The Mediating Effect of Metacognitive Learning Strategy on the Relationship between Memory Retention Skill and Academic Productivity among Elementary Education Students

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ABSTRACT

The purpose of this study was to determine the mediating role of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students. Quantitative, non-experimental research utilizing a descriptive-correlational technique and mediation analysis was employed in this study. The data were gathered from 164 Bachelor Of Elementary Education (BEEd) students through stratified random sampling utilizing proportional allocation. Data gathering was done through survey adopted-modified standardized questionnaires. The statistical tools used in the computation of data and testing the hypotheses at an alpha 0.05 level of significance were mean, Pearson r, and structural equation modeling (SEM) using mediation analysis. Findings revealed that the levels of memory retention skill, metacognitive learning strategy, and academic productivity were descriptively high, which is oftentimes manifested by the elementary education students. Consequently, there was a strong positive significant relationship between memory retention skill and academic productivity, metacognitive learning strategy and academic productivity, and memory retention skill and metacognitive learning strategy. Results also revealed that metacognitive learning strategy partially mediated the relationship between memory retention skill and academic productivity, indicating that while metacognitive learning strategy contribute to academic productivity, memory retention skill still exerts a direct effects. It can be concluded that metacognitive learning strategy play a crucial role in enhancing the impact of memory retention skill on academic productivity, emphasizing their importance in educational achievement. Educators are encouraged to incorporate metacognitive learning strategy instruction into the curriculum, while school leaders and policymakers should support training programs that strengthen students' memory retention skill to boost academic productivity among students.

Keywords: Academic Productivity; Memory Retention Skill; Metacognitive Learning Strategy; Mediation Analysis; Elementary Education Students

INTRODUCTION

Academic productivity plays a crucial role in assessing the ability of the students to complete academic tasks and actively participate. It indicates their ability to produce academic works, sustain concentration, manage time effectively, and use available resources to achieve educational objectives. A variety of internal and external factors, such as personal backgrounds, mental well-being, financial circumstances, and living conditions, can either support or impede students' academic performance. Such issues as the inconsistency in study habits and the inefficiency in time management may lead to distractions and therefore reduce the productivity of the students. In this way, the underlying factors can be identified and strategies can be put in place that will help in creating a supportive environment that will enable the students to achieve their academic potential (Narsico et al., 2023).

In the global setting, particularly in Indonesia, academic productivity has become a significant concern among students, especially in Islamic educational institutions. Academic productivity, a crucial factor of meaningful learning, as it highlights students' ability to work independently on tasks and projects that reflect not only their understanding but also their capacity to apply knowledge in practical and academic contexts. However, the existing studies show that a large number of students perform poorly in terms of academic productivity as measured by poor evaluation scores across a number of subjects in one academic term. This suggests that perhaps current methods of teaching are not adequate in promoting students' academic productivity. In addition, a congested curriculum where a number of subjects have to be taught to the students in a single day can overwhelm the students, making learning a burden rather than meaningful learning. Furthermore, the lack of supportive educational frameworks also hampers academic productivity in addition to highlighting the need for an educational system that aligns with the students' developmental needs (Ihsan, 2023).

In the Philippines, especially at the University of Mindanao located in Tagum City, Davao del Norte, studies on academic productivity highlight several critical factors that affect students' academic productivity. A recent study revealed that elements such as classroom management, parental engagement, and the relationships between students and teachers play a significant role in academic productivity. Ineffective classroom management might lead to some potential consequences of distractions that make it difficult for the students such as paying attention and learning effectively. Also, the lack of parents' involvement in the education system of children may lead to the loss of interest and slow progress in studies. Also, it is crucial to build positive relationships with the teachers, as they motivate the students and help in creating a good learning environment. It is therefore important to identify these influences so as to improve on the academic productivity of students (Aporbo, 2023).

Conducting this study on academic productivity is urgent and highly relevant in the current educational context. It is urgent and relevant because the increasing concerns about low academic productivity among students in elementary education are alarming. Moreover, this study is relevant for improving metacognitive learning strategy, as it could provide valuable insights regarding the relationship between memory retention skill and academic productivity among elementary education students, particularly in our locality. With that in mind, this study will be highly beneficial to teachers and local institutions, enabling them to develop approaches and make plans that effectively address the current issues of academic productivity.

In connection, there are already related studies that had been conducted in different designs and approaches. In fact, Narsico et al. (2023) conducted a study entitled, "Screentime Activity and Academic Productivity of Students" which measured the influence of screen time activities on students' academic productivity using the quantitative method. Further, a study entitled, "Efforts to Internalize Islamic Religious Education Values in Increasing Students' Academic Productivity" by Ihsan (2023) which investigates how the integration of Islamic educational values could help in improving students' productivity using a qualitative approach. Further, a study entitled, "Impact of Cooperative Learning Strategy on Students' Academic Productivity" by Aporbo (2023) which aimed to investigate the effectiveness of cooperative learning on the academic productivity of BSED students employed the quantitative design. The existing studies show the connections between the variables present in this paper. However, these studies did not explore the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity, particularly among elementary education students. This gap shows the need for the present research to determine how metacognitive strategy can influence the relationship between the memory retention skill and academic productivity, so it gives unique insights relevant to the local educational context.

Research Objectives

The purpose of this study was to examine the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students at Kapalong College of Agriculture, Sciences, and Technology (KCAST).

Specifically, this study aimed to address the following objectives:

1. To determine the level of academic productivity among elementary education students in terms of

1.1. socialization;

1.2. learner interaction:

1.3. content information; and

1.4. research abilities.

2. To determine the level of metacognitive learning strategy among elementary education students in terms of

2.1. planning

2.2. monitoring, and

2.3. evaluation.

3. To determine the level of memory retention skill among elementary education students in terms of:

3.1. motivational practices and experiences;

3.2. goal setting and accomplishment;

3.3. personalized learning; and

3.4. educational resources and learning devices.

4. To examine the significant relationship between:

4.1. metacognitive learning strategy and memory retention skill;

4.2. memory retention skill and academic productivity; and

4.3. metacognitive learning strategy and academic productivity.

5. To determine the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students.

Research Hypothesis

The null hypotheses which were tested at the 0.05 level of significance, stated that there were no significant relationships between metacognitive learning strategy and memory retention skill, memory retention skill and academic productivity, and metacognitive learning strategy and academic productivity among elementary education students. Additionally, the null hypotheses asserted that metacognitive learning strategy had no mediating effects on the relationship between memory retention skill and the academic productivity among elementary education students.

LITERATURE REVIEW

Metacognitive Learning Strategy

Metacognitive Learning Strategy refers to a structured approaches which aims at increasing students' knowledge and self-control regarding how they learn. This strategy, specifically the PDCA (Preparing, Doing, Checking, and Assessing & Following-Up) model, is designed to enhance students' metacognitive skills, scientific reasoning, and critical thinking skills. It helps students to define the learning objectives, check whether they are on the right track or not, and feedback on the results to promote effective learning. This strategy is based on the metacognition theory and has been developed to help the students to have useful tools for learning, thus improving their grades (Parlan, 2024).

Furthermore, research highlights that metacognitive learning strategy significantly enhance students' academic outcomes by fostering self-awareness and self-regulation, enabling learners to take control of their learning processes and boosting their confidence in managing academic tasks (Crasta et al., 2024). When integrated into educational practices, these strategies not only improve academic performance but also enrich students' ability to plan, monitor, and evaluate their understanding, leading to more meaningful and independent learning experiences (Mara, 2022). Furthermore, tools like Metadig have demonstrated that metacognitive learning strategy can significantly develop students' critical thinking, particularly in areas such as reading, writing, and oral expression, thereby promoting self-regulated learning and preparing students for success beyond the classroom (Pereles et al., 2024).

Memory Retention Skill

Memory retention skill is the ability of students to retain and recall information effectively over time, which is very important in academic performance, especially in mathematics where comprehension and application are necessary for success. It is defined not only by the memorizing of facts but also by the understanding and practical use of concepts in different contexts. Research highlights that motivational practices, goal-setting activities, and personalized learning experiences greatly contribute to the strengthening of memory retention skills, which has a positive impact on students' academic achievement in mathematics (Orejudos et al., 2024).

Research underscores the vital role of memory retention in students' academic success, particularly in mathematics, as it enhances their ability to recall lessons and follow sequential problem-solving steps (Pillado et al., 2020). However, challenges such as lack of concentration hinder students' ability to retain information, emphasizing the need to integrate motivational strategies to improve both memory and performance. Studies also reveal that instructional approaches significantly impact retention, with active learning environments—such as the use of interactive modules—proving more effective than traditional methods by fostering deeper cognitive engagement (Tarigan et al., 2023). Furthermore, memory retention not only aids in academic performance but also promotes critical thinking, making students more engaged and independent learners. The study suggests that although students tend to be above-average possessors of memory retention skills, developing critical thinking with these abilities may advance their academic success. (Bayan et al., 2019).

Academic Productivity

Academic productivity is the measure of students' effectiveness, efficiency and interest in their learning processes, —that is, how good students are at completing their homework assignments and participating in academic tasks. It's essentially a habit, routine, or attitude developed by students to optimize educational outcomes. Among the factors influencing productivity are time management, the quality of study environments, and the level of relational support received. In addition, student self-evaluation of their experiences is one of the biggest determinants of their productivity levels. Generally, academic productivity varies from a series of behaviors relating directly to learning and academic performance, hence highlighting the importance of both intrinsic motivation and external support systems (Bates, 2023).

Evidently, research revealed that academic productivity among students improves significantly through various strategies and factors. Cooperative learning, for instance, has been proven to enhance both subject understanding and overall academic progress compared to traditional lecture methods, as demonstrated among BSED students at the University of Mindanao-Tagum College (Aporbo, 2023). Moreover, regular study habits and dedication play a crucial role in fostering productive engagement, such as active listening and reflection, although factors like non-recreational screentime showed no significant impact on productivity, suggesting the influence of multiple internal and external elements (Narsico & Flores, 2023). Academic productivity is also closely linked to learning readiness and value creation, where higher productivity promotes adaptability and sustainability essential to educational success (Diestro, 2022). Recently, the integration of AI tools like ChatGPT has further enhanced student productivity by improving efficiency, time management, collaboration, and motivation, indicating that technological innovations can create more supportive and effective learning environments conducive to better academic outcomes (Fauzi et al., 2023).

Theoretical Framework

Metacognitive Theory. This study was primarily anchored in the Metacognitive Theory of Schraw and Moshman (1995) highlighted the importance of awareness and regulation of one's own cognitive processes for effective learning. This theory suggested that students who were aware of their thinking processes and could strategically apply various learning strategies tended to retain information better, which could enhance academic productivity. Metacognitive strategies enabled learners to monitor their understanding, adjust their approaches, and make effective use of memory aids, facilitating both knowledge retention and productivity in educational tasks.

Self-Regulated Learning Theory. Moreover, this study was also grounded in the Self-Regulated Learning Theory of Zimmerman & Schunk (2001), which posited that students' ability to regulate their learning through self-directed strategies, such as goal setting, self-monitoring, and reflection, played a crucial role in their academic productivity. According to this theory, students who employed self-regulated strategies could effectively manage and improve their cognitive skills, including memory retention. Self-regulated learners actively engaged in their own learning processes, which enhanced their academic productivity by allowing them to adapt strategies to suit their learning goals. In this study, metacognitive learning strategy was examined as a mediating factor, supporting students' memory retention skills and promoting overall academic productivity.

Educational Productivity Theory. Furthermover, the Educational Productivity Theory of Walberg (1982) supported this study by suggesting that a student's academic performance was influenced by factors such as individual cognitive abilities, motivation, and learning environments. Walberg's theory emphasized that productivity in educational settings could be optimized through effective instructional strategies that catered to students' learning needs. Applying this theory, metacognitive learning strategy could enhance students' ability to organize, retain, and recall information, thereby increasing their academic productivity.

Expectancy-Value Theory. Finally, the Expectancy-Value Theory of Wigfield & Eccles (2000) suggested that students' motivation was influenced by their expectations for success and the perceived value of the tasks they undertook. When students believed in their ability to succeed and saw the relevance of what they were learning, they were more likely to invest effort and achieve higher academic productivity.

Conceptual Framework

Figure 1 shows the conceptual framework of the study. This illustrates that independent variable is memory retention skill. The dependent variable is academic productivity, and the mediating variable is metacognitive learning strategy. The researcher intended to analyze how the independent variable, memory retention skill was determined by the following four indicators: motivational practices and experiences, goal setting and accomplishment, personalized learning, and educational resources and learning devices (Orejudos et al., 2024). *Motivational practices and experiences* refer to the internal and external factors that drive students to engage in learning activities, which in turn affect their ability to retain information. *Goal setting and accomplishment* relates to students' capacity to define clear academic objectives and achieve them, fostering a structured approach to memory retention. *Personalized learning* emphasizes the adaptation of educational experiences to individual learners' needs, which improves retention by catering to diverse learning strategies. Lastly, *educational resources and learning devices* refer to the tools and materials provided to support learning, such as textbooks, multimedia, and technology, all of which contribute to improved memory retention.

Meanwhile, the dependent variable used in this study was academic productivity, which was determined by the following four indicators: socialization, learner interaction, content information, and research ability (Karadag, 2018). *Socialization* refers to the process through which students develop interpersonal skills and form connections with peers, which can enhance collaborative learning and academic success. *Learner interaction* describes the extent to which students engage with both their peers and instructors during the learning process, promoting active participation and deeper understanding. *Content information* pertains to the knowledge and understanding students acquire from their studies, which is critical for achieving academic goals. Finally,

research abilities encompasses students' skills in seeking, evaluating, and utilizing information effectively, which is essential for academic productivity and success.

Lastly, the mediating variable in this study was metacognitive learning strategy, which was determined by the following three indicators: planning, monitoring and regulation, and evaluation (Mansilla et al., 2024). *Planning* refers to the strategies students use to prepare for learning tasks, including setting goals and selecting appropriate methods. *Monitoring and regulation* involve students' ability to assess their understanding and adjust their learning strategies as needed, ensuring they remain on track to meet their objectives. Lastly, *evaluation* encompasses the process by which students reflect on their learning outcomes and the effectiveness of their strategies, allowing for continuous improvement.
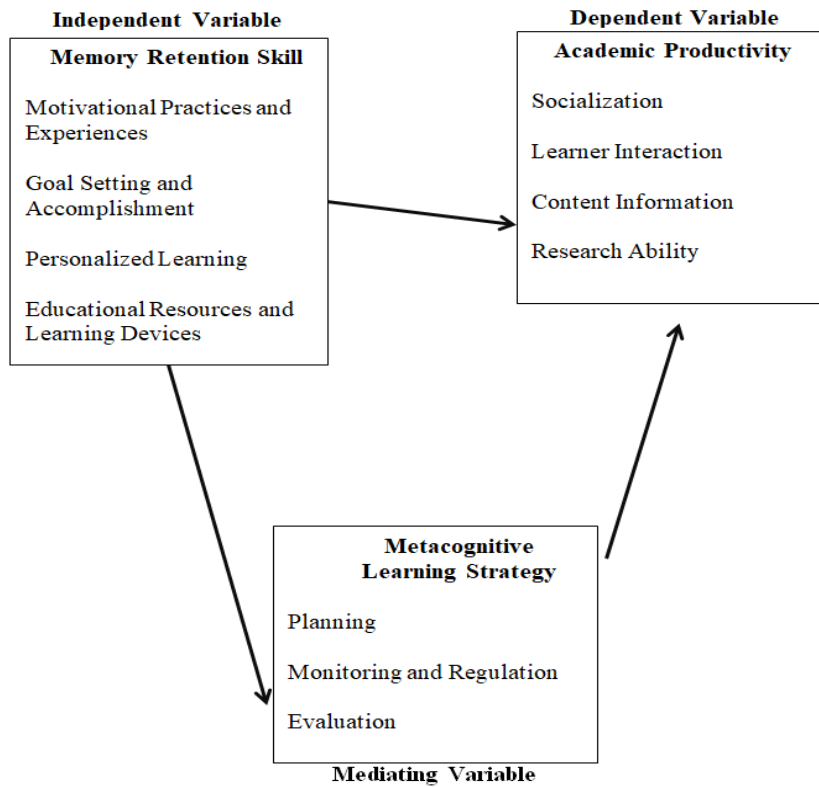

Figure 1: Conceptual Framework of the Study Illustrating the Link between Variables

Definition of Terms

In this section, the concepts of memory retention skills, academic productivity, and metacognitive learning strategy ware operationally defined to establish a clear framework for understanding and interpretation in this study.

Academic Productivity. Academic productivity is defined as the measure of students' performance and engagement in their educational tasks, which reflect their ability to achieve academic goals and contribute to their learning environment (Karadag, 2018). As used in this study, academic productivity refers to socialization, learner interaction, content information, and research ability.

Memory Retention Skill. Memory retention skill refer to the cognitive processes that enable individuals to encode, store, and retrieve information effectively, impacting their ability to learn and remember (Orejudos et al., 2024). As used in this study, memory retention skill refers to motivational practices and experiences, goal setting and accomplishment, personalized learning, and educational resources and learning devices.

Metacognitive Learning Strategy. Metacognitive learning strategy is defined as the processes involved in planning, monitoring, and evaluating one's own learning and understanding, which help learners become more aware of their cognitive processes and improve their academic performance (Mansilla et al., 2024). As used in this study, metacognitive learning strategy refers to planning, monitoring, and evaluation.

RESEARCH METHODOLOGY

Research Design

This study utilized a quantitative non-experimental research approach using descriptive-correlational strategy and mediation analysis to examine the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students at Kapalong College of Agriculture, Sciences, and Technology (KCAST). This approach involved testing objective theories by examining the relationships among variables. In this design, the independent variable was memory retention skill, the dependent variable was academic productivity, and the mediating variable was metacognitive learning strategy. Structured questionnaires were used to collect numerical data, which were then analyzed using statistical techniques. The results provided insights into the relationships among these variables and offered recommendations based on the findings (Creswell, 2014).

Moreover, a descriptive-correlational research design was also employed to examine the relationships among memory retention skill, metacognitive learning strategy, and academic productivity. This design focused on describing relationships between two or more variables by quantifying both their magnitude and direction using empirical data. A dataset was created with participant scores for each variable, allowing exploration of associations without implying causation. Using this design, the study aimed to make predictions and descriptions based on the collected data, providing insights into how metacognitive learning strategy influenced the link between memory retention skill and academic productivity (Bhat, 2018).

Mediation analysis, in its simplest form, represented the addition of a third variable to the X-Y relation, whereby X caused the mediator, M, and M caused Y, forming XMY. This analytical approach provided a deeper understanding of the mechanisms through which the independent variable affected the dependent variable. By identifying and exploring the role of the mediator, researchers gained insights into the underlying processes and pathways that contributed to the observed relationship between X and Y. Mediation analysis was particularly valuable in uncovering the intervening variables that explained how and why changes in X led to changes in Y (MacKinnon et al. 2007).

Research Locale

The study was conducted at Kapalong College of Agriculture, Sciences, and Technology. The researcher chose this school because it was the only public higher educational institution in the Municipality of Kapalong, Province of Davao del Norte, and was recognized by the Commission on Higher Education (CHED). KCAST currently offered bachelor's degree courses in Teacher Education, Business Administration, Office Administration, Public Administration, Criminology, and Agriculture. In the coastal province of Davao del Norte, Kapalong was a landlocked municipality that was politically subdivided into 14 barangays. The municipality covered 830.01 square kilometers (320.47 square miles), or 24.25 percent of the total area of Davao del Norte.

Research Respondents

The respondents of this study were first to fourth-year Bachelor of Elementary Education (BEEd) students enrolled in the academic year 2024-2025 at Kapalong College of Agriculture, Science, and Technology. Using Slovin's formula with a 0.05 margin of error and 95% confidence level, a sample of 164 was drawn from the total population of 284 students. The selection process included specific inclusion criteria officially enrolled regular BEEd students following the required course sequence without delays or repeated subjects and excluded irregular students who did not meet these requirements. To enhance representativeness and reduce bias, stratified random sampling with proportional allocation was employed, dividing the population into strata based on educational level to give each member an equal chance of selection. This method ensured the sample reflected the diverse characteristics of the BEEd program, which was critical for examining the mediating effect of metacognitive learning strategies on memory retention and academic productivity. Consequently, the final sample consisted of 20 first-year students out of 34 (6.91%), 68 second-year students out of 118 (23.99%), 52 third-year students out of 90 (18.30%), and 24 fourth-year student out of 42 (8.54%).

Research Instrument and Data Gathering process

The instruments on memory retention skill, metacognitive learning strategy, and academic productivity were adopted and modified from various published sources to align with the scope and objectives of this study. A five-point Likert scale was utilized to assess respondents' frequency of behaviors, ranging from 5 – Always to 1 – Rarely. The instrument for memory retention skill was adopted from Orejudos et al. (2024), which originally consisted of 37 items and was modified to 20 items to suit the specific context of the study. The tool for academic productivity was adopted from Anteg (2024), which was based on the earlier work of Karadag (2018). This instrument was carefully developed using Karadag's theoretical framework on academic performance and productivity in higher education. Anteg's version underwent rigorous testing and evaluation by experts in the field to ensure item clarity, content relevance, and construct alignment. Meanwhile, the metacognitive learning strategy questionnaire was adopted from Mansilla et al. (2024). Originally composed of 23 items, it was likewise tailored to 20 items to reflect the study's specific research context. All three instruments were subjected to content validation by experts in educational research to ensure clarity, relevance, and alignment with the defined research variables. To verify the internal consistency and reliability of the tools, Cronbach's alpha was computed. The metacognitive learning strategy instrument achieved a reliability score of 0.83, as reported by Mansilla and Diaz (2024). The memory retention skill instrument had a reliability score of 0.70, following the validation and reliability guidelines by (Orejudos & Fabricante, 2024, with reliability based on Comighud, 2021),. The academic productivity instrument's reliability was verified through the findings of Anteg (2024), confirming its statistical soundness.

The level of the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students was interpreted in the table that followed.

Memory Retention Skill. The questionnaire for this variable was intended to determine the level of memory retention skill. It has 37 items with four indicators: motivational practices and experiences, goal setting and accomplishment, personalized learning, and educational resources and learning devices (Orejudos et al., 2024). The respondents answered the given questions based on a five-point Likert scale, with their respective ranges of means and descriptions as follows:

Range of Means	Descriptive Level	Interpretation
4.20-5.00	Very High	The measure described in the memory retention skill is always observed.
3.40-4.19	High	The measure described in the memory retention skill is oftentimes manifested.
2.60-3.39	Moderate	The measure described in the memory retention skill is sometimes manifested.
1.80-2.59	Low	The measure described in the memory retention skill is rarely manifested.
1.00-1.79	Very Low	The measure described in the memory retention skill is never manifested.

Academic Productivity. The questionnaire for this variable was designed to assess the level of academic productivity. It consisted of 20 items with four indicators: socialization, learner interaction, content information, and research ability (Karadag, 2018). For this variable, the respondents answered the given questions based on the following five ordered gradations with their respective range of means and descriptions to evaluate their academic productivity.

Range of Means	Descriptive Level	Interpretation
4.20-5.00	Very High	The measure described in the academic productivity is always observed.
3.40-4.19	High	The measure described in the academic productivity is oftentimes manifested.
2.60-3.39	Moderate	The measure described in the academic productivity is sometimes manifested.
1.80-2.59	Low	The measure described in the academic productivity is rarely manifested.
1.00-1.79	Very Low	The measure described in the academic productivity never manifested.

Metacognitive Learning Strategy. The questionnaire for this variable was aimed at measuring the level of metacognitive learning strategy. It contained 23 items with three indicators: planning, monitoring and

regulation, and evaluation (Mansilla et al., 2024). For this variable, the respondents answered the given question based on the following five ordered gradations with their respective range of means and descriptions.

Range of Means	Descriptive Level	Interpretation
4.20-5.00	Very High	The measure described in the metacognitive learning strategy is always observed.
3.40-4.19	High	The measure described in the metacognitive learning strategy is oftentimes manifested.
2.60-3.39	Moderate	The measure described in the metacognitive learning strategy is sometimes manifested.
1.80-2.59	Low	The measure described in the metacognitive learning strategy is rarely manifested.
1.00-1.79	Very Low	The measure described in the metacognitive learning strategy is never manifested.

To conduct the research, the researcher secured authorization from the College President of Kapalong College of Agriculture, Science, and Technology. The finalized and validated questionnaires were submitted for institutional approval, and upon receiving permission, informed consent was obtained from BEEd students across first to fourth year levels. Respondents were assured of the voluntary nature of their involvement and the confidentiality of their responses in accordance with ethical research practices. Paper-and-pencil questionnaires were then distributed, accompanied by clear instructions to guide the participants. After completion, all responses were collected and securely stored. As a token of gratitude, participants received small gifts or tokens of appreciation. The data were carefully encoded, tabulated, and organized into spreadsheets in preparation for statistical analysis. Various statistical tools were applied to examine patterns and determine the relationships among the key variables, with particular attention to how metacognitive learning strategy mediates the link between memory retention skill and academic productivity.

Data Analysis

The gathered data through the questionnaires were tallied and treated using the following statistical tools. The following statistical tools were used in the computation of data and to test the hypothesis at alpha 0.05 level of significance. *Mean.* This was used to determine the level of memory retention skill, metacognitive learning strategy, and academic productivity. *Pearson r Correlation.* This was used to determine the relationship between metacognitive learning strategy and memory retention skill, memory retention skill and academic productivity, and metacognitive learning strategy and academic productivity, which are the variables of the study. *Structural Equation Modeling using Mediation Analysis*. This was carried out to figure out whether the mediating variable has any impact on the relationship between the independent and dependent variables using indirect effect. It was utilized in this research to find out whether the metacognitive learning strategy mediates the relationship between memory retention skill and academic productivity by answering the main statement of the problem.

Ethical Considerations

This study was conducted with strict adherence to ethical standards to protect the rights, privacy, and well-being of the respondents, who were 1st to 4th-year Bachelor of Elementary Education students at Kapalong College of Agriculture, Sciences, and Technology. Ethical considerations were thoroughly addressed to ensure the research was conducted with transparency and integrity, especially given the specific challenges that often accompany quantitative studies. Several fundamental ethical principles guided the research process. Informed consent was the first essential component, ensuring that all participants were fully informed about the study's purpose, procedures, and potential consequences before voluntarily agreeing to participate. This included informing them of their rights, such as the freedom to withdraw at any stage, the option not to answer sensitive questions, and the opportunity to inquire about the study for further clarity. Each participant signed a consent form prior to participating, confirming their understanding and agreement. The consent process also guaranteed participants access to study results upon completion (Denzin & Lincoln, 2011).

The second ethical component focused on minimizing the risk of harm and maintaining anonymity, privacy, and confidentiality. The researcher took deliberate measures to protect respondents' identities and personal data, omitting identifiable information and assigning numerical codes instead of names. All data were securely stored in a password-protected folder, following the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173) and were scheduled for deletion three years after the study concluded (National Privacy Commission, 2012). These steps ensured that respondents' well-being and privacy were preserved throughout the research process. The third principle was conflict of interest, which was carefully addressed by the researcher through full disclosure of any potential relationships or interests that might influence the study. No financial, commercial, or familial ties affected the research process, ensuring the objectivity and ethical soundness of the findings. Additionally, to maintain impartiality, the researcher excluded any relatives of participants from the study. Through these ethical measures, the study upheld a high standard of academic and moral responsibility (Berg & Lune, 2017).

RESULTS AND DISCUSSION

This section presents the findings and results of the study on the mediating effect of metacognitive learning strategy on the relationship between memory retention skill and academic productivity among elementary education students. The level of memory retention skill, the level of academic productivity, and the level of metacognitive learning strategy; as well as the significant relationship between memory retention skill and academic productivity, the significant relationship between metacognitive learning strategy and memory retention skill, and the significant relationship between metacognitive learning strategy and academic productivity; and the direct, indirect, and total effect of the variables. Analyses and interpretations of data were done parallel to the research objectives.

Table 1. Summary on the Level of Memory Retention Skill among Elementary Education Students

Indicators	Mean	Description
Motivational Practices and Experiences	4.16	High
Goal Setting and Accomplishment	4.17	High
Personalized Learning	4.17	High
Educational Resources and Learning Devices	4.10	High
Overall	**4.15**	**High**

Level of Memory Retention Skill among Elementary Education Students

As shown in the Table 1 is the summary on the level of memory retention skill among elementary education students had an overall mean of 4.15, with a descriptive equivalent categorized as high. This high descriptive equivalent indicates that the level of memory retention skill as perceived by the elementary education students is oftentimes manifested. Moreover, the level of memory retention skill considering its four indicators, both goal setting and accomplishment and personalized learning obtained the highest mean of 4.17, interpreted as high, which is oftentimes manifested by the elementary education students. In contrast, the lowest indicator is educational resources and learning devices, which obtained a mean of 4.10, with a descriptive equivalent of high. This indicates that personalized learning is the least oftentimes manifested by the elementary education students. Additionally, the motivational practices and experiences indicator obtained a mean of 4.16 which means high. This indicates that the level of memory retention skill in terms of motivational practices and experiences is oftentimes manifested by the elementary education students. The result above is supported the findings of the study conducted by Pillado et. al. (2020), which states that stronger memory retention skill bring students to a higher level of cognitive performance, allowing them to effectively remember and retain academic content-thereby improving their academic achievement, boosting their confidence in classroom participation, enhancing their ability to connect prior knowledge with new concepts, and fostering long-term learning and mastery of subject matter.

Table 2. Summary on the Level of Academic Productivity among Elementary Education Students

Indicators	Mean	Description
Socialization	4.15	High
Learner Interaction	4.13	High
Content Information	4.08	High
Research Abilities	4.09	High
Overall	**4.11**	**High**

Level of Academic Productivity among Elementary Education Students

As reflected in Table 2 is the summary on the level of academic productivity among elementary education students had an overall mean of 4.11, with a descriptive equivalent categorized as high. This high descriptive equivalent indicates that the level of academic productivity as perceived by the elementary education students is oftentimes manifested. Furthermore, the highest mean among the four indicators is 4.15, obtained by socialization, with a descriptive equivalent categorized as high. This suggests that socialization is the most oftentimes manifested by the respondents. In contrast, the lowest indicator is content information, which obtained a mean of 4.08 which means high. This indicates that content information is the least oftentimes. manifested by the respondents among the four indicators. Additionally, the learner interaction indicator obtained a mean of 4. 13, while research ability obtained a mean of 4.09, both of which are classified as high. This suggests that these domains are also oftentimes manifested by elementary education students in relation to academic productivity. The result above is parallel to the findings of Bates (2023), which states that students with higher academic productivity tend to exhibit strong teamwork, interact deeply with instructional materials, and apply efficient strategies for gathering information. The result confirms that students' academic productivity is highly observed as they participate actively in group tasks, process content deeply, and utilize relevant resources to enhance their understanding.

Table 3. Summary on the Level of Metacognitive Learning Strategy among Elementary Education Students

Indicators	Mean	Description
Planning	4.26	Very High
Monitoring and Regulation	4.12	High
Evaluation	4.14	High
Overall	**4.17**	**High**

Level of Metacognitive Learning Strategy among Elemenatry Education Students

Reflected in Table 3 is the summary on the level of metacognitive learning strategy among elementary education students had a total mean of 4.17, with a descriptive equivalent categorized as high. This indicates that metacognitive learning strategy is oftentimes manifested by the respondents. Further, the highest mean among the three indicators is 4.26, obtained by planning, with the descriptive equivalent of very high. This indicates that the level of metacognitive learning strategy in terms of planning is always observed by the respondents. In contrast, the lowest indicator is monitoring and regulation, which obtained a mean of 4.12, with a descriptive equivalent of high. This indicates that the level of metacognitive learning strategy in terms of monitoring and regulation is oftentimes manifested. Lastly, the evaluation indicator obtained a mean of 4.14, with a descriptive equivalent of high. This indicates that the level of metacognitive learning strategy in terms of evaluation is oftentimes manifested by elementary education students. The result above confirmed the findings of Parlan (2024), which revealed that students with stronger metacognitive learning strategies such as planning, monitoring, and evaluating their own learning processes tend to exhibit greater academic success. These students are more capable of identifying their cognitive strengths and weaknesses, setting achievable goals, and adjusting their learning techniques accordingly.

Table 4. Significant Relationship Between Memory Retention Skill and Academic Productivity among Elementary Education Students

Variable	Mean	R-Value	P-Value	Decision @=0.05
Memory Retention Skill	4.15	.781	**<.001**	**H₀ Rejected**
Academic Productivity	4.11			

Significant Relationship Between Memory Retention Skill and Academic Productivity among Elementary Education Students

As presented in Table 4 is the correlation between memory retention skill and academic productivity revealed that the mean score for memory retention skill among elementary education students was 4. 15, while the mean score for academic productivity was 4. 11. These values indicate that memory retention skill was oftentimes manifested among the respondents, and their academic productivity was also oftentimes manifested. This suggests that students demonstrate strong memory retention skills, which contribute to their ability to perform academic tasks effectively. Furthermore, the analysis revealed that the computed r-value was 781, which means that 78.1% of the variation in academic productivity is due to the relationship of memory retention skill to academic productivity. The remaining 21.9% is due to other factors not covered in this study. This indicates a strong positive relationship between the two variables, suggesting that as memory retention skill increases, the likelihood of students exhibiting higher academic productivity also increases. Since the result revealed that the p-value is less than 001, this means that the null hypothesis stating there is no significant relationship between memory retention skill and academic productivity is not accepted. Thus, it stipulates that there is a strong positive significant relationship between the two variables among elementary education students. Consequently, this result supported the findings of Hu and Hu (2023), which asserted that memory retention skill have a significant positive correlation with academic productivity, indicating that students with stronger memory retention are more likely to perform effectively in academic tasks due to their ability to recall, apply, and synthesize learned information with greater accuracy and efficiency. The result confirmed that elementary education students with stronger memory retention skill tend to perform better in academic tasks, demonstrating the importance of retaining and recalling learned information. This suggests that enhancing memory retention skills can improve academic productivity, reinforcing the need for structured learning strategies that support students' ability to retain and apply knowledge effectively in their studies.

Table 5. Significant Relationship Between Metacognitive Learning Strategy and Memory Retention Skill among Elementary Education Students

Variable	Mean	R-Value	P-Value	Decision @=0.05
Metacognitive Learning Strategy	4.17			
Memory Retention Skill	4.15	.783	**<.001**	**H₀ Rejected**

Significant Relationship Between Metacognitive Learning Strategy and Memory Retention Skill among Elementary Education Students

As presented in Table 5 is the correlation between metacognitive learning strategy and memory retention skill revealed that the mean score for metacognitive learning strategy among elementary education students was 4.17, while the mean score for memory retention skill was 4.15. These results suggest that students frequently apply metacognitive learning strategy, which may support their ability to retain and recall information effectively. The computed r-value was 783, indicating that 78.3% of the variation in memory retention skill is due to the relationship of metacognitive learning strategy to memory retention skill. The remaining 21.7% is attributed to other factors not examined in this study. This highlights a strong positive relationship between the two variables, implying that the more students apply metacognitive learning strategy, the more they enhance their memory retention skill. Since the result revealed that the p-value is less than 001, this means that the null hypothesis stating there is no significant relationship between metacognitive learning strategy and memory retention skill is not accepted. Thus, it stipulates that there is a strong positive significant relationship between the two variables. As demonstrated by the result above, the findings of Adiansyah et. al. (2021) confirmed that metacognitive skills have a significant positive correlation with memory retention skill, with students who

actively engage in metacognitive skill demonstrating stronger retention skill. The result confirms that elementary education students who apply metacognitive learning strategies, such as planning, monitoring, and evaluating their understanding, are more likely to retain and recall information effectively. This suggests that fostering metacognitive learning strategy awareness in students enhances their memory retention skill, reinforcing the importance of strategic learning approaches in improving academic performance and long-term knowledge retention.

Table 6. Significant Relationship Between Metacognitive Learning Strategy and Academic Productivity

Variable	Mean	R-Value	P-Value	Decision @=0.05
Metacognitive Learning Strategy	4.17	.674	<.001	H$_o$ Rejected
Academic Productivity	4.11			

Significant Relationship Between Metacognitive Learning Strategy and Academic Productivity among Elementary Education Students

As presented in Table 6 is the correlation between metacognitive learning strategy and academic productivity revealed that the mean score for metacognitive learning strategy among elementary education students was 4.17, while the mean score for academic productivity was 4.11. This suggests that students often use metacognitive strategy, which may influence their academic productivity levels. The computed r-value was 674, indicating that 67.4% of the variation in academic productivity is due to the relationship of metacognitive learning strategy to academic productivity. The remaining 32.6% is due to other factors not covered in this study. This reflects a strong positive relationship between the two variables, suggesting that as metacognitive learning strategy improves, academic productivity also tends to increase. Since the result revealed that the p-value is less than 001, this means that the null hypothesis stating there is no significant relationship between metacognitive learning strategy and academic productivity is not accepted. Thus, it stipulates that there is a strong positive significant relationship between the two variables. In accordance with the result above, the findings confirmed the study conducted by Mwangi et. al. (2024), which stated that metacognitive learning strategy significantly enhance academic productivity, particularly among students who effectively employ these strategies in their learning process. The result confirmed that elementary education students who actively plan, monitor, and evaluate their learning processes tend to develop stronger memory retention skill. This suggests that the use of metacognitive learning strategy allows students to retain and recall information more effectively, reinforcing the importance of metacognitive learning strategy in improving memory retention skill.

Mediation Analysis

Preacher and Hayes mediation analysis approach was utilized in this study to determine if metacognitive learning strategy mediates the relationship between memory retention skill and academic productivity among elementary education students. It is a regression-based bootstrap approach, similar to SEM (Structural Equation Modeling), that is used for analyzing mediation. It consists of two steps that reflect the recommendation for mediation analysis. In Step 1, the direct and indirect effects are tested for significance. Step 2 involves defining the type of effect and mediation, which is classified into partial and full mediation. Full mediation is achieved if the direct effect is not significant, and the indirect effect is significant. This means that only the indirect effect via the mediator exists. On the other hand, partial mediation happens when the direct effect is significant.

Table 7. Indirect Effects

					Estimate	Std. Error	z-value	p	95% Confidence Interval	
									Lower	Upper
IV	→	MV	→	DV	0.125	0.061	2.065	0.039	0.006	0.244

Indirect Effect. It can be noticed in Table 7 the indirect effect of memory retention skill (IV) on academic productivity (DV) through metacognitive learning strategy (MV). The result yielded a beta (3) of 0.125 and standard error (SE) of 0.061, with p = 0.039, indicating significance (β = 0.125, SE = 0.061, 95% CI [0.006, 0.244]). Furthermore, it was found that the beta value is 0.125, which means that for every unit increase in memory retention skill (IV), there is an expected 0.125 increase in academic productivity (DV) as it goes through metacognitive learning strategy (MV). This indicates that metacognitive learning strategy (MV) serves as a mediating variable in the relationship between memory retention skill (IV) and academic productivity (DV). Based on the result, it shows that memory retention skill (IV) has a significant indirect effect on academic productivity (DV) through metacognitive learning strategy (MV). This stipulates that memory retention skill (IV) influences academic productivity (DV) indirectly through the mediating variable, metacognitive learning strategy (MV).

Table 8. Direct Effects

			Estimate	Std. Error	z-value	p	95% Confidence Interval	
							Lower	Upper
IV	→	DV	0.649	0.077	8.453	< .001	0.498	0.799

Direct Effect. It can be observed in Table 8 the direct effect of memory retention skill (IV) on academic productivity (DV). The result yielded an estimate of 0.649 and standard error (SE) of 0.077, with p<.001, indicating significance (ß = 0.649, SE = 0.077, 95% CI [0.498, 0.799]). Additionally, it was found that the beta value is 0.649, which means that for every unit increase in memory retention skill (IV), there is an expected 0.649 increase in academic productivity (DV). This result reinforces the notion that memory retention skill (IV) has a direct effect on academic productivity (DV). This indicates that memory retention skill (IV) has a direct effect on academic productivity (DV). Hence, as memory retention skill (IV) increases, academic productivity (DV) also increases significantly.

Table 9. Total Effects

			Estimate	Std. Error	z-value	p	95% Confidence Interval	
							Lower	Upper
IV	→	DV	0.774	0.048	16.006	< .001	0.679	0.869

Total Effect. As presented in Table 21, the total effects of memory retention skill on academic productivity resulted in a beta (ß) value of 0.774, which is derived from the sum of each beta in prior analyses. The standard error (SE) was found to be 0.048, with p < .001, indicating significance (ß = 0.774, SE = 0.048, 95% CI [0.679, 0.869]). Additionally, it was found that the beta value is 0.774, which means that for every unit increase in memory retention skill, there is an expected 0.774 increase in academic productivity. This result reinforces the notion that memory retention skill is a vital component in improving students' academic productivity. Since the result revealed that the p-value is less than 001, this means that the null hypothesis is not accepted. This confirms a statistically significant total effect of memory retention skill on academic productivity. These findings align with the Preacher and Hayes mediation analysis approach, which emphasizes that a total effect is significant when the computed p-value is below the 0.05 threshold.

The model in Figure 1 indicates the significant relationship between memory retention skill (IV) and academic productivity (DV) through the mediating effect of metacognitive learning strategy (MV). In Path A, memory retention skill (IV) has a significant influence on metacognitive learning strategy (MV) beta = 0.72 p < 0.001) . In Path B, metacognitive learning strategy (MV) was also reported as significantly correlated academic productivity (DV) (beta = 0.17 , p < 0.001) In Path C, memory retention skill (IV) was positively predictive of academic productivity (DV) beta = 0.65 p < 0.001).
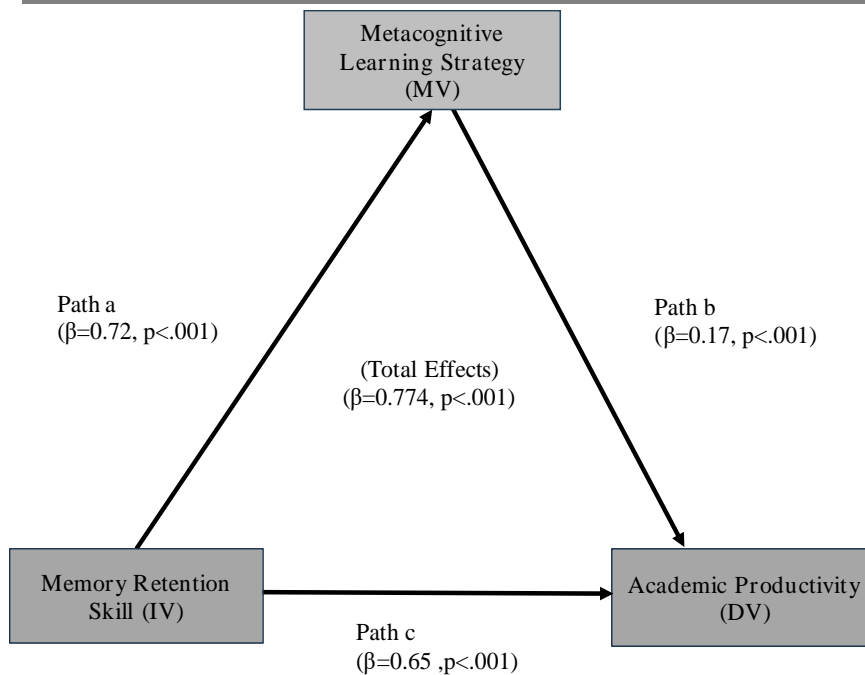
Figure 2. Path Plot Showing the Variables of the Study

Apparently, it explained that because the direct effect is significant while the indirect effect is also significant, then the metacognitive learning strategy (MV) partially mediates the relationship between memory retention skill (IV) and academic productivity (DV) among elementary education students. Hence, these results stipulate that the relationship between memory retention skill and academic productivity is partially mediated by the indirect pathway through metacognitive learning strategy (MV), a claim that was also supported in Table 7 by the estimation of a significant indirect effect.

As a result, the mediation analysis in this study revealed results that were comparable to the of a results of Swanson et. al. (2024), which examined the effects of a metacognitive learning strategy intervention on students' academic productivity. The findings demonstrated that students who actively engaged in metacognitive learning strategy showed improved learning outcomes, reinforcing the role of metacognitive learning strategy as a factor influencing academic productivity. Moreover, students who exhibited greater confidence in their metacognitive learning skills early in the intervention were more likely to complete it, which correlated with higher academic productivity. These findings align with the present study, affirming that metacognitive learning strategy serves as a partial mediator between memory retention skill and academic productivity among elementary education students.

CONCLUSION

This section presents the overall summary of the study, particularly the results and their implications. Based on the findings, the following conclusions were drawn in response to the research objectives:

The level of academic productivity among elementary education students was found to be high, with socialization being the highest mean among the indicators of academic productivity, highlighting students' ability to interact and collaborate effectively. However, content information was the least oftentimes manifested, suggesting a need to strengthen their ability to analyze and synthesize academic materials. While students excel in engaging with peers and fostering interactive learning environments, improving content mastery is crucial for deeper academic understanding. Enhancing research-based activities and critical analysis strategies can help bridge this gap and further improve academic productivity.

Moreover, the level of metacognitive learning strategy among elementary education students was also found to be high. Among the indicators, planning had the highest mean, indicating that students excel in setting goals and structuring their learning process. However, monitoring and regulation had the lowest rating, suggesting a

need to enhance students' ability to track their progress and adjust strategies accordingly. While their strong planning skills contribute to organized learning, reinforcing monitoring and evaluation can ensure continuous improvement and adaptability. Providing training in self-assessment techniques and reflective learning activities can help students become more aware of their cognitive processes.

Furthermore, the level of memory retention skill among elementary education students was also found to be high. This implies that students oftentimes manifested in motivational practices and experiences, goal setting and accomplishment, personalized learning, and educational resources and learning devices. The highest-rated indicators, goal setting and accomplishment, and personalized learning, suggest that students effectively set objectives and adapt learning strategies to enhance retention. However, the lowest-rated indicator, educational resources and learning devices, highlights the need to improve access to and utilization of learning tools. Strengthening resource integration can further enhance students' ability to retain and recall information.

In addition, the study revealed a strong positive correlation between metacognitive learning strategy and memory retention skill, memory retention skill and academic productivity, and metacognitive learning strategy and academic productivity. Students who actively engage in planning, monitoring and regulation, and evaluation tend to develop stronger memory retention, which enhances their ability to recall and apply academic content effectively. Additionally, students with high memory retention, demonstrated through motivational practices, goal setting, and the use of educational resources, exhibit greater academic productivity in socialization, learner interaction, and research ability. The findings emphasize that fostering metacognitive learning strategy can significantly enhance both memory retention and academic productivity.

Lastly, mediation analysis revealed that metacognitive learning strategy partially mediates the relationship between memory retention skill and academic productivity. This indicates that while memory retention skill directly influences academic productivity, metacognitive learning strategy play a crucial role in strengthening this relationship. These findings align with the Self-Regulated Learning Theory of Zimmerman and Schunk (2001), which emphasizes the role of cognitive and metacognitive processes in academic achievement. The results support the idea that fostering metacognitive learning strategy enhances both memory retention skill and academic productivity, reinforcing the necessity of structured self-regulated learning approaches in education.

RECOMMENDATION

The suggestions of the researcher are established based on the results and the wholeness of the paper. In light of the aforementioned findings of the study, following recommendations are proposed to enhance academic productivity, metacognitive learning strategy, and memory retention skill among elementary education students were made:

To enhance academic productivity and content comprehension, targeted interventions such as diversified instructional strategies, real-world applications, and structured feedback are essential. Educators should integrate interactive lectures, multimedia tools, and hands-on activities to engage learners, while institutions can support metacognitive learning strategy—particularly monitoring and regulation—through workshops, reflection tools, and peer collaboration. Enhancing memory retention involves expanding access to digital tools, training students in their use, and offering varied educational resources. Despite the strong correlation between metacognitive strategy strategy and academic productivity, their relationship remains the weakest among key variables, necessitating the integration of metacognitive learning startegy across subjects and mentorship programs. Future research should examine additional influencing factors, use larger samples, and include qualitative methods for deeper insights.

ACKNOWLEDGEMENTS

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