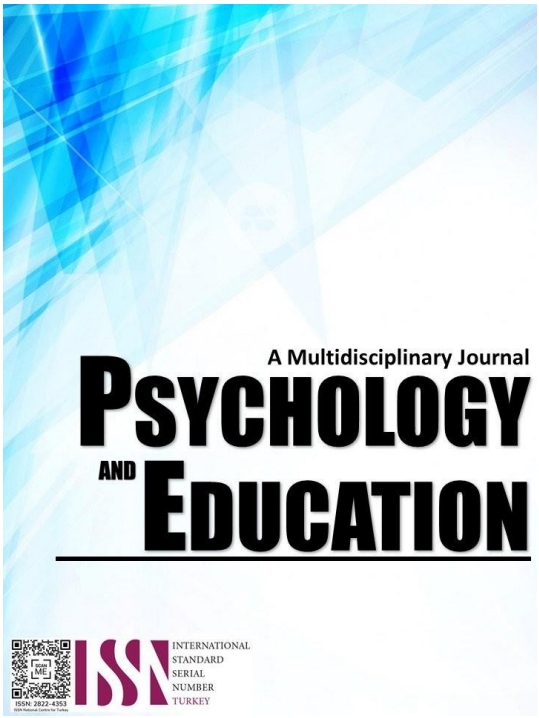
EFFECTIVENESS OF INTERACTIVE CONCEPT NOTES IN TEACHING APPLIED ECONOMICS TO GRADE 12 STUDENTS IN LAGUNA SENIOR HIGH SCHOOL



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Research Article

Effectiveness of Interactive Concept Notes in Teaching Applied Economics to Grade 12 Students in Laguna Senior High School

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Abstract

The integration of interactive concept notes in teaching Applied Economics aims to enhance student engagement and academic performance. Traditional lecture-based methods often fail to accommodate diverse learning styles, leading to passive learning and limited retention of economic concepts. This study assessed the effectiveness of interactive learning strategies in improving student academic performance. A quasi-experimental research design was utilized, involving two groups: an experimental group exposed to interactive learning methods and a control group taught using traditional instructional strategies. Pre-test and post-test assessments measured knowledge acquisition and improvement. Findings revealed that both groups had statistically similar pre-test mean scores, indicating comparable baseline knowledge. However, after the intervention, the experimental group exhibited a significantly higher post-test mean score (M = 25.77, SD = 3.36) compared to the control group (M= 17.42, SD = 4.95). A paired t-test confirmed a significant improvement in the experimental group's scores, reinforcing the effectiveness of interactive learning strategies. These results highlight the advantages of incorporating student-centered instructional approaches to enhance learning outcomes. The study suggests that traditional methods alone may not be sufficient, emphasizing the need for problem-based learning and technology-enhanced instruction. It is recommended that school administrators provide resources and training to support teachers in implementing innovative strategies. Future research could examine the long-term effects of interactive learning and its applicability across various subjects and educational levels. This study contributes valuable insights into improving pedagogical approaches, underscoring the importance of dynamic and interactive teaching methods.

Keywords: *academic performance, interactive concept notes, teaching strategies*

Introduction

The inclusion of applied economics in secondary school education has gained significant momentum in recent times, highlighting its importance as a foundational discipline in today's interconnected world. Recognizing economics as more than just theoretical concepts, educators and policymakers are increasingly advocating for its practical applications to empower students. This change demonstrates a dedication to providing young students with the tools they need to understand and manage complex economic settings, empowering them to make well-informed choices that impact their personal lives and communities. As global economic challenges—such as inflation, unemployment, and income inequality—become more pressing, the need for a solid understanding of applied economics has never been more critical. By integrating these concepts into the curriculum, schools aim to foster a generation of thoughtful, skilled individuals prepared to tackle the economic realities of the modern world.

In recent years, there has been a growing emphasis on the integration of applied economics education in secondary school curricula worldwide. This trend reflects the recognition of economics as a vital discipline that informs decision-making processes in personal, community, and global contexts. As the complexities of the global economy continue to evolve, educators are increasingly tasked with preparing students to navigate these challenges. Specifically, applied economics equips students with essential skills such as critical thinking, problem-solving, and informed decision-making—skills that are particularly crucial in addressing contemporary economic issues like inflation, unemployment, and income inequality (Shah & Shukla, 2020).

Despite the clear importance of economic literacy, many students, particularly in public secondary schools, face significant barriers to effectively engaging with economic concepts. Globally, students face challenges in applying theoretical knowledge to practical contexts, resulting in significant gaps in understanding economic principles. The Organization for Economic Co-operation and Development (OECD) reported in its 2021 education outlook that students in both developed and developing nations struggle to relate classroom economics to real-life scenarios (OECD, 2021).

In the Philippines, this issue is particularly pronounced. The Department of Education (DepEd) acknowledges that while the K to 12 curriculum aims to enhance economic education, many students still grapple with grasping concepts due to limited practical exposure (DepEd, 2021). The Philippine Institute for Development Studies (PIDS) highlights disparities in educational quality, with urban areas like Metro Manila benefiting from better resources compared to rural regions (PIDS, 2020). Inadequate teacher training, limited access to current economic data, and insufficient experiential learning opportunities further exacerbate these challenges. Surveys indicate that many high school students find it difficult to understand how economic theories apply to their daily lives, diminishing their interest in the subject and hindering the development of economically literate citizens (PIDS, 2020).

Region 4A (CALABARZON) exemplifies these challenges. While the region is known for its economic growth and educational advancements, disparities in access to quality education persist. Urban schools in Batangas and Cavite often have better resources and

trained educators compared to rural institutions in Quezon province. Reports from the DepEd Region 4A suggest that, despite efforts to implement the K to 12 curriculum effectively, teachers struggle to deliver engaging economics lessons that resonate with students' everyday experiences (DepEd Region 4A, 2021). Limited opportunities for experiential learning, such as field trips or community projects, hinder students' ability to apply theoretical knowledge practically. Consequently, many students in this region express difficulty in understanding the relevance of economic principles, leading to decreased interest and participation in economics courses.

This problematic situation underscores the need for innovative instructional strategies that promote active learning and apply economic concepts to students' lives. It is essential to develop Applied Economics Concept Notes with Interactive Activities that not only align with the curriculum but also enhance students' engagement and comprehension of key economic principles. By fostering an interactive learning environment, educators can better prepare students for the realities of economic participation and decision-making in their communities and beyond.

Interactive concept notes are designed to engage students actively in the learning process by incorporating visual aids, interactive elements, and concise summaries of key concepts. Traditional teaching methods in economics often rely heavily on lectures and textbooks, which may not fully engage students or cater to diverse learning styles. Interactive concept notes offer a more dynamic approach, potentially enhancing students' understanding and retention of economic principles.

According to Barnett-Itzhaki, Beimel, and Tsoury (2023), interactive teaching tools, such as concept mapping and multimedia presentations, can improve students' academic performance and engagement in various subjects. Studies have also indicated that visual aids and interactive elements can help students better grasp complex concepts and retain information longer (Guo, Mctigue, Matthews, and Zimmer, 2020).

While there is substantial evidence supporting the use of interactive teaching tools in general, there is limited research specifically focused on the effectiveness of interactive concept notes in teaching Applied Economics to Grade 12 students in public schools. In light of these challenges, this study aims to explore the effectiveness of Applied Economics Concept Notes with Interactive Activities for Grade 12 students in public secondary schools, seeking to bridge the gap between theoretical knowledge and practical application of economic concepts.

Research Questions

This study investigates the effectiveness of using interactive concept notes in teaching applied economics to Grade 12 students in Laguna Senior High School. Specifically, it seeks answers to the following questions:

1. What are the mean scores of the pre-test in terms of:
    1.1. experimental group; and
    1.2. controlled group?
2. What are the mean scores of the post-test in terms of:
    2.1. experimental group; and
    2.2. controlled group?
3. Is there a significant difference in the pre-test mean scores between the Experimental Group and Controlled Group?
4. Is there a significant difference in the post-test mean scores between the Experimental Group and Controlled Group?
5. Is there a significant difference between the pre-test and post-test mean scores of the experimental group?
6. Is there a significant difference between the pre-test and post-test mean scores of the controlled group?
7. What intervention plan can be developed based on the results of the study?

Methodology

Research Design

This study employed a quasi-experimental research design to assess the effectiveness of interactive concept notes in teaching applied economics to Grade 12 students at Laguna Senior High School. The quasi-experimental approach was appropriate as it allowed for the systematic comparison of instructional methods while minimizing threats to internal validity. Unlike true experimental designs, this approach did not use random assignment but instead relied on pre-existing class sections, ensuring feasibility within the school setting. Quasi-experimental designs are particularly valuable in educational research where random assignment is impractical, enabling researchers to infer causal relationships despite the absence of randomization (Kim & Clasing-Manquian, 2023).

The choice of a quasi-experimental design was justified as it enabled a structured comparison between interactive concept notes and traditional teaching approaches. This method allowed the researcher to identify associations between instructional strategies and academic performance while accounting for potential confounding variables. By examining measurable learning outcomes, the study provided empirical evidence on the relative effectiveness of these strategies, contributing valuable insights to educational practices in applied economics. Integrating active learning techniques, such as interactive concept notes, has been shown to enhance student engagement and comprehension in economics education (Jacobson et al., 2024).

Respondents

The respondents of the study primarily consisted of Grade 12 students enrolled in the Applied Economics subject at Laguna Senior High School. Aiming for a statistically significant sample size, the study involved 327 students from the aforementioned school. The selection criteria ensured that students from different sections were included to provide each section an equal chance of being selected as participants. The purpose of the selection process was to effectively address the research objective by ensuring the inclusion of suitable participants. Furthermore, once the class was selected, it was divided into two groups: the experimental group, which used Interactive Concept Notes, and the control group, which followed traditional teaching methods.

The study employed a purposive sampling technique to ensure that participants possessed specific characteristics relevant to the research objectives. This approach allowed the researcher to select Grade 12 students who were currently studying an Applied Economics subject, ensuring the collection of rich and relevant data regarding their academic performance in economic concepts when using interactive concept notes. Furthermore, the sampling procedure for this study initially included all Grade 12 classes with the Applied Economics subject at Laguna Senior High School. To select the class that participated in the study, the researcher used simple random sampling. Specifically, a "spin a wheel" method was employed, where each class was assigned a number, and the final spin determined which class became the participant in the study.

Experimental group, which used Interactive Concept Notes, and the control group, which followed traditional teaching methods. The experimental group was selected through the fishbowl method. Each student's name was placed in a container, and names were randomly drawn, ensuring a fair and unbiased selection process. A pre-test was administered to assess the students' initial knowledge, followed by a post-test after the intervention to measure performance improvements. Throughout the process, ethical considerations, including obtaining informed consent from students and parents, were observed.

Instrument

The study utilized a combination of standardized assessment tools and statistical measures to evaluate the effectiveness of Interactive Concept Notes in teaching Applied Economics to Grade 12 students at Laguna Senior High School. The research instruments were carefully selected to measure students' academic performance before and after the intervention and to determine the statistical significance of observed differences.

The primary instrument used for data collection was a pre-test and post-test assessment. These tests were adopted from the Department of Education (DepEd) module for Applied Economics, ensuring alignment with the official curriculum. The assessments were validated by subject matter experts to ensure content validity and reliability. The pre-test was administered before the implementation of Interactive Concept Notes to assess students' baseline knowledge, while the post-test was conducted after the intervention to measure learning gains. To quantify student performance, the study employed the Mean Percentage Score (MPS), which provided a standardized representation of students' scores as a percentage of the total possible score. This allowed for a consistent comparison of student performance between the experimental and control groups. Additionally, the mean score was calculated to determine the central tendency of students' test results.

To analyze the differences in performance between groups, the study utilized t-tests as statistical tools. An unpaired t-test was used to compare the pre-test and post-test mean scores between the experimental and control groups. This statistical test determined whether there was a significant difference in the academic performance of students who used Interactive Concept Notes compared to those who received traditional instruction. Furthermore, a paired t-test was applied to compare pre-test and post-test scores within each group, assessing whether there was a significant improvement in students' knowledge due to the instructional approach.

All statistical computations were conducted using appropriate data analysis software to ensure accuracy and reliability of the results. The findings from these research instruments provided empirical evidence on the impact of Interactive Concept Notes in enhancing students' learning outcomes in Applied Economics, forming the basis for the study's conclusions and recommendations.

Procedure

The data gathering procedure began with the researcher seeking permission from the developer of the Interactive Concept Notes to use their materials in the study. This involved sending a formal request detailing the purpose of the research and how the materials would be used. Upon receiving approval, the researcher then sought permission from the school administration of Laguna Senior High School to conduct the study within the school and to use the computer laboratory for hands-on experience with the Interactive Concept Notes via online platforms, providing a detailed letter outlining the research objectives, methodology, and ethical considerations.

Once all necessary permissions were obtained, consent forms were distributed to the selected Grade 12 students and their parents, ensuring informed and voluntary participation. The pre-administering phase involved preparing the pre-test and post-test questionnaires and holding an orientation session to explain the study's purpose and procedures to the students. During the administering phase, a pre-test was given to both the experimental and control groups to assess initial knowledge levels. The experimental group then used Interactive Concept Notes, while the control group followed traditional teaching methods. After the intervention, a post-test was administered to measure performance improvements.

The post-administering phase included collecting all completed post-tests, holding a thank-you session for participants, and ensuring data entry for analysis. Ethical considerations, such as obtaining informed consent and ensuring confidentiality, were observed throughout the process. The procedure concluded with data analysis using statistical methods to evaluate the effectiveness of the Interactive Concept Notes, ensuring a fair and unbiased comparison between the two teaching methods.

Data Analysis

The data collected from the pre-test and post-test assessments were analyzed using descriptive and inferential statistical techniques. Descriptive statistics, including the Mean Percentage Score (MPS) and mean scores, were used to summarize and compare the performance of students in both the experimental and control groups. These measures provided insights into overall trends and differences in student achievement before and after the intervention.

The scores were treated as the numerical representation of the students' mastery level. To determine their mastery level, the mean percentage score was computed, and the mastery level was determined based on where their mean percentage score fell using the scale provided by the DepEd Memorandum Order 160 series of 2012 (Department of Education, 2012). Furthermore, for inferential analysis, t-tests were conducted to determine the significance of observed differences. An unpaired t-test was utilized to compare the mean scores of the experimental and control groups in both the pre-test and post-test assessments. This test assessed whether there were significant differences in student performance between the two groups. Additionally, a paired t-test was employed within each group to analyze the differences between their pre-test and post-test scores, determining the effectiveness of Interactive Concept Notes in improving student learning outcomes.

All statistical analyses were conducted using data analysis software to ensure precision and validity. The results of these analyses helped in drawing meaningful conclusions regarding the impact of the intervention and guided the formulation of recommendations for future teaching practices in Applied Economics.

Ethical Considerations

In conducting this study on the effectiveness of Interactive Concept Notes in teaching Applied Economics, several ethical considerations were observed to ensure the protection and respect of all participants. First, the researcher sought permission from the developer of the Interactive Concept Notes to use their materials in the study. This included sending a formal request detailing the purpose of the research and how the materials would be utilized. Additionally, permission was sought from the principal of Laguna Senior High School to conduct the study within the school and to use the computer laboratory for hands-on experience with the Interactive Concept Notes via online platforms. This involved providing a detailed letter outlining the research objectives, methodology, and ethical considerations.

Informed consent was obtained from all participants, with parental consent secured for minors. Prior to participation, students were provided with a detailed explanation of the study's purpose, procedures, potential risks, and benefits, ensuring that they understood their involvement was voluntary and that they could withdraw at any time without consequences. Confidentiality and anonymity were strictly maintained throughout the study. Personal information was not collected, and responses were coded to protect participant identities. Data was securely stored, accessible only to authorized personnel involved in the research, and was disposed of properly once the study was completed. Additionally, the study adhered to the principle of non-maleficence by ensuring that no harm came to the participants. The content of the lessons and assessments aligned with the standard curriculum so as not to place students at any disadvantage.

Furthermore, the research followed the principle of beneficence, as the primary aim was to improve educational practices for the benefit of students. Results were shared with the participating school in a way that respected the confidentiality of all participants, contributing to the broader knowledge base on effective instructional strategies in economics education. Ethical approval was sought from relevant institutional review boards or ethics committees prior to the commencement of the study, ensuring compliance with all institutional guidelines and standards.

Results and Discussion

This chapter presented the collected data, statistical analysis, and interpretation of findings regarding the effectiveness of the intervention in improving student performance. The data included the pre-test and post-test results of both the experimental and control groups, along with comparative analyses to determine the significance of improvements.

Table 1. *Mean Percentage Scores of the Pre-test*

Group	*Mean*	*Mean Percentage Score*	*Verbal Interpretation*
Experimental	13.731	46	Average
Control	13.077	44	Average

Legend: *96–100 – Mastered; 86–95.9 – Closely Approximating Mastery; 66–85.9 – Moving Towards Mastery; 35–65.9 – Average; 15–34.9 – Low; 5–14.9 – Very Low; 0–4.9 – Absolutely No Mastery.*

Table 1 presented the mean percentage scores from the pre-test for both the experimental and control groups, evaluating the effectiveness of interactive concept notes in teaching Applied Economics. The experimental group achieved a mean percentage score of 46, while the control group scored 44. Both scores fall within the range of 35–65.9, which is verbally interpreted as "Average."

These results indicate that, prior to the intervention, both groups had a similar level of understanding of the subject matter, suggesting comparable baseline knowledge. This similarity in pre-test performance ensures a fair comparison when assessing the impact of interactive concept notes on students' academic performance.

The comparable pre-test scores support the assumption that any observed differences in post-test performance can be attributed to the intervention rather than initial disparities in knowledge. According to Pan and Carpenter (2023), pre-testing plays a crucial role in experimental designs by establishing equivalence between groups and controlling for confounding variables. Similarly, research by Hockett and Doubet (2014) emphasizes that pre-test assessments serve as benchmarks for measuring instructional effectiveness, enabling educators to accurately gauge student progress.

Supporting these findings, a study by Pan and Carpenter (2023) found that pre-test assessments provide critical insights into students' prior knowledge, which significantly influences their ability to acquire new information. Research by Hockett and Doubet (2014) also highlights the importance of pre-testing in formative assessment, noting that students with similar starting points are more likely to benefit equally from instructional interventions.

Furthermore, a study by Soderstrom and Bjork (2023) suggests that establishing baseline equivalence between groups minimizes potential biases in educational experiments and strengthens the validity of findings regarding instructional strategies. Ensuring that both the experimental and control groups begin with similar levels of understanding allows researchers to isolate the effects of an intervention, such as interactive concept notes, from other influencing factors. This methodological approach is crucial in determining whether changes in student performance are genuinely attributable to the instructional strategy rather than pre-existing differences in knowledge.

Moreover, the results align with the study of Valdez, Tamoria, and Barron (2022), which emphasized that students' initial understanding before exposure to interactive learning tools is typically within an average range. Their research suggests that interactive instructional materials, such as concept notes, provide structured engagement by reinforcing economic concepts through visualization, scaffolding, and active learning. This finding is supported by Pan and Carpenter (2023), who underscore the role of prior knowledge assessment in instructional design. They argue that interactive materials are most effective when aligned with students' cognitive load capacity, allowing them to build on existing knowledge rather than overwhelming them with new, unstructured information.

Overall, the pre-test results validate the comparability of the experimental and control groups, reinforcing the credibility of the subsequent analysis. These findings highlight the importance of pre-test assessments in experimental research, ensuring that instructional interventions are evaluated on a fair and reliable basis.

Table 2. *Mean Percentage Scores of the Post-test*

Group	*Mean*	*Mean Percentage Score*	*Verbal Interpretation*
Experimental	25.769	86	Closely Approximating Mastery
Control	21.769	73	Moving Towards Mastery

Legend: *96–100 – Mastered; 86–95.9 – Closely Approximating Mastery; 66–85.9 – Moving Towards Mastery; 35–65.9 – Average; 15–34.9 – Low; 5–14.9 – Very Low; 0–4.9 – Absolutely No Mastery.*

Table 2 presented the mean percentage scores from the post-test assessments for both the experimental and control groups following the implementation of interactive concept notes in teaching Applied Economics. The experimental group achieved a mean percentage score of 86, categorized as Closely Approximating Mastery, while the control group obtained a mean percentage score of 73, classified as Moving Towards Mastery. These results indicate that both groups improved compared to their pre-test scores; however, the experimental group, which was exposed to interactive concept notes, exhibited a higher level of mastery than the control group. This suggests that the use of interactive concept notes may have significantly enhanced students' academic performance, supporting their effectiveness as a teaching strategy in Applied Economics.

These findings align with recent research emphasizing the benefits of interactive learning materials. For instance, a study by Summatic (2024) highlighted that interactive materials enhance student engagement and retention, particularly in complex subjects such as economics. Similarly, research by Fiorella and Mayer (2021) demonstrated that interactive learning tools generally result in higher learning gains compared to traditional lecture-based methods. Additionally, a study by Lew (2024) found that students who had access to pre-lecture materials, such as interactive videos, scored significantly higher in comprehension and retention than those with access only to textbooks.

Beyond academic performance, the use of interactive concept notes may also foster a more engaging and student-centered learning experience. Interactive instructional materials can cater to different learning styles, allowing students to visualize and interact with concepts, thus promoting better understanding. This approach is particularly relevant in Applied Economics, where students must connect theoretical concepts with real-world applications. By integrating interactive concept notes into the curriculum, educators may enhance students' analytical skills and their ability to apply economic principles in practical scenarios.

Moreover, interactive learning strategies align with modern educational trends that emphasize active learning and student participation. As educational technology continues to evolve, leveraging interactive tools can help bridge the gap between theoretical instruction and practical application. This shift toward more dynamic learning environments can contribute to higher motivation levels, deeper cognitive engagement, and improved long-term retention of knowledge.

Overall, this study provides empirical support for the effectiveness of interactive concept notes in improving student mastery in Applied Economics. The results suggest that integrating interactive learning strategies enhances comprehension and engagement, leading to better academic outcomes. However, while the findings indicate the positive impact of interactive concept notes, further research is needed to explore their effectiveness across different student demographics, learning preferences, and instructional settings. Future studies may also examine how to optimize their implementation to maximize student learning and ensure sustained educational benefits.

Table 3. *Test of Difference in the Pre-test Scores of Experimental and Controlled Group*

Test	*p-value*	*Verbal Interpretation*
Pretest	0.62769	Not Significant

Legend: *p-value < 0.05 – Significant; p-value ≥ 0.05 – Not Significant.*

Table 3 presented the test of difference in the pre-test scores between the experimental and control groups. The p-value of 0.62769 was greater than the significance level of 0.05, leading to a verbal interpretation of Not Significant. This indicated that there was no statistically significant difference between the pre-test scores of the two groups, suggesting that both groups had a similar level of prior knowledge before the intervention. This ensured that any differences observed in the post-test could be attributed to the applied teaching strategy.

The absence of a significant difference in pre-test scores aligned with the fundamental principle of randomization in experimental research, as emphasized by Shadish et al. (2021). In experimental designs, establishing initial equivalence between groups was critical for isolating the effects of an intervention and enhancing internal validity. Similarly, Marzano (2022) highlighted that ensuring comparable baseline knowledge allowed researchers to attribute variations in learning outcomes to instructional interventions rather than differences in students' cognitive starting points. The results also reinforced the findings of Hattie (2020), who argued that maintaining group equivalence at the outset of an instructional study increased the reliability of post-test comparisons, leading to more accurate assessments of the intervention's effectiveness.

Furthermore, Black and Wiliam (2021) emphasized that pre-test assessments served as essential benchmarks for evaluating the success of educational interventions. When pre-test scores did not significantly differ, the instructional strategy under investigation could be more precisely analyzed for its impact on learning outcomes. Wang et al. (2023) similarly asserted that initial equality in prior knowledge allowed researchers to link post-test performance differences to the instructional approach rather than confounding variables such as motivation, background knowledge, or external learning influences.

Beyond its role in validating experimental results, the use of pre-test assessments also provided insights into students' learning progressions. Diagnostic pre-tests helped educators identify knowledge gaps, tailor instructional strategies to student needs, and measure the effectiveness of interventions beyond traditional summative assessments. By confirming that both groups started at a similar academic level, the study strengthened its claim that the observed improvements in the experimental group could be attributed to the use of interactive concept notes rather than external factors.

Given these insights, the non-significant difference in pre-test scores reinforced the validity of the study's findings. Establishing comparable baseline knowledge ensured the credibility of post-test comparisons, allowing for a more accurate evaluation of the teaching intervention's impact. Future research could explore additional diagnostic measures to refine assessments of students' prior knowledge, consider longitudinal studies to assess long-term retention effects, and incorporate qualitative insights to better understand how students engaged with interactive concept notes in Applied Economics.

Table 4. *Test of Difference in the Post-test Scores of Experimental and Controlled Group*

Test	*p-value*	*Verbal Interpretation*
Post-test	0.00048	Significant

Legend: *p-value < 0.05 – Significant; p-value ≥ 0.05 – Not Significant.*

Table 4 presented the test of difference in the post-test scores between the experimental and control groups. The p-value of 0.00048 was less than the significance level of 0.05, leading to a verbal interpretation of significant. This result indicated that there was a statistically significant difference in the post-test scores between the two groups, with the experimental group performing better. This suggested that the use of interactive concept notes had a meaningful impact on students' academic performance in Applied Economics.

Research by Mayer (2021) on multimedia learning supported these findings, arguing that interactive instructional materials significantly improved learning outcomes by engaging multiple cognitive pathways. The Cognitive Theory of Multimedia Learning suggested that

students learned more effectively when information was presented using a combination of text, visuals, and interactive components, which aligned with the structure of interactive concept notes. By integrating multiple modes of representation, these instructional materials enhanced cognitive processing and retention, making them particularly effective for complex subjects such as economics.

Similarly, a study by Hattie (2021) found that interactive and student-centered teaching strategies had a high effect size on learning outcomes. His meta-analysis of various educational interventions demonstrated that active learning approaches, such as concept mapping and interactive notes, significantly enhanced understanding and long-term retention compared to traditional lecture-based methods. Hattie's research underscored the importance of student engagement in the learning process, reinforcing the idea that interactive concept notes provided a structured yet flexible learning experience that fostered deeper comprehension.

Moreover, Black and Wiliam (2022) emphasized the role of formative assessment in interactive learning, stating that students benefited from continuous feedback and self-regulated learning opportunities. Interactive concept notes, by allowing students to engage with content dynamically, aligned with their findings that frequent engagement led to higher academic achievement. The interactive nature of these materials encouraged students to reflect on their understanding, correct misconceptions in real time, and actively participate in their learning process.

A more specific study by Lim and Hew (2023) examined the effects of interactive digital notes on economics students and found that those who used such notes scored significantly higher on post-tests than those relying solely on static, text-based materials. Their research supported the idea that interactive features promoted better comprehension and application of economic concepts by facilitating connections between theoretical knowledge and practical applications. These findings highlighted the potential of interactive concept notes to bridge the gap between abstract economic principles and real-world problem-solving.

The findings in this study aligned with existing research supporting interactive concept notes as an effective teaching strategy. The results indicated that these materials enhanced learning outcomes by engaging students through multimedia and interactive elements, fostering deeper cognitive processing, retention, and application of economic concepts. Additionally, the integration of formative assessment and self-regulated learning opportunities within interactive concept notes contributed to improved academic performance.

Given the promising outcomes of this instructional approach, future research could explore strategies to further optimize interactive concept notes to maximize their impact across different learner profiles and instructional settings. Investigating the effectiveness of various interactive elements—such as adaptive feedback, gamification, and personalized learning pathways—could provide insights into how educators could tailor these tools to meet diverse student needs. Furthermore, exploring the long-term effects of interactive concept notes on knowledge retention and skill development could offer valuable guidance for their sustained integration into economics education and beyond.

Table 5. *Test of Difference between the Pre-test and Post-test Scores of Experimental Group*

Test	*p-value*	*Verbal Interpretation*
Pre-test and Post-test	0.0000	Significant

Legend: *p-value < 0.05 – Significant; p-value ≥ 0.05 – Not Significant*

Table 5 presented the test of difference between the pre-test and post-test scores of the experimental group. The p-value of 0.0000 was less than the significance level of 0.05, leading to a verbal interpretation of Significant. This result indicated that there was a statistically significant improvement in the scores of the experimental group after the intervention. This meant that the use of interactive concept notes had a positive effect on students' learning and performance in Applied Economics.

Research on active learning supported these findings. Freeman et al. (2021) conducted a large-scale meta-analysis comparing active learning (which included the use of interactive materials) to traditional lecturing. Their results showed that students in active learning environments had significantly higher exam scores and lower failure rates, indicating that interactive materials enhanced comprehension and application of knowledge. Similarly, Prince (2022) argued that active learning techniques improved student engagement, leading to better conceptual understanding and long-term retention. These studies reinforced the effectiveness of interactive concept notes as a pedagogical tool.

Additionally, Bonwell and Eison (2020) emphasized that interactive note-taking strategies, such as structured concept notes, promoted higher-order thinking skills. Their research found that students who used guided interactive materials showed improvements in critical thinking and problem-solving abilities compared to those relying solely on passive note-taking. This suggested that interactive concept notes did not merely aid in knowledge acquisition but also encouraged analytical and evaluative skills, which were essential in economics education.

Chi and Wylie (2021) introduced the ICAP framework, which categorized learning engagement into four modes: Interactive, Constructive, Active, and Passive. Their research suggested that interactive learning methods, such as concept mapping and dynamic note-taking, led to deeper understanding compared to passive learning approaches. This supported the significant difference observed in the post-test results of the experimental group, as students who engaged with interactive concept notes were likely involved in more meaningful learning processes.

Further, Rittle-Johnson et al. (2023) found that concept mapping, a key component of interactive concept notes, enhanced knowledge integration and retrieval. Their research highlighted that students using structured interactive tools outperformed those using conventional note-taking methods in assessments. This reinforced the idea that interactive concept notes not only improved immediate academic performance but also contributed to long-term knowledge retention and application.

Moreover, studies on self-regulated learning suggested that students who engaged in interactive learning strategies developed stronger metacognitive skills. Zimmerman and Schunk (2024) argued that students who actively engaged with their learning materials became more adept at monitoring their understanding, setting learning goals, and adjusting their study strategies. This implied that interactive concept notes did not merely act as supplementary learning aids but also fostered independent learning habits that could benefit students beyond the classroom.

The significant difference between the pre-test and post-test scores of the experimental group provided empirical evidence that interactive concept notes enhanced student learning in Applied Economics. The results suggested that this instructional strategy supported comprehension, critical thinking, and knowledge retention, leading to better academic outcomes. Furthermore, these findings aligned with broader educational research that highlighted the effectiveness of interactive learning in improving student engagement and mastery of complex subjects.

Given these promising results, future research could explore the long-term impact of interactive concept notes on student performance in economics and other related disciplines. Additionally, studies could examine how different levels of interactivity within concept notes influenced learning outcomes across various student profiles. By refining and adapting interactive instructional strategies, educators could optimize their teaching approaches to meet diverse learning needs and further enhance student success.

Table 6. *Test of Difference between the Pre-test and Post-test Scores of Controlled Group*

Test	*p-value*	*Verbal Interpretation*
Pre-test and Post-test	0.0000	Significant

Legend: *p-value < 0.05 – Significant; p-value ≥ 0.05 – Not Significant*

Table 6 presented the test of difference between the pre-test and post-test scores of the control group. The p-value of 0.0000 was less than the significance level of 0.05, leading to a verbal interpretation of Significant. This result indicated that the control group also showed a statistically significant improvement in their post-test scores compared to their pre-test scores. While this meant that learning occurred through traditional teaching methods, the comparison with the experimental group, as seen in Table 8, suggested that the use of interactive concept notes resulted in a greater improvement in academic performance.

Several studies demonstrated that traditional teaching methods, such as lectures and guided discussions, remained effective in enhancing student learning. According to Kirschner, Sweller, and Clark (2020), direct instruction, a core component of traditional teaching, provided clear, structured guidance that helped students learn efficiently by minimizing cognitive overload. Their findings suggested that teacher-centered approaches were highly effective, especially for novice learners who benefited from explicit explanations and step-by-step instruction.

Mayer (2021) also supported the effectiveness of traditional instruction, emphasizing that well-structured lectures that integrated multimedia elements enhanced students' retention and understanding. His research on cognitive theory suggested that when traditional methods incorporated visual aids and examples, they significantly improved learning outcomes.

Additionally, a meta-analysis by Hattie (2021) found that direct instruction, when combined with formative feedback, had a strong positive impact on student achievement. The study highlighted that structured lessons with clear objectives and guided practice remained a powerful teaching strategy, explaining the significant learning gains observed in the control group.

Despite the effectiveness of traditional methods, several studies argued that interactive and student-centered approaches produced better learning outcomes. Freeman et al. (2021) conducted a large-scale study comparing active learning to traditional lecturing and found that students in active learning settings had significantly higher exam scores and lower failure rates. Their findings challenged the notion that traditional methods alone were sufficient for maximizing student achievement.

Bonwell and Eison (2020) also emphasized that traditional lectures often promoted passive learning, where students focused more on memorization rather than deep understanding. Their research suggested that while students could achieve significant learning gains through traditional methods, interactive strategies often led to better engagement and retention.

Moreover, Prince (2022) found that active learning methods, such as problem-based learning and collaborative activities, outperformed traditional instruction in fostering critical thinking and application skills. This suggested that although traditional teaching produced learning gains, more interactive approaches might be better suited for long-term retention and deeper understanding.

The significant improvement in the control group's post-test scores confirmed that traditional teaching methods remained an effective means of instruction. However, comparisons with the experimental group suggested that interactive concept notes provided additional benefits in enhancing student performance. While traditional instruction was valuable, integrating interactive elements might further optimize learning outcomes. Future studies could explore the specific conditions under which traditional and interactive methods

yielded the best results, helping educators develop balanced and effective teaching strategies.

Proposed Intervention Plan

Proposed Intervention Plan for the Development and Implementation of Interactive Concept Notes in Teaching Applied Economics to Grade 12 Students in Laguna Senior High School

I. Introduction

The intervention plan focuses on the development and implementation of Interactive Concept Notes as a teaching aid for Grade 12 students in Laguna Senior High School. The intervention plan aims to enhance the teaching and learning process in Applied Economics by developing and implementing Interactive Concept Notes for Grade 12 students in Laguna Senior High School. It also aims to present economic principles in a structured, visually appealing, and interactive manner, making lessons more engaging and accessible to students. By incorporating elements such as infographics, case studies, real-world examples, and guided exercises, the Interactive Concept Notes will serve as an essential tool to bridge the gap between theory and practice in Applied Economics.

Based on the findings that the experimental group showed a higher post-test mean score (25.77) compared to the controlled group (21.77), with a significant difference between pre-test and post-test scores, an intervention plan can be developed to enhance student learning outcomes.

The proposed action plan outlines a systematic approach to designing, implementing, and evaluating these materials to ensure their effectiveness in improving student engagement, comprehension, and academic performance. Through this initiative, teachers will be equipped with an innovative resource that enhances their instructional strategies, while students will benefit from a more dynamic and interactive learning experience.

Objectives:

1. Develop Interactive Concept Notes tailored for Grade 12 Applied Economics.
2. Implement the materials in classroom instruction to enhance student engagement and comprehension.
3. Evaluate the effectiveness of Interactive Concept Notes in improving student performance.

Action Plan for the Development and Implementation of Interactive Concept Notes

Activities	Strategies	Responsible Person	Timeline	Resources Needed	Outcomes
1. Needs Assessment	Conduct surveys and focus group discussions with teachers and students to identify challenges in learning Applied Economics.	Subject teachers, researchers	Month 1	Survey forms, interview guides	Identified key areas where Interactive Concept Notes can improve learning.
2. Development of Interactive Concept Notes	Design concept notes with visual aids, case studies, and interactive exercises. Ensure alignment with the curriculum.	Subject teachers, researchers, IT expert or developers	Months 2-9	Computers, graphic design software, textbooks, module	Ready-to-use Interactive Concept Notes for Applied Economics.
3. Training for Teachers	Conduct workshops on how to integrate the Interactive Concept Notes into lesson plans.	School administrators, subject experts	Month 10	Training materials, venue, projector	Teachers equipped to effectively use the concept notes.
4. Implementation in Classrooms	Distribute materials and integrate them into classroom discussions and activities.	Economics teachers	Months 11-14	Printed/digital concept notes, lesson plans	Increased student engagement and participation.
5. Monitoring and Feedback Collection	Conduct classroom observations, student surveys, and teacher feedback sessions.	Subject teachers, researchers	Months 15-16	Feedback forms, observation checklists	Identified strengths and areas for improvement.
6. Evaluation of Effectiveness	Compare pre-test and post-test results to measure student progress. Analyze survey and feedback data.	Researchers, teachers	Month 16	Test materials, data analysis tools	Data on the impact of Interactive Concept Notes on student performance.
7. Refinement and	Revise concept notes based on evaluation	School administrators,	Continuous	Updated materials, school	Sustained use of improved

Sustainability Plan	results. Develop a plan for continuous improvement and institutionalization.	curriculum developers.	policy integration	Interactive Concept Notes

This intervention plan provides a structured and innovative approach to enhancing the teaching of Applied Economics in Grade 12. By integrating Interactive Concept Notes, the plan aims to improve student comprehension, engagement, and performance, ultimately bridging the gap between theoretical knowledge and real-world economic applications. The successful implementation of this plan will contribute to better learning experiences and more effective instructional strategies in Laguna Senior High School.

Conclusions

Based on the analysis and interpretation of data, the following conclusions were made: The pre-test results indicated that both the experimental and controlled groups had comparable initial knowledge levels, as no significant difference was found between their mean scores. This confirms that any observed improvements in post-test performance can be attributed to the intervention rather than initial disparities in knowledge. The post-test results demonstrated that the experimental group, which was exposed to interactive concept notes, performed significantly better than the control group. The experimental group achieved a mean percentage score of 86 (Closely Approximating Mastery), while the control group obtained 73 (Moving Towards Mastery). The statistically significant difference in post-test scores confirms the effectiveness of interactive concept notes as a teaching strategy in Applied Economics. Both the experimental and control groups showed significant improvements in their post-test scores compared to their pre-test scores. However, the greater increase in the experimental group's performance suggests that interactive concept notes are more effective in enhancing students' learning outcomes compared to traditional teaching methods. Although the controlled group exhibited some progress, the findings suggest that conventional teaching methods may not be as effective in achieving optimal learning outcomes compared to more interactive and structured interventions. The proposed intervention plan for developing and implementing interactive concept notes in teaching Applied Economics aims to enhance student engagement, comprehension, and academic performance. The structured approach outlined in the plan—covering material development, teacher training, implementation, monitoring, and sustainability—ensures a systematic integration of interactive concept notes into the curriculum. By following the intervention plan, educators can transition from traditional lecture-based teaching to a more dynamic, student-centered approach that promotes critical thinking and real-world application of economic concepts.

Based on the findings and conclusions, the following recommendations are proposed: For educators and schools, it is recommended to adopt interactive teaching strategies. Given the effectiveness of interactive concept notes, educators should incorporate these materials into the teaching of Applied Economics. Schools should consider implementing the instructional approach used in the experimental group to improve student learning outcomes. Interactive elements such as visuals, guided questions, and real-world applications should be emphasized to improve student engagement and understanding. To further enhance student learning, teachers should adopt complementary active learning strategies, such as problem-based learning, group discussions, and gamified activities. These methods encourage critical thinking and deeper comprehension of economic concepts. Educators should implement pre-tests and post-tests consistently to track student progress and provide targeted interventions. Formative assessments allow for early identification of learning gaps and enable timely adjustments in instructional strategies. Training sessions and workshops should be conducted to equip teachers with the skills needed to design and implement interactive concept notes effectively. This will ensure the successful integration of interactive learning materials into lesson plans. The instructional intervention plan developed in this study should be expanded to other subjects and student groups. Continuous refinement based on student feedback and performance data should be prioritized to maintain the long-term effectiveness of the intervention. For future researchers, future studies should explore the impact of interactive concept notes in other subjects and grade levels. Future research may involve a larger sample size or different subject areas to validate the effectiveness of the intervention. A long-term study could assess the sustained impact of the intervention on student learning and retention. Future studies could compare different instructional strategies to determine which approaches yield the most significant improvements. Additionally, research can be conducted on the effectiveness of different types of interactive materials, such as digital versus printed concept notes, to determine the most suitable format for student learning. Overall, the study confirms that interactive and structured interventions significantly improve student performance compared to traditional teaching methods. By implementing these recommendations, educational institutions can improve instructional methods, leading to enhanced student learning outcomes and overall academic performance in Applied Economics and other disciplines.

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