

The Internal Logic and Construction Path of "Learning-Doing-Teaching" Integrated Model in NICU Evidence-Based Nursing Education

Tong Zhang

Maternal and Child Health Hospital of Gansu Province, Lanzhou, China

Abstract: Addressing the challenge of the "know-do gap" in evidence-based nursing education within the Neonatal Intensive Care Unit (NICU), this study integrates action learning theory, experiential learning cycle theory, and cognitive apprenticeship theory to construct an integrated "learning-doing-teaching" educational model. Driven by authentic clinical problems, the model follows a four-stage cyclic pathway "project initiation, inquiry and action, externalization and deliberation, integration and iteration" embedding learning within practical contexts. It guides nurses to engage in inquiry through "doing" and internalize knowledge through "teaching," providing a theoretical framework and actionable pathway for systematically cultivating evidence-based practice competencies among NICU nurses.

Keywords: Neonatal Intensive Care Unit; Nurses; Evidence-Based Practice; In-Service Education

1. Introduction

The clinical practice environment of neonatal intensive care unit (NICU) is highly complex, technology-intensive and dynamic uncertainty. In the face of the treatment of vulnerable groups such as very low birth weight infants and ultra-premature infants, nursing decisions are directly related to the quality of life and safety outcomes of children. In this context, clinical practice based on the best scientific evidence has evolved from a professional concept to a core nursing ability related to life [1,2]. It requires nurses not only to be able to understand and obtain evidence, but also to have the comprehensive literacy to carefully integrate evidence into specific, complex and rapidly changing clinical situations [3,4]. However, the current traditional in-service education model mostly adopts centralized teaching, seminars and

other forms, focusing on the one-way transmission of knowledge, resulting in a clear "knowledge-action gap" between education investment and clinical behavior change. Many nurses are caught in the dilemma of knowledge overload but lack of action [5-8].

The essence of this dilemma lies in the mismatch between the traditional training paradigm and the ability generation and system improvement goals required by evidence-based practice. Evidence-based practice requires that nursing education and training must shift from discrete knowledge transfer to integrated learning that is embedded in workflows and promotes reflection and collaboration. Therefore, based on the theory of action learning, experiential learning circle and cognitive apprenticeship, this study constructs an integrated evidence-based nursing education model of "learning-doing-teaching". This model is a dynamic circulatory system driven by solving the real clinical problems of NICU, with reflective practice as the core, and with the socialized sharing and organization of knowledge as the destination [9,10]. Its core goal is to internalize evidence-based practice from an external and additional task into an organic part of nurses' professional identity and daily work logic.

2. The Theoretical Basis of 1 "Learning-Doing-Teaching" Integration Model

The internal logic and efficacy potential of the "learning-doing-teaching" integrated model in the training of evidence-based practice ability in NICU are derived from the deep integration and situational application of three classical learning and development theories: action learning theory, experiential learning circle theory and cognitive apprenticeship theory.

2.1 Action Learning Theory

The theory of action learning was proposed by

Reg Ravens, who believes that the most profound and effective learning does not occur at the moment of passive acceptance of knowledge, but in the process of individual or team action and continuous reflection in response to real, urgent and complex practical challenges [11]. This theory regards action and learning as an inseparable unity, and emphasizes that the acquisition of procedural knowledge must be through the fundamental way of "learning by doing." The theory requires that learning must be based on real problems that have no ready-made solutions; there should be a learning group dedicated to solving problems; be willing to take action and test the effect; and the four key elements of the cycle process of in-depth questioning and reflection on actions and results. In NICU, a highly complex and dynamic clinical field, NICU nurses often face not textbook-style standard cases, but real, complex and uncertain practical problems. Action learning theory provides methodological guidance for solving such problems. It requires educational designers to take such real clinical problems as the starting point and core carrier of learning. By forming a learning group composed of nurses with different seniority and background, under the guidance of the tutor, the team members experience the cycle of "plan-action-observation-reflection" together [12]. Its essence is to embed the ability of inquiry, collaboration and change necessary for evidence-based practice directly into the context of nurses' daily work, so that learning and work can be combined into one.

2.2 Experiential Learning Circle Theory

Kolb believes that learning is not a simple accumulation of experience, but a process of transforming experience into knowledge and guiding new actions through a continuous cycle of four adaptive learning stages: "concrete experience", "reflective observation", "abstract conceptualization" and "active experiment" [13,14]. The "learning-doing-teaching" model provides a structured practical path for the complete operation of Kolb's experiential learning circle.

"Learning", by teaching the methodology of evidence-based practice, pre-implants the condensed abstract conceptualization results of "how to learn" into the learner's cognitive schema. In the face of complex clinical situations, nurses can observe, reflect and refine

concepts in a direction and way, so as to significantly improve the efficiency and depth of experience learning.

"Doing" refers to a micro evidence-based project driven by real clinical problems. It is not only the field of applying the methodology obtained by "learning", but also the key carrier for the complete development and dynamic iteration of the theory of experiential learning circle. In this process, the complete project cycle experienced by nurses constitutes an intensive "plan-action-observation-reflection" experiential learning microcirculation. Each evidence-based clinical intervention attempt is "specific experience"; the team's review and discussion around the intervention process and data is "reflective observation"; to extract key findings from complex information and form a preliminary practice plan is "abstract conceptualization"; putting the new scheme into the next round of verification constitutes "active experiment". This cycle is not a non-linear advance, but rather repeated shocks and iterative deepening in the project cycle, promoting nurses' cognition from appearance to essence, from ambiguity to clarity, and completing the active construction of knowledge. In this process, the role of the tutor is very important, which effectively catalyzes and accelerates the operation of this internal cognitive cycle through precise questions, timely guidance and provision of a reflective framework.

"Teaching" is to realize experiential learning from individual internalization to organizational knowledge generation. First of all, at the individual level, the process of preparing "teaching" constitutes a powerful metacognitive intervention. In order to clearly explain the project logic, evidence chain and practical enlightenment to others, nurses must sort out, clarify and structure the cognition they have obtained in "doing". This is essentially a reflective observation and abstract conceptualization of their own experience learning process, which is the re-learning of learning, thus consolidating and deepening the internalization of ability. Secondly, at the organizational level, the results reporting meeting, as an institutionalized knowledge exchange ceremony, puts the local knowledge generated by individuals or groups in empirical learning into the examination, debate and integration of the department community. Through social interaction, personal experience

can be tested, revised and expanded, and finally precipitated as a practical knowledge asset shared by the department. This indicates that learning outcomes go beyond the individual's mind and are transformed into organizational capabilities that can guide collective action. It is a key mechanism for cultivating a sustainable evidence-based culture.

Therefore, the former in the "learning-doing-teaching" model is the realization form of the latter's systematization, contextualization and organization. Through "learning" to provide cognitive preparation, through "doing" to build a practice cycle, through "teaching" to achieve cognitive sublimation and knowledge socialization, so as to effectively transform the internal psychological process of experiential learning into a professional development engine that can be designed, guided, evaluated and have a wide range of organizational influences.

2.3 Cognitive Apprenticeship Theory

The theory of cognitive apprenticeship advocates the externalization of the thinking process of the tutor, so that learners can gradually master those complex and tacit cognitive skills through observation, imitation, practice and with the support of the tutor in real or simulated working situations. The theory emphasizes the key role of mentors, learner communities, and real situations in promoting the development of higher-order cognitive skills [15]. In the "learning-doing-teaching" model, the concept of cognitive apprenticeship runs through, especially in the interactive dimension of "teaching" and the role of mentors. First of all, the mentor is not a one-way imparter of knowledge throughout the project cycle, but as a "coach", through demonstration, guidance, infrastructure construction and clear expression, the complex cognitive process of evidence-based practice is gradually presented to learners [16]. Secondly, in the "teaching" part of the model, learners are actually externalizing the thinking process by expounding their project logic and discovery; the questions, doubts and supplements of the audience (including other nurses, tutors and managers) constitute multi-angle social reflection and knowledge co-construction. This kind of social interaction based on real work situations promotes the transmission and circulation of tacit knowledge including clinical judgment and critical thinking in the community,

which is difficult to achieve in traditional classroom teaching.

To sum up, the action learning theory gives the "learning-doing-teaching" model a practical orientation, the experiential learning circle theory reveals its internal circulation mechanism to promote individual cognitive development, and the cognitive apprenticeship theory provides a framework for the inheritance of ability through the interaction between tutor guidance and community in real social and cultural situations.

3. The Systematic Construction and Implementation Path of the "Learning-Doing-Teaching" Integrated Model

3.1 The Core Connotation and Operation Logic of the Mode

The "learning-doing-teaching" integrated model is not a linear combination of three links, but a dynamic ecosystem based on specific theoretical integration and designed for the dilemma of NICU evidence-based practice ability generation. Its core is to fundamentally reconstruct the connotation of "learning", "doing" and "teaching" and to form an organic whole of mutual nesting and continuous circulation.

The paradigm shift of "learning". In this model, "learning" is no longer equivalent to the passive reception of static and established knowledge, but is transformed into an active inquiry process for real and complex clinical problems. The focus of learning shifted from memorizing specific guidelines or operation steps to mastering a set of transferable evidence-based methodology, that is, how to transform vague clinical confusion into searchable PICO problems, how to systematically search and strictly evaluate evidence, and how to carefully combine evidence with specific clinical situations, children's family wishes and available resources. This kind of "learning" is embedded in the needs of "doing". It is a methodological acquisition with a clear problem consciousness. It aims to cultivate the meta-cognitive ability of nurses as "evidence-based explorers" and lay a foundation for their role transformation from "knowledge consumers" to "knowledge producers".

The situation carrier of 'do'. "Doing" refers to a micro evidence-based practice project carried

out by a learning group composed of nurses, which is driven by the real clinical problems in NICU and has no ideal solution. In this process, nurses experienced a complete closed loop from problem definition, evidence retrieval and evaluation, program formulation and localization, to small-scale pilot and data collection. This process deeply integrates the theory of action learning and the theory of experiential learning circle, that is, the interaction between action and reflection, and promotes cognition from concrete experience, through reflective observation and abstract conceptualization, to new active experiments. "Doing" enables abstract evidence-based knowledge to be tested, applied and adjusted in specific, complex and even uncertain clinical situations, thus realizing the transformation of knowledge from "knowing" to "using" from "cognitive understanding" to "action competence".

The sublimation mechanism of "teaching". 'Teaching' requires nurses to systematically sort out and logically organize the experience, data and preliminary conclusions obtained in 'doing', and to report and explain them to peers, tutors and managers in a structured way. This process has dual effectiveness. At the individual level, 'teaching' constitutes a powerful metacognitive coercion. In order to clearly and convincingly explain the project logic, nurses must reflect, clarify and structure their own implicit learning process and decision-making basis, which may still be fragmented. This is essentially the secondary processing of experience and the re-conceptualization of cognition, which greatly promotes the deep internalization and solidification of knowledge. At the organizational level, formal results reporting will become an institutionalized 'social knowledge construction' ceremony. Personal and local experience and knowledge are tested, revised and enriched in the community's questioning, debate and supplement, and may eventually precipitate into practical knowledge shared by departments or new normative processes. At the same time, learning outcomes will go beyond the individual mind and be transformed into the collective wisdom and memory of the organization.

3.2 The Four-Stage Cycle Implementation Path of the Model

In order to transform the "learning-

doing-teaching" integrated model from a theoretical concept to an operable and manageable practice plan, this study constructed a systematic implementation path with project as the carrier and four-stage cycle as the promotion logic, aiming to guide the nursing team to complete the complete learning and improvement cycle from problem identification to knowledge solidification through structured steps.

3.2.1 Project start-up

The core of this stage is to stimulate intrinsic motivation and clarify the direction of inquiry. Specifically, first of all, it is necessary to select those real clinical problems with improved value, relatively clear evidence base and moderate scope from NICU daily quality monitoring data, adverse event reports or clinical discussions. Subsequently, a heterogeneous learning group was formed around the selected issues. The members should cover nurses with different years of experience and backgrounds, and relevant medical professionals can be invited to participate to simulate the real situation of multidisciplinary collaboration and promote complementary perspectives. After the group was formed, directional learning in the form of 'evidence-based practice workshop' was carried out.

The content of this stage focuses on methodological tools, which aims to provide necessary cognitive support and method guidance for subsequent independent inquiry, and ensure that learning has a clear problem orientation and practical orientation from the beginning.

3.2.2 Exploration and action

This stage aims to guide the learning group to experience a complete micro evidence-based cycle in the real work situation. According to the problems identified in the first stage, the team should cooperate to carry out systematic evidence retrieval and strict evaluation, and formulate a localized practice improvement plan based on the best evidence, department resources, children's family wishes and clinical tutors' opinions. After the formation of the scheme, small-scale pilot projects were carried out within a controllable range. The pilot process is not only the implementation of the program, but also the collection of data and the continuous reflection of the team. The group needs to meet regularly, use the 'plan-action-observation-reflection' action learning cycle, analyze the

pilot data, discuss the obstacles encountered and unexpected results, and adjust the program accordingly.

This process transforms the abstract methodology into the situational judgment of individual nurses and the ability of teamwork to solve practical problems in dealing with the challenges of specific and complex situations.

3.2.3 Externalization and trial

The core goal of this stage is to realize the transformation and sublimation of knowledge from individual or group to organizational level. The project team systematically combed and structured the exploration process, evidence base, program adjustment logic and pilot results of the second phase, and prepared to report to a wider audience. Subsequently, a formal department or interdisciplinary results reporting meeting was organized to invite nursing colleagues, relevant department members and managers to participate. The report is not only a display of results, but also a forum for collective deliberation. In this process, the reporter needs to clearly explain its decision-making basis and accept questions and debates from multiple perspectives; the audience's questions may involve the applicability of the evidence, the feasibility of the scheme or potential risks. The participation of managers is related to the possibility of resource support and institutional change. This process of "teaching" and "debate" forces individual knowledge to undergo public testing and collective revision, thus sublimating it from personal experience to more robust shared knowledge reviewed by the organizational community.

3.2.4 Integration and iteration

The core goal of this stage is to institutionalize and structure the verified project results, and to trigger a continuous improvement cycle based on this, so as to ensure that the learning results can be transformed into lasting organizational capabilities and achieve performance expansion. For the best practices that have been reviewed and approved, knowledge coding is performed, which is converted into standard operating procedures, clinical pathways or training materials, and integrated into the knowledge management system of the department or hospital to become a searchable and reusable organizational asset. At the same time, through the organization of training, workshops, etc., the new norms will be promoted to all personnel in related positions. More importantly, a

mechanism for long-term monitoring of the effectiveness of new practices has been established to assess their sustainability and effectiveness. Finally, in daily practice and monitoring, we actively identify new problems derived from the current round of improvement, or other unresolved clinical dilemmas, thus naturally triggering a new round of "learning-doing-teaching" cycle. Successful project teams or members can grow into new mentors in the process, driving the intergenerational transmission of capabilities.

4. The Value Construction of "Learning-Doing-Teaching" Mode

4.1 Individual Empowerment

Traditional nursing training often shapes nurses as skilled technical operators and medical order executors, and their professional judgment space is limited. The core goal of this model is to train nurses to become independent clinical decision makers and reflective practitioners. Through the complete 'learning-doing-teaching' cycle, nurses not only master the evidence-based method, but also internalize the habit of critical thinking, dare to put forward evidence-based questions on routine practice, and can independently evaluate the advantages and disadvantages of different interventions.

The solution of complex problems in practice has exercised its clinical reasoning and judgment ability. More importantly, the link of 'teaching' requires him to defend his practice rationally, which enhances his professional autonomy and sense of responsibility. In the end, the professional identity of nurses is reconstructed, that is, nurses are no longer passive recipients and users of knowledge, but active explorers of clinical problems, prudential evaluators of evidence and co-improvers of nursing practice. This transformation from "knowing what it is" to "knowing what it is" to "co-creating what it should be" is the key to improving the connotation of nursing specialty.

4.2 Team Activation

The high pressure and specialization of NICU work have led to knowledge barriers and information islands. This model effectively breaks this gap through structured group projects and institutionalized results sharing. Cross-level and cross-year collaborative inquiry forces members to conduct in-depth dialogues, share

tacit knowledge, and face uncertainty together. This process naturally gave birth to a team psychological safety atmosphere based on respect for evidence and rational discussion. When evidence-based practice becomes the team's common language and the way to solve problems, a team culture of continuous learning and common improvement begins to emerge. As a collective reflection ceremony, the results report will transform individual learning outcomes into intellectual assets shared by the team and promote the formation of organizational memory. Therefore, this model is not only a tool for personal capacity building, but also promotes the formation of 'learning organization' within NICU, so that the team has the internal motivation to self-renew and adapt to the complex environment.

4.3 Management Innovation

Traditional nursing management relies heavily on hierarchical control and experience inheritance. This model provides a new perspective for nursing managers, that is, the department is regarded as a knowledge creation and management system. By supporting the 'learning-doing-teaching' cycle, managers consciously capture, integrate, validate and code the clinical wisdom, external latest evidence and specific clinical situations scattered in individual nurses. Each successfully completed micro-evidence-based project, with structured reports and recommendations of its outputs, is an incremental addition to the knowledge base. In the long run, the department can gradually accumulate a set of localized and dynamically updated 'best practice set' or clinical decision support resources. It realizes the transformation of nursing knowledge from implicit to explicit, from individual to organization, from fragment to system, and makes the update of nursing management decision-making and practice standards based on the continuously generated endogenous evidence, so as to achieve more scientific and accurate quality improvement.

5. Discuss

5.1 A Systematic Training Path of Evidence-Based Practice Ability Integrating Multiple Theories Is Constructed

The core theoretical contribution of the 'learning-doing-teaching' integrated model proposed in this study lies in the systematic

integration of the core mechanisms of action learning, experiential learning circle and cognitive apprenticeship, and the construction of a set of evidence-based practice ability training path suitable for NICU situation. Through the organic combination of theoretical learning, project practice and knowledge transfer, the path realizes a complete closed-loop from individual cognitive development to team collaborative learning until organizational knowledge precipitation, and provides a solution with both theoretical depth and operational feasibility for fundamentally bridging the 'knowledge-action gap'.

5.2 The Effective Operation of the Mode Depends on the Synergy of Multi-Level Support Elements

The in-depth implementation and continuous optimization of this model depend on the collaborative support of multi-level elements such as individuals, teams and organizations. At the organizational level, managers' strategic identity and resource guarantee are the basic premises; at the process level, it is the key link for the tutor to promote deep reflection and team learning through professional guidance; at the cultural level, the establishment of an open and inclusive psychological safety environment that encourages exploration is an important condition for stimulating the subjectivity of nurses. At the same time, it is also necessary to face up to its higher requirements for clinical working hours and teachers' professional ability.

5.3 In the Future, It is Necessary to Promote the Development of the Model through Multiple Verification and Effect Tracking

In order to deepen the application value of this model, the follow-up research can be carried out from the following three directions: First, carry out multi-center, contextualized application research to verify its adaptability and effectiveness in different medical environments; the second is to explore the integration with digital tools such as clinical information systems and mobile learning platforms to improve the efficiency and scalability of the model. Thirdly, a mixed method or longitudinal design was used to systematically evaluate the long-term impact of this model on nurses' behavior change, nursing quality improvement and patients' health outcomes, so as to provide high-level evidence for its promotion.

References

- [1] Ubbink D T, Guyatt G H, Vermeulen H. Framework of policy recommendations for implementation of evidence-based practice: a systematic scoping review. *BMJ open*, 2013, 3(1): e001881.
- [2] Melnyk B M, Gallagher-Ford L, Long L E, et al. The establishment of evidence-based practice competencies for practicing registered nurses and advanced practice nurses in real-world clinical settings: Proficiencies to improve healthcare quality, reliability, patient outcomes, and costs. *Worldviews on Evidence-Based Nursing*, 2014, 11(1): 5-15.
- [3] Härkönen H, Hannila H M, Oikarinen A, et al. The Measurement of Evidence-Based Healthcare Competence of Nurses and Associated Background Factors: A Scoping Review. *Research in Nursing & Health*, 2025, 48(5): 581-593.
- [4] Ruzafa-Martinez M, Lopez-Iborra L, Moreno-Casbas T, et al. Development and validation of the competence in evidence based practice questionnaire (EBP-COQ) among nursing students. *BMC medical education*, 2013, 13(1): 19.
- [5] Almarhabi M, Cornish J, Raleigh M, et al. Developing effective In-Service Education for intensive care nurses: Exploring the views of clinical stakeholders in the Kingdom of Saudi Arabia. *Nurse Education Today*, 2024, 134: 106092.
- [6] Atalla A D G, El-Ashry A M, Mohamed S M S. The relationship between evidence-based practices' facilitators and barriers among nurses and their competencies: self-efficacy as a mediator. *BMC nursing*, 2025, 24(1): 458.
- [7] Hu S, Liu S, Li X, et al. Organizational evidence-based practice culture, implementation leadership, and nurses: A bidirectional mediation model. *International nursing review*, 2025, 72(2): e13054.
- [8] Todd J, Shanahan B, Del Fabbro L, et al. Translating person-centered care policy into practice: A pre-post study of a work-based learning intervention for nurses. *The Journal of Continuing Education in Nursing*, 2024, 55(6): 303-308.
- [9] Nguyen-Truong C K Y, Davis A, Spencer C, et al. Techniques to promote reflective practice and empowered learning. *Journal of Nursing Education*, 2018, 57(2): 115-120.
- [10] Sujin S, Inyoung L, Jeonghyun K, et al. Effectiveness of a critical reflection competency program for clinical nurse educators: a pilot study. *BMC nursing*, 2023, 22(1): 69-69.
- [11] Revans R W. *The origins and growth of action learning.* (No Title), 1982.
- [12] M K P, Kateryna M. Reflective practice in nursing: A concept analysis. *International journal of nursing knowledge*, 2021, 33(3): 180-187.
- [13] Lavoie P, Michaud C, Belisle M, et al. Learning theories and tools for the assessment of core nursing competencies in simulation: A theoretical review. *Journal of Advanced Nursing*, 2018, 74(2): 239-250.
- [14] KOLB D A. *Experiential Learning: Experience as the Source of Learning and Development.* Upper Saddle River: Prentice-Hall, 1984: 31-61.
- [15] Lyons K, McLaughlin J E, Khanova J, et al. Cognitive apprenticeship in health sciences education: a qualitative review. *Advances in Health Sciences Education*, 2017, 22(3): 723-739.
- [16] Lee M, Bobek H, Casler K. Incorporating Evidence-Based Practice Learning Activities throughout Family Nurse Practitioner Clinical Practicum Courses. *The Journal of nursing education*, 2024, 1-4.