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RESEARCH ARTICLE

The Efficacy of a Systematic Learning Framework in Fostering Critical Thinking Skills in Pre-Service Teachers

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ABSTRACT

This research investigates the effectiveness of the developed learning framework in enhancing critical thinking skills among pre-service teachers. The THINK-COMM Framework is a multidimensional educational platform that comprehensively integrates various foundational learning theories, encourages the systematic integration of critical thinking activities, and provides a responsive mechanism for real-time feedback and performance assessment. Critical thinking (CT) is essential for individuals in all fields of work, particularly in the education sector. Pre-service teachers often lack adequate baseline knowledge of critical thinking, which is essential for their future teaching career. This study sought to address this issue by developing and testing the effectiveness of a learning framework that promotes critical thinking skills among pre-service teachers. The research uses a mixed-methods approach, including a pretest-posttest design, surveys, and focus group discussions. The study was conducted at Bicol State College of Applied Sciences and Technology in Naga City. The participants are pre-service teachers enrolled in Purposive Communication in the second semester of SY 2022-2023 and teachers handling the subject during the identified semester. Schools and higher education institutions should consider adopting and customizing the critical thinking framework as part of a complete strategy to enhance students' critical thinking abilities. The THINK-COMM Framework presents a promising avenue to facilitate the holistic development of student's skills and knowledge by integrating various learning theories and providing robust, real-time feedback. The study also has broader implications for promoting critical thinking skills in education, which is crucial for preparing students for the challenges of the 21st century.

Contribution/Originality: This research presents a Systematic Learning Framework as a unique method for enhancing critical thinking abilities in pre-service teachers. In contrast to conventional approaches that focus on content delivery or separate skill practice, this framework combines organized learning processes with reflective activities to systematically develop higher-order thinking and thoughtful teaching.

1. Introduction

Critical thinking (CT) is essential for individuals in all fields of work, particularly in the education sector. Critical thinking skills (CTS) have grown in importance for people who want to become good teachers as the demands on teachers continue to change. According to (Jones et al.) most teachers are not well-equipped to handle the complicated demands of teaching in our current environment. Therefore, pre-service teachers (PSTs) are at a critical stage of their development as they prepare to enter the workforce and begin their careers as educators. Hence, enhancing their critical thinking skills is of paramount importance. It is particularly relevant today as the education landscape continues to change rapidly.

Several factors, including inadequate baseline knowledge of critical thinking, a lack of suitable materials, and systemic issues within the education system, hamper the promotion of critical thinking abilities in schools. Khalid et al. (2021) revealed a number of obstacles that have been found to prevent critical thinking from being taught in schools, including students' backgrounds, the instructional strategies used in class, the classroom organization, and the available materials that do not promote it. It takes a concerted effort from educators, decision-makers, and other stakeholders to address these concerns, prioritize critical thinking skills in education, and provide the necessary resources and support to promote these skills effectively.

An extensive examination conducted by Arum and Roksa (2011) of more than 2,300 undergraduate students at 24 universities discovered that, in their first two years of college, about 45% of these students did not significantly progress in a variety of skills, such as writing, complex reasoning, and critical thinking. Hence, the academic community must work harder to ensure that today's students develop into tomorrow's skilled thinkers. Setyowati et al. (2020) stated that an effective learning method could help students enhance their critical thinking skills; thus, the learning process should be packaged so students actively engage in the classroom. The goal is to improve the quality of learning by using appropriate learning frameworks to achieve these outcomes.

Karakoc (2016) addressed critical thinking ability in educational processes and the importance of CT for a student in any educational program. Modern educational techniques and models emphasize the development of CTS. The study aimed to provide a framework for thinking critically while teaching or learning. The study indicated that CT is essential in all aspects of life, particularly in jobs dealing with people. Teachers and counselors must be dedicated to critical thinking and its philosophy before implementing it in their classrooms. Vong & Kaewurai (2017) conducted research to create, put into practice, and assess a cognitively based instructional model to improve critical thinking in trainee students and build their ability to teach critical thinking to learners. The model was created using four primary research and development procedures components and tested with English majors. The results show that there are six main parts to the developed instructional model: the concept, the objective, the learning content, the learning instruction, the learning materials, and the evaluation. The applicability of the created teaching paradigm was exceptional.

Critical thinking is a 21st-century skill expected of tertiary students and is especially important in education. Critical thinking skills training is so crucial that some academics believe it should be the primary goal of university education and experience. According to the report by Tamayo et al. (2014), students must develop critical thinking abilities to

fulfill the demands of the emerging information economy. Educators are also advised to focus on ways to help pupils build their critical thinking skills. Finally, school administrators, curriculum planners, and developers can improve the curriculum by providing students with instructional resources, modules, and approaches that will help them strengthen their critical thinking skills.

Mugot & Sumbalan (2019) ascertain the level of PSTs' preparation for the actual teaching environment. Developing teachers' learning and teaching skills while they are still in college is one of the key components of teaching in the twenty-first century. Assessing pre-service teachers' 21st-century skills may provide a foundation for developing feasible coursework that meets the current demands of college students in developing their abilities and competencies. The study's conclusions highlight the need for Teacher Education Institutions in the Philippines to develop 21st-century curricula for students who can think critically about the world, engage appropriately with digital and social media, and develop the collaboration and communication skills necessary for success in college and the future teaching profession. Furthermore, College of Education faculty members can explore best practices and strategies for engaging education students in developing 21st-century capabilities. This study raises optimism for the Philippine educational system even though the development of learning theories and technological breakthroughs has significantly altered teaching in the 21st century. The development of these skills in teachers should, therefore, be a top priority for colleges and universities.

1.1. Research Objectives

To ensure that pre-service teachers are ready to address the many and changing demands of their future pupils, it is crucial to assess their critical thinking abilities. It allows teacher educators to offer specialized resources and support, eventually resulting in more productive and influential teachers in the classroom. Furthermore, a systematic learning framework offers the organization and direction required for pre-service teachers to develop and improve their critical thinking abilities effectively. It ensures that these abilities are included in their education in a meaningful, quantifiable way and encourages long-term retention and application in the classroom.

i. What is the level of critical thinking skills of the pre-service teachers as revealed by Watson-Glaser Critical Thinking Appraisal?
ii. What learning framework may be adapted to enhance critical thinking?
iii. What is the level of effectiveness of the framework to enhance critical thinking skills?

2. Literature Review

An extensive examination conducted by Arum and Roksa (2011) of more than 2,300 undergraduate students at 24 universities discovered that, in their first two years of college, about 45% of these students did not significantly progress in a variety of skills, such as writing, complex reasoning, and critical thinking. Hence, the academic community must work harder to ensure that today's students develop into tomorrow's skilled thinkers. Setyowati et al. (2020) stated that an effective learning method could help students enhance their critical thinking skills; thus, the learning process should be packaged so students actively engage in the classroom. The goal is to improve the quality of learning by using appropriate learning frameworks to achieve these outcomes.

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3. Research Methods

The paper intended to identify the pre-service teachers' level of CTS as revealed by the Watson-Glaser Critical Thinking Appraisal (W-GCTA). The W-GCTA offers the perspective that critical thinking is a skill set that significantly contributes to students' academic success Zulmaulida et al. (2018). A critical thinking test evaluates one's capacity for logically analyzing premises, justifications, deductions, inferences, and interpretations. The Watson Glaser Critical Thinking Appraisal is widely used to measure CTS. It is a standardized test mostly used for evaluating critical thinking and is appropriate for evaluating adults (16 years old and above). It can be an important tool for assessing the CTS of pre-service teachers for several reasons. First, it is a valid and reliable measure of CTS since it has been extensively researched and validated. Second, it is a standardized measure that provides a consistent and objective measure of critical thinking skills across individuals and contexts. Thus, it is an effective tool for comparing pre-service teachers' critical thinking skills and assessing changes in critical thinking skills over time. Third, it provides a comprehensive measure, covering a wide range of cognitive processes, including "inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments," which identifies strengths and weaknesses in critical thinking skills and specific areas for improvement. Lastly, it is useful for instructional planning by identifying specific areas where pre-service teachers may need additional support or instruction.

Validation of the learning framework by the pool of experts and English teachers was done to ensure correctness as they were trained to identify errors, inconsistencies, and inaccuracies. They also offered insightful comments on the framework and the usability of the tools, as well as perceptions of whether the tool actually measures the intended variables or outcomes. Similarly, potential sources of variability that could impact the tool's reliability were identified and suggested ways to improve it. Because the research utilized a standardized test and the framework was examined and approved by experts in the field, credibility has been established.

This research utilized a causal-comparative type as the research investigated the developed learning framework's effect on the identified respondents' critical thinking skills based on the pre-and post-test results. Causal-comparative research can help identify factors influencing pre-service teachers' critical thinking skills, such as teaching methods, curriculum, and prior knowledge. This can inform the development of interventions and strategies to enhance CTS. Furthermore, the pre-and post-test results were compared using the Paired T-test to measure the framework's effectiveness. This helped identify which interventions are most effective and efficient in improving CTS among pre-service teachers. In general, causal-comparative study design can be useful for figuring out how treatments, like a learning framework, affect particular outcomes, like critical thinking.

Additionally, developmental research is also utilized. This research design was considered as the study developed a critical thinking framework that enhances critical thinking skills in a systematic and evidence-based way. The learning framework was pilot-tested and scrutinized by experts for evaluation and validation. Critical thinking is a complex and multifaceted skill that develops gradually over time and is influenced by various factors, including cognitive ability, motivation, and prior knowledge. The researcher identified key factors that promote or hinder critical thinking skills in pre-service teachers and thus targeted interventions to enhance these skills.

The research population involved the PSTs, particularly the first-year Bachelor of Science in Secondary education majors in English, Math, Science, and TLE of the academic year 2022-2023. The researcher identified sixty (60) participants, where fifteen (15) students for each major were randomly picked through the fish-bowl technique. Additionally, a pool of experts composed of language and research professors, a quality assurance director, Language/English instructors from BISCAST and higher education institutions in Naga City, and student representatives also participated in the study. This group of specialists and language instructors assessed and validated the developed critical thinking framework.

Informed consent was sought after the study's objectives, procedures, and potential benefits were explained to the participants, and permission from the school administration where the study was carried out was obtained. Additionally, the students were notified that the test results would not count toward their grade.

Watson-Glaser Critical Thinking Appraisal (W-GCTA) is a standardized test; thus, prior arrangement with an authorized distributor was made in order to obtain the test. A licensed psychometrician administered the test and checked and analyzed the results.

4. Results

One of the most underappreciated 21st-century learning abilities is critical thinking. Teachers and academicians concur that it is essential for preparing students for college and careers and has even been related to a more productive life outcome. The table below reveals the critical thinking level of pre-service teachers based on Watson-Glaser Critical Thinking Appraisal.

Table 1 reveals the total raw score for the critical thinking skills is 40.08 on the pre-test and 44.57 on the post-test, considered below average under the W-GCTA criteria. This suggests that pre-service teachers have a below-average level of critical thinking skills based on W-GCTA criteria. The SD of 6.25 demonstrates that the participants' critical thinking ratings were generally consistent. The SD of 7.70 in the post-test indicates more variability in the critical thinking level scores following the learning framework intervention. These results imply that the learning framework intervention positively affected the participants' critical thinking levels.

Moreover, the results of this study are consistent with previous research that suggests a need for developing critical thinking skills among pre-service teachers. Research suggests that pre-service teachers must possess a strong understanding of critical thinking to effectively reflect on their teaching duties (Gashan, 2015). By implementing a comprehensive approach to critical thinking development in teacher education, teachers can better facilitate their students' development of these skills. Pre-service teachers who

understand critical thinking can reflect on their skills and practice them in their teaching duties, thereby modeling and instilling critical thinking in their students. Teachers who receive training and professional development opportunities in critical thinking pedagogy can also integrate these strategies into their teaching to support students in developing their critical thinking skills.

Table 1: Critical thinking skills level of the pre-service teachers

WGCTA (N=60)	PRE-TEST SCORES			POST-TEST SCORES		
	Average	StdDev	Verbal Description	Average	StdDev	Verbal Description
TOTAL	40.08	6.25	Below Average	44.57	7.70	Below Average

N = 60

Legend:

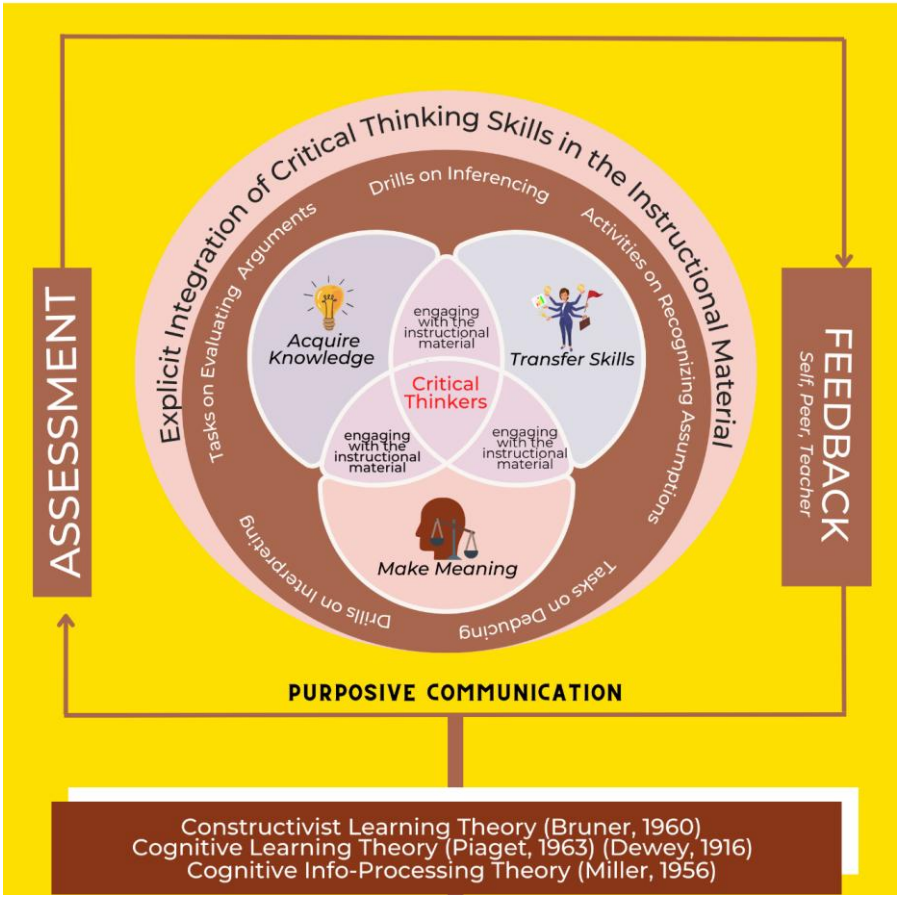
Criteria (Item=80) Total Level	Verbal Description
62-80	Superior
55-61	Above Average
47-54	Average
0-46	Below Average

Furthermore, this study highlights the need for ongoing research in the area of critical thinking skills among pre-service teachers, particularly in the context of remote learning. As the education landscape continues to evolve, it is essential to understand how different instructional modalities impact the development of critical thinking skills among pre-service teachers. Future studies could investigate the effectiveness of different strategies and approaches for enhancing critical thinking skills in pre-service teachers and explore the factors that facilitate or hinder the development of these skills.

The proposed framework shown in Figure 1 draws on three prominent learning theories: Constructivist Learning Theory, Cognitive Learning Theory, and Cognitive Info-Processing Theory. These serve as the foundation for the framework's design and implementation. Bruner's Theory of Constructivism emphasizes that learning involves learners actively engaging with their environment, participating in hands-on experiences, interacting socially, and reflecting on their experiences that are enhanced by feedback. The Cognitive Learning Theory emphasizes the importance of understanding learners' cognitive abilities and limitations to design effective learning frameworks tailored to their needs. Furthermore, the Cognitive Info-Processing Theory approach emphasizes the role of feedback in the learning process, as learners' ability to process information can be improved through feedback and practice. In addition to integrating established learning theories, the proposed framework also recognizes the importance of explicitly integrating critical thinking skills into the learning framework. The explicit inclusion of critical thinking skills in the learning process catalyzes learners to actively engage with it and think critically about what they are learning. Incorporating drills on inferencing, recognizing assumptions, evaluating arguments, interpreting, and deducing, among other critical thinking skills, guides learners through thinking critically and developing transferable skills. In conclusion, the critical thinking framework is a comprehensive approach that draws on established learning theories and integrates critical thinking skills drills, feedback, and assessment mechanisms. By emphasizing the

active role of learners in the learning process, the framework fosters a deeper understanding of the learning process and enables learners to apply their knowledge and skills in real-world situations.

Figure 1: The Learning Framework to Foster Critical Thinking



THINK-COMM Framework
Tasks to **H**eighten **I**ntegration of **N**ew **K**nowledge Through Critical Thinking Drills In Purposive **Comm**unication

Table 2: Effectiveness of the Developed Critical Thinking Framework

The developed Critical Thinking Framework …	**MS**	**Verbal Description**
is clear and easy to understand.	2.8	Very Effective
can be applied to a wide range of problems and situations.	2.7	Very Effective
is effective in helping learners approach problems and decision-making situations.	2.5	Very Effective
is easy to use and implement.	2.7	Very Effective
integrates well with other skills and knowledge.	2.6	Very Effective
Total	2.66	Very Effective

A paired t-test was used to analyze whether the mean difference between the pre-test and post-test scores is statistically significant, as presented in Table 3, thereby determining the effectiveness of the learning framework intended to improve the critical thinking skills of the pre-service teachers. The mean post-test score was 44.57, while the mean pre-test score was 40.08. The variance of the post-test scores was higher than that of the pre-test scores. The t-test result ($t = 4.753$, $p < 0.001$) shows that the difference between the means of the two groups being compared is statistically significant. The t-test indicates that this null hypothesis can be rejected in favor of the alternative hypothesis that a statistically significant difference exists between the two means. The degrees of freedom (df) for the t-test is 59, and the t-critical value for a two-tailed test at a 0.05 significance level is 2.000995378. The calculated t-statistic of 4.753 is greater than the critical value, which confirms that the results are statistically significant. Hence, we can infer a statistically significant difference between the pre-test and post-test scores, with the post-test scores being higher on average. The moderate positive correlation between the two sets of scores suggests that the change in scores is likely related to the intervention or treatment administered between the two tests, further strengthening the value of the crafted learning framework. In addition, the learning framework could also benefit from incorporating more interactive and multimedia elements or technology, to enhance learners' engagement and comprehension. Research has shown that multimedia elements can improve students' learning outcomes and retention rates (Mayer, 2017).

5. Conclusion

In conclusion, using a learning framework in teaching and learning activities can significantly impact students' academic achievement and critical thinking skills development. The learning framework presented in this study was found to be effective in promoting these outcomes, and their potential effectiveness as a teaching-learning tool was high. However, there is room for improvement in terms of addressing diverse learners' needs and incorporating more interactive and multimedia elements or technology into the materials. Future research should address this study's limitations and explore the long-term effects of using a learning framework in educational settings. Overall, this study highlights the importance of using evidence-based teaching and learning strategies to promote students' learning and success.

Ethics Approval and Consent to Participate

The study was approved by the appropriate authorities at Bicol State College of Applied Sciences and Technology. Data collection commenced after informing the participants regarding study purpose and taking their written consent. Rigorous procedures were established to ensure confidentiality and anonymity of participants throughout the research process.

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Conflict of Interest

The author declares there are no conflicts of interest.

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