IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

BRANCHING PATH SIMULATION IN NURSING

Dr. KANCHANA K , & KANMANI S

Vice Principal Cum HOD & Associate Professor

College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore -44

Affiliated to The Tamil Nadu Dr M G R Medical University

Branching Path Simulation in Nursing education is continuously evolving to meet the increasing complexity of healthcare systems and the growing demand for safe, competent, and confident nursing professionals. Traditional teaching methods, which are largely lecture-based and passive in nature, are often insufficient to develop the higher-order thinking skills required in modern clinical practice. As patient care becomes more complex, nurses are expected to make rapid, accurate, and evidence-based decisions. This shift has created a need for innovative teaching strategies that actively engage students and enhance clinical reasoning skills.

Simulation-based learning has emerged as one of the most effective educational approaches in nursing. It provides learners with realistic clinical experiences in a controlled and safe environment where mistakes can be made without harming patients. Among various forms of simulation, Branching Path Simulation (BPS) is an advanced and interactive method that has gained increasing attention in nursing education. It is designed to replicate real-life clinical decision-making processes by presenting learners with multiple pathways based on their choices.

Branching Path Simulation is a digital or scenario-based learning strategy in which learners are placed in a clinical situation and required to make decisions at key points. Each decision leads to a different outcome or "branch," thereby creating a dynamic and personalized learning experience. Unlike linear simulations, where all learners follow the same sequence, BPS allows for variability in outcomes, encouraging critical thinking, reflection, and clinical judgment. This method closely mirrors real clinical environments where nurses must continuously assess situations, prioritize care, and adjust interventions based on patient responses.

The importance of Branching Path Simulation in nursing education lies in its ability to bridge the gap between theoretical knowledge and clinical practice. Nursing students often struggle to apply classroom learning to real patient care situations due to limited clinical exposure, high patient acuity, and restricted learning opportunities in hospitals. BPS helps overcome these challenges by offering repeated exposure to realistic clinical scenarios without risking patient safety. It also enhances learner confidence, reduces anxiety, and promotes independent decision-making.

Furthermore, Branching Path Simulation aligns with modern competency-based education frameworks that emphasize critical thinking, clinical judgment, communication, and problem-solving skills. It supports active learning by engaging students in decision-making processes rather than passive observation. The immediate feedback provided after each decision helps learners understand the consequences of their actions and encourages reflective learning. This process strengthens knowledge retention and improves long-term clinical competence.

Technological advancements have further contributed to the growth of BPS in nursing education. The integration of multimedia elements such as videos, interactive software, and virtual patients has made simulations more realistic and accessible. With the expansion of online and blended learning environments, especially after the global shift toward digital education, BPS has become an essential tool for continuing nursing education and remote learning.

Despite its advantages, the implementation of Branching Path Simulation also presents certain challenges. These include the need for specialized software, faculty training, time-consuming scenario development, and institutional support. However, its educational benefits outweigh these limitations, making it a valuable addition to nursing curricula worldwide.

TYPES OF BRANCHING PATH SIMULATION:

Linear Branching Path Simulation: Linear branching path simulation is the most basic type used in nursing education. In this approach, learners move through a structured clinical scenario with a limited number of decision points. Each decision leads to a fixed and predictable outcome. It is mainly designed for beginners to help them understand basic nursing concepts, step-by-step clinical procedures, and simple decision-making in a controlled and safe learning environment.

Multi-Level Branching Path Simulation: Multi-level branching path simulation involves several interconnected decision points where each choice leads to further complex pathways. This type closely resembles real clinical situations, requiring continuous assessment, prioritization, and clinical judgment. It helps nursing students develop higher-order thinking skills, problem-solving ability, and the capacity to manage complex patient conditions effectively.

Adaptive Branching Path Simulation:

Adaptive branching path simulation is a dynamic learning method in which the simulation automatically adjusts according to the learner's performance. If the student makes correct decisions, the scenario becomes more challenging, while incorrect answers may lead to simplified or supportive pathways. This individualized approach ensures personalized learning and allows students to progress at their own pace while improving weak areas.

Video-Based Branching Path Simulation: Video-based branching path simulation uses interactive video scenarios where learners make decisions at key points during a recorded clinical situation. Each decision changes the direction of the video and influences the outcome of the case. This type enhances engagement, communication skills, and clinical reasoning by providing a realistic visual representation of patient care situations.

Virtual Patient Branching Path Simulation: Virtual patient branching path simulation involves computer-based clinical cases where learners interact with a digital patient. They are provided with clinical data such as vital signs, laboratory results, and patient history. Based on this information, learners make decisions related to diagnosis, treatment, and nursing interventions. This method helps bridge the gap between theory and real clinical practice.

Game-Based Branching Path Simulation: Game-based branching path simulation integrates gamification elements such as points, levels, rewards, and challenges into clinical scenarios. Learners progress through the simulation by making correct decisions and earning scores. This approach increases motivation, engagement, and repeated practice, making learning more interactive and enjoyable for nursing students.

High-Fidelity Branching Path Simulation: High-fidelity branching path simulation combines advanced patient mannequins with branching decision-making scenarios in a simulation laboratory. The mannequin responds physiologically based on the learner's actions, creating a highly realistic clinical environment. This type is particularly useful for advanced nursing students to develop clinical judgment, teamwork, and emergency management skills in real-time practice situations.

Rababa and Masha'al (2020) conducted one of the earliest experimental studies examining the effectiveness of branching path simulations in promoting critical thinking among undergraduate nursing students. The study involved 102 nursing students enrolled in advanced adult health nursing courses. Participants were randomly assigned to either a branching simulation group or a traditional lecture group. The findings revealed that students exposed to BPS demonstrated significantly higher critical thinking scores compared with those who received traditional instruction. The authors concluded that branching path simulation provides students with opportunities to analyse patient situations, evaluate alternatives, and make informed clinical decisions, thereby enhancing critical thinking abilities. The researchers recommended incorporating BPS into nursing curricula to improve student learning outcomes.

In another study, Masha'al and Rababa (2020) explored undergraduate nursing students' perceptions regarding the use of BPS as an interactive learning method. Forty-four nursing students participated in four branching scenarios related to pain management among patients with dementia. Students reported positive perceptions regarding the design, usability, satisfaction, and self-confidence associated with BPS. Participants expressed that the simulations were engaging, realistic, and enhanced their ability to apply theoretical concepts in clinical situations. The findings indicated that BPS is well accepted by learners and may serve as an effective complement to traditional teaching approaches. The authors emphasized the need for further studies to evaluate its long-term educational impact and integration into nursing curricula.

The application of branching simulation has also been extended to practicing nurses. Rababa et al. (2022) investigated the effectiveness of branching simulations in improving nurses' knowledge, attitudes, practices, and decision-making related to sepsis assessment and management. The experimental study involved 70 emergency nurses divided equally into intervention and control groups. Nurses who participated in branching simulations demonstrated significant improvements in clinical practices and decision-making abilities compared with the control group. These improvements were sustained during follow-up assessments, suggesting that BPS not only enhances immediate learning outcomes but also contributes to knowledge retention and improved professional competence. The study highlighted the potential of BPS in continuing nursing education and professional development.

More recently, Banta-Wright, Wright, Tews, and Miller (2024) examined the use of branching path simulation among Pediatric Nurse Practitioner students. This quasi-experimental study included 22 graduate nursing students who completed branching simulations integrated into an advanced practice course. Students reported high levels of satisfaction with the design and usability of the simulations. Self-confidence scores were also favorable, indicating that BPS effectively supported advanced clinical reasoning and critical thinking. The researchers concluded that branching path simulation is particularly valuable in graduate nursing education because it provides learners with opportunities to practice complex decision-making within a low-risk environment. They further suggested that BPS may enhance online and hybrid learning experiences where direct clinical exposure may be limited.

Evidence from broader simulation literature further supports the educational benefits of branching approaches. Daneshfar and Moonaghi (2025), in a systematic review of clinical simulation studies published between 2010 and 2025, reported that simulation-based education significantly improved nursing students' clinical judgment, decision-making, self-confidence, and learner satisfaction. Although the review included various forms of simulation, the authors emphasized that structured, scenario-based simulations encouraging active decision-making were particularly effective in bridging the theory-practice gap. The review also identified challenges such as technological limitations, faculty preparedness, and resource availability, which must be addressed to maximize the benefits of simulation-based learning.

The literature consistently demonstrates that Branching Path Simulation promotes active engagement and experiential learning. By exposing learners to realistic patient situations requiring immediate decisions, BPS enhances critical thinking, clinical reasoning, and judgment. Students appreciate the opportunity to make mistakes without causing harm to actual patients and value the immediate feedback provided through the simulation process. Furthermore, the flexibility of BPS allows learners to repeat scenarios multiple times until competency is achieved.

Despite these advantages, several limitations have been identified. The development of branching simulations requires substantial time, technological expertise, and institutional resources. Faculty members may require additional training to design meaningful scenarios and facilitate debriefing sessions effectively. Moreover, many studies have utilized relatively small sample sizes and short follow-up periods, limiting the generalizability of findings. Therefore, future research should focus on large-scale randomized controlled trials, long-term outcome evaluation, cost-effectiveness analyses, and the exploration of BPS across diverse nursing specialties and educational contexts.

Indian Scenario:

In India, Branching Path Simulation (BPS) in nursing education is in a developing stage and is gradually being integrated into competency-based curricula as recommended by the Indian Nursing Council. Nursing institutions are increasingly adopting simulation-based pedagogies such as virtual simulation, scenario-based learning, and computer-assisted clinical decision-making to enhance students' clinical reasoning and preparedness for practice. However, the implementation of advanced branching simulation remains limited and uneven across institutions due to constraints such as inadequate simulation infrastructure, limited access to advanced digital platforms, lack of trained faculty, and financial restrictions. Despite these challenges, premier nursing colleges and selected simulation centres in India are progressively incorporating technology-enhanced learning strategies to bridge the theory–practice gap. The increasing emphasis on skill laboratories, digital learning resources, and outcome-based education is expected to strengthen the adoption of branching simulation in Indian nursing education in the near future.

Global Scenario:

Globally, Branching Path Simulation is well-established and widely integrated within nursing and health professions education as an evidence-based instructional strategy. Countries such as the United States, Canada, Australia, and the United Kingdom have extensively incorporated branching simulation into undergraduate and postgraduate curricula through advanced simulation laboratories and digital learning platforms. These systems often utilize sophisticated technologies including virtual patients, adaptive learning environments, immersive video-based scenarios, and artificial intelligence-supported decision-making tools to enhance clinical competence. International literature strongly supports the effectiveness of branching simulation in improving clinical judgment, critical thinking, communication skills, and patient safety outcomes. Furthermore, global nursing education frameworks emphasize

simulation as a core component of competency-based training, ensuring that learners are adequately prepared for complex clinical environments. Overall, the global scenario reflects high levels of institutional integration, technological advancement, and sustained research support for branching path simulation as a key pedagogical approach in nursing education.

Conclusion:

The reviewed literature indicates that Branching Path Simulation is an effective and innovative teaching strategy in nursing education. Research findings consistently show that BPS enhances critical thinking, clinical decision-making, self-confidence, satisfaction, and learner engagement among both nursing students and practicing nurses. By allowing learners to explore the consequences of their actions within a safe and controlled environment, BPS bridges the gap between classroom instruction and clinical practice. As nursing education increasingly embraces technology-enhanced learning, Branching Path Simulation has the potential to become an integral component of competency-based nursing curricula. In conclusion, Branching Path Simulation represents a significant advancement in nursing education by providing an interactive, learner-cantered, and clinically relevant learning experience. It enhances critical thinking, decision-making, and clinical competence, thereby preparing nursing students to meet the demands of modern healthcare environments effectively

References:

- Jeffries, P. R. (2021). *Simulation in nursing education: From conceptualization to evaluation* (3rd ed.). National League for Nursing.
- Foronda, C., Fernandez-Burgos, M., Nadeau, C., Kelley, C. N., & Henry, M. N. (2020). Virtual simulation in nursing education: A systematic review spanning 1996–2018. *Simulation in Healthcare, 15*(1), 46–54. https://doi.org/10.1097/SIH.0000000000000411
- Padilha, J. M., Machado, P. P., Ribeiro, A., Ramos, J., & Costa, P. (2019). Clinical virtual simulation in nursing education: Randomized controlled trial. *Journal of Medical Internet Research, 21*(3), e11529. https://doi.org/10.2196/11529
- Banta-Wright, S. A., Wright, B. M., Tews, A. A., & Miller, N. (2024). Branching path simulation for pediatric nurse practitioner students to promote critical thinking: A quasi-experimental study. *Journal of Pediatric Health Care, 38*(5), 737–746. https://doi.org/10.1016/j.pedhc.2024.03.004
- Liaw, S. Y., Ooi, S. W., & Chow, F. (2022). E-learning and simulation in nursing education: Enhancing clinical reasoning and decision-making. *Nurse Education Today, 110*, 105269. https://doi.org/10.1016/j.nedt.2022.105269

- Banta-Wright, S. A., Wright, B. M., Tews, A. A., & Miller, N. (2024). *Branching Path Simulation for Pediatric Nurse Practitioner Students to Promote Critical Thinking: A Quasi-Experimental Study*. Journal of Pediatric Health Care, 38(5), 737–746.
- Masha'al, D., & Rababa, M. (2020). *Nursing students' perceptions towards branching path simulation as an effective interactive learning method*. Teaching and Learning in Nursing, 15(4), 218–225.
- Rababa, M., & Masha'al, D. (2020). *Using branching path simulations in critical thinking of pain management among nursing students: Experimental study*. Nurse Education Today, 86, 104323.
- Rababa, M., et al. (2022). *The effectiveness of branching simulations in improving nurses' knowledge, attitudes, practice, and decision-making related to sepsis assessment and management*. Nurse Education Today, 110, 105270.
- Daneshfar, M., & Moonaghi, H. K. (2025). *The impact of clinical simulation on bridging the theory–practice gap in nursing education: A systematic review*. BMC Medical Education, 25, 1216.

- Liaw, S. Y., Ooi, S. W., & Chow, F. (2022). Virtual patient simulation and clinical reasoning in nursing education. *Nurse Education Today, 110*, 105269. https://doi.org/10.1016/j.nedt.2022.105269
- Padilha, J. M., Machado, P. P., Ribeiro, A., Ramos, J., & Costa, P. (2019). Clinical virtual simulation in nursing education: Randomized controlled trial. *Journal of Medical Internet Research, 21*(3), e11529. https://doi.org/10.2196/11529
- Banta-Wright, S. A., Wright, B. M., Tews, A. A., & Miller, N. (2024). Branching path simulation for pediatric nurse practitioner students to promote critical thinking: A quasi-experimental study. *Journal of Pediatric Health Care, 38*(5), 737–746. https://doi.org/10.1016/j.pedhc.2024.03.004.