

Development and effectiveness of ADDIE-based case-based learning model enhancing motivation, critical thinking, and outcomes

Hardin Hardin¹✉, Hairuddin Safaat¹, Lestari Lorna Lolo² 

¹ Sekolah Tinggi Ilmu Kesehatan Kamus Arunika, Palopo, South Sulawesi, Indonesia

² Universitas Kurnia Jaya Persada, Palopo, South Sulawesi, Indonesia

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ABSTRACT

Introduction: Psychiatric nursing education remains largely teacher-centered, resulting in low student motivation, limited engagement, and suboptimal critical thinking. Innovative, student-centered approaches are needed. This study aimed to develop and evaluate the effectiveness of an ADDIE-based Case-Based Learning (CBL) model in improving learning motivation, critical thinking, and cognitive learning outcomes among nursing students.

Research Methodology: This study employed a Research and Development design using the ADDIE framework (Analysis, Design, Development, Implementation, Evaluation). A total of 38 fifth-semester nursing students participated. Instruments included an ARCS-based motivation questionnaire, case-based essay tests for critical thinking, and multiple-choice tests for cognitive learning outcomes. Data were analyzed using descriptive statistics and paired-samples t-tests with $\alpha = 0.05$.

Results: Significant improvements were observed across all variables. Learning motivation increased from 64.00 to 70.98 (mean difference = 6.98; $t(37) = 14.96$; $p < 0.001$). Critical thinking scores improved from 59.61 to 67.45 (mean difference = 7.84; $t(37) = 12.58$; $p < 0.001$). Cognitive learning outcomes increased from 62.72 to 72.32 (mean difference = 9.60; $t(37) = 13.55$; $p < 0.001$). These results indicate statistically significant improvements following the implementation of the ADDIE-based CBL model.

Conclusion: The ADDIE-based CBL model is valid, practical, and effective in enhancing student motivation, critical thinking, and learning outcomes in psychiatric nursing education. This model supports the adoption of student-centered learning strategies to improve educational quality and readiness for clinical competency.

Keywords: ADDIE; case-based learning; critical thinking; learning outcomes; motivation.



✉Corresponding author. email: hardin.nunung@gmail.com

Sekolah Tinggi Ilmu Kesehatan Kamus Arunika, Palopo, South Sulawesi, Indonesia



INTRODUCTION

Psychiatric nursing education faces a persistent pedagogical challenge: the dominance of teacher-centered approaches that inadequately foster higher-order cognitive skills and intrinsic learning motivation (Ahn et al., 2025). In mental health contexts, where clinical decision-making requires a nuanced interpretation of psychosocial data, deficits in critical thinking directly compromise students' readiness for practice (Branch & Varank, 2009). Empirical reports in Indonesia indicate that nursing graduates often demonstrate suboptimal competencies in analytical reasoning and clinical judgment, reflecting a misalignment between instructional strategies and competency-based educational outcomes (Chen et al., 2026). This gap is particularly consequential in psychiatric nursing, which demands integrative thinking, empathy, and adaptive problem-solving in complex patient scenarios (Cho & Yun, 2025).

A growing body of evidence supports the transition toward student-centered learning paradigms, particularly Case-Based Learning (CBL), as an effective approach to enhance engagement and cognitive processing (Fang & Chiu, 2024). CBL situates learners in realistic clinical scenarios, prompting active analysis, collaborative reasoning, and application of theoretical knowledge (Fonseca et al., 2025). Systematic reviews have shown that CBL significantly improves critical thinking, clinical reasoning, and learner motivation compared to traditional lecture-based methods. Furthermore, the ARCS (Attention, Relevance, Confidence, Satisfaction) motivational framework shows that meaningful, contextual learning experiences are strongly associated with increased student motivation and persistence. However, the effectiveness of CBL depends on rigorous instructional design and structured implementation (Funa, 2026).

Despite the growing adoption of Case-Based Learning (CBL) in nursing education, its implementation is often limited to classroom case discussions without a structured framework to guide the development, validation, implementation, and evaluation of learning activities (Hasani et al., 2024). Consequently, variations in case design, facilitation strategies, and assessment methods may lead to inconsistent learning outcomes and limit the scalability of CBL across educational settings (Hashimoto et al., 2025). In psychiatric nursing education, where students are expected to integrate clinical reasoning, communication skills, and psychosocial assessment, a more systematic instructional approach is needed to ensure effective learning. However, evidence for a validated, systematically developed CBL model specifically tailored to psychiatric nursing education remains limited (Jeon & Jeong, 2025). This gap highlights the need for an instructional model that not only applies CBL principles but also incorporates a structured design process to enhance learning motivation, critical thinking skills, and cognitive learning outcomes (Suprpto et al., 2025).

To address this gap, the ADDIE model provides a systematic instructional design framework that aligns learning objectives, learning activities, assessment strategies, and evaluation processes. The integration of ADDIE with Case-Based Learning enables the development of structured learning experiences that are responsive to learner needs and psychiatric nursing competencies. Through a sequence of analysis, design, development, implementation, and evaluation, the model supports continuous refinement of learning materials and instructional strategies to improve educational effectiveness.

The novelty of this study lies in the development and empirical validation of an ADDIE-based Case-Based Learning model specifically tailored for psychiatric nursing education. Unlike conventional CBL approaches that primarily focus on classroom case discussions, the proposed model incorporates a systematic needs assessment, competency-based case development, expert validation of learning materials, structured facilitator guidelines, and iterative evaluation

procedures. These components provide a more comprehensive and standardised framework for implementing CBL in psychiatric nursing courses. Furthermore, by simultaneously evaluating learning motivation, critical thinking skills, and cognitive learning outcomes, this study offers a multidimensional assessment of educational effectiveness. The findings are expected to contribute to evidence-based instructional design in nursing education and inform the adoption of scalable, student-centered learning models in similar contexts.

RESEARCH METHODOLOGY

Type of Research

This research is a research and development study by Sugiyono (2015) aimed at producing a Case-Based Learning (CBL) model. The ADDIE model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Branch & Varank, 2009).

Research Location and Time

This research was conducted at STIKes Kamus Arunika from March to August 2024.

Population and Sample

The subjects of this study were fifth-semester students of the D3 Nursing Program at STIKes Kamus Arunika enrolled in the Mental Health Nursing course during the odd semester of the 2024/2025 academic year, totaling 38 participants.

Data Collection

Data collection was conducted using several instruments: (1) a learning motivation questionnaire based on Keller's ARCS theory (Attention, Relevance, Confidence, Satisfaction) (2010), consisting of 20 statements on a 4-point Likert scale, administered as a pre-test and post-test to measure changes in motivation; (2) a critical thinking ability test based on Ennis' (2011) indicators (issue clarification, assumption identification, information interpretation, conclusion drawing, argument evaluation) in the form of 10 case study questions with an analytical rubric of 0–4 points per indicator, also administered as a pre-test and post-test; (3) A cognitive learning outcome test consisting of 30 multiple-choice questions at levels C2–C4 in accordance with the course syllabus, administered concurrently with the critical thinking test; (4), a model validation sheet by a team of lecturers (3 validators) using a 1–4 scale and a comment column to assess the suitability of content, design, language, and format after the development stage; and (5), an observation sheet on the implementation of the model by two independent observers during four meetings, assessing lecturer activities, student activities, the case discussion process, and media utilization using a 1–4 scale and qualitative comments. All quantitative data were analyzed descriptively and inferentially (paired sample t-test, $\alpha = 0.05$), while qualitative input was used for model refinement.

Data Processing and Analysis

Table 1. The Development Process Follows the ADDIE model (Branch & Varank, 2009)

Stage	Activities	Output
Analysis	- Analysis of learning needs through interviews with lecturers and distribution of questionnaires. - Identification of weaknesses in conventional learning	Report on learning needs and previous learning weaknesses
Design	- Developing a Case-Based Learning model design based on ADDIE - Developing RPS, case modules, and learning scenarios - Determining assessment indicators	Design of learning models, teaching tools, and assessment instruments

Stage	Activities	Output
Development	- Developing learning tools based on design - Validation by content experts and method experts - Revision based on validator input	A validated and ready-to-implement CBL model
Implementation	- Applying the model to students during 4 meetings - Managing case discussions and reflecting on learning outcomes	The learning process using the CBL model was carried out as planned.
Evaluation	- Conducting pre-tests and post-tests (motivation, critical thinking, learning outcomes) - Analyzing effectiveness with statistical tests	Model effectiveness data, conclusions on the success of development

The model was analyzed descriptively and quantitatively based on the scores given by the validator and observer. The model's effectiveness was tested by comparing pretest and posttest scores using a paired t-test in SPSS. The motivation questionnaire data and critical thinking test results were also analyzed using descriptive and inferential statistics.

RESULT

This section presents the study's empirical findings, focusing on the effectiveness of the ADDIE-based Case-Based Learning (CBL) intervention in improving learning motivation, critical thinking, and cognitive learning outcomes among nursing students. Results are presented in a structured sequence, including respondent characteristics, followed by bivariate and multivariate analyses. Emphasis is placed on the magnitude, direction, and statistical significance of effects to ensure a rigorous and transparent evaluation of the intervention's impact. **Table 2.** Mean pre-test and post-test scores for learning motivation, critical thinking, and cognitive learning outcomes, showing overall improvement following the ADDIE-based Case-Based Learning intervention.

Table 2. Average pre-test and post-test scores for each variable

Variable	Pre-test Mean	Post-test Mean
Motivation to Learn	64.00	70.98
Critical Thinking	59.61	67.45
Learning Outcomes	62.72	72.32

The average score across all variables increased after implementing the ADDIE-based Case-Based Learning model.

Statistical Test (Paired Sample t-Test): To determine the significance of this increase, a paired t-test was conducted, yielding the following results. Table 3. Results of paired-sample t-test analysis comparing pre-test and post-test scores, demonstrating statistically significant improvements in learning motivation, critical thinking, and cognitive learning outcomes after the intervention.

Table 3. Hasil uji Statistik (Paired Sample t-Test)

Variable	t (37)	p-value
Motivation to Learn	14.96	0.000
Critical Thinking	12.58	0.000
Learning Outcomes	13.55	0.000

All variables show p-values < 0.05 , indicating a significant difference between pre-test and post-test scores. The ADDIE-based CBL model significantly improves student motivation, critical thinking skills, and learning outcomes. Figure 1. Comparison of mean scores for learning

motivation, critical thinking, and learning outcomes between pre-test and post-test, showing consistent improvement across all variables after the ADDIE-based Case-Based Learning intervention.

Figure 1. Comparison of pre-test and post-test mean scores across learning motivation, critical thinking, and cognitive learning outcomes, indicating consistent and statistically significant improvements following the intervention.

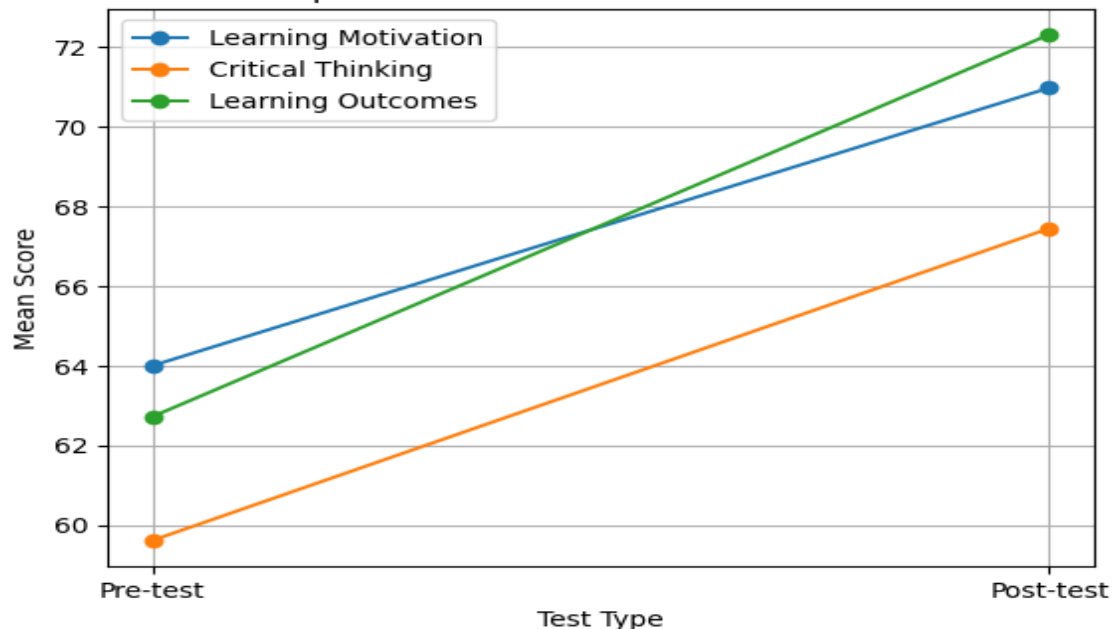


Figure 1. Comparison of Pre-Test and Post-Test Scores

The figure shows a consistent increase in mean scores for learning motivation, critical thinking, and learning outcomes from pre-test to post-test. This indicates that the ADDIE-based Case-Based Learning intervention had a positive and statistically significant impact on all measured variables.

DISCUSSION

This study aims to develop and test the effectiveness of the ADDIE-based Case-Based Learning (CBL) model in improving student motivation, critical thinking, and learning outcomes in Mental Health Nursing courses. Based on the pre-test and post-test data analysis of 38 students, there was a significant increase in all variables.

Motivation to Learn

The average pre-test score for learning motivation was 64.00, while the post-test score increased to 70.98. The paired sample t-test showed a t-value (37) = 14.96, with $p = 0.000$ ($p < 0.05$), indicating that this increase was statistically significant. This increase in motivation reflects the success of the CBL model in creating a more meaningful, challenging, and relevant learning environment. CBL presents real-life cases that reflect field conditions, so students feel that learning is more contextual. This is in line with Pears et al. (2025) opinion that motivation increases when students feel that learning is relevant to their real lives and professional goals. This model also fulfills the ARCS (Attention, Relevance, Confidence, Satisfaction) elements of Peršolja (2025), which is an effective approach in designing motivating learning. Significant changes in student motivation indicate that pedagogically appropriate learning interventions can stimulate learning enthusiasm, especially in challenging topics such as mental health nursing (Martínez-González et al., 2024).

The ADDIE-based Case-Based Learning model enhances students' learning motivation by increasing engagement, relevance, and active participation in the learning process Lepp et al.,

2026). Contextual case scenarios stimulate interest and confidence, while structured guidance fosters persistence and satisfaction, leading to stronger intrinsic motivation and sustained involvement in psychiatric nursing learning activities (Liu et al., 2026).

Critical Thinking

Critical thinking skills improved from a pre-test score of 59.61 to 67.45 on the post-test. The t-test yielded a $t(37)$ value of 12.58 ($p = 0.000$), indicating a statistically significant difference. Case-based learning provides students with the opportunity to analyze mental health nursing issues, explore alternative solutions, and develop logical arguments. This process encourages the use of higher-order thinking skills. According to (Pimdee et al. (2024), critical thinking is at the core of clinical decision-making in nursing. Therefore, the implementation of CBL directly contributes to the development of this capacity. Research by (Purwanto et al. (2024) also supports this finding, indicating that problem- and case-based learning approaches are significantly more effective than conventional lectures in enhancing nursing students' critical thinking abilities (Safitri et al., 2025). The ADDIE-based Case-Based Learning model enhances students' critical thinking by promoting analytical reasoning, interpretation of clinical data, and evidence-based decision-making (Kim et al., 2025). Through structured case analysis, students develop the ability to identify problems, evaluate alternatives, and construct logical arguments, thereby improving clinical judgment in psychiatric nursing contexts (Leiviska et al., 2025).

Learning Outcomes

The improvement in student learning outcomes was demonstrated by an increase in scores from 62.72 (pre-test) to 72.32 (post-test), with a t-test result of $t(37) = 13.55$, $p = 0.000$. This indicates a significant difference in learning outcomes before and after the implementation of the ADDIE-based CBL model.

The CBL model helps students understand the material not only theoretically, but also practically. Through case studies, students can integrate the concepts they have learned and relate them to real-world practices, deepening their understanding and improving learning retention. According to Seo et al. (2024), a deep understanding of the material is at a higher cognitive level, ideally achieved through active and reflective learning methods. The ADDIE-based Case-Based Learning model significantly improves students' cognitive achievement by enhancing knowledge integration, analytical reasoning, and application of psychiatric nursing concepts (Vieira et al., 2026). Students demonstrate better understanding of clinical cases, improved problem-solving abilities, and higher retention of learning materials following structured, context-driven instructional interventions (Yu et al., 2025).

This improvement in learning outcomes also reinforces the view that student-centered approaches such as CBL can enhance academic outcomes for students in the health field (Tan et al., 2025). The effectiveness of this model demonstrates that the Case-Based Learning approach designed within the ADDIE framework has significant potential in (1) enhancing students' intrinsic motivation, (2) developing essential critical thinking skills in nursing practice, and (3) strengthening overall understanding and learning outcomes. ADDIE-based CBL provides systematic, relevant, and in-depth learning tailored to the needs of D3 Nursing students as they face the challenges of complex mental health nursing practice (Melani et al., 2025). This model enables more contextually grounded, student-centered learning tailored to the competency needs of mental health nursing students (Palmera & Rincón, 2025). Based on research findings, the following stages of developing a Case-Based Learning model designed using the ADDIE framework in mental health nursing are outlined as follows:

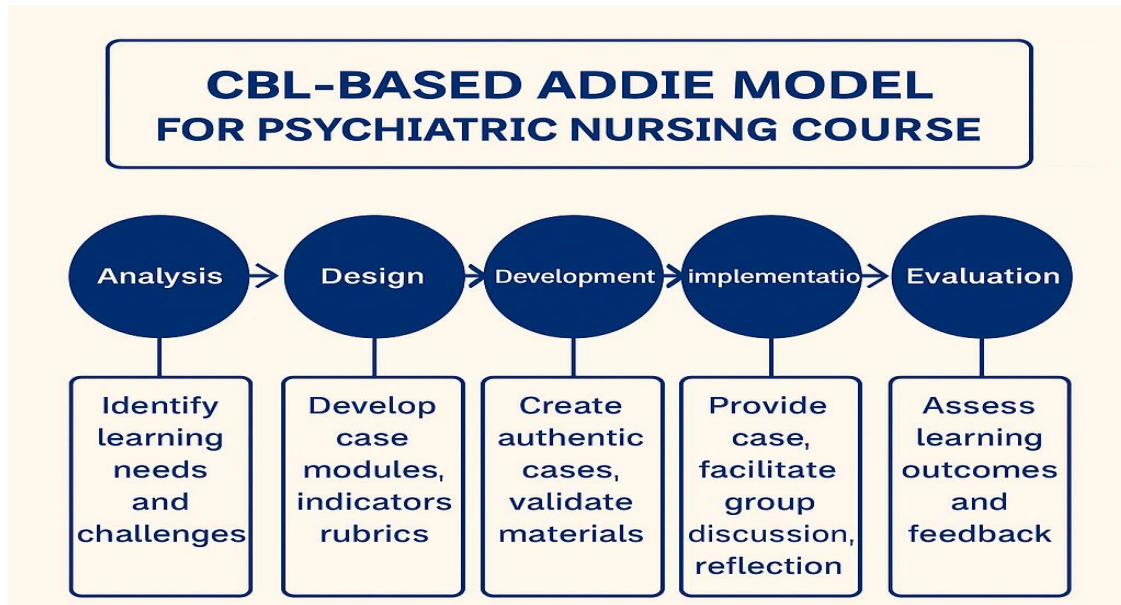


Figure 2. ADDIE-Based Case-Based Learning Development Model

Based on the results of research on the CBL learning model using the ADDIE framework: (1) Analysis (Identify gaps in students' competencies in mental health nursing practice, assess student needs, and determine key competencies: assessment, diagnosis, therapeutic communication, nursing interventions, and evaluation). (2) Design (Create mental health disorder case scenarios, organize the chronological flow of the case, medical-psychosocial information, and nursing history. Prepare assessment rubrics for case analysis, interventions, communication strategies, and learning session design: group discussions, role-playing, simulations, and critical reflection. (3) Development (Develop a comprehensive CBL mental health nursing module including: patient cases, analysis worksheets, discussion guides, and evaluation rubrics. Validate the content with a team of lecturers and mental health practitioners. (4) Implementation (Implement in the classroom or clinical practice; students are given cases and work in groups to: analyze data and nursing issues, determine intervention priorities, simulate therapeutic communication, with lecturers acting as facilitators). (5) Evaluation (Learning evaluation is conducted through: case analysis, performance, practice simulations (mini OSCE), self-reflection and feedback, formative/summative tests. Review the model's effectiveness using student feedback and learning outcomes.

CONCLUSION

This study confirms that the ADDIE-based Case-Based Learning (CBL) model has the potential to improve learning motivation, critical thinking, and cognitive learning outcomes among nursing students in psychiatric nursing education. The findings address the study objective by demonstrating that a systematically developed and validated instructional model can enhance both cognitive and affective learning. The integration of the ADDIE framework with CBL provides a structured, contextually relevant, and pedagogically robust approach that supports student engagement and higher-order thinking. This model facilitates knowledge acquisition while promoting competencies essential for clinical decision-making in mental health nursing. Although the findings indicate promising educational benefits, they should be interpreted with consideration of the study's limitations, including the relatively small sample size and implementation within a single institution. Therefore, further studies involving larger and more diverse populations, multiple educational settings, and comparative research designs are

recommended to strengthen the evidence base and support broader implementation of the model in nursing education.

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This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Authors' Contributions

Hardin: Conceptualization, methodology, data collection, formal analysis, and manuscript drafting.

Hairuddin Safaat: Supervision, validation, and critical revision of the manuscript.

Lestari Lorna Lolo: Investigation, data curation, and manuscript editing.

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Declaration of Generative AI Use

Generative artificial intelligence tools were used to support language refinement and improve clarity of expression during manuscript preparation. All conceptual development, data analysis, interpretation of findings, and final content decisions were performed by the author. The author takes full responsibility for the accuracy and integrity of the work

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