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From Habits to Honors: Unpacking the Learning Behaviors Behind Science Student Achievement

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Study habits are crucial to learning outcomes in undergraduate science classes, but there are a variety of methods for studying and factors affecting studying. It is expected that deeper learning strategies such as practice question use will lead to better learning outcomes as opposed to surface level learning strategies like textbook reading. Similarly, being able to focus while studying should be crucial to being able to learn effectively. This study aimed to further investigate study habits' role and its impact on learning and performance. The study was conducted by collecting a survey from students on their study habits using Likert-type and short response questions, as well as information such as GPA and college level. The study took place at the City College of New York which is an urban minority serving institute and 199 students participated in this research project. This would allow for the determination of the most effective strategies and important factors based on GPA as a measure of effective learning. After compiling and analyzing the data, study habits did appear to provide a positive correlation with learning and performance as defined by student GPA. Practice problems and note reviewing were reported as the most popular study methods. The most popular response on how to improve study habits was to employ better time management. Students with higher GPAs tended to focus better while studying, plan out study sessions, and used practice questions while studying. Overall, this supports the importance of using deeper learning strategies while studying, but also highlights the importance of time management and planning when creating an effective study routine.

Keywords: study habits, learning, performance, undergraduate science courses, science classes, achievement

INTRODUCTION

Study habits are something that has been deemed very important to learning as a whole, but this seems to be especially the case in science classes. Everyone is expected and

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pressured to study to do well, but everyone often has their own methods of studying. Some are often considered better than others, but is that truly the case? Similarly, due to differences in study habits, different habits often utilize different methods of learning. To measure the effectiveness of these techniques, we can investigate the level of learning achieved in these science classes by analyzing the scores from various assessments after determining the study practices used by students. This will help us understand if study habits have a major impact on learning in these undergraduate science classes or if there are other factors in play when it comes to learning.

To start off, we must define what study habits are. They can generally be considered as any techniques or method a student may use to learn and further understand the material for a given course. This means a variety of techniques can be considered a study habit or part of a study habit. These habits often employ different learning techniques though. For example, retrieval practice includes self-testing after learning instead of just restudying material. This means doing things like practice exams, instead of just reviewing notes. Similarly, distributed practice involves spacing out the study sessions as opposed to cramming all the studying in one session. This would be studying throughout the semester, instead of everything being studied the day before the exam (Geller et al., 2017). Both learning techniques have been shown to be effective in improving learning as memory was enhanced and information was retained better in the long term (Kornell & Vaughn, 2016; Rowland, 2014; Carpenter, 2017).

Other more intricate methods of learning were also discussed such as Bloom's Taxonomy which organizes learning into different levels. The easiest ones are at the base of the pyramid, while the deepest is at the top. According to the Bloom's Taxonomy Website the order from most basic to most complex is remembering, understanding, applying, analyzing, evaluating and creating (Bloom, 1956). As you get to higher levels of education, topics must be mastered at higher and higher levels (Cook et al., 2013). Various study habits of students engage different levels of learning on the pyramid which means that study habits requiring students to think deeper about the topic, as opposed to simply remembering the facts, should yield greater learning and better outcomes in the classes. Good note-taking, concentration, good time management and reading comprehension are some of the habits considered effective (Garner-O'Neale & Harrison, 2013).

Deeper learning methods were examined by Rossum and Schenk (1984) who found that students who tried to understand the material (deep-level), scored better on questions requiring insight while students who just tried to memorize the content to reproduce it (surface-level) did equally well on factual questions as the deep-level understanding students. Blumner & Richards (1997) found there was little evidence that high quantities of compulsive style studying, which is considered surface level, helped the grade performance of the engineering students.

Atsuwe & Moses (2017) found consistent results with reading and note-taking being the most influential factors where better reading and note-taking skills were linked to better academic performance among the students in the study. These show that good reading skills and effective note-taking are some of the most prominent effective study habits students can use to aid their learning.

Another habit many studies examined was the use of cramming. Cramming would be trying to learn as much material as possible in a short time span, oftentimes to prepare for an exam. This is generally the opposite of time management skills which are considered a good study habit as studying is more planned out, instead of trying to learn a lot quickly. Hartwig and Dunlosky (2012) found there is data to support the idea that students with greater academic performance, based on self-reported GPA, are less likely to cram study and more likely to employ retrieval practice. They are also more aware of the benefits testing can have and preplan times to study. Mastery approach goals (students with goals to master the topic) were found to be linked with preplanning study times and performance avoidance (students striving to not fail class) was linked with studying urgent material instead of what's most interesting (Elliot & McGregor, 2001). Some may be fine with cramming while most students perform better with spaced out and organized study sessions. This is not the only habit that affects student learning though.

Based on the information prior, its clear study habits are important to learning, but oftentimes many students don't know how to study efficiently and use deeper studying methods. Many studies aimed to address this issue by launching intervention programs to see if teaching good habits will yield more learning. In Cook et al. (2013) students were taught about Bloom's taxonomy and then they learned about the Study Cycle which involved previewing the material before class, attending class, reviewing after class, studying in short, but intense sessions, as well as reviewing over the weekend, and assessing their learning. After employing techniques such as the Study Cycle and doing homework without example problems as a reference, they performed better in their undergraduate general chemistry class. Similar techniques were used in Hoskins et al. (2017) where graduate TAs offered an intervention course to students which pushed an adaptation of the study cycle from Cook and co-workers as well as encouraging students to have a study schedule and system to hold them accountable to studying. TAs introduced a study system that emphasized outlines and concept maps which would help students follow the methods of the study cycle. The participants in the study began with exam scores significantly below the class average, but eventually rose, after participation in the program, to become statistically the same as the nonparticipating students' scores on the following exams. These examples show the importance of having good study habits, but also that these habits can be taught via interventions so that struggling students can learn more and perform in their classes.

The goals of students affecting their behaviors and study habits, leading to different degrees of learning, can also be observed in other studies such as Liao et al. (2021) which investigated students in a CS1 class. They found that low performers didn't always address any questions or doubts they had and instead just focused on getting the assignment to meet requirements without fully grasping why. The higher performing students essentially aimed to learn the concepts fully while low performing students only wanted to learn as much as was required. The previous study, Liao et al. (2019), found that low performers started assignments late and didn't get a chance to ask instructional staff for help and though high performers did the same, they were more likely to finish the work without help. This shows low performers' lack of commitment to working effectively, through poor time management, led to late assignment

submissions and failure to learn concepts fully since they couldn't get help. Meanwhile, though high performers had similar time management issues, they had learned more due to their prior habits, so they were still able to complete the work without help.

Students in the active learning classes with more guidance had the greatest amount of group learning and had the highest grades even without having the highest average GPAs going in. This supports the idea that the performance of students is affected a lot by active classrooms that have the students engage in good study practices, instead of one that tells students to use these methods independently (Eleazer & Scopa Kelso, 2018). With proper guidance in classes, students can learn to learn effectively through their study habits. Girls were also found to have better study habits than boys and were able to concentrate better (Numan & Hasan, 2017).

Various major factors involving study habits and their effect on learning have been discussed, but it's also important to be aware that other factors can also affect learning regardless of the study habits used. Prior learning can also be influential in future learning as Tuner (2016) found students who took honors biology had better scores on exam 1 than those who took regular biology classes in high school. Resources available for aid at schools can also be important so when Bruck & Bruck (2018) investigated community colleges they found that even with access to professional tutors with degrees in science, students at the college performed worse on average than those at the other college who only had access to student tutors. The difference was explained by the fact that the college that seemed to perform better allowed students to withdraw until a later date, so many poorly performing students had a chance to remove their low grades from the averages. This reminds us that the results of studies can have other factors in play.

Science literacy can be another factor that can affect learning in science courses but when Garner-O'Neale & Ogunkola (2015) investigated the topic, it was discovered interest in science was found to have the greatest effect on the level of science literacy with study habits and level of study being less influential. Even parental education levels can affect learning since Magulod Jr. (2019) found students with mothers who were college undergraduates and graduates self-assessed to have great note-taking habits and ability when compared to students with mothers of lower education levels. Even though this is self-assessed, based on what we know from prior, if the note-taking abilities of students with more educated mothers is truly better, then they are more likely to outperform the students with worse note-taking abilities. All of this is to say that though study habits are important, they are not the only factor in play when it comes to learning in science courses as students can have other factors in their lives which can affect both results from studies and our understanding of their learning.

Ultimately, various factors are in play when it comes to learning. Study habits are a major part though since based on the prior discussion it is clear, the type of studying, time of studying and quality of studying all influence the academic performance, and therefore the learning of students. It's crucial that students use deep learning strategies in their study if they wish to truly understand the concepts. Some important ones from the studies are things such as good note-taking, self-quizzing, making concept diagrams and other activities that require reanalysis of the information as opposed to simply reading notes. If students lack these abilities, it is possible to teach them the proper

techniques via intervention so that they can learn and succeed. If not interventions, teachers can also shift teaching styles to encourage the development of deeper study habits. Beyond this, we know factors such as student goals in class, levels of distractibility, student anxiety and others can affect students' choices of study habits and in turn their learning in science courses. Even with this, it's important to be aware of the fact that other outside factors that we cannot control, such as parent education levels or student interests, can influence their learning in these courses as well.

METHOD

Our research aimed to study the impact of study habits on student learning outcomes. A study was performed which included responses from 199 students who were mostly STEM majors. The survey was handed out in hallways outside science courses and labs. The survey was optional to the participants. The City College of New York is a public university in the CUNY system, present in an urban area, and serves students from a variety of backgrounds and lifestyles. At City College of New York (CCNY), approximately 80% of undergraduate students receive financial aid, with the majority of that aid coming through grants. A smaller percentage (around 7%) receive aid through loans. The study included results from students in a variety of age ranges spanning from 18 to 43. Some of the STEM majors reported include Biology, Biochemistry, Psychology, Computer Science, Mechanical Engineering, Electrical Engineering, Chemical Engineering, Civil Engineering, Chemistry and Environmental Science.

Guiding Research Questions:

1. What role do study habits play in learning and performance for STEM college students?
2. What are some of the most common study habits that students rely on during their academic studies?
3. What are the most effective study habits in correlating with learning and performance?

The study requested students to answer survey questions utilizing Likert-type and open-ended questions. The surveys were administered, and data was collected after approval from the CCNY Internal Review Board (IRB). Survey findings were analyzed by correlating various study habits to student reports of academic outcomes and experience. The survey recorded information on student major, GPA, number of credits completed, gender, and age but names were not recorded to keep surveys anonymous. This mixed methods approach is considered a rigorous method for such research and provides valuable data about the phenomenon being studies (McKim, 2017).

The survey was developed by the authors to examine students' perceptions about study habits and their role in learning and performance. According to two experts who examined the survey, the questions appropriately capture the investigation into study habits and how it relates to performance, and learning. Using the test-retest method, the reliability coefficient was determined to be 0.86. A single factor ANOVA was performed on the Likert-type questions, and the results showed a substantial correlation between the variables and strong evidence against the null hypothesis ($p<.001$ and p-value <0.05).

For Likert-type questions, answers were converted to numerical values depending on the category of the response: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Averages were calculated based on student response for these types of questions. These types of questions included those addressing topics such as students' goals during studying, resources utilized to study, confidence regarding learning, general methods of studying, interest in courses, and preferences or experiences while studying like getting distracted or being alone. The coding for the open-ended questions included creating categories for each response and placing similar responses in the same category. This is followed by adding up all of the responses in the various categories and converting these to percentages. Responses to open-ended questions were compiled based on salient factors mentioned such as using practice problems, reviewing notes while studying or mentions of the importance of time management for studying. Likert-type question responses were averaged and plotted using line graphs with other factors like GPA, age and college progress level. Open-ended questions were graphed on bar graphs using the percent of students that reported the salient factor being studied.

FINDINGS AND DISCUSSION

To answer our research questions, we converted the results to a table and figures to make improve presentation of the results and the readability of the results. The data collected provided a significant data which are organized in this section in a meaningful way and a simple way to follow the argument.

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

Likert-type Question	Average Answer from Respondents
Q1. I try to fully understand the theory behind material taught.	3.65
Q2. I prefer the professor to teach only material important for the exam, instead of the concepts as a whole.	3.45
Q3. I review my notes and the material taught after each lecture.	2.87
Q4. I believe I take good notes during lectures.	3.26
Q5. I am confident in my ability to solve given problems.	3.67
Q6. I get distracted often while studying.	3.80
Q7. I study using sources outside of those provided in class or on Blackboard.	4.19
Q8. I think I can predict my exam scores well.	3.32
Q9. I plan my study sessions.	3.36
Q10. I cram study before exams.	3.84
Q11. I attend all lectures for a class.	3.52
Q12. I feel I have good study habits.	2.93
Q13. I find the material being taught to be interesting.	3.47
Q14. I use practice exams or practice questions to study for an exam.	4.04
Q15. I prefer studying alone, instead of studying in a group.	3.64

When looking at the results in Table 1 some things stand out. The Likert-type question scale used indicates neutral feelings on a question if the response is a 3 with strong disagreement at a value of 1 and strong agreement at a value of 5. The table shows students on average agreed with the prompts presented in Q1, Q5, Q6, Q7, Q10, Q11,

Q14, and Q15. There are no prompts that stood out with strong disagreement values, as the rest of the average response values hovered around a value of 3 indicating a neutral feeling toward the prompts presented by the question.

The agreement in Q1 could indicate students were trying understand material taught in class to the best of their ability. Q5 shows that students on average do have confidence in their ability to solve problems so they may be less affected by anxiety which has been shown by previous studies to be detrimental to academics (Sato et al., 2019). Q6 shows students struggle with distractions which has been shown to be detrimental to performance as well (Blumner & Richards, 1997; Walck-Shannon et al., 2021). The strongest agreement could be seen in Q7 which may indicate that most students find the material supplied by instructors to be insufficient or incompatible with their study plans for the course. Q10 may imply that due to personal life choices or time constraints, many students end up cramming for exams, which is consistent with surface learning and memorizing before an examination to achieve a passing grade instead of deeper learning. In chemistry classes Brown et al. (2015) found that, after surveys were collected, all students preferred the surface learning style regardless of their degree pathway. They also preferred to be taught in a manner that prepared them for exam requirements which isn't considered beneficial since it means students simply memorize content without being able to fully apply it. Q11 implies most students attend all lectures for the class. A strong agreement value was also prominent in Q14 which may indicate many students found practice exams and questions to be very helpful, likely because they were most reflective of what they would face on the real exam. The importance of deeper study habits is further exemplified by Walck-Shannon et al., (2021) where after surveying techniques used by students, almost all of the students said they read notes. The next most prominent strategies were active and included doing problem sets and old exams, self-quizzing, synthesizing notes, explaining concepts, and making diagrams. Office hours, extra help and review sessions were less frequent. Even if more studying was done at surface level, less often deep level studying was still more effective (Ye et al. 2016). This shows how active techniques which were deeper learning strategies, yielded more learning as students performed better on exams. Q15 implies that students prefer studying alone. This may be due to personal preferences or their course environments not being idea of group studying. The neutral values imply that students have no strong feelings on the matter being addressed or there was an even split amongst students on agreement and disagreement regarding the matter.

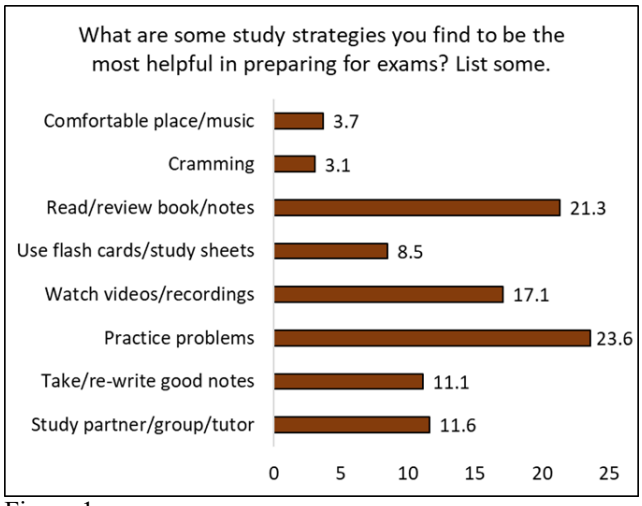

Figure 1
A bar chart of a compilation of percentages of students' perceptions of helpful studying strategies when learning for science courses.

Looking at Figure 1, practice problems (23.6%) are most popular while reading or reviewing the book and notes for the class (21.3%) are in a close second position. Note-taking have been found to improve students' memory of the subject matter, increase students' understanding of the content, aide in preparation for examinations, and improve their overall grades (Salame et al., 2024). The third most popular was watching videos or recordings (17.1%). Using flashcards and study sheets (8.5%) wasn't the least popular, but was not found to be as helpful as taking or rewriting good notes (11.1%) or studying with a partner, group, or tutor (11.6%). The least popular study strategies were cramming (3.1%), and having a comfortable place to study or listening to music (3.7%).

These results are similar to findings by Walck-Shannon et al. (2021) where after surveying techniques used by students, almost all of the students said they read notes. The next most prominent strategies were active and included doing problem sets and old exams, self-quizzing, synthesizing notes, explaining concepts, and making diagrams. The low popularity of cramming on the survey likely indicates students are aware of the lack of benefits from compulsively studying at the last minute as previous studies have indicated (Blumner & Richards, 1997). Other have found similar results with higher GPA students planning their study schedules more often and studying anything planned, instead of whatever was urgently due or past due (Geller et al., 2017).

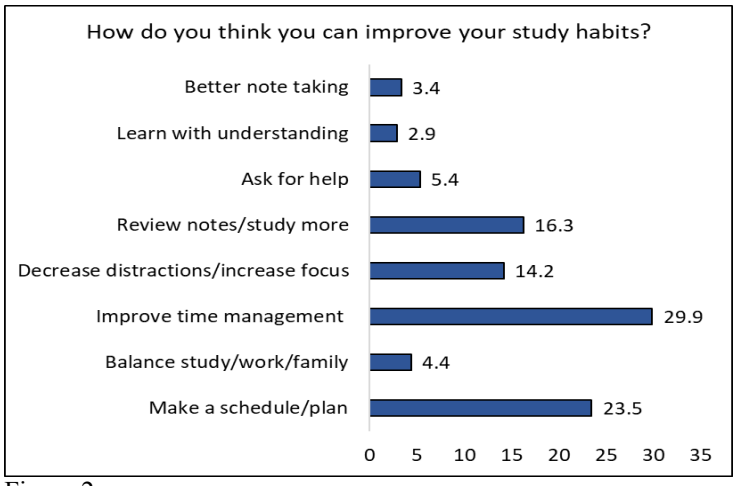

Figure 2
A bar chart of a compilation of percentages of students' perceptions of ways to improving study habits

Of the responses in Figure 2, improving time management (29.9%) was the primary strategy listed. Research reports show that responsible students who better plan their time and track their progress procrastinate less which translates to improved time management can lead to success (Nieto-Fernández et al, 2024). The second most popular was making a schedule or plan (23.5%). Reviewing notes and studying more (16.3%), and decreasing distraction and increasing focus (14.2) were in the middle in terms of popularity. Least popular were asking for help (5.4%), balancing study, work, and family (4.4%), taking better notes (3.4%), and learning with understanding (2.9%).

Student opinions on potential effective study habits agree somewhat with previous research which has good time management to be an effective strategy and this was the most popular improvement listed by students in this study. Good note-taking was also mentioned as being an effective and important habit, but this was less popular among the students surveyed here (Atsuwe & Moses, 2017; Çakıroğlu, 2014; Garner-O'Neale & Harrison, 2013). In one study, researchers found a correlation between note-taking and learning and performance (Salame & Thompson, 2020). Though it seems deeper strategies are better than surface level strategies, studies such as Ye et al. (2015) have also shown simply going beyond the mandatory course work can be important in learning too. The study also found that students using mandatory course work as their main method of studying performed similarly to students who didn't report studying at all, while students who studied beyond the mandatory course work performed better. Similar results were found in Turner (2016) with students simply studying with the PowerPoint lectures having poor calibrations when judging exam performance.

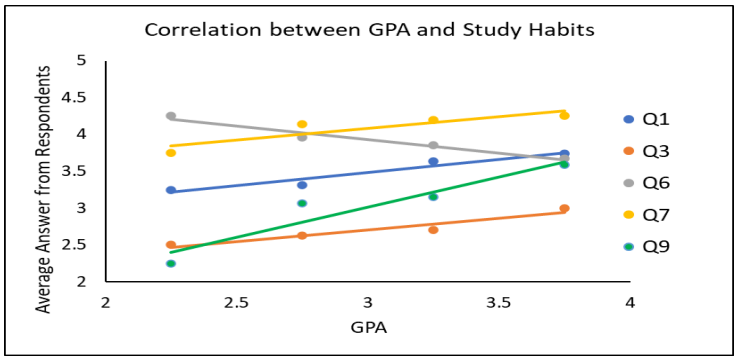

Figure 3
Correlation between GPA and Study Habits A line chart representing the relationship between GPA and study habits matched with the Likert-types questions and their numbers

When observing the trends between GPA and studying habits the slopes of the graphs, in Figure 3, for Q1, Q3, and Q7 indicated that generally as student reported GPAs increased, their responses agree more with the prompts for these questions. This indicates a positive correlation between students reported GPAs and trying to fully understand the theory behind material taught, reviewing their notes and the material taught after each lecture, and studying using sources outside of those provided in class or on Blackboard. Continuing to look at Figure 3, a similar trend with an even greater slope could be seen in Q9 where increasing reported GPAs had a correlation with agreeing with the idea of planning their study sessions. Meanwhile the opposite trend could be seen in Q6 where students less often reported getting distracted while studying as their reported GPA increased.

Liao et al. (2019) found similar results, as the current results for Q1, with higher performing students aiming to learn concepts fully while lower performing students learned the minimum. Other studies addressed specific study habits and their degrees of effectiveness in learning. Çakıroğlu (2014) found the study habits of reading and note-taking, planning of subjects, and general habits and attitudes improved, the average score increased for all students. Rossum and Schenk (1984) found that students who tried to understand the material scored better on questions requiring insight as compared to students who just tried to memory the content and this is supported by the current study as well, since the increasing agreement with students trying to fully understand the theory as their GPAs increased, likely indicates they were performing better on the questions requiring a deeper understanding as well. These findings from Q7 align with those of Ye et al. (2015) which found that students using mandatory course work as their main method of studying performed similarly to students who didn't report studying at all, while students who studied beyond the mandatory course work performed better. In our case students with higher GPAs reported more usage of outside resources. The results from Q9 are consistent with past findings that observed students with higher GPAs were less likely to cram study and more likely to plan their study schedules ahead of time. (Atsuwe & Moses, 2017; Geller et al., 2017; Hartwig and

Dunlosky, 2012). The decreases in distraction as GPA increased is consistent with previous research that has found that higher achieving students and students that scored higher on exams reported being less distracted (Blumner & Richards, 1997; Walck-Shannon et al., 2021).

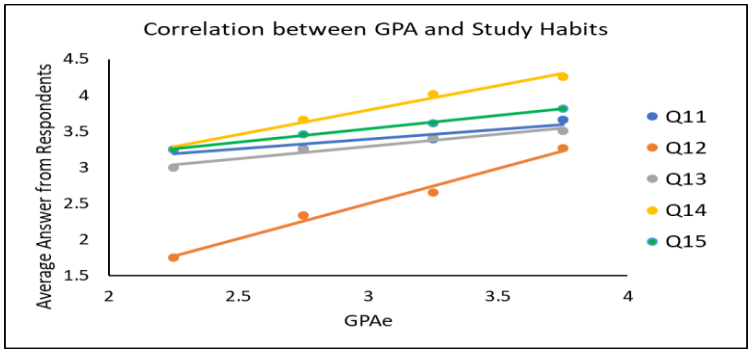

Figure 4
Correlation between GPA and Study Habits A line chart representing the relationship between GPA and study habits matched with the Likert-types questions and their numbers

This positive correlation was also present in Figure 4 between student agreement with the statement and GPA for Q11 through Q15. In Q11, students were more likely to agree that they attend all lectures for the class as reported GPA increased, but the agreement range stayed around the value for neutral to halfway between neutral and agreement the entire time. Q12 had the greatest slope with students shifting from disagreeing that they feel they have good study habits to feeling neutral as the reported GPA increased. Very similar agreement values and slopes as Q11 could be seen for Q13 and Q15, which asked students if they found the material being taught to be interesting and if they preferred studying alone, with a higher maximum agreement level for Q15 topping out with more of a bias toward agreement instead of neutral. Q14 had a large range of responses too with a shift from slightly above neutral at the lowest reported GPAs to slightly above agreement at the highest reported GPAs when rating if students used practice exams or practice questions to study for an exam.

The results in Q14 were backed by previous research as well. Studies have presented the benefits of using practice exams with students being able to score better on exams and predict their exam grades more accurately, likely because practice exams and questions are considered active study strategies and likely led to deeper understanding of the material (Brown et al., 2014; Walck-Shannon et al., 2021).

The correlation between GPA and agreement with feeling as though one has good study habits also presented a high slope, but the range ran from disagreement to neutral with higher GPA students feeling neutral. This may indicate lower GPA students are aware their study habits are ineffective, but higher GPA students don't necessarily feel their habits are strong so awareness of study habit ineffectiveness may be a predictor of bad learning outcomes. Higher GPA students reported greater agreement with using practice

questions as well, which should be the case as these were deemed as a deep learning strategy due to the critical thinking required to answer the questions, so use of practice questions may also be a predictor of good learning outcomes. In one research study, the research team reports that students' self-regulation skills causes and improvement in learning strategy (Listiana et al., 2020).

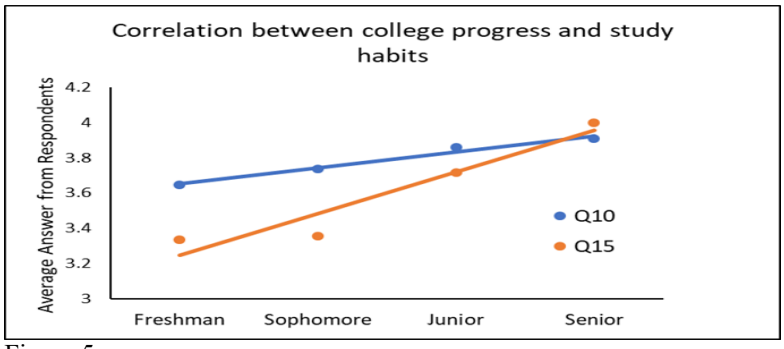

Figure 5
A line chart representing the relationship between college progress and study habits matched with the Likert-types questions and their numbers

Positive correlations were also present, in Figure 5, between college progress and study habits. As students progressed more in college from freshman to senior, for Q10 they shifted from slightly above halfway between neutral and agreement to a greater bias toward agreement when it came to if they cram study before exams. Q15 had a greater slope and range of responses with freshman responding to slightly above neutral, but seniors responding with agreement to having a preference of studying alone as opposed to a group. This may be explained by time limitations as older students may be engaged in more upper-level classes, jobs or other extracurricular activities requiring more time from their schedules and therefore less time to study for classes. This may also be why they are more isolated, as it is easier for them to study alone instead of trying to coordinate a group study session.

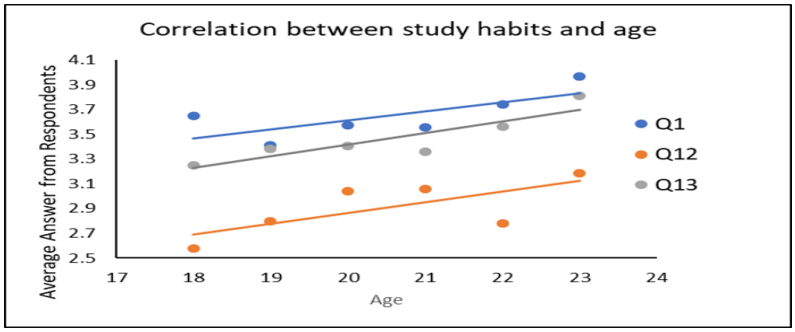

Figure 6
A line chart representing the relationship between students' age and study habits matched with the Likert-types questions and their numbers

Similar positive correlations patterns could be seen amongst responses on study habits and age of students in Figure 6. The slopes for Q1, Q12, and Q13 were very similar but the responses they covered differed. In Q1, students on average shifted from the midpoint between neutral and agreement to just below agreement, as age increased from 18 to 23, when asked if they try to fully understand the theory behind material taught. For Q12 as student ages increased from 18 to 23, they shifted from slightly below neutral to neutral feelings towards whether they have good study habits. Q13 involved a shift from slightly above neutral to slightly above the midpoint between neutral and agreement, across the same age range, when answering if they found the material being taught to be interesting. These changes may have been due to students getting more comfortable with their study habits as their college experience increased, which may have led to greater curiosity and interest in understanding the material being taught in their classes. Following a specific major may have also increased their interest in the subject as they kept studying it and were able to take more specific higher-level classes, they were able to choose instead of the more general required classes for their majors.

CONCLUSIONS

Ultimately, though we cannot assume certain study habits cause specific learning outcomes, some correlations have been highlighted by the data. Students most reported practice problems and reviewing their notes as the most helpful exam preparation strategies. Meanwhile, least popular was cramming, indicating students may be aware of the implications of cramming. Students also reported most often that they could improve time management and make a schedule for studying when asked how they can improve their study habits which could indicate students are aware of the benefits of taking the time to study via effective manners but fail to allocate time and plan properly to execute such strategies. The correlations with the greatest slopes indicated focus during studying and planning study sessions as being the most important predictors of good learning outcomes. Higher GPA students reported getting distracted less while studying compared to lower GPA students which could indicate focus as being crucial to good learning outcomes. The highest positive slope in correlation was present for planning study sessions indicating that the planning of study sessions may also be a prominent predictor of good learning outcomes.

There appears to be a preference in study habits based on college progress as well, with senior students preferring to study alone to a much greater degree as compared to freshman and sophomores and juniors falling somewhere in between, but our data doesn't show major differences in GPA based on preferring to study alone. Age seems to be another factor affecting the study habit choices since as age increased students agreed more with trying to understand the theory behind the material, having good study habits and feeling the material was interesting.

This study is limited as it relies on self-reported data, so it is only as accurate as the data reported from students. Similarly, many other factors could not be addressed or controlled by the study since it relies on a survey so there is the possibility of other factors like socioeconomic status playing a role in the learning outcomes of the students surveyed. Similarly, learning outcome data must be assumed from GPA in this study, but it is not the best method of determining learning outcomes as its possible for

students to not have learned much and simply memorized the information short term to perform well on exams. Future studies could aim to address these factors by potentially grouping similar students and having them practice specific study habits to observe their effects on exam score outcomes to determine what are the best predictors in terms of study habits. The current study's data could be used to determine what predictors to address as focus levels, study planning, personal feelings on study habits, and practice question use were the most prominent ones from this study.

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