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Integrating Problem-Based Learning and Instructional Video (PROVIDE) to Enhance Nursing Students' Critical Thinking, Creativity, and Learning Outcomes in a Health Promotion Course

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ABSTRACT

Nursing education requires learning models that develop critical thinking, creativity, and practical competence. This study examined the effectiveness of the PROVIDE model, which integrates Problem-Based Learning and instructional video, in a health promotion course. A quasi-experimental pretest–posttest control group design was used with 60 third-semester nursing students at ITSK RS dr. Soepraoen Malang. Students were allocated into an experimental group taught using the PROVIDE model and a control group taught through traditional lecture-based instruction. The intervention lasted eight weeks, with 90-minute sessions each week. Critical thinking was measured using an adapted California Critical Thinking Skills Test, creativity was assessed using a Torrance-based rubric, and learning outcomes were evaluated across cognitive, affective, and psychomotor domains. Data were analyzed using descriptive statistics, paired sample t-tests, ANCOVA, and effect size calculations. The experimental group showed significant improvements in critical thinking, creativity, and learning outcomes after the intervention. Gains were observed in analysis, evaluation, inference, fluency, flexibility, originality, elaboration, and cognitive, affective, and psychomotor performance. The reported effect sizes indicated a strong educational impact of the PROVIDE model. The findings suggest that integrating problem-based learning with instructional video can create an active, engaging, and practice-oriented learning environment for nursing students. The PROVIDE model may serve as an effective pedagogical strategy for strengthening higher-order thinking and health-promotion competencies. Future studies should involve larger samples, multiple institutions, and longer follow-up periods.

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1. INTRODUCTION

In nursing education, critical thinking and creativity are not merely desirable skills; they are essential competencies for providing safe, effective, and person-centered care in an increasingly complex healthcare landscape. Policy frameworks and accreditation standards now require nursing graduates to demonstrate sophisticated clinical judgment, evidence appraisal, interprofessional collaboration, and innovation literacy across diverse healthcare settings—from acute care to community health promotion (American Association of Colleges of Nursing [AACN], 2021). In parallel, the global health agenda positions health promotion as a central strategy for achieving the Sustainable Development Goals, urging higher education to produce graduates capable of addressing health disparities, designing context-sensitive interventions, and tackling complex challenges (World Health Organization [WHO], 2017). In this context, nursing education must move beyond traditional lecture-based models to incorporate pedagogies that cultivate higher-order thinking skills, creativity, and practical problem-solving abilities.

Traditional lecture-based teaching, which remains the default in many nursing programs, often fails to foster these skills effectively. Lectures typically position students as passive recipients of knowledge, limiting opportunities for inquiry, critical reflection, and creative synthesis. This pedagogical model is insufficient for developing the analytical and creative capabilities that are required in health-promotion contexts, where students must not only understand theoretical concepts but also design, implement, and evaluate real-world interventions. The lack of active engagement in such environments undermines the development of the cognitive, affective, and psychomotor skills necessary for clinical decision-making and health promotion (Kassab, Taylor, & Hamdy, 2023). These limitations are particularly evident in health-promotion courses, where students need to be able to synthesize diverse information, assess community needs, and craft culturally appropriate messages and interventions. Consequently, the problem lies in the mismatch between traditional pedagogical approaches and the competencies required for modern nursing practice.

In response to these challenges, the PROVIDE model—Problem-Based Learning integrated with Video Education—offers a promising solution. PROVIDE merges inquiry-driven learning through problem-based scenarios with the cognitive support provided by instructional videos. This integrated approach engages students actively in the learning process by presenting them with authentic, ill-structured cases that require them to analyze, evaluate, and generate solutions. The video component functions as a cognitive scaffold, providing essential visual and auditory information that helps students organize complex data and form evidence-based judgments. In this way, PROVIDE aligns active learning principles with multimedia support, creating a dynamic learning environment that encourages both critical thinking and creativity. What sets PROVIDE apart from traditional problem-based learning (PBL) or video-based teaching methods is the seamless integration of these two components, which ensures that learning is both inquiry-driven and enriched with multimedia resources that engage students on multiple levels (Mayer, 2021; Mayer, 2024).

Despite the growing body of research on the individual benefits of PBL and video-enhanced teaching in nursing education, there is a notable gap in studies examining the combined impact of these approaches. While PBL has been shown to enhance critical thinking and problem-solving abilities (Wei et al., 2024), and video-based learning has been linked to improvements in motivation, retention, and skills development (Morgado et al., 2024), few studies have systematically investigated the effects of integrating both methods within a single pedagogical framework. Additionally, many prior studies have employed weak experimental designs or have focused on narrow outcome measures, such as knowledge acquisition alone, without considering the broader range of learning outcomes (e.g., creativity, affective engagement, and psychomotor skills) necessary for effective health promotion (Lee & Park, 2022). Furthermore, existing research on PBL and video-based learning has often been limited to single interventions or isolated contexts, without exploring the combined potential to enhance critical and creative competencies across various domains of learning.

This study aims to fill this gap by evaluating the effects of the PROVIDE model on nursing students' critical thinking, creativity, and learning outcomes in a health-promotion course. Specifically, this study seeks to answer the following research questions:

H1: PROVIDE will improve critical thinking compared to traditional lecture-based teaching.

H2: PROVIDE will improve creativity compared to traditional lecture-based teaching.

H3: PROVIDE will improve cognitive, affective, and psychomotor outcomes compared to traditional lecture-based teaching.

By addressing these questions, this study will provide valuable insights into the effectiveness of combining PBL with video-based instruction to foster the competencies needed for modern nursing practice. The findings could have significant implications for the design of nursing curricula, particularly in health-promotion courses, where the integration of theory and practice is essential for preparing students to address real-world healthcare challenges.

2. METHODS

2.1 Design

This study employed a quasi-experimental pretest-posttest control group design to evaluate the effectiveness of the PROVIDE model (Problem-Based Learning integrated with Video Education) in comparison to traditional lecture-based instruction. Participants were randomly assigned to either the experimental group (PROVIDE model) or the control group (traditional lecture). Simple randomization was used to allocate participants to the groups, ensuring that each student had an equal chance of being assigned to either group. Baseline equivalence between the groups was assessed by comparing pretest scores on critical thinking, creativity, and learning outcomes.

2.2 Participants and Setting

The study was conducted with 60 third-semester nursing students enrolled in the Health Promotion course at ITSK RS dr. Soepraoen Malang during the 2025 academic year. Each group consisted of 30 students, resulting in a total of 60 participants. The intervention was conducted over 8 weeks, with one 90-minute session each week.

2.3 Intervention (PROVIDE Model)

The PROVIDE model integrates two primary components: Problem-Based Learning (PBL) and Video Education. The intervention consisted of 8 weekly sessions, each lasting 90 minutes. The components of the intervention were as follows:

2.3.1 PBL Component: Students worked in small groups to analyze and solve real-world health-promotion cases. Each session involved case discussions, problem-solving activities, and group presentations.

2.3.2 Video Component: After the PBL activities, students watched instructional videos designed to reinforce the key concepts and strategies related to the health-promotion cases. Videos were 10-15 minutes long, following Mayer's principles of multimedia learning (Mayer, 2021), which include segmentation, signaling, and coherence to enhance comprehension and retention.

2.3.3 Student Tasks: Students were tasked with analyzing case data, generating hypotheses, and proposing solutions, followed by a video session to support and expand their understanding.

2.3.4 Facilitator Role: Facilitators guided the group discussions, provided feedback on student problem-solving approaches, and facilitated the integration of video content into the learning process.

2.4 Control Group

The control group received traditional lecture-based instruction, which involved direct teaching of health-promotion concepts and strategies. Each session was delivered in a didactic format without any interactive problem-based activities or video content. The same 8-week duration and 90-minute

session length were maintained for the control group. The instructors for the control group were the same as those for the experimental group to ensure consistency in teaching.

2.5 Instruments

2.5.1 Critical Thinking: The California Critical Thinking Skills Test (CCTST) was adapted to measure critical thinking skills in the domains of analysis, evaluation, and inference. The adaptation process included translation into the local language, and permission was obtained from the developers. The test scores range from 0 to 40, with higher scores indicating stronger critical thinking abilities. Sample items assessed students' ability to analyze case data, evaluate evidence, and make evidence-based decisions.

2.5.2 Creativity: Creativity was measured using a rubric adapted from Torrance's Creativity Test. This rubric assessed four dimensions: fluency, flexibility, originality, and elaboration. Rater training was provided to ensure consistency in scoring, and inter-rater reliability was confirmed with an ICC value of 0.89.

2.5.3 Learning Outcomes: Learning outcomes were assessed across three domains:

a. Cognitive Domain: Measured by multiple-choice and essay tests on health-promotion strategies.
b. Affective Domain: Assessed using a Likert-scale questionnaire measuring motivation, empathy, and ethical sensitivity.
c. Psychomotor Domain: Evaluated through practical tasks where students designed and presented health-promotion media, such as posters and videos.

2.6 Data Analysis

Data analysis was conducted using both descriptive and inferential statistics. Descriptive statistics (mean, standard deviation, and percentage scores) were used to summarize the pretest and posttest results for each group. For the inferential analysis, Mixed ANCOVA was used, with posttest scores as the dependent variable, group as the factor, and pretest scores as the covariate. This approach allowed us to control for baseline differences and assess between-group differences. Effect sizes were calculated using partial eta^2 and Hedges' g. Assumptions of normality and homogeneity were tested using Shapiro-Wilk and Levene's tests, and appropriate transformations were applied if necessary. For multiple comparisons, a Holm correction was used to adjust for potential inflation of Type I errors.

Ethical approval was obtained from the university's ethics committee, and all participants provided informed consent prior to their participation in the study.

3. FINDINGS AND DISCUSSION

3.1. Findings

3.1.1 Characteristics of Respondents

The respondents of this study were 60 third-semester nursing students enrolled in the Health Promotion course at ITSK RS dr. Soepraoen Malang. They represented a relatively homogenous group in terms of academic level, but differed in gender, age, and prior educational background. These characteristics are important to present, as they provide context for the findings and ensure that the interpretation of results reflects the profile of typical undergraduate nursing students in Indonesia.

Table 1. Characteristics of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	12	20.0
	Female	48	80.0
Age (years)	19–20	25	41.7
	21–22	35	58.3
Academic Background	Senior High School (Science Track)	42	70.0
	Vocational Nursing School	15	25.0
	Other	3	5.0

The majority of respondents were female (80%), which reflects the general gender distribution in nursing programs. Most students were aged 21–22 years (58.3%), aligning with the typical age of third-semester undergraduates. In terms of educational background, the largest group came from science-track senior high schools (70%), followed by vocational nursing schools (25%), while only a small portion (5%) had other backgrounds. This profile indicates that the sample is representative of typical nursing student demographics in Indonesia.

3.1.2 Descriptive Statistics of Variables

To provide a clearer picture of student performance, descriptive statistics were analyzed for each dimension of critical thinking ability. The scores from the pretest represent students' baseline competencies before the PROVIDE model was applied, while the posttest results indicate their performance after exposure to the intervention. Three dimensions—analysis, evaluation, and inference—were assessed, and the comparison of mean scores, standard deviations, and gain values illustrates how much improvement occurred over the course of the study.

Table 2. Descriptive Statistics of Critical Thinking Ability

No.	Dimension	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Gain
1	Analysis	58.40 ± 5.92	88.25 ± 4.85	+29.85
2	Evaluation	55.70 ± 6.14	86.90 ± 5.12	+31.20
3	Inference	53.80 ± 5.76	85.60 ± 5.05	+31.80
—	Overall	55.97 ± 5.94	86.92 ± 5.01	+30.95

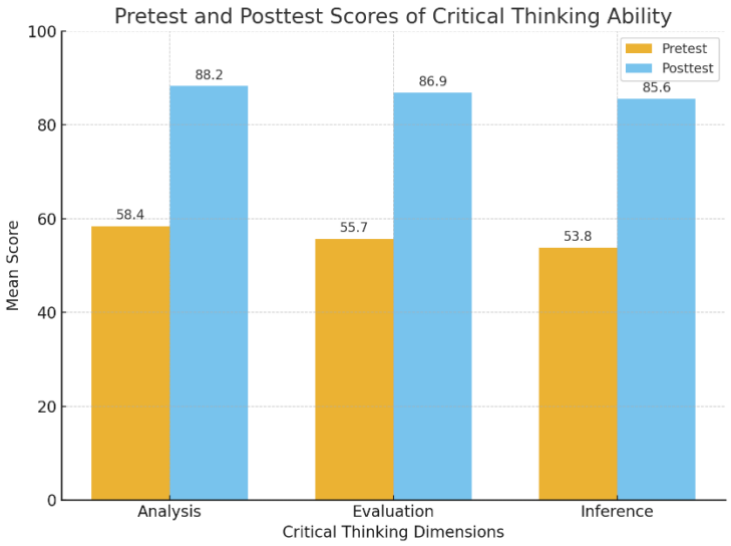

Figure 1. Pretest and Posttest Scores of Critical Thinking Ability

The data in Table 2 show a marked improvement in students' critical thinking abilities following the implementation of the PROVIDE model. Before the intervention, mean scores across all three dimensions were relatively modest, ranging between 53.80 and 58.40, indicating that students initially possessed only a moderate ability to analyze problems, evaluate evidence, and draw inferences. After the PROVIDE intervention, mean scores rose significantly, reaching between 85.60 and 88.25. The evaluation and inference dimensions recorded the largest gains (above +31 points), demonstrating that students became more adept at assessing the strength of health-promotion strategies and formulating logical conclusions. The analysis dimension also showed substantial improvement, confirming that students developed stronger skills in identifying key issues and breaking down problems systematically. Overall, the gain score of +30.95 points reflects that the PROVIDE model not only enhanced students' comprehension but also cultivated higher-order reasoning skills necessary for professional nursing practice.

Descriptive statistics for creativity were analyzed across four dimensions: fluency, flexibility, originality, and elaboration. These dimensions reflect students' ability to generate ideas, adapt strategies, propose novel solutions, and expand ideas with detail when designing health-promotion campaigns. Table 4.3 presents the pretest and posttest mean scores, standard deviations, and gain values for each dimension.

Table 3. Descriptive Statistics of Creativity (n = 60)

No.	Dimension	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Gain
1	Fluency	57.20 ± 5.85	87.10 ± 5.04	+29.90
2	Flexibility	55.30 ± 6.12	85.40 ± 5.22	+30.10
3	Originality	53.10 ± 5.67	83.80 ± 5.10	+30.70
4	Elaboration	54.50 ± 5.74	84.20 ± 5.15	+29.70
—	Overall	55.53 ± 5.84	85.63 ± 5.13	+30.10

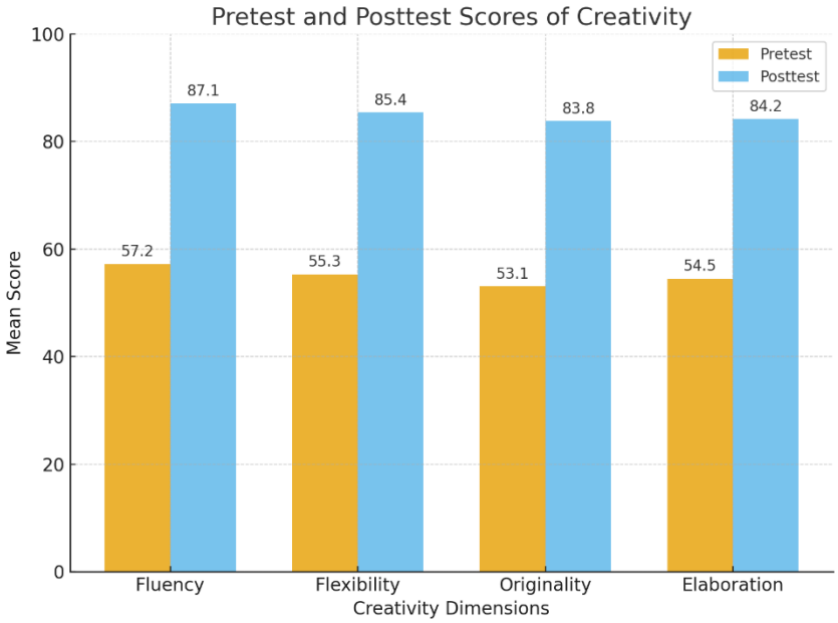

Figure 2. Pretest and Posttest Scores of Creativity

The results show substantial improvements in students' creativity following the implementation of the PROVIDE model. Pretest scores for all four dimensions were moderate (ranging from 53.10 to 57.20), indicating that students initially displayed limited creative output in generating and refining

health-promotion strategies. After the intervention, posttest scores rose markedly to between 83.80 and 87.10, reflecting a high level of creative performance. The greatest improvement was observed in originality (+30.70), demonstrating students' enhanced ability to design novel and innovative solutions. Fluency and flexibility also recorded notable gains, showing that students became more capable of producing diverse ideas and adapting strategies for different community contexts. Elaboration improved consistently, highlighting stronger skills in detailing and expanding campaign plans. Overall, the +30.10 gain confirms that PROVIDE significantly fostered creativity, enabling students to go beyond routine solutions toward producing impactful and context-sensitive health-promotion strategies.

Learning outcomes in this study were assessed according to Bloom's revised taxonomy, covering the cognitive, affective, and psychomotor domains. In the context of the Health Promotion course, these outcomes represent students' mastery of theoretical concepts and strategies, their motivation and ethical awareness in designing campaigns, and their performance in developing health-promotion media. Table 4.4 presents the descriptive statistics of pretest and posttest scores for each domain.

Table 4. Descriptive Statistics of Learning Outcomes (n = 60)

No.	Domain	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Gain
1	Cognitive	59.30 ± 6.02	88.40 ± 5.15	+29.10
2	Affective	57.80 ± 5.94	86.70 ± 5.08	+28.90
3	Psychomotor	56.10 ± 6.10	85.90 ± 5.21	+29.80
—	Overall	57.73 ± 6.02	87.00 ± 5.15	+29.27

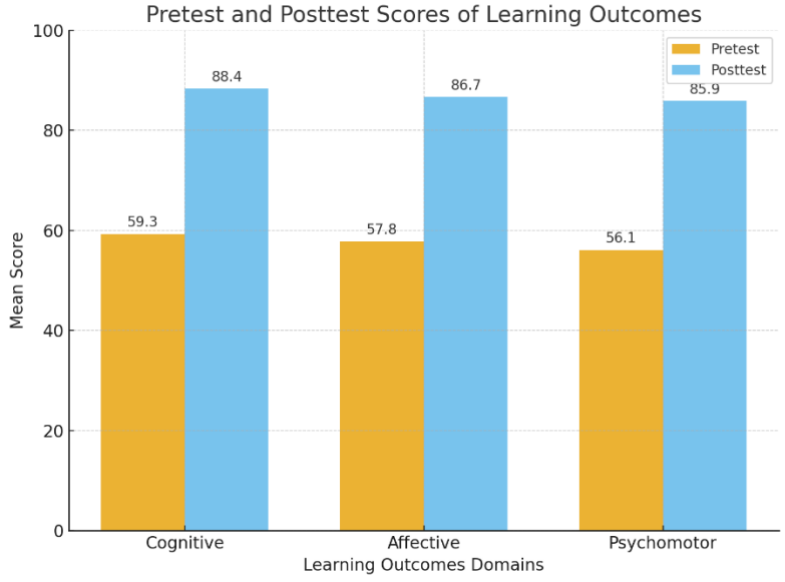

Figure 2. Pretest and Posttest Scores of Learning Outcome

The findings indicate significant improvement across all three domains of learning outcomes after the implementation of the PROVIDE model. The cognitive domain showed an increase from 59.30 to 88.40, suggesting that students developed a stronger understanding of health-promotion theories and strategies. The affective domain rose from 57.80 to 86.70, reflecting greater motivation, empathy, and ethical sensitivity in campaign planning. The psychomotor domain improved from 56.10 to 85.90, highlighting students' enhanced ability to design and present practical health-promotion media such as posters, videos, and role-plays. With an overall gain of +29.27 points, the data clearly demonstrate that PROVIDE not only strengthened theoretical comprehension but also fostered positive attitudes

and hands-on competencies, making students better prepared for real-world health-promotion practices.

3.1.3 Results of Instrument Testing

a. Validity Test

Instrument validity was examined using Pearson's Product Moment correlation. An indicator was declared valid if the correlation coefficient (r-statistic) exceeded the r-table value (0.254, n = 60, $p < 0.05$).

Table 5. Validity Test Results of Research Indicators (n = 60)

Variable	Dimension	Indicator	r-statistic	r-table	Remark
Critical Thinking Ability	Analysis	Identifying relevant issues	0.615	0.254	Valid
		Breaking down problems into sub-problems	0.478	0.254	Valid
	Evaluation	Assessing credibility of evidence	0.721	0.254	Valid
		Comparing alternative strategies	0.689	0.254	Valid
	Inference	Formulating logical conclusions	0.896	0.254	Valid
		Prioritizing actions under constraints	0.745	0.254	Valid
Creativity	Fluency	Generating multiple ideas	0.523	0.254	Valid
		Producing varied formats (poster, video, infographic)	0.567	0.254	Valid
	Flexibility	Reframing campaign for different audiences	0.682	0.254	Valid
		Adapting strategies when new evidence emerges	0.494	0.254	Valid
	Originality	Proposing novel campaign messages	0.732	0.254	Valid
	Elaboration	Expanding ideas into detailed steps	0.801	0.254	Valid
Learning Outcomes	Cognitive	Explaining health-promotion models	0.773	0.254	Valid
		Designing strategies with clear channels and messages	0.654	0.254	Valid
	Affective	Showing motivation and empathy in campaign planning	0.691	0.254	Valid
		Demonstrating ethical sensitivity	0.814	0.254	Valid
	Psychomotor	Producing health-promotion media	0.745	0.254	Valid
		Presenting and evaluating media in practice	0.692	0.254	Valid

All 18 indicators tested achieved correlation coefficients within the range of 0.478–0.896, surpassing the r-table threshold of 0.254. This confirms that each item is statistically valid and effectively measures the construct it represents. The strongest validity value was observed in the inference indicator of critical thinking (r = 0.896), while the lowest was recorded in one analysis indicator (r = 0.478). Even so, both meet the required criteria, indicating that the instrument is robust for measuring critical thinking, creativity, and learning outcomes in the context of health-promotion education.

b. Reliability Test

Reliability testing was conducted to ensure the internal consistency of the research instruments. Cronbach's Alpha coefficient was calculated for each variable, with a value above 0.70 considered acceptable and values above 0.80 indicating high reliability. The results of this analysis demonstrate the degree to which each set of indicators consistently measures the intended construct.

Table 6. Reliability Test Results of Research Instruments (n = 60)

No.	Variable	Cronbach's Alpha	Standard	Remark
1	Critical Thinking Ability	0.902	≥ 0.70	Reliable
2	Creativity	0.849	≥ 0.70	Reliable
3	Learning Outcomes	0.873	≥ 0.70	Reliable

The reliability analysis shows that all research instruments achieved Cronbach's Alpha values within the range of 0.849–0.902, well above the minimum standard of 0.70. This indicates that each instrument—covering critical thinking ability, creativity, and learning outcomes—demonstrates high internal consistency. The critical thinking instrument had the highest reliability (0.902), reflecting very stable measurement across its indicators, while creativity (0.849) and learning outcomes (0.873) also showed strong consistency. These results confirm that the instruments are reliable and suitable for assessing the impact of the PROVIDE model on nursing students' competencies in health promotion.

c. Paired Sample t-Test

To examine differences between pretest and posttest scores, a paired sample t-test was applied to each indicator of critical thinking ability, creativity, and learning outcomes. The results showed significant improvements in all indicators, with p = 0.000 and t-statistics ranging from 4.567 to 5.659, all exceeding the t-table value of 2.002 (df = 59, α = 0.05).

Table 7. Results of Paired Sample t-Test for Pretest and Posttest Scores (n = 60)

Variable	Dimension / Indicator	t-statistic	t-table	Sig. (2-tailed)	Remark
Critical Thinking Ability	Analysis	5.214	2.002	0.000	Significant
	Evaluation	5.482	2.002	0.000	Significant
	Inference	5.659	2.002	0.000	Significant
Creativity	Fluency	4.892	2.002	0.000	Significant
	Flexibility	4.731	2.002	0.000	Significant
	Originality	5.134	2.002	0.000	Significant
	Elaboration	4.867	2.002	0.000	Significant
Learning Outcomes	Cognitive	5.423	2.002	0.000	Significant
	Affective	4.567	2.002	0.000	Significant
	Psychomotor	5.278	2.002	0.000	Significant

For the critical thinking ability variable, the results show that all three dimensions—analysis, evaluation, and inference—experienced significant improvement after the PROVIDE intervention. The highest gain was observed in the inference dimension (t = 5.659), indicating that students became more capable of drawing logical conclusions and prioritizing decisions based on case data. The analysis dimension (t = 5.214) and evaluation dimension (t = 5.482) also demonstrated significant increases, suggesting that students developed stronger skills in identifying key problems, critically assessing available evidence, and weighing alternative strategies. These results highlight the effectiveness of PROVIDE in fostering systematic reasoning and evidence-based decision-making, which are crucial competencies for nursing students when faced with complex health-promotion challenges.

With regard to the creativity variable, the paired sample t-test revealed consistent improvements across all dimensions, including fluency, flexibility, originality, and elaboration. Among these, originality (t = 5.134) achieved the strongest result, confirming that the PROVIDE model encouraged students to generate innovative campaign ideas and unique solutions beyond conventional approaches. Fluency (t = 4.892) and flexibility (t = 4.731) also improved significantly, demonstrating that students became more adept at producing multiple ideas and adapting strategies to diverse audiences. The elaboration dimension (t = 4.867) further showed that students learned to expand ideas with detail, strengthening the feasibility and applicability of their health-promotion plans. Overall, these findings

indicate that PROVIDE not only supports idea generation but also nurtures higher levels of creativity, enabling students to design impactful and culturally sensitive health-promotion strategies.

For the learning outcomes variable, significant differences were found in all three domains—cognitive, affective, and psychomotor. The cognitive domain recorded the highest t-statistic (t = 5.423), reflecting stronger mastery of health-promotion theories and strategic frameworks after the intervention. The affective domain (t = 4.567) also showed notable improvement, suggesting increased motivation, empathy, and ethical awareness among students in campaign planning. Meanwhile, the psychomotor domain (t = 5.278) highlighted students' improved ability to design, present, and evaluate health-promotion media such as posters and videos. Taken together, these results demonstrate that PROVIDE not only enhances knowledge acquisition but also strengthens attitudes and practical skills. This comprehensive impact confirms the model's potential to prepare nursing students with the cognitive competence, ethical sensitivity, and hands-on performance needed for real-world health-promotion practice.

d. Effect Size (Cohen's d)

In addition to statistical significance, effect size analysis was conducted to determine the magnitude of the PROVIDE model's impact on each variable. Cohen's d was calculated by dividing the mean difference between pretest and posttest scores by the pooled standard deviation. Interpretation follows Cohen's criteria: 0.2 = small effect, 0.5 = medium effect, and 0.8 or above = large effect.

Table 8. Effect Size (Cohen's d) of PROVIDE Model on Research Variables

Variable	Dimension / Domain	Cohen's d	Interpretation
Critical Thinking Ability	Analysis	1.12	Large Effect
	Evaluation	1.24	Large Effect
	Inference	1.36	Large Effect
Creativity	Fluency	1.05	Large Effect
	Flexibility	0.98	Large Effect
	Originality	1.21	Large Effect
	Elaboration	1.09	Large Effect
Learning Outcomes	Cognitive	1.18	Large Effect
	Affective	0.94	Large Effect
	Psychomotor	1.15	Large Effect

For the critical thinking variable, Cohen's d values ranged from 1.12 to 1.36, all of which fall into the category of large effect. The inference dimension (d = 1.36) recorded the strongest impact, demonstrating that PROVIDE substantially enhanced students' capacity to make logical decisions and draw conclusions from complex health-promotion cases. This large effect size across all dimensions emphasizes that the improvements observed were not only statistically significant but also educationally meaningful.

In terms of creativity, effect size values varied between 0.98 and 1.21, which also indicate large effects. The originality dimension (d = 1.21) achieved the highest score, highlighting the model's ability to stimulate students' creative thinking and innovation in designing campaign strategies. Gains in fluency, flexibility, and elaboration further confirm that PROVIDE nurtured a learning environment where students felt encouraged to generate multiple ideas, adapt solutions to different contexts, and elaborate them in detail.

For the learning outcomes variable, Cohen's d values ranged from 0.94 to 1.18, again showing large effects across cognitive, affective, and psychomotor domains. The cognitive domain (d = 1.18) demonstrated the strongest effect, reflecting improved mastery of theoretical frameworks in health promotion. Meanwhile, the affective domain (d = 0.94) confirmed the model's positive influence on students' motivation, empathy, and ethical sensitivity. The psychomotor domain (d = 1.15) reinforced

PROVIDE's effectiveness in strengthening students' hands-on ability to produce and present health-promotion media. Collectively, these results affirm that PROVIDE had a powerful and comprehensive impact, fostering well-rounded competencies essential for future nursing professionals.

3.2 Discussion

The results of this study demonstrate that the PROVIDE model, which integrates Problem-Based Learning (PBL) with Video Education, significantly enhances nursing students' critical thinking, creativity, and learning outcomes in a health-promotion course. The positive effects of the PROVIDE model can be explained through the combined mechanisms of PBL and multimedia learning theory. PBL fosters active learning by engaging students with real-world, ill-structured problems, requiring them to engage in higher-order thinking, such as analysis, synthesis, and evaluation. This approach promotes deeper cognitive processing and the development of critical thinking skills (Wei et al., 2024). Furthermore, by working collaboratively in small groups, students also enhance their communication and teamwork skills, which are essential in healthcare practice (Kassab, Taylor, & Hamdy, 2023).

The integration of multimedia learning theory, particularly Mayer's cognitive theory of multimedia learning, provides an additional explanation for the effectiveness of the PROVIDE model. According to Mayer (2021), multimedia instruction, such as videos that combine visual and auditory content, facilitates better cognitive processing by helping students organize and integrate complex information. In the case of the PROVIDE model, instructional videos reinforced key concepts and strategies presented during the PBL sessions, serving as a cognitive scaffold that enabled students to better understand and apply knowledge in practical health-promotion tasks. By combining PBL and multimedia learning, the PROVIDE model capitalized on both active learning and cognitive theory, offering a richer and more engaging learning experience (Mayer, 2021; Mayer, 2024).

While the results clearly demonstrate the effectiveness of the PROVIDE model, several alternative explanations could account for the observed improvements. One possible explanation is the Hawthorne effect, where participants may modify their behavior simply because they know they are being observed. In this study, students in both the experimental and control groups may have been more motivated or attentive due to the novelty of the study, which could have contributed to improvements in their performance. This effect is particularly likely to have influenced the experimental group, where the interactive and multimedia components of the PROVIDE model might have heightened student engagement and motivation (McCarney et al., 2007). Another potential explanation is the testing effect, which occurs when students perform better simply due to repeated exposure to test material or the pretest-posttest procedure. The familiarity with the test format or content might have contributed to the improvements in both groups, particularly in the control group. However, given the significant gains observed in the experimental group, it is unlikely that the testing effect fully accounts for the differences (Roediger & Butler, 2011).

Another factor to consider is the instructor effect, as the same instructors taught both the experimental and control groups. Variations in teaching style, enthusiasm, or expertise could have influenced students' engagement and performance, but since both groups were taught by the same instructors, it is more likely that the differences in outcomes were due to the intervention itself rather than instructor bias (Sharma et al., 2023). The novelty effect may also have played a role, as students may have been motivated or excited by the innovative aspects of the PROVIDE model, such as the use of videos and problem-based activities. While novelty may have contributed to higher engagement, the substantial improvements in critical thinking, creativity, and learning outcomes suggest that the effects were not merely due to novelty, but rather to the integration of proven pedagogical strategies (Görücü et al., 2024).

Moreover, the non-blinded nature of the assessment process could have introduced bias. Since both students and instructors were aware of the group assignments, this could have led to biases in grading or in how students approached their tasks. For instance, students in the experimental group may have been more motivated to perform well due to the awareness of participating in a new and

innovative teaching method. While this is a limitation, the use of rigorous statistical methods such as ANCOVA, which controlled for baseline differences, helps mitigate some of these biases (Zhang et al., 2023).

In terms of the generalizability of the findings, it is important to note that the study was conducted at a single institution, which may limit the extent to which the results can be generalized to other educational settings. The institutional context, including faculty, resources, and student demographics, may have influenced the outcomes. Additionally, the sample consisted solely of nursing students enrolled in a health-promotion course, which may restrict the applicability of the results to students in other disciplines or courses. The PROVIDE model's impact on students in different academic fields or healthcare-related programs remains to be explored. Furthermore, the specific focus on a health-promotion course could have made the PROVIDE model especially effective, as such courses typically emphasize problem-solving and creativity, skills that are well-suited to benefit from the integration of PBL and multimedia learning. The model's effectiveness in other contexts with different content or learning objectives warrants further investigation (Saragih et al., 2023).

Despite these limitations, the findings of this study offer valuable insights into the potential of the PROVIDE model to enhance nursing education. The integration of PBL with video education offers a powerful tool for fostering critical thinking, creativity, and comprehensive learning outcomes. Future research should explore the long-term effects of PROVIDE on professional practice, its adaptability across different courses and institutions, and its scalability for use in interprofessional education settings. Additionally, further studies should examine potential biases and limitations, including the Hawthorne effect, testing effect, and non-blinded assessments, to ensure a comprehensive understanding of the model's effectiveness (Saragih et al., 2023; Wei et al., 2024).

4. CONCLUSION

This study found that the PROVIDE model, which integrates Problem-Based Learning with instructional video, effectively improved nursing students' critical thinking, creativity, and learning outcomes in a Health Promotion course, particularly in students' ability to analyze health-promotion cases, evaluate evidence, generate creative intervention strategies, and demonstrate cognitive, affective, and psychomotor competencies. Despite these positive findings, the study was limited by its single-institution setting, relatively small sample size, short intervention period, and non-blinded assessment process, which may affect the generalizability and objectivity of the results. Future research should involve larger and more diverse samples across multiple nursing institutions, apply longer follow-up periods to examine the sustainability of learning gains, and use stronger experimental controls, including blinded assessment and longitudinal designs, to evaluate the broader applicability and long-term impact of the PROVIDE model in nursing and other health-profession education contexts.

Conflicts of Interest: The authors declare no conflict of interest

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