction, blended learning modalities, and simulation-based training—has emerged as a powerful, viable solution to address these structural challenges while delivering accessible, engaging, and personalized educational experiences (Ahmad et al., 2023). By integrating digital platforms and asynchronous learning repositories into healthcare education, flexible learning offers several operational benefits, including self-paced learning, greater accessibility for geographically dispersed healthcare staff, and tailored content that matches individual learning styles and cognitive needs (Andrade & Alden-Rivers, 2019).

Context of the Study: Tertiary Hospitals in Saudi Arabia

This review focuses specifically on the adoption and impact of flexible learning modalities within nursing orientation programs in tertiary hospitals across Saudi Arabia. The Saudi Arabian healthcare system is undergoing a major structural transformation driven by the national Vision 2030 initiatives, which strongly emphasize technology integration, digital health infrastructure, and advanced nursing education (Alsufyani et al., 2020). The Saudi government has made substantial capital investments to build modern healthcare facilities and attract highly qualified healthcare professionals to meet growing clinical demands. Examining the implementation, execution, and educational outcomes of flexible learning within this specialized context provides valuable empirical insights for policymakers, hospital administrators, and nurse leaders seeking to modernize nursing education, streamline clinical onboarding, and elevate the overall standard of patient care.

Technology in Nursing Education

Technology has revolutionized nursing education, offering innovative ways to enhance learning experiences and prepare graduates for the complex demands of modern healthcare environments. This section explores the history, benefits, and ongoing challenges of integrating technology into nursing education.

Historical Overview

The integration of technology in nursing education is not a recent phenomenon, but an ongoing evolution that has mirrored broader technological advancements over the past several decades. Initially, early technological adoption was characterized by the introduction of basic desktop computers used primarily for administrative tracking, word processing, and elementary instructional drills.

Over time, as clinical care grew more complex, nurse educators shifted toward building sophisticated, high-fidelity simulation laboratories equipped with computerized manikins that mimic complex physiological responses (Penaflor-Espinosa, 2016). A major turning point occurred with the widespread adoption of the internet and centralized Learning Management Systems (LMS), such as Canvas and Moodle. This technological shift revolutionized traditional teaching paradigms by enabling remote access to course materials, asynchronous online learning, and dynamic blended learning models that bridge theoretical instruction with clinical application (Dolan et al., 2021).

Benefits of Technology Integration

Strategic technology integration offers a wide range of substantial benefits for nursing education, fundamentally improving how theoretical knowledge and clinical competencies are taught and retained. First, modern digital platforms foster engaging, immersive, and interactive learning environments. Through high-fidelity clinical simulations, virtual reality (VR) patient scenarios, educational gamification, and continuous access to rich multimedia learning repositories, students can interact with educational content in dynamic ways that traditional lectures cannot replicate (Penaflor-Espinosa, 2016).

Challenges of Technology Integration

Despite its significant advantages, successfully integrating technology into nursing education presents several persistent operational, financial, and pedagogical challenges. Chief among these structural obstacles is the substantial cost of infrastructure. Designing, procuring, and maintaining modern educational technology—including high-fidelity simulation equipment, virtual reality gear, software licenses, and high-speed network connections—requires substantial, continuous capital investments from academic and healthcare institutions (Yu et al., 2013).

Beyond capital requirements, institutional adoption depends heavily on human capital readiness. Academic faculty and clinical preceptors need ongoing professional development, structured technical training, and administrative support to effectively incorporate complex digital tools and e-learning methodologies into their instructional practice (Pomerantz & Brooks, 2017). Without dedicated faculty support, advanced systems often go underutilized.

Theoretical Framework

First, Social Learning Theory, proposed by Albert Bandura, emphasizes the importance of observing and modeling others' behavior. In the context of nursing orientation, this theory suggests that new nurses learn from their experiences and interactions with more experienced nurses and healthcare professionals. The theory posits that through observation, imitation, and reinforcement, new nurses acquire knowledge, clinical skills, and professional competencies. By integrating flexible learning modalities, such as technology-based platforms, the Theory suggests that new nurses can observe and learn from online resources, virtual simulations, and collaborative online communities, enhancing their learning experience during orientation.

Second, in the context of nursing education and technology-driven learning, a theoretical framework that integrates a nursing theory is the Technology Acceptance Model (TAM) combined with Roy's Adaptation Model. The Technology Acceptance Model, developed by Fred Davis, examines the factors that influence individuals' acceptance and adoption of new technologies. When combined with Roy's Adaptation Model, which focuses on individuals' adaptation to stressors and changes in their environment, this framework addresses both the technological and human aspects of nursing education.

According to the Technology Acceptance Model, users' perceptions of technology's ease of use and usefulness play a crucial role in their acceptance and adoption. In the context of nursing orientation programs, nurses' attitudes toward technology, their perceived usefulness of online platforms and virtual classrooms, and their ease of navigating digital learning materials are key factors influencing engagement and learning outcomes.

Conceptual Framework

The conceptual framework for this research consists of three primary components: Input, Process, and Output.

Input: Research Standard Operating Procedures

The Input phase establishes the foundation, institutional guidelines, and theoretical grounding for the entire investigation. This foundational stage begins with defining the scope of the study, which involves explicitly outlining the central research objectives, operational parameters, and core research questions. These elements function as the primary orienting framework for the investigation, systematically directing the evaluation toward identifying actionable, evidence-based improvements for the online General Nursing Orientation (GNO) program at King Fahd Specialist Hospital in Buraydah.

In parallel with establishing the scope, a comprehensive review of current scholarly literature is conducted to establish the baseline context of online and flexible GNO programs globally and within the Saudi Arabian healthcare landscape. This critical synthesis benchmarks the study against existing empirical evidence, ensuring that the research directly addresses established knowledge gaps while incorporating recognized best practices in digital health education.

Finally, securing absolute institutional research integrity is paramount during this initial phase. Strict standard operating procedures ensure informed consent, maintain complete participant confidentiality, protect sensitive data, and adhere strictly to institutional ethics board guidelines throughout all stages of the research.

Process: Research Execution

The Process phase represents the active methodological execution of the research plan, translating conceptual parameters into empirical data through a structured research design. A mixed-methods research design is selected and operationalized to effectively address the study's qualitative and quantitative objectives, providing a rigorous, multi-faceted approach to data gathering.

During data collection, standardized measurement instruments—including quantitative surveys and semi-structured interview guides—are refined, validated, and systematically administered. Data collection strategically engages multiple key stakeholder groups, including onboarding nurses, preceptors, course facilitators, and hospital administrators, capturing a

comprehensive, 360-degree perspective on GNO program efficacy, technology adoption, and organizational impact.

Once collected, the dataset undergoes rigorous analysis. Quantitative survey data is evaluated using descriptive and inferential statistical tools to measure satisfaction and knowledge metrics, while qualitative interview responses are analyzed using thematic synthesis to identify recurring patterns, operational challenges, and participant perceptions regarding flexible learning modalities.

Output: Formulation of Guidelines / Enhancement of GNO Program

The Process phase represents the active methodological execution of the research plan, translating conceptual parameters into empirical data through a structured research design. A mixed-methods research design is selected and operationalized to address the study's qualitative and quantitative objectives, providing a rigorous, multifaceted approach to data collection.

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Through this structured conceptual framework, the research moves from a solid foundation through a systematic process to produce informed, impactful strategies for advancement. The ultimate goal is to refine the GNO program in a way that not only enhances nurses' educational experiences but also aligns with healthcare institutions' broader objectives to ensure a well-prepared nursing workforce.

METHODOLOGY

Research Design

This study employed a convergent parallel mixed-methods research design, combining both quantitative and qualitative approaches to evaluate the impact of a flexible learning modality on the effectiveness of nursing orientation at a tertiary hospital in Saudi Arabia.

The quantitative phase utilized a descriptive, correlational design to evaluate objective outcomes, including knowledge retention (measured through pre- and post-test scores), nurses' satisfaction with the orientation program (via a validated survey), and their clinical performance evaluations during the probationary period. Simultaneously, the qualitative phase employed an exploratory approach using semi-structured interviews to capture the lived experiences, perceptions, and nuanced insights of nurses who completed the flexible learning orientation.

Sample and Sampling Design

The study sample comprised nurses who participated in the modified General Nursing Orientation (GNO) Program. During the pandemic, the program was taught using flexible modalities, including synchronous simulation for Unit Specific Orientation and asynchronous web-based training. The program's main goal was to familiarize new nurses with organizational rules, practices, and guidelines that were important for providing high-quality, patient-centered care.

Data Gathering Procedure

The data-gathering process for this research study followed a series of structured, rigorous steps designed to ensure methodological integrity and strict compliance with ethical standards. These sequential procedures involved seeking formal ethical approvals from the Ethical Review Board (ERB) of Saint Bernadette of Lourdes College and the Institutional Review Board (IRB) of the Al Qassim Health Cluster, establishing collaboration with key administrative stakeholders, obtaining informed consent, enforcing comprehensive data privacy protocols, and executing a dual-phase quantitative and qualitative data collection strategy.

Seeking ERB Approval - SBLC

The researcher began the formal review process by preparing the ERB Application Form and all required supporting institutional documentation. The Research Committee of Saint Bernadette of Lourdes College rigorously evaluated this submission to assess the study's alignment with academic research standards. The committee carefully evaluated the proposed ethical considerations, risk-mitigation measures, and data privacy frameworks to ensure that all planned interactions with participants and data handling complied with institutional regulations and fundamental ethical principles.

Seeking IRB Approval - Al Qassim Health Cluster

In parallel, a detailed research proposal detailing the background, objectives, methodology, data collection instruments, and participant safety measures was submitted to the Institutional Review Board (IRB) of the Al Qassim Health Cluster for official clearance. The IRB panel conducted a thorough review focusing on participant autonomy, potential operational risks, data security protocols, and strict adherence to Ministry of Health guidelines. Approval was granted after confirming that the research design adequately protected healthcare personnel and maintained the highest standards of data confidentiality within the regional health system.

Collaboration with the Research Committee and Nursing Director

After obtaining formal institutional review clearances, the researcher engaged with the hospital's Research Committee to establish institutional support and secure administrative approval for on-site data collection. The researcher also established formal communication with the Director of Nursing to align the data collection timeline with the nursing units' operational workflows. This collaboration ensured the study received administrative backing while respecting clinical schedules, minimizing disruptions to patient care, and supporting the hospital's broader objectives for nursing education and professional development.

Obtaining Consent and Ensuring Data Privacy

Before initiating any primary data collection, the researcher developed a comprehensive, standardized Informed Consent Form detailing the study's purpose, procedural expectations, potential risks, expected benefits, and the voluntary nature of participation. The

document explicitly guaranteed strict data privacy and reassured prospective participants that non-participation or withdrawal would carry no professional repercussions. Staff nurses were given ample time to review the document, ask clarifying questions, and provide signed informed consent before the researcher distributed any survey link or began interviews.

Collecting Staff Information from Human Resources

To establish an accurate sampling frame representing the target population, the researcher coordinated directly with the hospital's Human Resources department. Through this collaboration, the researcher obtained a verified roster listing all staff nurses who completed the General Nursing Orientation (GNO) program under the flexible learning modality between 2020 and 2023 and were actively deployed across various clinical units. Using this official HR registry ensured participant selection was grounded in precise, verifiable institutional criteria, preserving the sample's representativeness and demographic integrity.

Data Collection Process

After obtaining the necessary approvals and participant information, the researcher collected data using Google Forms and took strict precautions to protect data privacy. Access to the online responses was strictly limited to the researcher, thesis adviser, and statistician. The data collection process involved administering the adapted questionnaire to measure staff nurses' satisfaction with the orientation program, retrieving pre- and post-orientation test scores to assess knowledge retention, and securing probationary evaluation records from institutional files.

The qualitative data-gathering process involved interviewing staff nurses using a semi-structured interview guide with open-ended questions to explore their experiences using technology within the flexible learning orientation. The interviews were conducted virtually via Google Meet and face-to-face. With participant consent, the researcher audio-recorded the interviews to ensure accurate data capture and allow focus on the interpersonal interaction during the interview. The recordings were then transcribed verbatim, providing a detailed textual dataset for qualitative analysis.

Before the interviews, the researcher obtained written informed consent from the staff nurses. The consent process involved providing detailed information about the interview structure, purpose, and intended utilization of the data. Nurses could ask clarifying questions before consenting.

As part of the consent process, the researcher sought explicit permission to audio-record. The nurses were informed about the recording process and its purpose. They were offered the choice to consent to audio recording, and the researcher ensured that the decision to participate in the interview was treated separately from the decision to be recorded.

The researcher emphasized data privacy and confidentiality throughout the consent process. Staff nurses were assured that all recordings and transcriptions were securely stored and accessible only to authorized personnel directly involved in the study. Measures ensured that all interview data were anonymized to protect participant identity.

Interview recordings were securely stored in compliance with standard data privacy and security guidelines. Access to the files was restricted to the research team, and all electronic storage was password-protected and encrypted to prevent unauthorized access.

During interviews, the researcher ensured that staff nurses were treated with professional respect and that their autonomy and dignity were upheld. Nurses were encouraged to express their experiences freely within a supportive, non-coercive environment.

The interview protocol, consent forms, and data-handling procedures underwent ethical review and approval by the Institutional Review Board (IRB) of Al Qassim Health Cluster. The IRB evaluated the protocol to confirm adherence to established ethical standards and to protect the rights and well-being of participating nurses.

RESULTS AND DISCUSSION

Quantitative Data Analysis

This section presents the empirical statistical findings from the quantitative phase of the study, evaluating the implementation and outcomes of the flexible learning modality in General Nursing Orientation (GNO). The analysis systematically details the descriptive demographic profile of respondents (age, gender, educational background, and clinical experience) alongside inferential evaluations of cognitive knowledge retention measured through pre- and post-orientation testing. It also quantifies staff satisfaction using a validated instrument and assesses clinical performance from standardized Ministry of Health (MOH) probationary appraisals across four cohort years (2020–2023).

Demographic Profile of the Respondents

This subsection details the personal and professional background of the participating nurses who completed the General Nursing Orientation (GNO) program via the flexible learning modality across four cohort years (2020–2023). Analyzing demographic variables—such as age, gender, highest educational attainment, and years of clinical experience—is essential, as these baseline characteristics directly influence digital literacy, learning styles, and clinical transition outcomes (Al-Mugheed et al., 2022; Kim & Shin, 2021). This profile provides crucial context for interpreting subsequent findings on knowledge retention, satisfaction, and probationary performance appraisals.

Percentage and Frequency Distribution of Respondents According to Age

The table presents the Percentage and Frequency Distribution of respondents by age. The data show that the 25-29 age group has the highest frequency of respondents (102) at 50.75%, ranking 1st.

The 30-34 age group follows with 62 respondents (30.85%), ranking 2nd. The age group 35-39 has 28 respondents at 13.93%, ranking 3rd. The age group 20-24 has the lowest frequency with 9 respondents at 4.48%, ranking 4th. The total number of respondents is 201, representing 100.00%.

Significant Relationship Between Knowledge Retention, Satisfaction, and Probationary Performance of Newly Hired Nurses

This subsection examines the inferential statistical analysis evaluating the interrelationships among knowledge retention scores, participant satisfaction levels, and the probationary clinical performance appraisals of newly hired nurses. Determining whether significant statistical linkages exist across these core parameters is vital to educational evaluation, as it shows whether cognitive gains and positive learning experiences translate into measurable, real-world clinical competence (Kirkpatrick & Kirkpatrick, 2016; O'Connor et al., 2022). Within the context of flexible, technology-enhanced orientation frameworks, demonstrating a strong, positive association across these variables confirms that interactive instructional modalities do not merely improve theoretical understanding, but also cultivate professional engagement and elevate bedside performance standards during critical transition periods (Al-Mugheed et al., 2022; Labrague & De los Santos, 2021). The resulting analysis

provides empirical evidence to support data-driven decision-making for hospital nurse executives and clinical education specialists.

Qualitative Data Analysis

Implementing technology through flexible learning modalities has been central to reshaping the nursing orientation program. Through semi-structured interviews with 22 participants, this research explored how technology affected nurses' learning experiences during orientation. The qualitative data analysis aimed to uncover how technology integration influenced orientation, highlighting implications, challenges, and suggestions for improvement within the nursing orientation program.

The analysis of these interviews revealed 7 themes that captured the diverse perspectives and experiences participants shared about integrating technology into the nursing orientation program.

Theme 1: Positive Influence of Technology on Understanding Nursing Practices

Implementing technology, such as Google Classroom and recorded learning materials, positively influenced understanding of nursing practices during the orientation program. Participants highlighted improved access to resources and stronger collaboration through virtual platforms, leading to a deeper understanding of nursing concepts.

Theme 2: Impact of Virtual Sessions and Recorded Materials on Grasping Nursing Concepts

Virtual sessions and recorded materials provided advantages such as convenience in revisiting content and flexibility in learning pace. However, challenges such as the lack of hands-on experience and potential distractions in virtual settings hindered the full grasp and application of nursing concepts within a clinical setting.

Implementing digital modalities in the orientation program offered distinct advantages alongside specific operational challenges. A primary benefit participants highlighted was the convenience of revisiting recorded instructional sessions, which allowed nurses to pause, rewind, and review complex lectures and procedural demonstrations at their own pace. This self-paced repeatability significantly enhanced cognitive processing and retention, enabling participants to master intricate hospital policies and specialized nursing concepts before entering active clinical shifts. This flexibility also let newly hired nurses work through modules around demanding schedules while supporting self-directed learning and deeper exploration of relevant clinical topics. Underscoring this benefit, Interviewee 3 shared, *“The ability to revisit recorded sessions was a game-changer for me. I could pause, rewind, and review the content at my own pace, which significantly improved my understanding of policies and procedures. Being able to revisit the material multiple times helped a lot.”*

Theme 3: Contribution of Technology Accessibility to Learning Experience

Access to technology tools significantly contributed to the overall learning experience during the orientation program. Participants noted the ease of access to resources and the convenience of using digital platforms for learning, which enhanced their engagement and organization of course materials.

The systematic deployment of technology tools significantly optimized the educational workflow by maximizing resource accessibility and operational convenience for newly hired nurses. Participants emphasized that the capability to access digital learning repositories

anytime and from any location was fundamental in fostering continuous, self-directed professional development.

Furthermore, the option to download instructional content for offline use eliminated connectivity barriers, ensuring uninterrupted study sessions during off-peak hours or personal downtime. Highlighting this seamless access, Interviewee 3 reflected, *“The accessibility of technology tools significantly enhanced my learning experience during the orientation program. Easy access to digital platforms and resources allowed me to study anytime and from any location. This flexibility made it convenient for me to engage with the course materials and stay organized throughout the program.”*

Theme 4: Facilitation and Hindrance of Interaction via Technology

While technology facilitated communication with instructors and peers, technical issues occasionally disrupted the flow of interaction. Participants appreciated the ease of communication but highlighted the need to address technical challenges for seamless interactions and effective collaboration.

Integrating digital platforms into the orientation framework served as a key mechanism for interpersonal communication while also introducing technical operational barriers. On one hand, virtual infrastructure facilitated dynamic interaction, enabling seamless, real-time communication among newly hired nurses, clinical instructors, and peer cohorts through instant messaging and video conferencing tools. These digital channels enhanced collaborative learning during group projects and complex case studies, allowing participants to dissect clinical scenarios collectively and maintain continuous contact with nurse educators regardless of scheduling constraints. Expressing this communicative benefit, Interviewee 22 noted, *“Technology facilitated seamless communication with instructors and peers through virtual platforms.”*

Theme 5: Challenges and Limitations in Technology Utilization

Technical difficulties, including internet connectivity issues and software glitches, posed challenges during the orientation program. Additionally, some participants faced adaptation barriers when transitioning from traditional learning methods to technology-driven approaches, impacting their learning process.

The transition to a technology-driven orientation program created notable operational friction for newly hired nurses, mainly due to technical difficulties and individual adaptation barriers. Systemic technical hurdles—such as software glitches, slow internet connectivity, and hardware compatibility issues—frequently disrupted learning. Furthermore, navigating complex, unfamiliar learning platforms caused initial confusion and required participants to spend time troubleshooting software rather than engaging directly with educational content. Describing these technical obstacles, Interviewee 8 stated, *“During the orientation program, I encountered various technical difficulties that affected my learning experience.”*

Theme 6: Impact of Support and Guidance on Confidence in Technology Use

Positive support and guidance for using technology improved participants' confidence in applying these tools to their nursing responsibilities. Access to assistance and clear instructions boosted their proficiency and willingness to incorporate technology into their practice.

Robust support mechanisms served as a critical catalyst for building confidence and technological self-efficacy among newly hired nurses during the orientation program. Dedicated encouragement and proactive guidance from clinical instructors and IT support staff provided a psychological safety net, enabling participants to navigate new digital platforms without fear of operational failure. Accessible technical assistance—ranging from timely clarification of doubts to step-by-step troubleshooting—significantly improved participants' operational proficiency in utilizing nursing applications and learning management systems. Reflecting on this essential backing, Interviewee 12 shared, “*The support and guidance provided by instructors helped me a lot.*”

Theme 7: Suggestions for Enhancing Technology Integration in Future Programs

Participants shared valuable suggestions for improving technology integration in future nursing orientation programs. Recommendations included comprehensive training sessions, feedback mechanisms for continuous improvement, and exploring additional communication channels to enhance interaction and collaboration.

These qualitative themes closely align with Level 1 (Reaction) and Level 2 (Learning) of Kirkpatrick's Evaluation Framework, as well as the LAYLO model's emphasis on supportive learning environments (Kirkpatrick & Kirkpatrick, 2016). The strong appreciation for flexible, self-paced access demonstrates positive participant reaction and enhanced cognitive engagement, which directly supports knowledge acquisition (Ashton, 2021). Concurrently, the identified adaptation barriers and technical friction underscore the need for continuous institutional support—critical to bridging the gap between theoretical e-learning and confident clinical practice during the probationary transition period (Labrague & De los Santos, 2021; O'Connor et al., 2022).

CONCLUSIONS

The empirical and qualitative findings from Chapter III demonstrate that integrating a technology-driven, flexible learning modality into the General Nursing Orientation program significantly improves onboarding outcomes for newly hired nurses in a Saudi Arabian tertiary hospital setting. The quantitative impact assessment revealed measurable enhancements in cognitive knowledge retention, high participant satisfaction regarding platform accessibility and usability, and exemplary probationary clinical performance appraisal marks. These triangulated findings confirm that e-learning infrastructure, combined with structured instructional delivery, provides a stronger educational foundation than traditional, purely lecture-based orientation models.

Overall, this study highlights the transformative potential of technology-driven flexible learning architectures to optimize cognitive acquisition, elevate job satisfaction, and accelerate clinical readiness among newly onboarded nurses. The evidence provides hospital administrators, nurse executives, and clinical educators with a validated model for modernizing workforce development programs. To sustain these institutional gains, continuous curriculum evaluation, preceptor support systems, and longitudinal tracking remain essential to maximize educational outcomes and support early-career adaptation among nursing staff.

RECOMMENDATIONS

To optimize the General Nursing Orientation program at King Fahd Specialist Hospital–Buraydah, management should implement a standardized, technology-driven flexible learning curriculum that incorporates interactive e-learning modules, clinical simulations, and adaptive self-paced learning paths. Instructional platforms must accommodate diverse learning styles and clinical backgrounds, providing foundational support for novitiates and enabling

efficient progression for experienced hires. Institutionalizing continuous access to digital learning repositories beyond the initial orientation window will enable staff to sustain clinical competencies and engage in lifelong learning (Ashton, 2021).

Hospital leadership and policy coordinators must draft formal administrative policies and clinical guidelines governing technology integration within nursing orientation. These policies should explicitly mandate flexible learning modalities in standard operating procedures, establish clear metrics to evaluate e-learning efficacy, and institutionalize routine assessments of knowledge retention, user satisfaction, and probationary clinical appraisals across all hospital departments. Standardizing these evaluation protocols maintains instructional quality, ensures regulatory compliance, and guarantees equitable educational delivery across clinical units (O'Connor et al., 2022).

Future scholarly endeavors should focus on longitudinal, multi-site studies that track the multi-year retention of clinical competencies and patient safety metrics among nurses onboarded through flexible learning modalities. Researchers should explore the feasibility and cost-effectiveness of integrating advanced immersive technologies, such as virtual reality clinical simulations and artificial intelligence-driven diagnostic tutors, into hospital orientation frameworks. Additionally, investigating institutional barriers, digital literacy variances, and operational friction will yield valuable strategies for refining technology-driven nursing education across broader healthcare settings.

Hospital administration must provide ongoing professional development opportunities for clinical nurse educators and preceptors to strengthen their digital pedagogy and technical troubleshooting skills. Equipping instructional leaders with advanced digital competencies fosters a culture of innovation, enhances peer-to-peer mentoring dynamics, and ensures that e-learning frameworks are supported by responsive instructional guidance, directly strengthening the overall quality of clinical care delivery (Labrague & De los Santos, 2021).

AI DECLARATION STATEMENT

Artificial intelligence (AI) tools were employed only to enhance language quality and formatting. The researcher carried out conceptualization, data analysis, interpretation of results, and formulation of conclusions independently.

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