# Meta-Talks: How a Supplemental Instructor Fosters Student Reflection through Everyday Data

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**Author Note**

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**Abstract**

We do not learn through experiences alone; we learn by thinking about our experiences. But after disappointing exam results, students can reflect on their performance in unproductive ways, circulating scripted beliefs about why they did poorly: "The professor talks too fast," "The test didn't cover the lectures in class," "I'm not smart enough." At Quinnipiac University, a supplemental instructor used accessible data to guide her first-year Biology students through a process of compelling metacognitive reflection after their tests so that the students could be less reactionary and more proactive in facing subsequent exams. This qualitative case study examines theory and practice regarding this step-by-step method, which can be

readily implemented in a variety of college-level programs invested in academic success.

## Meta-Talks: How a Supplemental Instructor Fosters Student Reflection through Everyday Data

In 1910, educational theorist and philosopher John Dewey stated that we often say we *think* something when we merely *believe* it. Dewey distinguished between beliefs with no evidence or testimony to support them and "reflective thought," which he defined as a deliberate examination of the basis or evidence of a belief, a "conscious inquiry into [its] nature, conditions, and bearings" (Dewey, 1910, p. 2). Dewey dedicated his seminal volume on education, *How We Think*, to this process of reflection. Of reflective thought, he wrote, "It alone is truly educative in value" (Dewey, 1910, p. 2).

This case study examines the process by which a supplemental instructor, Erin Nash, guided her first-year biology students at Quinnipiac University through a process of reflection so that they could respond to their test grades with more productive behaviors, not merely react to them with disappointment based on unexamined beliefs about their learning, a response contrary to Dewey's vision of a full education. Seeing reflection as a process that makes "meaning of experience" (Bringle & Hatcher, 1999, p. 179), we could say that Nash's exercises in reflection helped her students create meaning from their test performance so that they could make productive decisions regarding studying and feel more control over the outcome of subsequent tests. Nash's reflection process mainly employed metacognition, or the monitoring, assessment, and evaluation of one's understanding to effectively control behaviors related to learning (Rhodes, 2019). Interestingly, experiences in metacognition require that students serve both as subjects conducting an inquiry and the objects of that inquiry, and this process requires that students think at multiple levels; for instance, considering not only the content of a test but their study behaviors, which manage that content with differing degrees of responsibility and efficiency (Rhodes, 2019).

A central tenet of the International Center for Supplemental Instruction at the University of Missouri, Kansas City, which provides the model for our supplemental instruction program at Quinnipiac University, is that supplemental instructors, or SI's, are peers to the students they assist (International Center for Supplemental Instruction, 2014). SI's effectively remember what it was like to be challenged in a course because they have taken the target class in a prior semester—recent history for most undergraduate mentors. Consistent with the International Center for Supplemental Instruction's model, the SI's at Quinnipiac University, known as "peer fellows," have earned top grades in the courses they support (International Center for Supplemental Instruction, 2014). Following that model, peer fellows each attend their target class once more with its current students. They take notes so that they can help students reinforce the most relevant concepts for group study sessions that take place voluntarily at least once each week. In their study sessions, which are open to all students in the supported course, peer fellows employ a collaborative model of learning in which students are expected to participate by offering questions, solving problems, and sharing their understanding of concepts with their peers (International Center for Supplemental Instruction, 2014). This collaborative setting offers an opportunity for students who may have passively received content in course lectures to translate that content into simpler terms, internalize it in memory, and apply it to real-life situations, thereby solidifying their understanding. Mastering a difficult gateway course for majors in a recent semester, attending the target course again and taking notes with its current students, and employing pedagogy consistent with the International Center for Supplemental Instruction's collaborative model all place peer fellows in a unique position to guide reflection for the students they mentor.

## Background

Begun at the University of Missouri, Kansas City, in 1973 by Deanna Martin, supplemental instruction has a long record of demonstrated effectiveness in student participants' academic performance, especially when students attend SI study sessions regularly (Arendale, 1997; Kochenour et al., 1997; McGuire,

2006). Courses supported by supplemental instructors tend to be challenging, "high-risk" courses in those subjects in which there is a history of 30 percent or more students in the course receiving D's, F's or withdrawals (Congos & Schoeps, 1998, p. 49). Researchers in the practice of supplemental instruction have found that students who attend SI sessions regularly earn stronger mean final course grades and are retained at higher rates than those who do not attend, even when accounting for self-selection bias, or the tendency of higher-performing students to seek extra opportunities for learning (Hurley, Jacobs, & Gilbert, 2006; Congos & Schoeps, 1998, pp. 55-56).

For many students, threats to learning extend beyond cognitive difficulties. Anxiety and other mental health concerns in college students have posed a growing challenge nationwide in recent years (DeAngelis, 2019). In 2017, the American Psychological Association published statistics on the percentages of students entering college with significant mental health concerns. In that year, 36% of college students had lifetime diagnoses of mental health conditions, as opposed to two percent in 2007 (DeAngelis, 2019). Within those ten years, the number of students who received any mental health treatment rose from 19% to 34% (DeAngelis, 2019). These challenges, in addition to providing appropriate accommodations for students with disabilities and serving the general population, charge college and university learning centers with the monumental task of promoting student success across ever-widening populations.

Quinnipiac University is a private institution in Hamden, Connecticut, with 6,845 enrolled undergraduate and 2,863 graduate students. It should be noted that the Quinnipiac University Learning Commons robustly supports thousands of students in both the general population and in the cohort of students who have disclosed disabilities to its Office of Student Accessibility staff. For instance, the Peer Fellow Program, in which students voluntarily attend group supplemental instruction sessions that take place each week, served 1,432 distinct students who made 7,091 individual contacts with their supplemental instructors or peer fellows, through the fall 2019 semester, an average of 4.95 study sessions per undergraduate

student. Students who attend the Peer Fellow Program come from a wide variety of backgrounds across the university undergraduate population, which has seen an increase in student diversity in recent semesters. Twenty percent of undergraduates in the class of 2021 identify as first-generation students (Quinnipiac University, 2020). Twenty-one percent of individuals in Quinnipiac University's current first-year class self-identify as students of color (Quinnipiac University, 2020).

The 50 peer fellows at Quinnipiac University support mostly first-year students and sophomores across all levels of ability through their academic challenges and guide them in alleviating academic stressors. The peer fellows are hired by the Learning Commons to support twelve undergraduate programs, including Accounting, Biology, Biomedical Sciences, Chemistry, Mathematics, and Engineering. In two Sunday seminars and bi-weekly small-group appointments that occur throughout each semester, peer fellows undergo training in best practices and metacognition. A trouble-shooting component is woven into training throughout the semester so that peer fellows are well-equipped to handle the "what if" scenarios that inevitably arise in supporting a wide array of students.

Peer fellows must address students' mounting anxiety based on untested beliefs and assumptions about their level of knowledge and how understanding is achieved. Consistent with the "entity learners" developmental psychologist Carol Dweck (2006) discusses throughout *Mindset: A New Psychology of Success*, students may believe that they were not born with the necessary "gift" to excel in a particular course and that their grades are beyond their control. If a grade is poor, a student may conclude, "I can't do this. I'm not a math (or Biology or Chemistry) person," as if ability in a subject is an inherited or inborn entity that one either has or does not have (Dweck, 2006). When that assumption is collective, it may become a powerful shared belief among students, a dynamic that recalls Dewey's (1910) caution against taking more stock in beliefs than we should. In their training, peer fellows are equipped to acknowledge students' negative emotions with compassion, relate to their struggles, and reassure students (based on peer fellows' own experiences of struggle) that their choices can result in a more

successful outcome for the next test.

During her study sessions when students have reacted strongly to disappointing grades, Nash has often cited her initial difficulties with the content. "In fact," said Nash, a junior Physical Therapy major, "when I took BIO 101 my freshman year, I definitely had my own challenges. I remember struggling to learn the steps of photosynthesis, glycolysis, and the Krebs cycle. When I used that experience a number of times to help my students, it appeared to put them at ease a bit, knowing that they were not struggling alone." This compassionate approach, with a peer fellow relating to student struggle, is consistent with what Dweck (2006) called a "growth mindset," the belief that ability can grow with practice and effective strategy, undergirded by strong encouragement.

## Peer Fellow Training

Cognitive psychologists Ryan and Deci (2000) noted that intrinsic motivation is predicated on emotions of belonging and connection that are not only experienced in infancy, as when a child's attachment to parents is crucial, but in varying settings throughout a subject's lifetime (pp. 70-71). Intrinsic motivation, the drive to accomplish a task that originates within a person regardless of tangible reward, is "more likely to flourish in contexts characterized by a sense of security and relatedness" (Ryan and Deci, 2000, p. 71). Peer fellow training recognizes that learning is not merely about cognition, but about emotion. The belonging and connection that students feel in the group study session is a powerful antidote to the growing fear (and in some cases, panic) that has characterized students' transition to college in recent years (Cox 2009, pp. 20-21).

To channel Dewey, while deliberately examining the basis or evidence of fear-inducing beliefs that result in negative emotion ("I'm stupid"; "this course is too hard for me"), peer fellows like Nash are trained to summon empathy. They foster relatedness in study sessions by recalling their own mistakes and by modeling specific study strategies that work more efficiently than the shallow methods students have often employed before these conversations took place. Peer fellows are trained to continually monitor the affect, or emotional atmosphere, of their study sessions to redirect students

when necessary and create the optimum space for learning.

The emotional monitoring that peer fellows are trained to employ calls to attention the power of cognitive biases of which students may have initially been unaware. Monitoring cognitive bias is an important step in metacognition, as unconscious biases are heuristics, or mental shortcuts, that can distort students' views of their performance (Dwyer, 2018). For instance, consistent with a self-serving bias, a student may reason that she failed a test because the teacher hates her, but when she does better, her higher grade is due to her competence (Dwyer, 2018). In another instance, a student may fall into confirmation bias, which entails gathering only that evidence that reinforces his untested beliefs. The student may claim, "He's too difficult to understand and everyone agrees with me," when he has discussed his teacher with only three of his closest friends who happen to agree with him. A student may also claim, "She [the professor] doesn't teach, care, or want us to pass, so I'm not going to," leading to increased perceived difficulty and often a self-fulfilling prophecy.

Regardless of the irrationality of students' conclusions, peer fellows acknowledge that such mental shortcuts arise in stressful environments where grades and self-esteem are at stake, and they redirect fearful and unproductive conversations. Peer fellows are trained in key principles that characterize productive reflection: approaching students as equals free of judgment, revisiting mistakes that are very likely based on shallow study strategies, discussing more effective learning methods to achieve deeper understanding, and illuminating cognitive biases—all with student well-being as a goal.

**Data-Gathering**

Student well-being is also at the center of data collection in the Peer Fellow Program. Though many colleges and universities use data analytics effectively to identify at-risk students and offer appropriate supports (Kirp, 219),"Big Data" (Selingo 2017) is likely more often used for advertising purposes, such as purchasing names of high school sophomores and juniors from the ACT and College Board, consistent with the data mining of aggressive consumer marketers (Selingo, 2017). In contrast, much of the information-

gathering in the Peer Fellow Program is deliberately contained and student-centered, serving students on a small scale within specific courses. For instance, over three semesters, Nash and her colleague, peer fellow Olivia Rua, conducted surveys regarding students' approaches to test preparation in the BIO 101 course sections that they supported. Nash revealed the anonymous results to the students within each section in such a way that students could see the daily study strategies they chose, from attending class to taking notes through specific methods. They could then compare the strategies A students consistently chose versus those chosen by the group with lower grades. We call the information gathered this way "everyday data," because not only is the data informal and contained within relatively small classroom groups; it also centers around daily choices the students made leading up to their exams. Without revealing the identities of the students behind the data points, students could use the results of the surveys to interpret which choices were effective and which were ineffective. In this way, the data itself "spoke" to the group without the students having to confess any bad habits. Nash guided metacognitive reflections based on this everyday data and ultimately helped students recognize the study approaches that worked best.

## Method

With the assistance of peer fellow Olivia Rua, Nash approached first-year students across the various sections of their supported professor's fall BIO 101 and spring BIO 102 classes with a qualitative survey tool that Nash created and distributed via Google Forms (see Appendix A for a step-by-step instruction guide for using Google Forms this way.) Nash and Rua surveyed these groups of students across three semesters: 25 of 69 BIO 101 students completed surveys in fall 2018, and 49 of 99 BIO 102 students completed surveys in spring 2019. 57 of 93 students completed the surveys in fall 2019. The survey was run twice in fall of 2019 (in BIO 101) to create extra opportunities for metacognitive conversations. It should be noted that though each class had a different group of students, 54 of the 139 students (39 %) who took BIO 101 in fall 2019 returned to the same professor in BIO 102, affording these

students extra opportunities to reflect on any changes they may have made in their study methods.

After exam grades were made available to students, students received a link to the Google Forms survey to reflect upon the recent exam, their preparation, their grades, and habitual practices both within and outside the classroom. The survey asked students to reflect on eight general topics, such as habits they engaged in regularly as they related to academics and studying, methods of taking notes during lecture, the content of notes taken during a lecture, and the level of satisfaction with their score on the most recent exam (see Appendix B). Based on her experience observing students and her recent memory as a BIO 101-102 student herself, Nash offered more specific study strategies within Survey Question No. 6 which students could choose, as well as opportunities to write in their habits if these options did not reflect an approach they regularly employed (see Appendix C). To prevent skewed results, Nash and Rua maintained students' anonymity throughout all phases of survey distribution and data analysis. When they discussed the overall data with students, Nash and Rua did not require or encourage any student to identify themselves with their specific answer. Conversations regarding data remained around general trends and patterns as opposed to singling out specific respondents.

Nash created graphs of the data that specifically depicted the study habits employed by her students. Habits utilized by students reporting an A in the course at the time of the survey distribution were extracted and examined separately (see Appendix D, Figures 1 through 4). These graphical representations were reported back to the students on a brief document containing each graph that Nash posted on the course's online homepage to ensure it was accessible to all registered members of the class. Further conversations regarding observed trends were conducted in peer fellow study sessions regarding what the data meant to students and how they could use it to reflect on their habits and consider making changes. This means of reflection provided an opportunity for students not just to engage in metacognition individually, but also collectively as a group in SI sessions that took place outside of class. The central point of the surveys was not to quantify changes in study habits across semesters

and varying cohorts of students but to allow the student-generated anonymous data to "talk" among peers about which study methods were consistently the most effective when examined across three semesters.

## Results

It can be helpful for students to reflect on their studying by seeing what successful peers within their class are doing. Yet more convincing evidence in the effectiveness of strategies is found by comparing survey results from 4 distributions to create a more generalized overview of habits that work for students. Students need to see the habits most often utilized by students reporting an A that appear across each survey collection gathered four times through three semesters: fall 2018, spring 2019 (see Table 1), and fall 2019 (see Table 2).

*Table 1. Most Commonly Occurring Study Habits Among Students Reporting an A and A-, 2018-2019 Academic Year*

| FALL 2018 BIO101: Exam Two OCTOBER 2018* *n=17* | | SPRING 2019 BIO102: Exam Two MARCH 2019 *n=42* | |
|---|---|---|---|
| 5. Come to every class | 96% | 5. Come to every class | 98% |
| 13. Take breaks while studying | 96% | 13. Take breaks while studying | 80% |
| 8. Study alone primarily | 92% | 19. Study in a quiet environment | 78% |
| 19. Study in a quiet environment | 92% | 8. Study alone primarily | 71% |
| 14. Complete online practice exams | 80% | 26. Get a decent amount of sleep | 63% |
| 7. Attend peer fellow [SI] sessions | 72% | 7. Attend SI leader [Peer Fellow] sessions | 61% |
| 22. Exercise regularly | 64% | 16. Look through the study materials posted on Blackboard, if provided | 57% |

*Table 2. Most Commonly Occurring Study Habits Among Students Reporting an A and A- between Exam Two and Exam Four, Fall 2019*

| FALL 2019 BIO101: Exam Two OCTOBER 2019 *n=31* | | FALL 2019 BIO101: Exam Four NOVEMBER 2019 *n=32* | |
|---|---|---|---|
| 5. Come to every class | 97% | 5. Come to every class | 75% |
| 14. Look at or complete practice exams on Mastering Bio | 84% | 8. Study alone primarily | 75% |
| 8. Study alone primarily | 77% | 13. Take breaks while studying | 75% |
| Take breaks while studying | 74% | 14. Look at or complete practice exams on Mastering Bio | 69% |
| 7. Attend Peer Fellow [SI leader] sessions | 71% | 19. Study in a quiet environment | 59% |
| 19. Study in a quiet environment | 65% | 10. Create or complete my own diagrams for complicated processes | 53% |
| 26. Get a decent amount of sleep | 61% | 7. Attend Peer Fellow [SI leader] sessions | 50% |

Patterns emerged from this data that allowed Nash to discuss with her peer learners the common habits of BIO 101 and 102 students by grades earned. Students earning B+ and below could compare the graph of their habits to the approaches of those earning A's. These common approaches by grade are illustrated in Appendix E, Figures 1 and 2. Because of the variance among bar graphs in each set, the data is not presented in descending order.

The two groups of students completing the survey, those earning an A or A- and those with a B+ or below, chose unpredictably similar study methods. Seven of thirty habits topped the list as the most frequent approaches the students chose (see Appendices F and G). Within these seven habits, however, the data shows subtle differences. Students who earned B+ and below appeared to lean on breaks 92% of the time, while the cohort earning A's appeared to lean on breaks 81% of the time. (the percentage of students relying on breaks in this group dipped below 75% for two tests in fall of 2019).

While both groups acknowledged the importance of attending SI (peer fellow) study sessions, fewer than 50% of students earning B+ and below reported that they attended peer fellow sessions before the November 2019 exam. In contrast, from fall 2018 through fall 2019, an average of 64% of the A students reported that they attended study sessions as a learning strategy. Though 50% or more of the A students reported getting a decent amount of sleep as a study strategy across the three semesters, fewer B+ students (30% to 40% ) reported that attention to sleep was a study strategy in fall 2019.

Importantly, one of the eight anonymous questions concerned how far in advance of an exam students chose to study (see Appendix H, Figures 1 and 2). Students earning A-range grades tended to begin studying a few days before the exam and were less likely to study the night before or the day of the exam. Though there was a concentration of students earning a B+ or below studying a few days before the exam during the fall semesters, more of these students studied the day of or the night before their exams.

## Discussion

In their study sessions, Supplemental Instructors do not merely repeat the content provided by the professor in class. They combine discussions regarding content with ways to study it (International Center for Supplemental Instruction, 2014, p. 10). Survey results from Nash's three semesters allowed for metacognitive reflections about the specific habits that were consistent in students reporting an average in the A range. The habits were discussed in combination; particularly, the tendency for A students to combine their study approaches with the habit of studying a few days before their biology exams.

As conversations developed within the group during peer fellow sessions, individual students began to share how they were newly combining various study habits (such as attending peer fellow sessions and completing practice exams) to find the best fit. Not every student who engaged in these conversations made changes to their study habits as a result of these conversations, but students commented on how seeing how their high-achieving peers studied made them feel more confident in their habits, particularly when the student's habits matched the A students' habits. Students also had a chance to modify habits that might work when appropriate limits are observed. For instance, breaks are indeed necessary for mental rejuvenation, as they "increase productivity, replenish attention, solidify memories and encourage creativity" (Jabr, 2013). But the trick is to return to studying after sufficient downtime. As a result of analyzing the survey data, Nash could now see the need to advise students to take a short break of 5-15 minutes after every hour of studying and a longer break of 30 minutes or so after two hours of studying, but always with the aim of returning to the task punctually (Jabr, 2013).

At the end of each semester, students were given another survey to evaluate their experience in the peer fellow program in BIO 101 or 102. Two of these questions are directly relevant to the metacognitive conversations Nash conducted with her students: "The peer fellow helps me determine the causes of my difficulty"; and "The peer fellow provides study strategies that have helped me build my confidence level in the course." The wording of the

two questions deliberately implies that students participate in their learning, a principle central to supplemental instruction (International Center for Supplemental Instruction, 2014, pp. 10, 18-19, 36-40). Calculating averages through fall 2018, spring 2019, and fall 2019, we found that 86% of the students who answered the question, "the peer fellow helps me to determine the causes of my difficulty" across three semesters either strongly agreed (an average of 19 students in a group of 26 participants in peer fellow study sessions) or agreed (an average of 3.3 students per class out of a group of 26) that the peer fellow did indeed help the students determine the causes of their difficulties, one of the central aims of Nash's metacognitive talks about study skills with her students throughout the three semesters.

Regarding the question, "The peer fellow provides study strategies that have helped me build my confidence level in the course," we found that 90% of the students who answered that question across three semesters either strongly agreed ( an average of 19 students in a group of 26 participants in study sessions) or agreed (an average of 4.3 participants in study sessions) that this dynamic was in place. One of the student evaluation comments sums up Nash's approach well: "Erin was an amazing peer fellow. Not only did she give great study habits in the study session, but she replied to emails quickly if I ever had any additional questions. Her study guides always helped me prepare for exams and made me feel confident during exams."

## Conclusion

The anonymous study skills survey allowed first-year biology students to reflect on their existing habits and to monitor their learning in terms of the methods that worked best for their peers earning A's, all in an environment free of judgment or authority. Educators have promoted peer learning because of its powerful influence as the "predominant socializing agent during the college years" (Ender & Newton, 2000, p. 34). College students, who may likely live away from home while they are in school, find in their peers a "major source for gratification and validation […] Because of the important reliance on peers during these formative years, peer educators can be particularly influential as models and mentors to

other students" (Ender & Newton, 2000, p. 34).

Nash's "meta-talks" allowed for thinking on a level beyond the course content (the Greek "meta" means "beyond"), so that students could gain self-awareness regarding their study approaches. Though Nash facilitated this metacognition, it originated with the students themselves, employing data easily accessed in a few minutes on any given day after a test. We encourage any interested educator at the college level to tailor this process of gathering "everyday data" to serve metacognition in their programs. (Appendix A provides steps for setting up Google Forms with students).

To refine this case study, we would consider having students consistently complete the surveys in class to collect a wider sample set, since some sections of the BIO 101 and BIO 102 completing their surveys outside class resulted in narrower samples. We would perhaps divide the graphs so that A and B students were together in one cohort, with C and below students in another. That way we could determine if there were stark differences in study habits between the two groups. To widen the support available to students, we would also report our findings to interested faculty, all the while maintaining student confidentiality.

Nash's meta-talks with her Biology students, based on the accessible data she collected in surveys that took only minutes for students to complete, revealed that study approaches such as attendance at peer fellow sessions and completion of practice exams need to be combined with appropriate timing—usually a few days but not more than a week before the exam. More importantly, based on survey results in which a majority of students confirmed that Nash's peer fellow sessions helped them determine the causes of their difficulty and provided them with study strategies that increased their confidence in the class, we can argue that the students were growing in agency as a result of the peer fellow sessions.

Social learning theorist Albert Bandura (2006) characterizes individuals he calls "agents of action" as "self-reflective" and "self-examining" (p. 165). But agents of action do not only reflect on their qualities and experiences; they make appropriate changes within themselves when their prior approaches have not worked: "Through functional self-awareness, they reflect on their efficacy, the soundness

of their thoughts and actions, and the meaning of their pursuits, and they make corrective adjustments if necessary" (p. 165). A change of approach as a result of reflecting on one's ineffective habits is a step added to Dewey's (1910) idea of a full education, in which reflective thought alone is "truly educative in value" (p. 2). Nash sought to lead her students through both steps—reflecting on learning experiences and then taking action by employing study habits in new combinations—so that students knew exactly how beneficial choices could determine their success.

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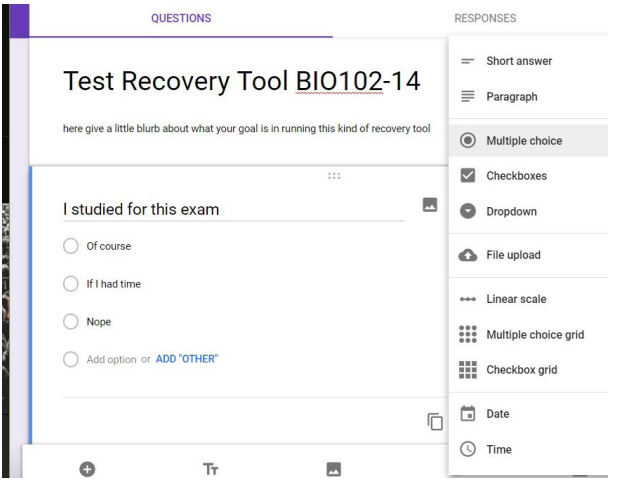
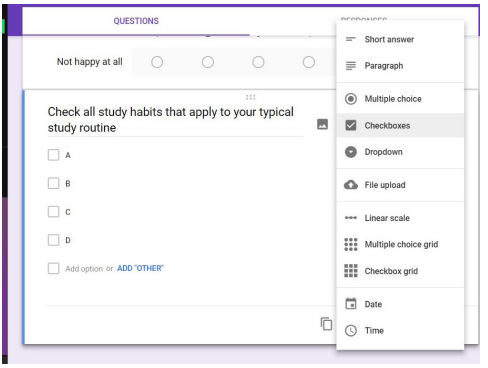
## Appendix A
## Instructions for Creating a Metacognitive Google Forms Survey

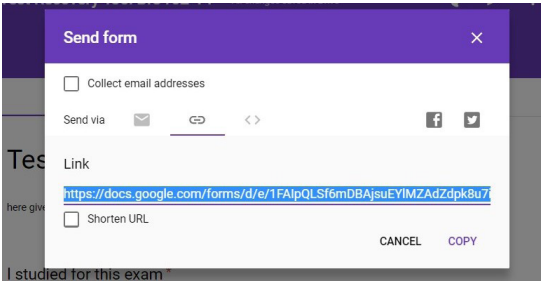
1. Open Google Forms.
2. Type in your first question.
3. Add in your options, pressing "enter" to add another option and choose the type of question.




4. Mark each question as "required."
5. To add the next question, click the plus circle.
6. For a scale question (ie rate from 1-5), choose "linear scale" and put in your scale and each end's definition.
7. For a "check all that apply" type question, choose "checkboxes". Click ADD "OTHER" to give an option for students to write in a response.



8. To send your survey to your students, click “send” in the top right of the page.
9. Click the link icon to generate a link to your survey so it can be completed by your students. This link can be copied here and then pasted into an email or Blackboard announcement (or equivalent) to send your students.




10. Once you begin getting responses from your students, you can see their responses as a whole by viewing from “summary” or you can see each individual response by viewing from “individual”. There will be a tally next to “Responses” of how many responses you have collected since the last refresh.
11. By exporting the raw data, you can generate a new chart displaying the results or use the one automatically generated by Google.
12. Once you are satisfied with how your chart looks, click to download the image you have created. It works to download it to your computer as either a .png or .pdf file, depending on how you want to share it with your students.

## Appendix B
## Questions Included in Nash's Surveys

1. I studied for this exam… For example, "yes," "no," "only if I had time."
2. Are you happy with your grade on this exam?
3. How far in advance did you start studying for the exam?
4. How did you take notes with respect to the content of your notes? For example, did you write down everything the professor said or just the points he stressed in class?
5. How did you format the structure of your notes? For example, did you write your notes by hand on paper?
6. Check all of the habits that typically applied to you and your studying routine.
7. My grade at this point in the semester is (*this is ANONYMOUS. No one will not be able to link your response with you as an individual).
8. Any other comments.

## Appendix C
## Specific Study Habit Choices Presented within the Surveys (Question No. Six, Appendix B)

Study in long marathon sessions.
2. Read over my notes within 2 days after class.
3. Study in groups primarily (outside of SI leader sessions).
4. Read the PowerPoint and/or chapter prior to coming to class.
5. Come to every class.
6. Check in with the professor when there are things I do not understand.
7. Attend SI leader sessions.
8. Study alone primarily.
9. Rewrite my notes in my notebook.
10. Create or complete my own diagrams for complicated processes.
11. Study in little bits every day.
12. Study alone and attend SI leader sessions.
13. Take breaks while studying.

14. Complete practice exams in online component of course.
15. Study while watching Netflix, playing video games, etc.
16. Look through the study materials posted on Blackboard, if provided.
17.Rarely sleep more than a few hours.
18. Use someone else's flashcards.
19. Study in a quiet environment.
20. Study in groups (outside of Peer Fellow sessions) and attend Peer Fellow sessions.
21. Eat healthy foods on some sort of schedule.
22. Exercise regularly.
23. Study in bed.
24. Regularly pull all-nighters.
25. Ask clarification questions.
26. Get a decent amount of sleep.
27. Make my own flashcards.
28. Study both alone and in groups (outside of Peer Fellow sessions).
29. For complicated processes, look at diagrams completed by someone else.
30. Watch YouTube videos to help me understand complicated processes.
31. I make my own flashcards on Quizlet.**
32. I make my own study guide.**
33. **Student write-in options.

## Appendix D
## Study Habits Students Reported at the Time of Each Survey Distribution (see Appendix C for a clear representation of the numbered Study Habit Choices)

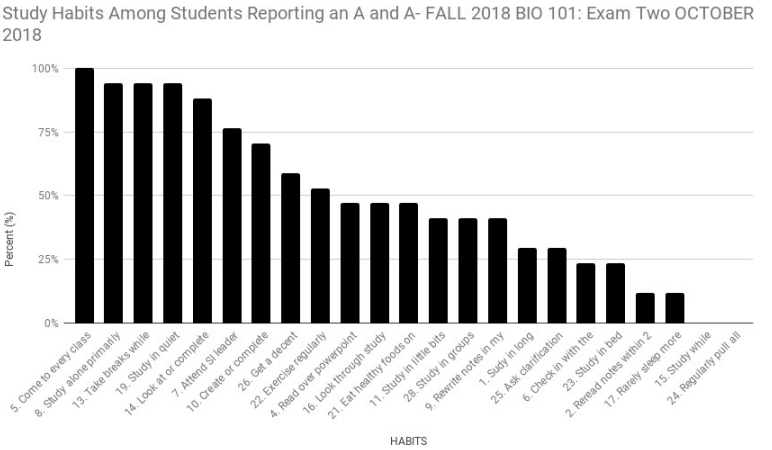



*Figure 1. Study habits among students reporting an A and A- Fall 2018 BIO 101: Exam Two October 2018*

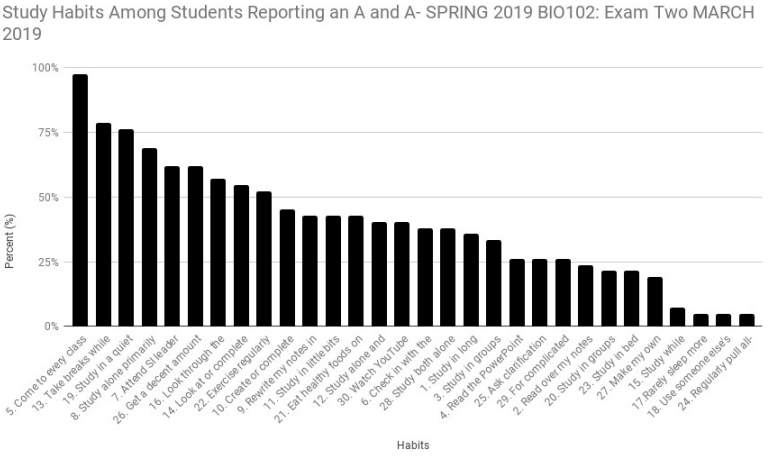



*Figure 2. Study habits among students reporting an A and A- Spring 2019 Exam Two March 2019*

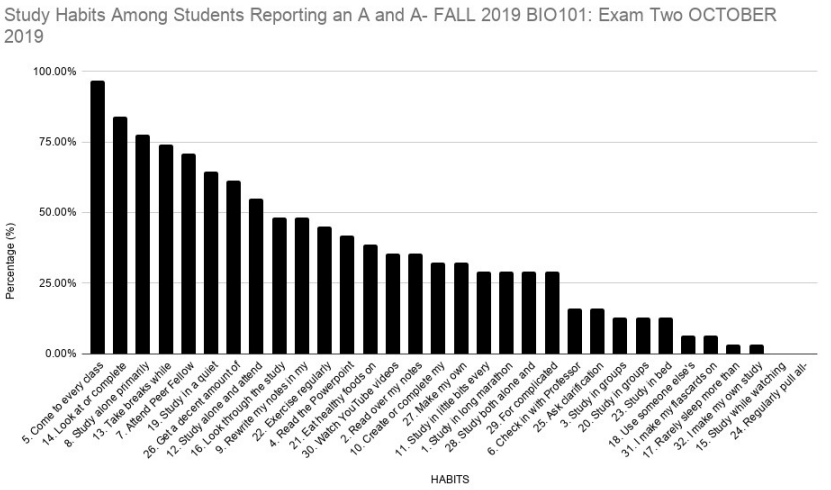



*Figure 3. Study habits among students reporting an A and A- Fall 2019 BIO 101 Exam Two October 2019*

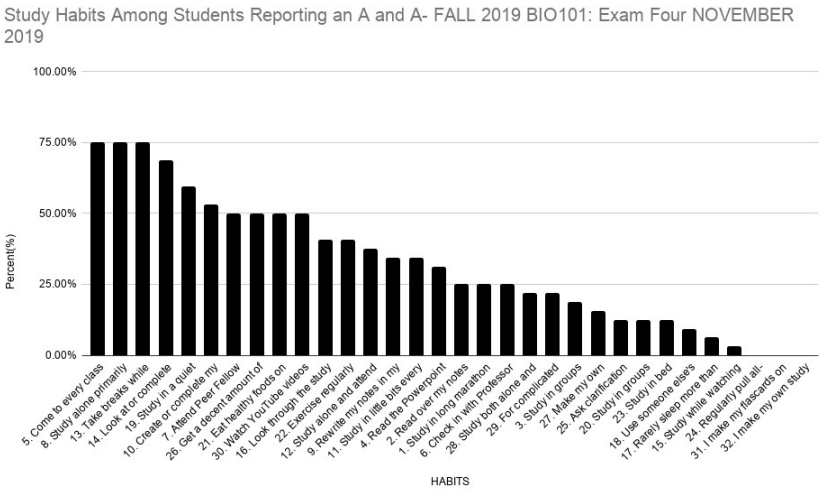



*Figure 4. Study habits among students reporting an A and A- Fall 2019 BIO 101: Exam Four November 2019*

# Appendix E
## Most Commonly Occuring Study Habits by Grade Group

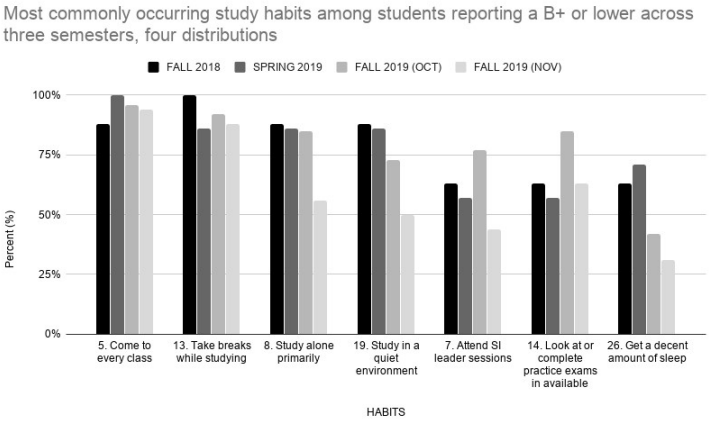



*Figure 1. Most commonly occurring study habits among students reporting a B+ or lower across three semesters, four distributions*

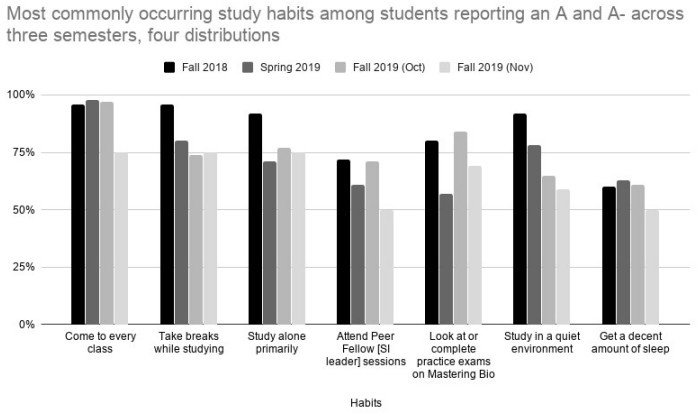



*Figure 2. Most commonly occurring study habits among students reporting an A or A- across three semesters, four distributions.*

## Appendix F
## Most commonly occurring study habits among students reporting B+ and below across three semesters, four distributions

Come to every class (95%)
Take breaks while studying (92%)
Study alone primarily (79%)
Attend Peer Fellow [SI leader] sessions (60%)
Look at or complete practice exams on Mastering Bio (67%)
Study in a quiet environment (74%)
Get a decent amount of sleep (52%)

## Appendix G
## Most commonly occurring study habits among students reporting an A or A- across three semesters, four distributions

Come to every class (92%)
Take breaks while studying (81%)
Study alone primarily (79%)
Attend Peer Fellow [SI leader] sessions (64%)
Look at or complete online practice exams on Mastering Bio (73%)
Study in a quiet environment (74%)
Get a decent amount of sleep (59%)

## Appendix H

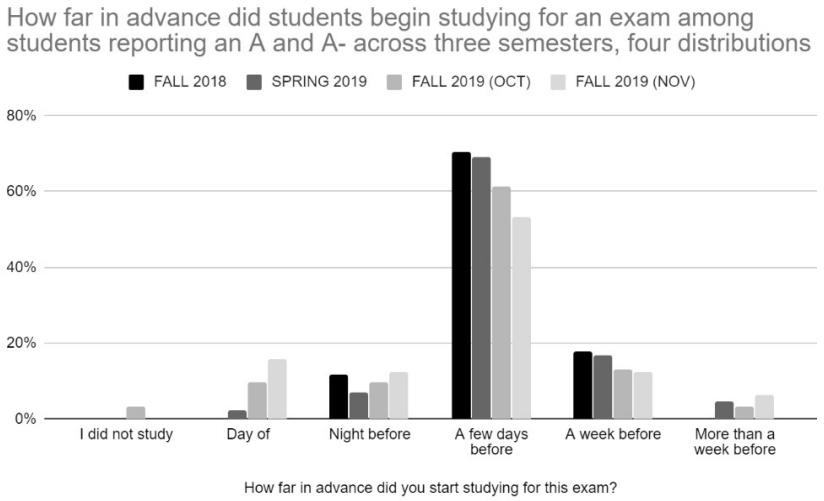



*Figure 1. How far in advance students began studying for an exam among*

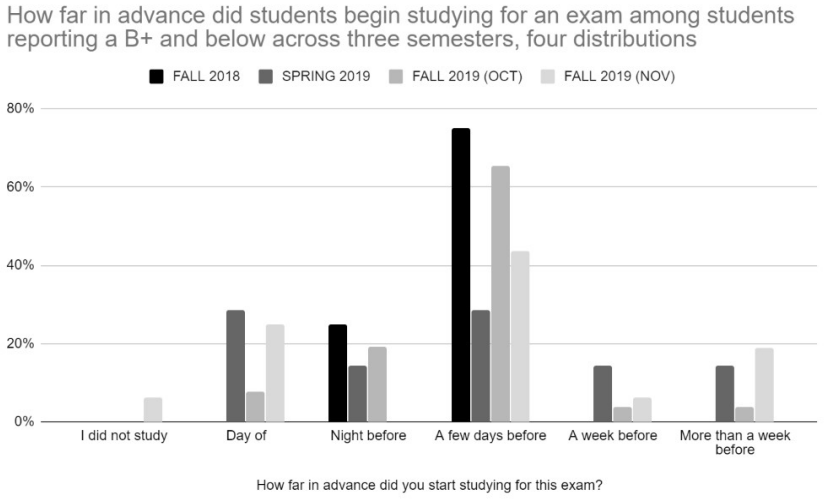



*Figure 2. How far in advance students began studying for an exam among students reporting a B+ across three semesters, four distributions*