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Note-taking and Its Impact on Learning, Academic Performance, and Memory

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Note-taking is a significant part of students' academics because it improves their learning and helps them with their memory. Writing effective notes that are concise helps students to understand the information easier and allows them to retrieve information efficiently. Note-taking allows students to organize information and to enhance their cognitive processing. There are many different ways to structure notes such as intentional free notes, outline notes, and matrix notes. Therefore, it is important that students find their own structured way to write effective notes during lecture. The purpose of this research study is to investigate whether effective-note-taking improves the quality of learning and memory retrieval for students. A survey was administered and collected from 200 students of the City College of New York during fall of 2022. The survey questionnaire included Likert-type and open-ended questions, which was used to examine the students' thoughts, perceptions and their views about the benefits of effective note-taking. The data suggest that student's ability to note-taking and their method of note-taking is positively correlated with their GPA and performance. Furthermore, most students believe note-taking is vital to have a higher academic performance. Furthermore, the data suggests that the students' perceptions is that effective note-taking helps them with their memory and information retrieval.

Keywords: note-taking, academic performance, memory, study skill, learning

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INTRODUCTION

Note-taking is a vital skill in the field of education which is useful for students at all levels be it elementary school or college. Note-taking raises a person's attention to the text by indicating which thoughts should be written down and which should be left out. Thus, taking notes may impact memory, by actively engaging the reader with the content to be remembered. It is evident that taking notes can help with student outcomes in their classes (Annis & Davies, 1975). Note-taking habits differ among students and impact their memory and learning in both offline and online courses. The art of note-taking is student-specific (Morehead et al., 2019). There are two significant purposes of note-taking which are encoding and storage. The function of encoding is to see how note-taking improves students' ability to learn specific materials. The function of storage is to see how a student learns and memorizes from their notes to perform better on a test (Kobayashi, 2006). The encoding part of note-taking concerns two vital parts: First being what strategies or methods students use to take notes and second how do the students organize the notes (Luo et al., 2018). It is beneficial if students take notes by summarizing and organizing their lectures instead of copying down lectures from slides. The storage part of note-taking is most functional when students study their notes in an effective manner (Morehead et al., 2019).

People encode information at several levels of comprehension and memory, notably the surface form, textbase, and situation model levels (van Dijk & Kintsch, 1983). In a nutshell, the surface form is a person's exact remembrance of the words and syntax that were employed. Aside from the surface shape, the textbase is a representation of the abstract idea units conveyed by language. Finally, the scenario model represents a person's referential knowledge of the events recounted. This serves as a mental simulation and can comprise both inferred and explicitly stated information. Furthermore, it has been proposed that people expand on the content while taking notes (Einstein et al., 1985). If this is the case, one would predict enhanced performance at the situation model level, since this is where such elaboration occurs frequently. Since notes are frequently meant for later review, they serve as self-generated memory cues in some ways. As a result, taking notes could also help with later performance. These findings back up prior research that demonstrates that taking notes can boost learning even without later review (Annis & Davies, 1975).

According to cognitive analysis, note-taking does not equal just copying down what you are listening to, observing, or your thoughts. Note-taking demonstrates that students encompass the lecture or the written document and can acknowledge data by copying it down. Note-taking involves students handpicking information and reformulating the data in their own words (Boch & Piolat, 2005). Three writing processes can be used during note-taking: the first is to plan the information of a text; the second is to translate the information to organize data; and the third is to revise meaning by finding a specific pattern to gather and write the required data (Kellogg, 1994). Note-takers must find a balance between the quality of text they write and the cognitive cost of the activity (Olive & Kellogg, 2002). Often note-takers deal with temporal pressure because they cannot slow down their writing speed while listening, but it can decrease their comprehension speed. Note-takers must synchronize their attention and storage pressure

for their understanding and written production (Baddeley, 1996). Working memory is a crucial part of note-taking because it plays a huge role in cognitive tasks that comprise temporary storage and manipulation of information. Working memory includes acknowledging data and writing the information, which are essential factors of note-taking (Baddeley, 2000, Olive, 2004).

There are different ways to structure a note, such as conventional free notes, outline notes, matrix notes, to mention a few. For example, conventional free notes have no specific design and are not written in a particular manner. On the other hand, matrix notes are more organized and follow a specific writing pattern (Kauffman et al., 2011). Matrix notes also include a two-dimensional cross table that enables students to compare their topics and information (Kauffman & Kiewra, 2010). Matrix notes could essentially be more advantageous than conventional note-taking because it initiates top-down active processing during online search tasks (Wu & Xie, 2018). Notes are taken in either paper format or digital format using laptops, tablets, or other technical devices. Written note-taking has been shown to increase cognitive understanding; some researchers have proposed that because longhand note-taking involves multiple processing which are listening, summarizing, paraphrasing those who take written notes have higher performance. Using laptops and tables are becoming more popular with college students as tools for taking notes. As students are more susceptible to interruptions (e.g., web surfing, texting), studies have identified more task switching and divided attention in digital notetaking than those in written note-taking (Mueller & Oppenheimer, 2014). College students stated that the critical benefits of handwriting notes were the flexibility and control over the spatial layout of the notes and the ability to combine various forms and special notations (Reimer et al., 2009). Students also indicated that taking notes by hand helps them recall more knowledge. Because written notetaking is said to increase cognitive load, some researchers claim that longhand note takers outperform written note takers on overall recall tasks (Mueller & Oppenheimer, 2014). A study conducted by Voyer and his colleagues found that that the manner of note-taking had no effect on performance. Furthermore, they explained that if you believe you can eliminate distractions on technological devices in any way, the notetaking method will have no effect. If you are unable to control distractions, you should avoid using digital note-taking (Voyer et al., 2021).

It is noteworthy that college and high school students take copious amounts of notes in almost all classrooms while listening to lecture sessions. And throughout their academic careers, few are ever trained or coached on note-taking and review (Kiewra, 1987). Students are often poor note-takers, recording only a small fraction of essential lecture ideas. According to the stated findings, some freshmen students recorded only 11% of critical lecture concepts, whereas "A" students recorded 62% of critical lecture notions (Hartley & Marshall, 1974). Students either fail to note crucial concepts that are likely to be assessed (Kiewra & Fletcher, 1984) or fail to highlight the critical concepts once they have recorded them in notes. However, the process function argues that taking notes is useful regardless of review because it promotes attention during the lecture and facilitates the storing of lecture concepts into long term memory (Kiewra 1987). Note-taking, is associated with academic accomplishment in both its process and product roles (Di Vesta & Gray, 1973).

Lecture note-taking is a challenging skill because its abilities demand the careful processing of complicated material (Al-Musalli, 2015). "Note-taking" is achieved while the student is listening, and "note-making" is when the student reads a material. Listening involves more uninterrupted concentration than reading; as a result, the reader has greater control over the data, allowing the student to focus on any part of the document they choose (Scovel, 2002). Research reports show that note-taking positively impact students' listening comprehension levels (Al-Ghazo, 2023).

Researchers have identified two basic functions of note-taking that could demonstrate its advantage in improving learning and performance: the encoding function and the external storage function as it can be used to be reviewed later (Di Vesta & Gray, 1973, Williams & Eggert, 2002). They claim that note-taking stimulates learning by drawing learner's attention to instructional content (Di Vesta & Gray, 1973; Einstein et al., 1985), facilitating translation of instructional content into text and one's own comprehension (Boch & Piolat, 2005), allowing for better development of deep-level mental representations of content (Bui & Myerson, 2014), and enabling learners to connect new information with things they know (Einstein et al., 1985). The study by Jiang et al aimed to examine how students use the open-ended learning environment's note-taking feature, with a particular emphasis on whether the volume of note-taking, content of middle school students' notes and reassessing behavior are associated with the success of their science learning in the environment. They discovered that students' note-taking/reassessing activity was more frequent and that the quality of their notes appeared to be significantly linked with performance (Jiang et al., 2018). Thus, the active process of taking notes, can be predicted to produce higher learning results than being passive and not taking notes (Chi, 2009). It is therefore hypothesized that elaborating on presented information and generating information and ideas that go beyond the meaning of the original content in notes, which constitutes a constructive activity, is preferable to reproducing instructional content while taking notes, which constitutes an active activity.

Instead of relying on remembering, notes allow students to "record, clarify, organize, and comprehend material highlighted during lectures" (Bonner & Holliday, 2006). However, there are numerous unanswered questions about agent roles and efficacy in aiding all students to manage their cognitive and metacognitive processes when taking notes, particularly because not all students take notes in the exact same way. Different note-taking tendencies, for example, may evolve depending on the learner's prior knowledge level (e.g., high or low), metacognitive awareness, capacity to appropriately utilize effective self-regulatory skills, and available instructional aids (Moos & Azevedo, 2008). Taking notes aided in the recognition and organizing of significant information (Bonner & Holliday, 2006). For these reasons, taking notes is an important and difficult ability for students to acquire as well as for scholars to investigate in the context of learning and academic accomplishment. Researchers evaluated learners' note-taking attempts while studying with intelligent pedagogical agents integrated within MetaTutor, an adaptive hypermedia learning environment. Trevors and his team aimed to uncover and examine crucial cognitive and metacognitive characteristics that affect the quality of note-taking processes and products, and consequently the quality of learning, using an information-processing SRL framework. Components of notes

comprise quantity and quality. In addition to other quantitative indicators, this study employed the distinction between deep and shallow to understand the quality of note-taking strategies (e.g., frequency, duration). Deeper ways to note-taking, such as commenting on content, drawing conclusions, or linking ideas from different areas of content. In addition, prior knowledge has been found to influence important note-taking factors and their interplay on academic results (Trevors et al, 2014).

Previous research found that students with poor prior knowledge of the circulatory system took quantitatively more notes than their high prior knowledge peers. This conclusion was attributable to low previous knowledge learners' requirement to create a basic understanding of the topic (Moos & Azevedo, 2008). High prior knowledge learners, on the other hand, could concentrate on checking their comprehension and validating what they already knew rather than dedicating cognitive resources to building a knowledge foundation (Trevors et al., 2014). The depth or shallowness of note-taking can be assessed. When employing a deep approach, the student strives to comprehend the fundamental significance and relevance of content, which can be accomplished by comparing instructional texts and diagrams to past knowledge and experience, or by discovering patterns, themes, and conclusions across learning materials.

A study concerning the relationship between the quantity and quality of notes and academic performance showed that the quantity of notes (as measured by frequency, duration, and segment count) and reproduction in note-taking were substantially negatively linked to learning efficiency, such that the more students took notes and the more they focused in information reproduction (a shallow approach to note-taking), the reduced the learning effectiveness (Azevedo et al., 2012). While using the shallow method learners relied extensively on exact copying of text; they used this strategy frequently rather than with restraint. Overdependence on this tactic cut down the time spent reading content (i.e., material assessed in the post-test) and may prevent students from employing a wider range of learning techniques, including those that may be more beneficial for learning outcomes, like summing up content, making observations, and knowledge elaboration (Trevors et al., 2014).

Note-taking is a technique that can be used to improve a learner's understanding of text. When working with text, perceived meaningfulness is essential for effective remembering. The mechanism involved in meaningful processing is attention to content, in which closer examination of text results in higher meaningful processing and improved memory over time. Once individuals pay more attention to and evaluate a passage, they tie the text to past knowledge and meaningfully process the material. The memory path is longer the deeper the content is analyzed. As a result, it appears logical to believe that taking notes can help with processing depth. Taking notes should aid in deeper analysis and a longer memory trace because notes are important for conceptual encoding and better processing indicates meaningful storage. Regardless of whether students took summary or paraphrase notes, both were preferable to word-for-word notes, and were more beneficial in memory than merely putting down capitalized words. Furthermore, students who took summary and exact notes remembered more than students who did not take notes.

Taking notes suggests comprehension. Students memorize while taking notes, especially when they participate in deep understanding of the material (Williams & Eggert, 2002). Working memory, as described by Baddeley (2000), is critical in all cognitive actions that entail the temporary storage and manipulation of information, regardless of whether the person performing these activities is learning or highly skilled. Overall, many students feel that the act of taking notes — putting things down in their own words — will aid their later memory (Hartley & Davies, 1978). There is little research on the empirical relationships between quantitative and qualitative components of students' lecture notes and test performance. Baker and Lombardi investigated these relationships naturally by evaluating the notes taken by college students during a specifically prepared but otherwise ordinary classroom talk. They discovered a link between content of the students' notes and test results. A study testing this theory indicated that the eight students with the highest total examination scores wrote two and a half times as many words of notes as the eight students with the lowest total examination scores. All students with very high examination results also had high scores on the two variables measuring note amount (Nye et al., 1984). Note-taking in a lecture assumes that some thorough listening comprehension happens, creating perspective content for the note-taking process.

Taking notes serves both an encoding and an external memory role. Kiewra and his colleagues has explored the external memory role of note-taking. The classic external storage function is reclassified as a "encoding plus storage" function in this study, and they suggested a new, independent external storage function represented by individuals who examine notes but have not previously viewed (or encoded) the lecture. This is accomplished by having students miss the lecture and then supplying them with "borrowed" notes from other students to review. This all-too-common practice of looking over borrowed notes has never been explored. These changes yielded three note-taking functions: the original encoding function (take notes/no review), the newly classified encoding plus storage function (take notes/review), and the new, independent external storage function (borrow notes/review). As discussed by many researchers, students must continually and concurrently listen, choose significant concepts, retain, and manipulate lecture ideas, analyze the information, decide what to transcribe, and write notes during lecture learning. Regarding note-taking functions, data show that writing lecture notes and not reviewing them (the encoding function) is not any more successful than listening to a lecture without taking notes or reviewing them (Kiewra et al., 1991). In one research study, it is reported that note-taking seems to enhance memory by enhancing the amount of information remembered (Brown-Schmid et al., 2023).

Another study demonstrated that, while taking notes is an essential requirement for high exam performance, it is not enough; for best performance, good notes must be combined with rigorous study. The test performance of students taking an introductory psychology course was contrasted with the quality of notes taken during lectures to obtain more accurate information on why students fail test things based on lecture material in this study. According to the findings of this study, students do not miss exam questions based on lecture material because their lecture notes are insufficient or wrong. Rather, most mistakes are made by students who precisely note the lecture

material but subsequently fail to study and learn the information in their notes. Students usually do not go over their lecture notes until immediately before an examination.

The motivation and purpose of the research study is to improve our understanding of the role of note-taking in improving academic performance and memory to better inform researchers, instructors, and students.

Guiding Research Questions:

1. What are the students' perception on the benefits of note-taking?

2. Does note-taking have an impact on students' academic performance?

3. Does note-taking positively impact students' memory and information retrieval?

METHOD

Our research was aimed to understand how does effective note-taking impacts students memory and learning. Out hypothesis was based on past studies about how notetaking has benefited students in their studies and overall memory. The study was done in City College of New York where we collected data from 200 students during the fall of 2022. The data was collected from the mic of the NAC and Marshak building. Majority of students were (STEM) majors Science, Technology, Engineering and Mathematics. Other students included majors from psychology, history, sociology, arts, world humanities, English and philosophy. The survey included a mixture of Likert-type and open-ended questions. These questions were specifically design to learn how effective note-taking impacts students and how much student consider note-taking to be vital. The survey was anonymous meaning the students name was not on the survey. The top of the survey asked students to write their major, GPA, gender, age, number of credits completed and number of science courses completed. The students were informed of their rights meaning if they were not comfortable with sharing some information they did not have not. The student's GPA and major was used to compare their note-taking strategy and their level of degree completion. The researcher tested the correlation between students' GPA and their note-taking organization, students' GPA and method of note-taking, students' note-taking organization and level of degree completion, and lastly students' note-taking ability and level of degree completion.

Two specialists who reviewed the survey concurred that the questions accurately reflect the inquiry into note-taking and its relationship to learning, performance, and memory. The reliability coefficient was calculated using the test-retest approach and was found to be 0.87. The Likert-type questions were subjected to a single factor ANOVA, which revealed $p<.001$ and p-value <0.05, which is strong evidence against the null hypothesis and demonstrates a strong association between the variables.

The first Likert-type section had a 5-point scale which included: least (1), to most (5). The second Likert-type section also had a 5-point scale which included: never (1), rarely (2), sometimes (3), usually (4), and always (5). The last part of the survey was open ended questions that allows students to free write their thought on effective note-taking. It also allowed us to understand some of the previous Likert-type questions more in depth because students were able to provide explanations to their answers. The first

open-ended question is "what does effective note-taking means to you? do you think it has an impact on your memory to retrieve information better?" The second open-ended question is "what type of classes do you think help you the most with note-taking? Why?" The third open-ended question is "what type of note-taking method do you use and why?"

FINDINGS AND DISCUSSION

Table 1
Likert-type questions and average answer from respondents. (1 least – 5 most)

Questions	mean
How successful do you think note-taking is in your ability to retrieve your memory?	3.84
How well can you apply a specific topic or explain it to your peer after taking effective notes?	3.83

According to table 1, 3.84 was the average answers for most students which means most students think note-taking is a successful method on their ability to retrieve their memory. The second question of the Likert question was used to understand if student's ability to apply a specific topic or explain it to your peer after taking effective notes was strengthened or not. It shows that the average answers for most students was 3.83. Both of the Likert questions demonstrated that note-taking allows students to develop better understanding of the material than if they were not taking notes. This is consistent with research that student's ability to retrieve memory is enhanced if they are able to take effective notes which ultimately helps with tests (Morehead et al., 2019).

According to the data, our hypothesis is supported because it shows that effective note-taking helps students with learning and to memory retrieval. The p-value of the data was less than 1 meaning note-taking has linear relationship with student's overall GPA. Table 1, Likert-type questions proves that note-taking allows students to excel in college if they have effective note-taking skills. There are two vital uses of note-taking which are encoding and storage (Kobayashi, 2006). The function of encoding is to determine how note-taking enhances students' ability to learn specific materials (Kobayashi, 2006). The function of storage is to understand if a student performs better on a test if they learn and memorizes from their notes (Kobayashi, 2006).

Table 2
Likert-type questions and average answer from respondents. (1 Never – 5 Always)

Questions	mean
How often do you take notes during lectures?	4.02
How often do you organize your notes such as highlighting or using subtopics after you finished taking notes?	3.31
How often do you retrieve your notes to study?	3.87
How often do you take notes from textbooks?	3.11
Do you discuss with your peers after note-taking to be sure that your notes were correct?	2.46
How often do you use pen and paper to write notes?	3.77
How often do you use technology such as iPad or laptop to write notes?	3.25
I take verbatim notes meaning I copy down what is written in the lecture or textbook?	3.44
I take notes in my own words where I write down key points and summarize what is in the lecture or textbook?	3.64
I have a structured way that I like to write my notes?	3.70
I can write effective notes without attending lectures every day?	2.80
Do you consider that professors recommend note-taking method when you write your notes?	3.13
Do you think effective listening skills are vital to taking effective notes during lectures?	4.43

Table 2 provides insights into the benefits of note-taking, based on a set of 13 Likert questions. Notably, responses above 3.3 indicate strong agreement among participants. Several questions received average answers of 4.04, 3.87, 3.77, 3.64, 3.70, 3.44, and 4.43, suggesting that students consistently engage in the corresponding actions. From the table, it is evident that students frequently take notes during lectures and refer back to them for studying purposes. There is a high level of agreement regarding the use of pen and paper for note-taking. Interestingly, students strongly agree with the idea of taking verbatim notes, where they copy information directly from lectures or textbooks. However, they also strongly endorse taking notes in their own words, focusing on capturing key points and creating summaries. The table further reveals that students have a strong preference for how they record their notes. Additionally, effective listening skills are seen as crucial for taking helpful notes. Moving to the neutral responses (average answers between 2.7-3.3), there are five questions with neutral average answers: 3.31, 3.11, 3.25, 2.80, and 3.13. Students somewhat agree that they organize their notes through highlighting or using subtopics after the note-taking process. On the other hand, they tend to take fewer notes from textbooks, resulting in a neutral average answer of 3.11. Moreover, students show a neutral inclination toward using technology such as iPads or laptops for note-taking, indicating a preference for traditional pen and paper. The question about attending lectures yields a neutral response, suggesting that students don't perceive a need to attend lectures daily to have effective notes. Similarly, they feel neutral about the note-taking methods recommended by professors. Interestingly, there is one question in the table where students disagree, reflected in an average answer of 2.46. This question pertains to discussing notes with classmates to verify accuracy. This disagreement can be attributed to time constraints as

students often take multiple classes, making it challenging to engage in post-note-taking discussions. In summary, Table 2 demonstrates that note-taking is viewed favorably by students, with strong agreement on various aspects, while some areas elicit neutral or dissenting responses based on individual preferences and practical constraints.

Table 2, question 1 average response is 4.02 meaning students often write note during lecture which means students are working with both the encoding and writing part of note-taking. Table 2, question 2,8,9 and 10 all discuss the method part of note-taking. How do students take note because the method of note-taking has a major impact on the effectiveness of note-taking? The encoding part of note-taking compose two vital parts which are what strategies or methods students use to take notes and second how the students organize the notes (Luo et al., 2018). It is important that students note-take verbatim notes our data show that on average answer is 3.44 meaning it won't be beneficial if students are copying down lectures from slides and not summarizing and organizing their lectures (Morehead et al., 2019).

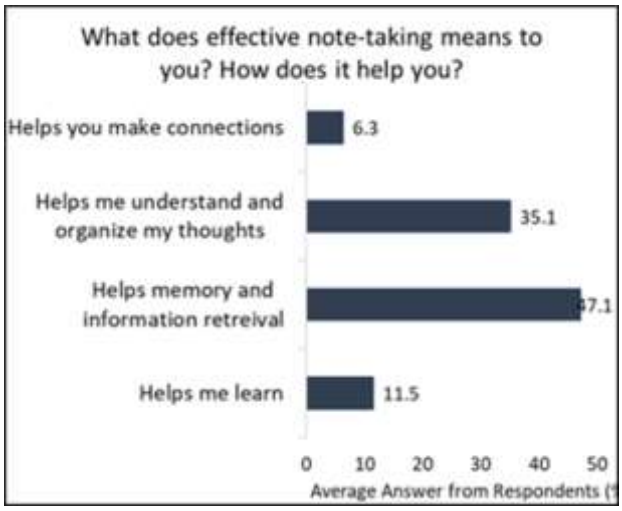

Figure 1
Students perceptions on how note-taking impacts them

Figure 1, was one of the open ended question where students had the freedom to write what they thought effective note-taking meant to them and if effective note-taking helped or not. 6.3% of students stated that effective note-taking helped them make connections. 35.1% of the students stated that effective note-taking helped them understand and organize their thoughts. 47.1% of the students stated that effective note-taking help them with their memory and information retrieval. 11.5% of the students stated that that effective note-taking helped them learn. Overall, most students believe effective note-taking benefited them in a positive manner.

Note-taking involves students handpicking information and reformulating the data in their own words (Boch & Piolat, 2005). Figure 1, displays that 35.1% of the students believe that effective note-taking helps them understand and organize their thoughts and

47.1% of the students believe it helps them with memory and information retrieval. According to Kellog (1994) he stated that the first of note-taking is to is to plan the text, second is to translate the information to organize data and third is to revise meaning by finding a specific pattern to gather and write the required data. These statements are supported by figure 1, 6.3% of the student believes that effective note-taking helps them make connection and 11.5% of the students believe it helps them learn.

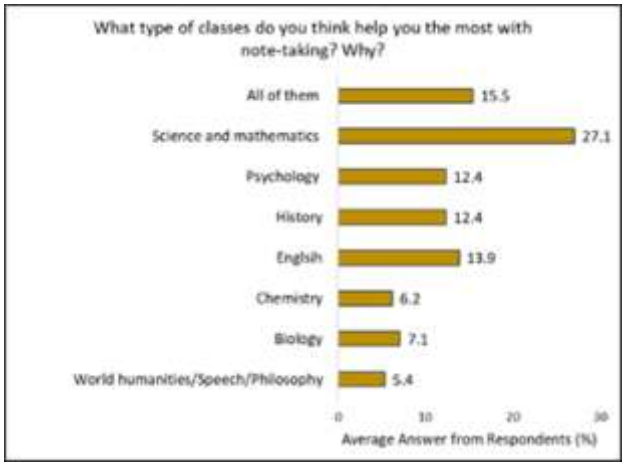

Figure 2
Students views of classes that help them with note-taking presented in percentages

Figure 2, was the second open ended question where the it asked student what type of class do they think helps them most with note-taking and why. 15.5% of the students stated that note-taking helps them with all of their classes. 27.1% of the students stated that note-taking helps them with science and math classes. Research and surveys have consistently indicated that taking notes while studying science is a cognitive approach that enjoys popularity among students and receives endorsement from their teachers (Weiss et al., 2001). Furthermore, 6.2% of the students stated that note-taking it helped them with chemistry. 7.1% of the students stated that note-taking it helped them with Biology. 12.4% of the students stated that note-taking helps them with psychology classes. 12.4% of the students stated that note-taking helps them with history classes. Lastly, 5.4% of the students stated that note-taking helps them with world humanities, speech and philosophy classes. According to figure 2, most students stated that they use note-taking methods for science and math classes which show that these classes have denser materials thus it is important to write note during lectures.

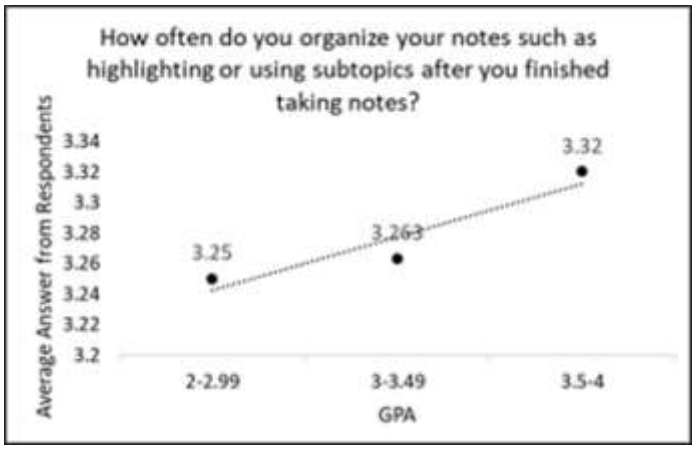

Figure 3
Correlation between students' note-taking organization and GPA

According to figure 3, it demonstrates the correlation between students note-taking organization and their GPA. The graph shows a linear relationship meaning the better their note-taking organization the higher the GPA. The question was from the Likert question of how often does a student organize their notes such as using highlighter or subtopic after taking their notes. Student who responded on average of 3.25 had a GPA between 2-2.99. Student who responded on average of 3.263 had a GPA between 3-3.49. Student who responded on average of 3.32 had a GPA between 3.5-4. Figure 3 shows that when students use highlight or use subtopics to write note their GPA is higher therefore students perform better on their courses because they are more involved after note-taking. Furthermore, Salame and Thompson conducted a study that yielded noteworthy findings, emphasizing the increasingly positive outcomes associated with taking effective notes. The majority of students participating in the study shared a common perspective that note-taking is a crucial strategy for ensuring academic success and promoting effective studying and learning. Also provides evidence that taking notes has a positive impact on learning outcomes and academic performance. Consequently, it can be concluded that the act of taking notes contributes to enhanced learning effectiveness and improved GPAs among students (Salame & Thompson, 2020).

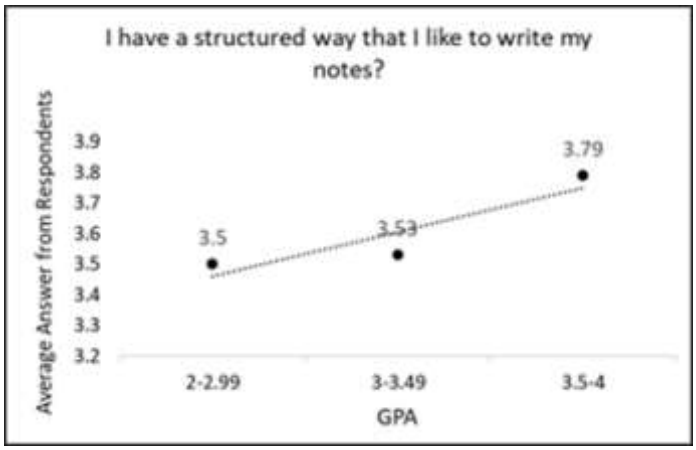

Figure 4
Correlation between students' method of note-taking and GPA

According to Figure 4, it demonstrates the correlation between students' method of note-taking and their GPA. The graph shows a linear relationship meaning the better their method of note-taking the higher the GPA. The question was from the Likert question where the student was asked if they have a structured way to write their notes. Student who responded on average of 3.5 had a GPA between 2-2.99. Student who responded on average of 3.53 had a GPA between 3-3.49. Student who responded on average of 3.79 had a GPA between 3.5-4. Figure 4 shows that students who have a structured way of note-taking have a higher GPA. The hypothesis attempts to study the relationship between note-taking and students' overall GPA, however, the study has conducted a mean analysis only which is not adequate to prove the said relationship since mean values only concern about the average responses given to a particular statement, not measuring the relationship or association between two variables. Effective notes will have the following skills which includes selective notes, students should not be writing everything write but rather the important information in a concise manner, it should be easy to follow and understand, outlining essential topics, synthesizing central ideas, explaining critical thoughts, providing enough details, and creating the citation of their notes straightforward so they can provide references (Drew & Bingham, 2001).

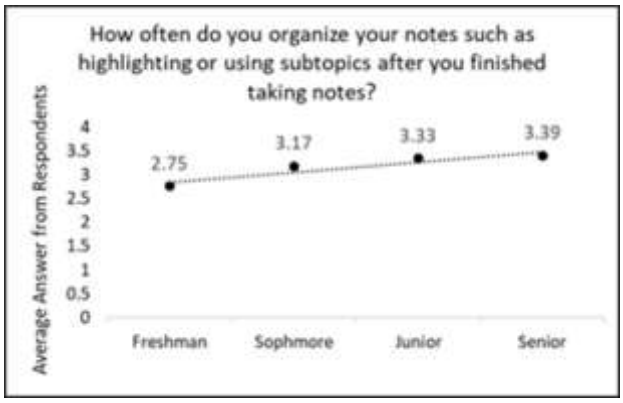

Figure 5
Correlation between students' note-taking organization and level of degree completion

Figure 5, took the same likely question of how often does a student organize their notes such as using highlighter or subtopic after taking their notes and compared to their level of degree completion. Student who responded on average of 2.75 are freshman students. Student who responded on average of 3.17 are sophomore students. Student who responded on average of 3.33 are junior students. Student who responded on average of 3.39 are senior students. According to figure 6, it shows that students ability and organization skills of note-taking increases as they progress in their level of degree completion. On average students Reponses around 2.75 and they were freshman's this these most of the students lack the organization skills of writing notes. On the other hand, senior students responded on average of 3.39 and they acquire an organization skill such as highlighting or using subtopics when writing notes.

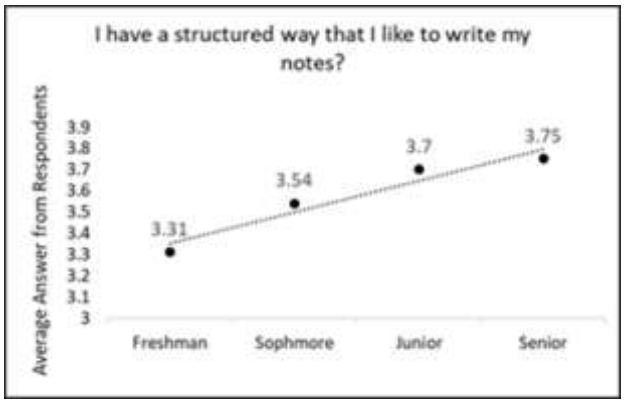

Figure 6
Correlation between students' note-taking ability and level of degree completion

Figure 6, took the same Likert question where the student was asked if they have a structured way to write their notes and compared to their level of degree completion.

Student who responded on average of 3.31 are freshman students. Student who responded on average of 354 are sophomore students. Student who responded on average of 3.70 are junior students. Student who responded on average of 3.75 are senior students. Figure 6, shows on average freshman students responded around 3.31 where they don't have a structured way of writing notes. Senior students responded around 3.75 where they have a structured way of writing notes. It shows the higher the level of degree of completion the better they wrote their notes.

CONCLUSION

In conclusion, our research investigated the impact of effective note-taking on students' memory, learning, and performance. Based on previous studies highlighting the benefits of note-taking, the researchers formulated a hypothesis to explore its influence on academic performance and memory. Through analysis of Likert-questions and open-ended responses, the researchers examined note-taking strategies, methods, organization, and their correlation with students' success. The research findings provide valuable insights into the importance of active engagement, selective information processing, and organized note-taking. The data supports our hypothesis, indicating a positive correlation between note-taking proficiency, approach, and GPA, and supports the idea that effective note-taking can enhance understanding, and academic performance. Additionally, the data hints that the students believe that taking notes well aids their memory and knowledge retrieval. These results can guide educators and students in promoting effective note-taking strategies. Further research can explore interventions and long-term effects on academic performance. The findings of this research study can help inform researchers, instructors, and students about the importance of note-taking in improving memory and academic performance. The implications is this can be used to improve learning and instruction.

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