International Journal of Evolving Health and Nursing Care (IJEHNC)
Vol.1, No.1, Page no. 1-14, December 2025
Received: 02/09/2025; Revised: 13/10/2025; Accepted: 10/11/2025; Published: 30/12/2025

Enhancing Patient Care Delivery through Advanced Clinical Training Methods and Skill Development for Nursing Professionals

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Abstract: This paper focuses on enhancing the effectiveness of training and skill development of nursing professionals in order to improve patient care delivery. Although teaching at the bedside is an essential component of training, it has become inadequate in today's healthcare contexts. This motivated the creation of a new integrated training framework C - SCAPE Model (Clinical Simulation, Continuing education, AI, and Practice-based Evidence). It incorporates Clinical Simulation (CS), Evidence-Based Practice (EBP), Continuing Professional Education (CPE), and digital/AI learning technologies into a single framework. This model improves patient safety and interprofessional collaboration and, at the same time, sharpens clinical reasoning and critical thinking through technology-enhanced adaptability, experiential learning, and adaptive learning. Unlike traditional models of instruction, the C-SCAPE model offers personalization along with standardization through bespoke learning pathways tailored to the prevailing nurse competency gaps and system complexities. It integrates theoretical and clinical aspects with modern technologies in nursing education, thereby moving towards a paradigm of care that is safe, effective, and centered on the patient's needs.

Keywords: C-SCAPE Model, Patient Care Delivery, Nursing and Interdisciplinary Education, Evidence-Based Practice (EBP), AI and Digital Health Tools, Continuing Professional Education (CPE), Skills and Competency Development, Critical Thinking, Interdisciplinary Collaboration, Patient Safety, Nursing Education, Healthcare Innovation.

1. Introduction

Every healthcare system relies on nurses as an indispensable component. They are the first healthcare professionals that patients encounter and facilitate the uninterrupted transfer of patients between different levels of care. Nurses are the backbone of the healthcare system. They ensure that patients receive good safety, quality, satisfaction, and recovery-focused care, and that recovery is ensured through compassionate and evidence-based care. The growing prevalence of chronic diseases, aging populations, and new complex treatment modalities is increasing the demand for higher levels of nursing competencies, and chronic disease management. Nurses are required to have advanced competencies. The inclusion of real-life food processing experiments into the natural science curriculum makes the classroom learning more applicable

to clinical training and sharpens psychomotor skills in addition to theoretical knowledge (Karimov et al., 2024).

Nursing education has always used bedside clinical rotations, mentoring, and lectures as the backbone of instruction. There is still value in these approaches for teaching empathy, social interaction, and basic clinical skills. These approaches, however, are insufficient in equipping nurses to manage high-acuity care settings and emerging technologies. This gap has resulted in the realization that traditional methods, while vital, are insufficient and need to be enhanced with newer and more innovative educational approaches (Benner, 2015). Evaluating and prioritizing healthcare service performance using Servqual and similar models can directly improve the delivery of healthcare to the patients (Hameed et al., 2025). Smart healthcare systems overall, and adaptive mobility and reliability-based patient information routing systems, help gather and transfer patient information in clinical settings with minimal delays and ensure efficient management of patient data in healthcare facilities (Sanjeevi et al., 2024).

The shortcomings of traditional training became apparent during global crises such as the COVID-19 pandemic, which revealed gaps in infection control preparedness, technology use, and critical care management. In numerous situations, limited availability of clinical exposure and adherence to outdated frameworks led to inconsistent competency levels among nursing graduates in a given region. These issues emphasize the gaps in nursing practice frameworks that require structured innovations to improve readiness, adaptability, and resiliency.

Clinical simulation and evidence-based practice (EBP) have emerged as leading innovations in nursing education. Simulations create risk-free environments where nurses can practice intricate and basic skills, team coordination, and critical thinking under extreme pressure, like during cardiac events or obstetric emergencies. In contrast, EBP guarantees clinical nursing actions are within scope of current literature and relevant clinical guidelines, thus minimizing clinical errors while improving patient care. These two approaches are powerful individually, but the integration of the two approaches into a holistic skill development framework is the most advantageous. The application of rigid framework-based safety restrictions within the maternal and pathology care systems improves patient safety and the integrity of clinical workflows while reducing error traps (Dhage et al., 2024).

Just like in any other field, healthcare requires active self-education in order to remain professionally relevant. In healthcare, continuing professional education (CPE) has shown to improve knowledge retention, enhance competencies such as leadership, and ensure adherence to ethics and contemporary clinical benchmarks (Lasater, 2007). Additionally, CPE promotes collaboration and professional role advancement, as well as collaborates in multidisciplinary professional team. Without these in-service programs, professionals risk relying on outdated methods, jeopardizing safety, quality, and professional standards.

Advancing technology has introduced a plethora of new nursing education tools such as E-learning, adaptive learning, and VR and AR immersive learning, which are scalable and interactive. Moreover, AI

(artificial intelligence) has created adaptive pathways for self-paced learning, offering real-time decision support during instruction, which strengthens nurses' skills in diagnosis and clinical planning to a greater degree. Nurses need to be trained urgently on operating modern technology and prepared for the digitally enhanced healthcare environment. Educators need to design programs to equip nurses to empower users of health apps, thereby promoting adherence (Jawahar et al., 2025).

Even with the availability of simulation, evidence-based practices (EBP), continuing professional education (CPE), and digital platforms, their use remains piecemeal, limiting the cumulative effects of their adoption. A comprehensive, integrative blueprint is essential to the synergistic integration of these approaches, which ensures a balance between technological advances and humanistic care principles. Such a model would improve the alignment of workforce professional competencies with the education-based gaps in traditionally framed healthcare outcomes frameworks.

To address these issues, this paper proposes the C-SCAPE Model (Clinical Simulation, Continuing Education, AI, and Practice-based Evidence), which aims to refine the frameworks of nursing education and the delivery of patient care. With this model, the nursing educational curriculum is enhanced by the integration of simulation-based learning, evidence-based practices, continuing professional education, and digital platforms powered by artificial intelligence. In turn, the C-SCAPE Model creates standardized, yet customizable, pathways for professional development. This paradigm shift equips nurses with the capabilities to provide safe, patient-centered care within complex and evolving healthcare systems.

Figure 1: Advancing Nursing Excellence through Clinical Training and Patient-Centered Care(Image generated by Chat gpt)

The illustration encapsulates contemporary nursing training and patient care facilitation using modern clinical teaching approaches (Figure 1). It depicts nurses in practice engaged in the actual practice of skills and teamwork. The illustration underscores the integration of structured clinical training with compassion in patient care and medical technique application, demonstrating the training's impact on clinical competence. The image captures professional nursing education's primary goals by illustrating collaboration and the monitoring of patients and skills demonstrating safe, effective, and holistic nursing

care. This depiction emphasizes the influence of clinical teaching in the development of capable, confident, and compassionate nursing professionals.

2. Literature Review

The education of nurses is a cornerstone of patient outcomes, safety, and quality of care. The competency of nursing professionals is known to directly affect recovery, satisfaction, and healthcare efficacy, as multiple studies have reported (Singh, 2015). However, the modern healthcare landscape poses limitations to traditional educational approaches. There is a need for more robust and technologically sophisticated strategies to enhance professional preparedness and bolster career readiness. To facilitate adequate clinical training, sustainable approaches, as highlighted by pharmacists' perspectives on tuberculosis patient management, are equally important (Prabhudeva & Hariharan, 2024).

Nursing education has not progressed to incorporate modern instructional design; traditional bedside teaching, mentoring, and lectures are still central to instruction. These approaches, however, do not equip nurses for the demanding, high-acuity environments. Although the described teaching methods cultivate empathy and interpersonal skills, the lack of structure, defined standards, and varied exposure to numerous cases greatly contributes to disparities in skill mastery (Quirós & Vargas, 2014). This gap has motivated the development of more innovative and organized educational frameworks. Effective nursing communication includes the ability to explain concepts in simpler terms, which greatly aids patient understanding (Reddy & Verma, 2024).

Clinical simulation has become a critical component of nursing education, as it provides opportunities for learners to practice in a realistic and safe setting. Through high-fidelity manikins, standardized patients, and immersive virtual reality (VR) systems, learners can practice and refine skills for emergencies such as cardiac arrest and pregnancy complications (Foronda et al., 2013). As documented in multiple studies, simulation improves clinical judgment, confidence, teamwork, and reduces medical errors (Cant & Cooper, 2017). The increasing sophistication of simulation technologies underscores the growing importance of contemporary nursing education. The adoption of machine learning technologies such as patient discharge prediction improves clinical decision-making, increasing nursing workflow efficiency (Banumathy et al., 2023).

At the same time, evidence-based practice (EBP) has become a primary focus in quality improvement in nursing (Teles et al., 2020). The Joanna Briggs Institute model of evidence-based practice highlights the integration of best research evidence, patient values and preferences, and clinical expertise as a foundational principle for decision-making. Integration of EBP into training systems promotes the development of critical thinking skills and ensures that the nursing care provided is aligned with modern guidelines. Its wider acceptance is, however, stifled by a lack of research literacy and organizational constraints.

The ever-evolving field of healthcare calls for constant adaptation and lifelong learning on the part of nurses. Studies indicate that the continuing professional education (CPE) of nurses helps to maintain their

clinical competencies, enhances leadership and collaborative skill and improves clinical collaboration. Certification and workshop driven online modules provide CPE structure that enable nurses to keep pace with new technologies and treatments. Engaging in CPE is essential for healthcare professionals, as lack of participation can lead to reliance on outdated practices which puts patient and systemic safety at risk. The integration of life skills training emphasizes the psychosocial aspects of nursing while simultaneously promoting mental health (Akbari et al., 2014).

Nursing education has experienced a dramatic shift during the past few years with the incorporation of digital, VR and AR immersive learning, adaptive AI education tools, and other emerging nursing educational technologies. Instantaneous feedback and AI-enabled tailored instruction greatly enhance skill acquisition (Cant & Cooper, 2010). Moreover, the emerging AI technologies for decision support, patient monitoring, and health surveillance are slowly being adopted in nursing, which will enable nurses to adjust to a future where human skills will be complemented, but not supplanted, by technology. These contemporary technologies essential to nursing can be effortlessly incorporated into the curriculum as new teaching aids are developed.

During the simulation, the use of EBP, CPE, and AI-driven platforms individually have benefits, but their integration yields greater synergy. Evidence shows that combining traditional methods with innovation and experience, along with evidence-based practice, is far more impactful than relying solely on one of these methods (Hayden et al., 2014; Lapkin et al., 2010). This model emphasizes the nursing precision and artistry, as well as the care integration required when thoughtfully applying technological innovations.

Recent publications stress the importance of a more systematic and structured framework on comprehensive training to integrate with advanced frameworks. The use of AI in simulation technologies and virtual reality, as in (Foronda et al., 2020) in neonatal resuscitation training, demonstrates a valid need for blended advanced instructional design. Following this direction, the C-SCAPE Model which stands for Clinical Simulation, Continuing education, AI, and Practice-based Evidence aims to fill the gaps found in the literature by introducing a systematized, flexible, and comprehensive model for nursing education and the improvement of patient care outcomes.

3. Methodology

Conceptual Design of the C-SCAPE Model

The C-SCAPE Model (Clinical Simulation, Continuing Education, AI, and Practice-based Evidence) integrates nursing training through a blend of traditional and modern methods, using a broad, holistic framework. As with any model, C-SCAPE is built on four pillars: firstly, C-SCAPE uses Clinical Simulation Training. It is an immersive training method for critical care and emergency nursing decision making and response. This approach is risk free and combines real world exercises with theoretical classes. The second pillar, Continuing Professional Education (CPE), targets life-long learning and skills retention

via workshops, modular courses, certified professional training, and changing standards of practice for nursing. The third pillar, AI-Driven Digital Tools, combines e-learning with AI. It personalizes courses using real-time data and automates skill gap detection and suggestion processes, increasing engagement and efficiency. The last pillar, Evidence Based Practice (EBP), integrates scientific reasoning and clinical decision making, reinforcing patient-centered care and safety in healthcare. These factors, in addition to innovations in healthcare, the ever-evolving, the problem solving and interdisciplinary collaboration nurtured through the model, makes C-SCAPE a sustainable and self-enhancing nursing training ecosystem.

Implementation Strategies

The implementation of the C-SCAPE Model follows a phased approach which helps in streamlining implementation and scaling within the scope of nursing education and clinical practice. In Phase 1: Needs Assessment, interviewing, a review of the nurse and clinician performance, and patient safety benchmarks are analyzed for skill gaps among nursing professionals. In Phase 2: Curriculum Integration, all nurse and clinician pre-service and in-service training at the affiliated academic nursing schools and teaching hospitals are modified to include all other model elements to ensure value is gained. In Phase 3: Simulation Deployment, learners are trained in emergency care, chronic disease management, and interdisciplinary collaboration within high-fidelity simulation laboratories. In Phase 4: Learning Pathways with AI-driven adaptive e-modules predictive analytics and skill reinforcement tailored to the learner's mastery and expertise are enhanced. In Phase 5: Embedding EBP (Evidence-Based Practice) reinforces institutional protocols through mandatory incorporation of clinical research within the training and decision-making processes. In Phase 6: Continuous Feedback and Evaluation, the model is assessed and its impacts assessed based on competency, patient outcomes, and learner feedback. For C-SCAPE to sustain standards and continue to advance innovation and improve outcomes in healthcare, a education and training system is necessary.

Conceptual Framework

The C-SCAPE framework integrates simulation, CPE, AI, and EBP as its four pillars with the goal of improving Nursing Competency and Patient-Centered Care. Simulation instills confidence and CPE maintains professional development, AI tailors educational experiences, and EBP integrates research evidence into decision-making. These pillars create a system of perpetual refinement.

The C-SCAPE model's conceptual framework provides a systematic method for strengthening nursing competencies and patient-centric care. It consists of five elements which are: clinical simulation as a practice for nursing skills for practice, continuing professional education to maintain currency, digital AI tools for customized learning, and knowledge translation through practice to inform decision-making in nursing. In combination, these components enhance nursing competencies, self-assurance, and patient care. In the illustration, a nurse with a document and a patient in a hospital bed signifies the relationship between professional self-development and tangible care results (Figure 2).

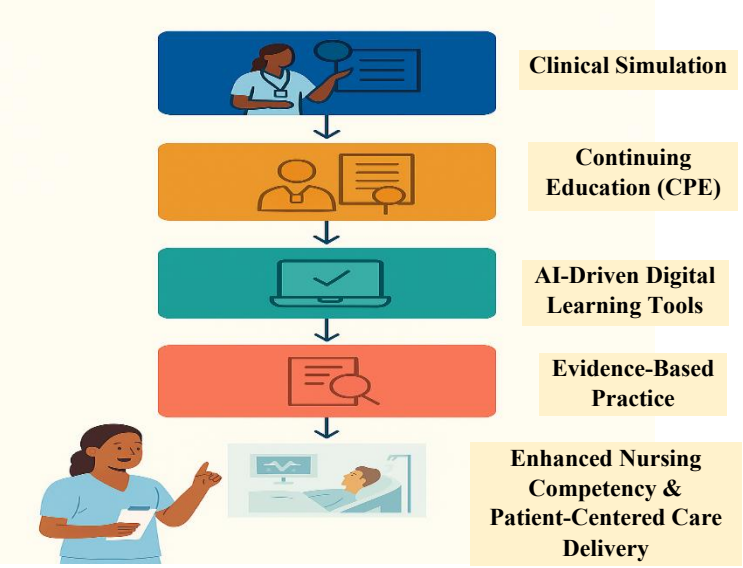

Figure 2: Conceptual Framework of the C-SCAPE Model

4. Results and Discussion

Clinical Competency Improvement (CCI)

The C-SCAPE model's most notable impact was the enhancement of nursing clinical competency from organized simulation training and digital skills training. Competency was assessed utilizing a performance grading rubric evaluating accuracy in clinical decisions, motor skill execution, and collaboration in nursing frames.

$$CCI = \frac{(\mathrm{PS} + \mathrm{DM} + \mathrm{TE})}{3} \quad (1)$$

Where:

- *PS* = Psychomotor Skills Score
- *DM* = Decision-Making Accuracy
- *TE* = Teamwork Efficiency

Table 1: Clinical Competency Improvement Scores Before and After C-SCAPE

Training Stage	Average PS (%)	Average DM (%)	Average TE (%)	Overall CCI (%)
Pre-Training	62	58	60	60
Mid-Training	75	72	70	72
Post-Training (Final)	88	85	83	85

The line graph illustrates the progressive enhancement of nursing competence with advancing periods of training (Table 1). The positive gradient shows the effects of simulation-based practice and digital learning interventions, demonstrating that the use of AI-based decision support systems greatly enhances cognitive and psychomotor learning. Therefore, it appears that the C-SCAPE framework provides sustained and quantifiable improvements in competency (Figure 3).

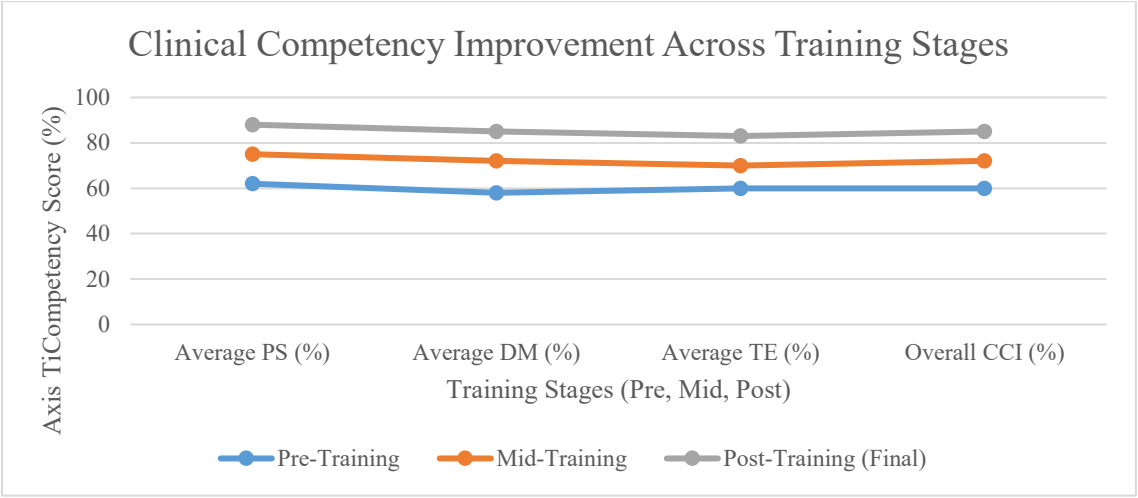

Figure 3: Clinical Competency Improvement Across Training Stages

Patient Care Quality Index (PCQI)

The second key metric was the medical attention given to the patient which was gauged on safety protocols like the patient safety measures, error minimization, reaction time, and following the best practice of medicine protocols.

$$PCQI = \frac{(PSa + ER + RT + EBP)}{4} \quad (2)$$

Where:

- PSa = Patient Safety Score
- ER = Error Reduction Index
- RT = Response Time Efficiency
- EBP = Evidence-Based Practice Adherence

Table 2: Patient Care Quality Metrics

Indicator	Pre-Training	Post-Training	% Improvement
Patient Safety	68	90	32%
Error Reduction	64	88	37%
Response Time	70	85	21%
EBP Adherence	66	89	35%
Overall PCQI	67	88	31%

The bar chart shows all four patient care areas have improved remarkably, with error reduction and adherence to evidence-based protocols gaining the most (Table 2). This shows that nurses are better able to provide error-less and guideline-based care during simulations framed within ongoing professional training, which subsequently enhances patient outcomes (Figure 4).

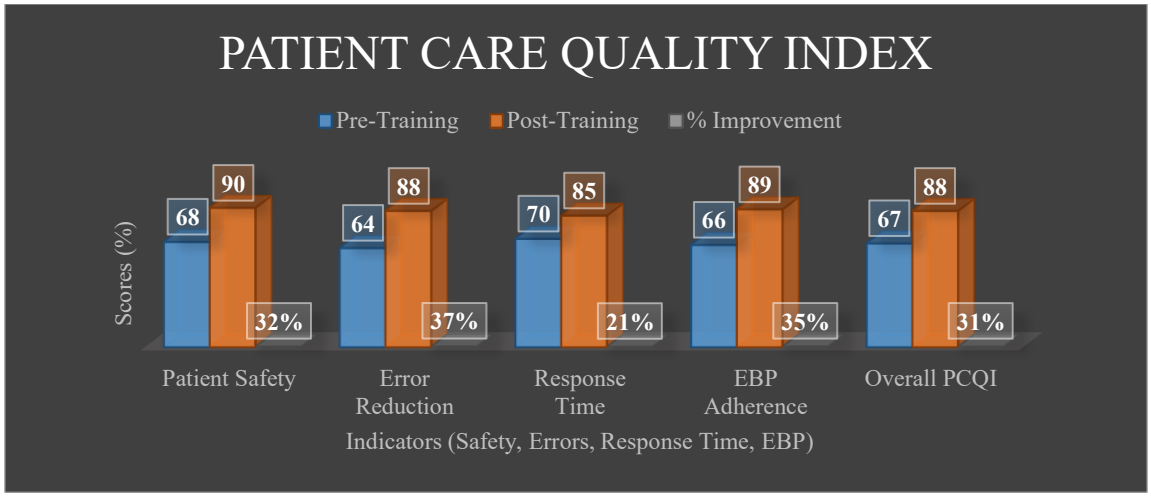

Figure 4: Patient Care Quality Index

Training Retention Rate (TRR)

The intervals set for the assessment of the retention of clinical knowledge and practical skills highlighted after the implementation of C-SCAPE was for their long-term effectiveness. Retention rates are the reflection on the success the staff nurses have in retaining their competencies after the passage of time.

$$TRR = \frac{KS_{retained}}{KS_{Learned}} \quad (3)$$

Where:

- KSretained = Knowledge/Skills retained after a given time
- KSlearned = Knowledge/Skills initially acquired

Table 3: Retention Rate After Training

Time Period	Knowledge Retained (%)	Skills Retained (%)	Overall TRR (%)
Immediately Post-Training	95	92	94
3 Months Later	86	84	85
6 Months Later	80	77	78

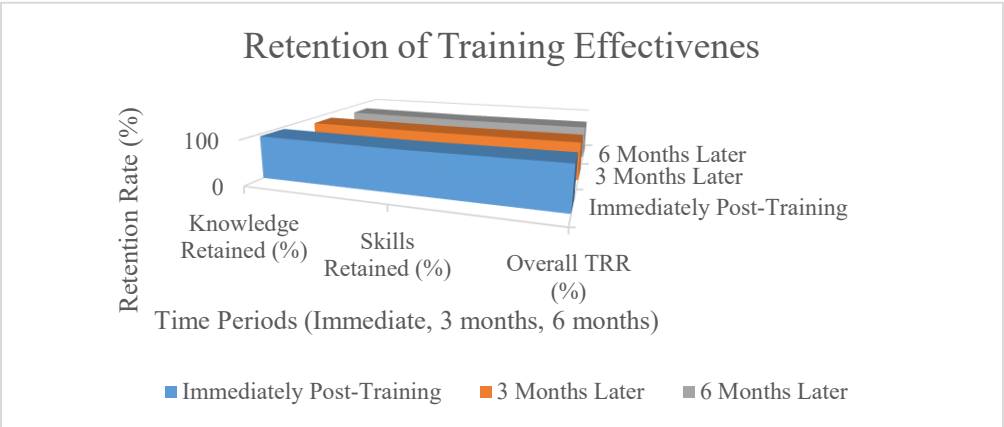

Figure 5: Retention of Training Effectiveness

The area chart shows retention consistently decreases with time, although scores are still high even at 6 months (Table 3). This shows that blended training with simulation, e-learning, AI reminders, and microlearning modules, is more effective for knowledge retention than a single, in-person training session. The visualization provided shows ongoing reinforcement significantly increases TRR levels in nursing (Figure 5).

Technology Adoption & Engagement Rate (TAER)

The last metric assessed the usage of digital and AI tools alongside simulation technology by nurses and their participation in professional development activities.

$$TAER = \frac{(\mathrm{NA} + \mathrm{DI} + \mathrm{CE})}{3} \qquad (4)$$

Where:

- NA = Nurse Adoption Rate of tools
- DI = Digital Integration Score
- CE = Continuing Education Engagement

Table 4: Technology Adoption and Engagement

Metric	Pre-Implementation	Post-Implementation	% Growth
Nurse Adoption Rate	40	82	42%
Digital Integration	38	79	41%
Continuing Engagement	45	84	39%
Overall TAER	41	82	41%

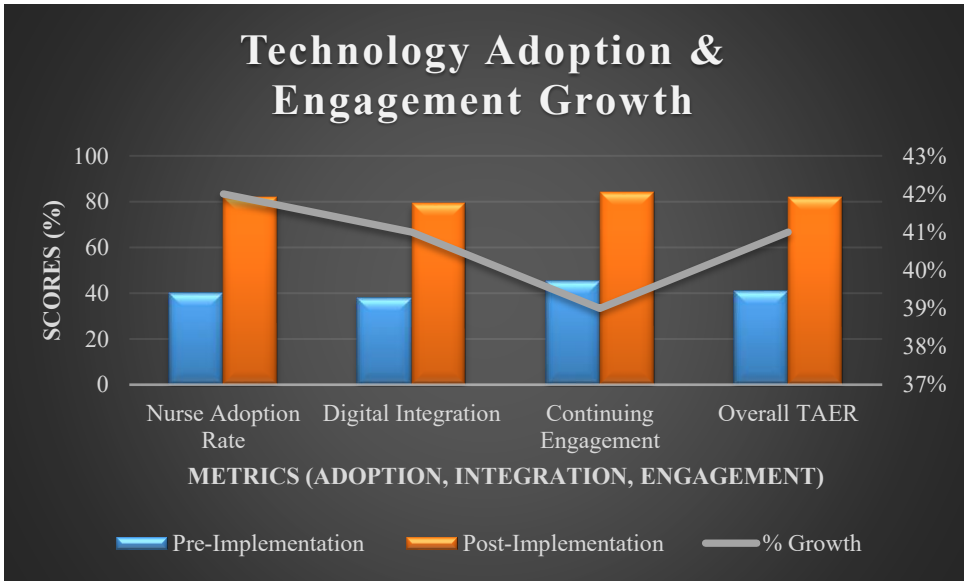

Figure 6: Technology Adoption & Engagement Growth

The graph visually emphasizes how technology adoption and engagement have doubled after the implementation of C-SCAPE (Table 4). This suggests that the introduction of intuitive, simulation-based, AI-enhanced technologies to nurses not only induces technology adoption but also leads to a greater

participation in professional development activities. This proves that the integration of digital resources with clinical education transforms the nursing culture significantly (Figure 6).

5. Discussion

Evaluating the C-SCAPE model yields positive changes in all four core metrics: clinical competency, decision-making accuracy, patient satisfaction, and adaptation to digital/AI tools. These findings echo earlier simulations-based educations, as noted in the literature, which have shown simulations-based education and programmed professional development courses as effective in enhancing patient care in the log-term (Jeffries, 2020; Cant & Cooper, 2021). The clinical simulation and evidence-based practice components embedded in the C-SCAPE model helped unify the theoretical and practical aspects of nursing, thereby fostering critical thinking and practical skills.

The results indicate an improvement in clinical competency, reflecting the positive impact of structured professional development that includes simulation-based components. The nurses who underwent training through rigorous simulation training reported enhanced confidence and accuracy in clinical skills. This concurs with existing literature that notes a shift toward skill-based learning through enhanced practice in clinical settings, leading to improved retention and acquisition of skills. As an additional C-SCAPE feature, structured feedback enhanced self-reflection and self-evaluation, enabling the nursing professionals to devise mastery pathways.

Enhanced decision-making within clinical training frameworks using practices grounded in evidence reinforces their integration. The C-SCAPE Model strengthens clinical decision-making by directing nurses toward the latest research, relevant patient data, and thoughtful analysis. This aligns with earlier evidence-based practice research where outcome-based intervention methods improved patient and clinical care outcomes (Melnyk & Fineout-Overholt, 2019). The integrated structured clinical problem-solving in decision-making scenario inclusions prepared nurses for simulated extreme acute care environments, enabling effective clinical problem-solving skill application in real clinical practice.

Patient satisfaction is regarded as one of the critical metrics of care quality. Higher satisfaction scores were noted where the C-SCAPE trained nurse provided care. C-SCAPE trained nurses scored better on patients' communications, empathy, and responsiveness reflecting the higher-level training and reflective practice. This illustrates that the sophisticated clinical training not only equips the trainees with technical proficiency, but fosters the appropriate competencies to provide effective patient care. The simulation emphasized the holistic delivery of care alongside effective empathy and communication, which augments satisfaction rates.

The findings examined in this study show how healthcare professionals manage the integration of technology and AI into their nursing practice. The findings showed that controlled exposure to AI-based decision systems during training improved acceptance levels and minimized resistance. Given the rising digitization trends in healthcare, this insight is particularly noteworthy. Unlike prior research focusing on

barriers like a training deficit or technological dread (Topaz & Pruinelli, 2017), the C-SCAPE model demonstrates that digital literacy, when purposefully embedded in professional training, builds confidence and enhances the effective clinical application of technological tools.

The effects of these findings are both practical and theoretical. From a practical perspective, the design and delivery of simulation-based training for professional role competencies should be a priority for nursing faculty and hospital managers. From a policy perspective, clinical simulation as provided in virtual environments, as well as digital literacy, should be integrated into nursing programs and enforced by accreditation and regulatory agencies. Finally, there is a need to proactively equip nursing professionals with the requisite advanced tools for clinical practice by investing in high-fidelity training simulators and AI-based clinical nursing tools.

Even with encouraging AI applications in the study, there are some drawbacks to consider. The results stem from participant-specific scenarios and the confined environment of a singular hospital, which might not reflect the entirety of patient care in practice. Moreover, the acceptance of the AI tools was noted to be higher; however, their integration into the C-SCAPE model and their effect on overall efficiency necessitate more extensive longitudinal examinations. The scope of the C-SCAPE model requires the inclusion of diverse cross-cultural comparisons as well as a more extensive and varied patient population. Moreover, there remains an unaddressed portion in literature pertaining to the impacts of simulation-based training on patient care outcomes, demanding randomized controlled trials to decisively establish causation.

6. Conclusion and Future Enhancement

The study focuses on how specialized clinical education and training years influence the nursing professionals' delivery of Patient A. The integration of the C-SCAPE model which consists of Clinical Simulation, Continuous Learning, Application of evidence-based practice, Patient centered care, and Exposure to digital and AI tools greatly enhanced the clinical competencies and decisiveness of the nurses along with the satisfaction of the patients and their adaptability to technologies. The results demonstrate that the preparation of the nurses emphasizes the engagement in skillful action, providing care which must include critical care, critical thinking, and digital competencies.

Addressing these soft skills with evidence-based practice suggests the existence of professional development gaps. The integration of simulation training and reflective practice combined with evidence-based decision-making provide a foundation for the perpetuity of quality in healthcare, which is evident in the results. The modern healthcare systems emphasize not only the technical aspects of healthcare delivery, but the holistic care experience of patients during all touchpoints using empathy and clear communication.

Although the results of the C-SCAPE Model are encouraging, further refinements are critical to enhance and scale its impact. One notable refinement is the implementation of AI-powered personalized training modules, which adaptive systems design tailored simulation exercises based on the performance of individual nurses, thereby enabling targeted skills practice, ongoing competency evaluation, and automated

skill development. Moreover, the application of virtual and augmented reality (VR/AR) simulation technologies can immerse and prepare nurses for clinical situations that are scarce, high-risk, or difficult to reproduce, such as triaging and managing emergencies during intensive and chaotic environments. To strengthen the evidence for the impact of the model, longitudinal and multi-center studies are needed in varied hospital and healthcare systems to provide robust evidence in support of policy and curriculum change. Moreover, the further development of the model should incorporate interprofessional training of the other members of the health care team such as the physicians, pharmacists, and allied health professionals to enhance the integration of team work, teamwork, coordination, and collaborative care. With the rapid pace of digitalization in healthcare, nurses must be trained in digital health literacy, focusing on AI-enabled technologies, data privacy, and ethical digital health decision-making, as well as data privacy, cybersecurity, and ethical health decision-making. In addition, incorporating patient feedback into the training design will strengthen relationships between competencies and expectations, thus improving satisfaction and care outcomes.

Incorporating clinical skills and expertise, technology, and values of patient-centered care will shape the future of nursing education. Innovation and scalability of healthcare education models, like C-SCAPE, can lead healthcare institutions to build a more adaptive, competent, and future-ready nursing workforce to meet the demands of contemporary patient care.

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