The Effects Of Course Type and Participant Characteristics on College Students' Studying Time

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While the number of hours college students spend studying has been extensively used as a variable in past psychological research, little has been done to examine how student personal characteristics and type of course may associate with this factor. Students (n = 156) at a small rural university campus completed a survey collecting personal characteristics and answers to questions for each of their current courses. Participants reported studying twice as long during weeks with tests than weeks without tests. In addition, males increased hours of studying with increased academic status, while females' hours of studying were related to the interaction between test presence and academic status. Females also reported more time studying than males for Anatomy/Biology/Chemistry and Math courses. Finally, a combination of strategies was associated with the greatest amount of time reported, followed by elaborative and simple strategies. Implications for research on student studying strategies are discussed as well.

Examining the effectiveness of various studying techniques is a relevant field of study that carries implications for student success and faculty effectiveness (e.g., for reviews, see Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). Within this field, however, the amount of time studying reported by college students tends to either not be included as a factor (e.g., Bartoszewski & Gurung, 2015; Gurung, Weidert, & Jeske, 2010), or is included in the role of a predictor variable for test performance, without examining potential interactions with participant characteristics (e.g., Blasiman, Dunlosky, & Rawson, 2017; Gurung, 2005). Yet, for survey-based research, this more comprehensive understanding of time reported studying may play an important role when evaluating the effectiveness of various studying strategies, as differing study strategies may require differing levels of time to be effective (Dunlosky et al., 2013). More elaborative strategies, such as being tested (by self or others) typically take more time than simpler strategies such as repetition of key facts or rereading the material (e.g., Smith, Holliday, & Austin, 2010). Students need to not only study effectively, but spend enough time doing so in order to excel (Bjork, Dunlosky, & Kornell, 2013).

Research dependent on the reporting of the amount of time students spend studying is further complicated by a number of factors, including the definition of studying, time periods examined and the type of course. Participants may be asked to report the total time spent studying for a particular test (e.g., Gurung, 2005) or, more commonly, the average number of hours spent studying on a weekly basis (e.g., NSSE, 2016; Wissman & Rawson, 2016). Students may be given detailed descriptions of what is meant by 'studying' (e.g., NSSE, 2016; Gurung, 2005), but others rely on students to provide their own interpretations of what the term studying means (e.g., Mason, Shuman, & Cook, 2103). In addition, study times may be examined for only one or two particular courses within a particular discipline, such as anatomy (e.g., Farkas, Mazurek, & Marone, 2015), engineering (e.g., Mason, Shuman, & Cook, 2103), or psychology (Gurung, Daniel, & Landrum, 2012). The majority of research comparing studying strategies, however, uses convenience sampling of psychology students (e.g., for a review, see Blasiman et al., 2017). If students in fields other than psychology report studying at significantly different levels of time, as was reported by the NSSE in 2016, it may impact the generalization of results from studies only utilizing psychology students, due to potential interactions between time and effectiveness of studying strategy used. Additionally, if the effectiveness of study strategies is different across course types (a possibility suggested by Dunlosky et al., 2013), researchers may also need to take into account differences in the amount of time spent studying in those courses, as interactions between average time studying and strategy effectiveness may exist.

The current study is based on the more comprehensive approach employed by Agarwal, D'Antonio, Roediger, McDermott, and McDaniel (2014) in a study of middle school and high school students. In both that and the current study, self-reported hours of studying was based on an open-ended question, but with concrete examples of studying behavior following. Students were asked to estimate the length of time spent studying on a weekly basis for each of their current courses, broken down by course type, and then further categorized by the presence or absence of an exam during that week. This method of measurement, originally used to measure test anxiety by Agarwal et al. (2014), but modified in the current study to focus on study duration, may help to illuminate specific differences between study patterns that a more global measurement of hours of studying per week cannot. Specifically, this breakdown should cause a reduction in the variability of hours of studying reported, compared to that found when hours of studying is looked at in a general sense.

The research suggests students typically report studying more during weeks with exams, particularly in the days immediately before the exam is administered (e.g., Susser & McCabe, 2013; Taraban, Maki, & Rynearson, 1999), as a majority of students report studying material based on due dates rather than planned study schedules (Kornell & Bjork, 2007).

Hence, this more specific breakdown of hours of studying based on exam presence and the resulting reduction in variability may also be more informative when examining the relationship between hours of studying and personal characteristics, such as gender, academic status (e.g., first year, second year, etc.), or type of course taken (e.g., Psychology or Biology), such as was done by Agarwal et al. (2014).

The effect gender plays in time spent studying outside of the classroom is unclear. The NSSE 2016 study, for example, reports American college females study an average of 40 minutes more per week than their male counterparts. Masui, Broeckmans, Doumen, Groenen, and Molenberghs (2014) report increased studying durations for female college students, but only for specific courses within a business economics program. However, Agarwal et al. (2014) reports no difference in studying times between middle and high school boys and girls. If, as suggested by Masui et al. (2014), gender plays a role in the amount of time spent studying for specific courses, there may also be differences based on more general course types. This difference may be detectable using the more specific breakdown of hours based on exam presence.

The second personal factor examined here, academic status, does seem to have an effect on the amount of studying reported. Taraban, Maki, and Rynearson (1999) show third year and above students reporting more studying time than second year students (though not first year students) within a particular psychology course. The NSSE 2016 study reports senior (4^{th}-year) American college students studying an average of 35 minutes more per week than their first-year peers. The reason for the inconsistency between these results could be due to the interrelations between personal factors such as gender and the types of individual classes being taken by the student.

There are two primary research goals within this survey-based exploratory study. First, it was designed to provide an initial examination of how student personal characteristics (gender and academic status) and student strategy use are associated with the amount of time reported studying. If such characteristics are associated with different patterns of time spent studying, this should be taken into consideration in future research on the factors that influence educational practices. In addition, the impact that course type plays on the amount of time spent studying was also examined. If different types of courses are associated with differing amounts of studying time, it would suggest that the classes sampled within education and psychological research could have an impact on the duration and type of study strategies employed, particularly if interactions between time spent studying and strategy effectiveness exist.

The survey for this study, based on one used by Agarwal et al. (2014), was designed to collect data about study strategies and amount of time spent studying for all courses the student was taking that semester, allowing for comparisons between course types and within individuals. The survey was modified to include a range of course type selection and a focus on Pilot, the University online learning management system (Blackboard Collaborate). Surveys were given within the last two to three weeks of the semester to maximize the number of weeks available for students to generalize from.

Method

Participants

One hundred fifty-two students from a rural, open-enrollment branch campus with 2-year and 4-year degree programs completed the survey (Appendix). Students ranged in age from 18 to 52 (M_{age} = 21.02 years), with 66 males (43%) and 85 females (56%). One student declined to provide information on gender. Participant ethnicity was not included in the survey to increase confidentiality. Participants ranged in their academic standing, with 55 (36%) indicating completing less than 30 credit hours (first-year status), 50 (33%) indicating completing between 30 and 60 credit hours (second-year status), and 39 (26%) indicating completing more than 60 credit hours (third-year or above status). Eight students declined to fill out academic standing information.

Students were recruited from a convenience sample of eleven courses chosen to maximize the diversity of classes reported on. These included five general education courses (math, biology, English, psychology, and economics) and six higher level courses (2nd, 3rd, and 4th year courses in agriculture, mechanical engineering, regional studies, political science, teacher education, and office information systems). Only courses with six or more students were approached for study participation in order to further minimize identifying information. Survey completion occurred during the last fifteen minutes of a random class session, two to three weeks before the final week of the semester. As there was a possibility of participants being in more than one of the courses sampled, all participants were reminded to complete the survey only once, and their participation was completely voluntary. Participants did not receive any incentive from the experimenter for participation.

Materials

The survey included general demographic questions about age, gender, and academic standing (less than 30 credit hours, more than 60 credit hours). In addition, participants reported the following for each of the classes in which they were currently enrolled: the type of course (e.g., math, engineering), time spent studying for this course, and strategies used while studying for this course.

To increase confidentiality, participants did not give the names or the specific topics of the individual courses they were reporting on. Instead, all courses at the University were divided into a total of twelve different course types. Course types were described with the names of general courses found within that type. Six of these divisions were based on the required course types for general education courses at the University. The remaining six divisions were based on the remaining major fields of study offered at the University. (See the Appendix for the survey, which contains a breakdown of these course divisions).

Procedure

Participants were given 15 minutes to complete the survey during course time. They were given an assent form, with a debriefing on the back, along with the survey. Surveys and the assent/debriefing form were distributed by the experimenter, with the course instructor either absent or in the back of the classroom during the entirety of survey completion. Participants were told to read the assent form and were then given a verbal explanation of the information on the assent form. They were told to not look at the debriefing on the back of the assent form until after they had completed the survey. Students were reminded verbally and through the assent form that participation was voluntary, anonymous, and would not affect their grades. Participants were allowed to leave the course early if they did not wish to take the survey or if they had already completed the survey. Participants were allowed to ask questions during the survey and handed their completed surveys to the experimenter when completed. Participants were told to count course presentations as being exams for those courses having no exams. Participants were told to not report on a course if it had no exams and no presentations. Class reports were not included in the analyses if they did not include required information (e.g., missing information about study time). On average, survey completion took eight minutes.

Scoring

When hours of studying was examined for individuals, an average number of hours of studying per week without a test and an average number of hours of studying per week with a test was calculated for each student. These should be interpreted as an average per class per week, not as a weekly average per student across all classes. When hours of studying was compared between course types, student's reports for courses were treated as individual reports, as individual participants did not report enough multiple class types to make comparisons between class types within individuals worthwhile.

Results

Study Time and Personal Characteristics

An omnibus 2 (gender) x 3 (academic status) x 2 (test week presence) analysis of variance (ANOVA) was conducted on the average time spent studying for 143 participants. There was not a significant main effect of gender (F (1, 137) = 0.318, p = .574), or academic status (F (2, 137) = 1.877, p = .157). There was a main effect of test presence, with students reporting longer studying during weeks with tests (M = 3.08 hours, SE = 0.183) than in weeks without tests (M = 1.50 hours, SE = 0.118) (F (1, 137) = 234.98, p < .001, η_p^2 = .63). There was not a significant interaction between gender and academic status (F (2, 137) = 3.03, p = .052) or between test presence and academic status (F (2, 137) = 0.028, p = .972) or between test presence and gender (F (1, 137) = 0.613, p = .435).

A significant three-way interaction between test presence, gender, and academic status (F (2, 137) = 6.09) p = .003, η_p^2= .082) further clarifies the main effect of test presence. Post hoc analyses consisting of omnibus 2 (test week presence) x 3 (academic status) ANOVAs were run for each gender. For males, an increase in academic status was associated with an increase in hours of studying times (for first year students M = 1.50, SE = 0.351, for second year students M = 2.05, SE = 0.374, for third year and above students M = 3.08, SE = 0.453) (F (2, 59) = 3.80, p = .028, η_p^2 = .11). Further post hoc tests comparing hours of studying across academic status using Bonferroni adjusted alpha levels of .0167 (.05/3) indicated a significant difference between hours of studying for the first year students and the third year and above students. For male students, the interaction between test presence and academic status was not significant (*F* (2, 59) = 2.20, *p* = .12). See Table 1 for details.

For females, the omnibus 2 (test week presence) x 3 (academic status) ANOVAs post hoc analysis of the significant three-way interaction indicates that an increase in academic status was not associated with a change in hours studying times (*F* (2, 78) = 0.207, *p* = .814). However, the interaction between test presence and academic status was significant (*F* (2, 78) = 4.25, *p* = .018, η_p^2 = .098). This interaction was followed with a set of two one-way ANOVAs, examining effect of academic status for each level of test presence, which failed to identify the cause of this interaction. For females, an increase in academic status was not associated with a significant change in hours of studying times for weeks without tests (for first year students *M* = 1.55, *SE* = 0.287, for second year students *M* = 1.50, *SD* = 0.239, for third year and above students *M* = 1.81, *SE* = 0.309) (*F* (2, 78) = 0.310, *p* = .74) or for weeks with tests (for first year students *M* = 3.50, *SE* = 0.388, for second year students *M* = 3.02, *SD* = 0.367, for third year and above students *M* = 2.84, *SE* = 0.396) (*F* (2, 78) = 0.805, *p* = .45). While no significant differences were found, a visual inspection of the means suggests that for females, an increase in academic status resulted in no change in hours of studying for weeks without a test, but a decrease in hours of studying for weeks with a test. See *Table 1* for details.

Table 1
Average Hours of Studying Per Week Reported Across Test Presence, Gender, and Academic Status

	Academic Status											
Test Presence	First Year	*SE*	*N*	Second Year	*SE*	*N*	Third Year and Above	*SE*	*N*	Mean	*SE*	*N*
Test Week	2.82	0.29	55	2.93	0.31	50	3.49	0.36	38	3.08	0.18	143
Female	3.50	0.39	30	3.02	0.40	28	2.84	0.45	23	3.12	0.24	81
Male	2.13	0.43	25	2.84	0.46	22	4.15	0.55	15	3.04	0.28	62
Non-Test Week	1.21	0.19	55	1.38	0.20	50	1.91	0.23	38	1.50	0.12	143
Female	1.55	0.25	30	1.50	0.26	28	1.81	0.29	23	1.62	0.15	81
Male	0.87	0.28	25	1.26	0.29	22	2.01	0.36	15	1.38	0.18	62

Study Time and Course Type

For the following analyses examining the interactions between study time and course type, each of the students' course reports were treated as an individual course response (n = 576). A 12-way (course type) univariate ANOVA was conducted in which participant number was entered as a random factor and hours of studying during a non-test week was the dependent variable. There was a significant effect of type of course (F (11, 255) = 7.01, $p < .001$, $\eta_p^2 = .23$). Tests comparing hours of studying across type of course were conducted using Bonferroni adjusted alpha levels of .0008 (.05/66). Results indicated significant differences between courses, as reported in Table 2.

A second 12-way (course type) univariate ANOVA was also run in a similar way, with participant number entered as a random factor, but with hours of studying during a test week as the dependent variable (n = 572). There was a significant effect of type of course (F (11, 250) = 9.90, $p < .001$, $\eta_p^2 = .30$). Tests comparing hours of studying across course type were conducted using Bonferroni adjusted alpha levels of .0008 (.05/66). Results indicated significant differences between courses, as reported in *Table 2*.

Table 2
Average Hours of Studying per Week Reported Across Course Type and Test Presence

	Average Hours of Studying Per Week						
Class Type	With Test	*SE*	*N*	Without Test	*SE*	*N*	Study Time Ratios
Engineering	6.72	0.29	66	3.33	0.19	66	2.02
Anat/Bio/Chem/EES/Physics	3.97^{a}	0.25	74	1.63^{a,b}	0.16	73	2.44
Math/Statistics	3.51^{a,b}	0.22	89	1.58^{a,c,e}	0.14	90	2.22
Regional/Relig/Anthro/History	2.90^{a,b,c,d}	0.36	35	1.14^{a,c,d}	0.23	35	2.54
Teacher Education	2.75^{a,b,d}	0.36	48	1.96^{b,e}	0.23	48	1.40
Accnt/Bus/Econ/Org. Leadership	2.43^{b,c,d}	0.24	94	1.00^{a,c,d}	0.16	94	2.43
Criminal Justice/Law Enforcement	1.83^{b,c,d,e}	0.61	14	0.925^{a,c,d}	0.40	14	1.98
Art/Culture/Music/Phil/Theatre	1.74^{a,b,c,d,e}	0.69	9	0.600^{a,c,d}	0.43	10	2.90
Agriculture/Food Science	1.68^{c,d,e}	0.52	22	0.850^{c,d}	0.34	22	1.98
PolySci/Psych/Soc/Soc Work	1.24^{e}	0.27	68	0.553^{d}	0.18	68	2.24
GraphicDes/IT/OIS/Tech	1.01^{b,c,d,e}	0.64	13	0.778^{a,c,d,e}	0.42	13	1.30
Comm/English/Languages	0.88^{e}	0.34	40	0.704^{c,d}	0.21	43	1.25
All Responses	2.85	0.10	572	1.31	0.06	576	2.176

Note. Data is based on averaging across all of the students' individual class responses. Superscripts denote significant Bonferroni adjusted post hoc differences ($p < .0008$) between course type groups within test week categories. Superscripts cannot be compared within class type. Study time ratios are the ratio of time spent studying during weeks with an exam to weeks without an exam.

Study Time, Course Type, and Gender

Gender differences for hours of studying within individual course types were examined using two sets of analyses composed of six independent sample t-tests each, based on test presence. For both analyses, the average number of hours of studying were calculated for each student for each of the course types. In order to reduce the total number of comparisons, gender differences were not examined for course types where there were less than five of either gender. For both sets of analyses, the use of Bonferroni adjusted alpha levels of .008 per test (.05/6) were employed.

For comparisons involving the number of hours studying per non-test week, significant differences between genders were found for the Anatomy/Biology /Chemistry/Earth and Environmental Studies/Physics courses, with females reporting more time studying (*M* = 2.46 hours, *SE* = 0.50) than males (*M* = 0.56 hours, *SE* = 0.17) (t (43) = 3.58, p = .001). Levene's test indicated unequal variances (F = 9.96, p = .002), so degrees of freedom were adjusted from 62 to 43. No other comparisons were significant. See Table 3 for a full breakdown of the hours of studying per non-test week by gender.

For comparisons involving the number of hours studying per test week, significant differences between genders were found for the Anatomy/Biology/Chemistry/Earth and Environmental Studies/Physics courses, with females reporting more time studying (*M* = 5.41 hours, *SE* = 0.82) than males (*M* = 1.96 hours, *SE* = 0.32) (t (47) = 3.93, $p < .001$). Levene's test indicated unequal variances (F = 15.78, $p < .001$), so degrees of freedom were adjusted from 63 to 47. Significant differences were also found for the Math and Statistics courses, with females reporting more time studying (*M* = 4.26 hours, *SE* = 0.56) than males (*M* = 2.51 hours, *SE* = 0.32) (t (75) = 2.71, p = .008). Levene's test indicated unequal variances (F = 5.11, p = .026), so degrees of freedom were adjusted from 84 to 75. See Table 3 for a full breakdown of the hours of studying per non-test week by gender.

Table 3

Average Hours of Studying Per Week Reported Across Course Type and Gender

	Average Hours of Studying Per Week					
Course Type	With Test	*SD*	*N*	Without Test	*SD*	*N*
Anat/Bio/Chem/EES/Physics	3.92	4.24	65	1.63	2.48	64
Female	5.41[a]	4.96	37	2.46[a]	2.98	36
Male	1.96[b]	1.70	28	0.56[b]	0.90	28
Math/Statistics	3.51	3.33	86	1.57	2.23	87
Female	4.26[a]	3.92	49	1.96	2.73	50
Male	2.51[b]	1.96	37	1.06	1.12	37
Accnt/Bus/Econ/Org. Leadership	2.43	2.31	56	1.00	1.20	56
Female	2.95	2.45	28	1.32	1.40	28
Male	1.90	2.08	28	0.67	0.88	28
Regional/Relig/Anthro/History	2.90	2.56	32	1.14	1.36	32
Female	3.40	3.04	16	1.27	1.51	16
Male	2.41	1.94	16	1.00	1.22	16
Poly Sci/Psych/Soc/Soc Work	1.24	1.46	51	0.55	0.96	50
Female	1.07	1.44	26	0.40	0.86	25
Male	1.42	1.48	25	0.71	1.05	25
Comm/English/Languages	0.88	1.29	36	0.70	1.35	38
Female	1.00	1.55	19	0.94	1.68	21
Male	0.74	0.94	17	0.41	0.72	17

Note. Data is based on individual participants' average hours of reported studying per course type. Superscripts denote significant Bonferroni adjusted differences ($p < .008$) between genders. Subscripts cannot be compared between class types.

Study Times and Strategy Use

The following analyses examined the differences in the amount of time reported studying dependent on the type of strategy use reported. Each of the students' course reports were treated as an individual course response. In order to minimize the number of comparisons made, participant strategy use was categorized as consisting of no strategy, simple strategy, elaborative strategy, or mixed strategy. No strategy indicated the participant reported no strategy use. Simple strategies included repeating key facts, reviewing material, or re-writing materials. Elaborative strategies consisted of mnemonics, testing themselves with or without flashcards, being tested by others, or practice quizzes. Mixed strategies consisted of any combination of simple and elaborative strategies. Two 4-way (strategy type) univariate ANOVAs were conducted in which participant number was entered as a random factor, with type of strategy use as the independent variable and time spent studying as the dependent variable. There was a significant effect of strategy reported (F (3, 106) = 11.33, p < .001, (η_p^2 = .24) for weeks without a test. There was also a significant effect of strategy reported (F (3, 104) = 15.63, p < .001, (η_p^2 = .31) for weeks with a test.

Post hoc tests comparing hours of studying across types of strategy were conducted using Bonferroni adjusted alpha levels of .008 (.05/6) for both levels of test presence. For weeks without a test, results indicated the average hours of studying reported for courses in which no strategy (*M* = 0.61, *SE* = 0.19) or simple strategies (*M* = 0.91, *SE* = 0.11) were reported had the lowest number of hours of studying, followed by significantly higher levels for elaborative strategies (*M* = 1.11, *SE* = 0.27). The significantly greatest amount of time was from those who reported using multiple strategies (*M* = 2.39, *SE* = 0.10). See Table 4 for a full breakdown of the hours of studying per test week by strategy type.

For weeks with a test, results indicated the pattern of average hours of studying reported for each level of strategy was the same as that found for weeks without a test. Courses in which no strategy was reported (*M* =1.23, *SE* = 0.35) or simple strategies were reported (*M* = 1.95, *SE* = 0.19) had the lowest number of hours of studying. Significantly higher levels were reported by those reporting elaborative strategies (*M* = 2.52 , *SE* = 0.47), followed by the greatest amount of time from those reporting the use of multiple strategies (*M* = 4.84 , *SE* = 0.17). See Table 4 for a full breakdown of the hours of studying per non-test week by strategy type.

Table 4
Average Hours of Studying Per Week Reported Across Strategy Use and Test Presence

	Average Hours of Studying Per Week					
Strategy Use	With Test	*SE*	*N*	Without Test	*SE*	*N*
No Strategy	1.23	0.34	63	0.61	0.19	65
Simple	1.95	0.19	215	0.91	0.11	216
Elaborative	2.52[a]	0.47	34	1.11[a]	0.27	34
Mixed	4.84[b]	0.17	260	2.39[b]	0.10	261

Note. Data is based on individual class reports. Superscripts denote significant Bonferroni adjusted post hoc differences ($p < .008$) between strategy usage. Superscripts cannot be compared across test presence.

Discussion

The current survey assessed the roles that gender, academic status, course type, and studying strategy play on reported studying times, further divided by test presence. These results provide a starting point for understanding several factors associated with differences in this widely-used variable. Each of these factors will be discussed, along with how the current results correspond with prior survey research. The importance of accounting for these factors when using student studying time in research will be discussed as well.

On average, students reported studying about 1.5 hours per week for the average course when a test was not present, and about 3 hours for weeks when a test was present. This is in line with Agarwal et al. (2014), where high school students also reported a rough doubling of studying times from weeks without a test to weeks with a test. This also fits with the results of Taraban et al. (1999), who found patterns of increased studying time in college students for the days immediately preceding an exam. Dividing the time period being examined into these two categories, then, allows greater precision than simply averaging over both when asking students how long they study.

Gender and Academic Status

The current study found an impact of gender in the amount of time reported studying, but only after the effect of academic status and test presence were included. Specifically, males reported studying more as they increased in academic status, regardless of test presence. Women did not change the amount they studied based solely on academic status, but rather on an interaction between academic status and test presence. These results correspond in part with the results of Agarwal et al. (2014), who also report no main effect of gender on study time. However, as the focus of Agarwal et al. was primarily examining test anxiety within middle and high school students, they did not provide an analysis of the interaction between academic status and gender on study times.

Gender did have a clear impact on the hours of studying reported for the natural science and math courses. Females reported studying 1.84 hours more per non-test week and 3.4 hours more per test week for the natural sciences, and 1.75 hours more per test week for the math courses. These findings, combined with the interaction described above, suggest gender can be a moderating factor when examining hours of studying, particularly when combined with academic status and course type. They also support the assertion that the effect of personal characteristics should be taken into consideration when conducting research on study strategies.

Course type

The amount of studying reported per week was significantly impacted by the type of course. Students in engineering courses reported the largest duration of studying, with an average of 3.33 hours for weeks without tests and 6.72 hours for weeks with tests. Compared to the students in the natural sciences (the second highest reported duration of studying), students in engineering classes reported studying about 1.7 times longer in weeks with tests and twice as long in weeks without tests. When comparing to the social science courses, which included psychology courses, students in engineering courses reported almost five and half times longer duration studying for weeks without tests and six times longer duration for weeks with tests.

These results correspond with the 2016 NSSE survey who report the greatest hours of studying from Engineering majors and the third lowest hours of studying from Social Science majors. These differences in studying time based on course type reinforce that when time spent studying is used as a variable, the type of course the student is reporting on may make a difference. For example, if type of study strategy is being examined, recruiting students from Engineering courses may be more fruitful than recruiting from Psychology classes, if the increased study time increases the ability to detect the influence of a particular strategy. It also supports the assertion that the effect of class type should be taken into consideration in research that examines the educational process.

Strategy use

The current study found an increase of studying time based on the complexity of the studying strategy used, as found by previous research (e.g., Smith, Holliday, & Austin, 2010). The current study found this to be the case for both weeks with and without a test. In addition, the longest duration of studying time occurred when a combination of simple and more elaborative strategies were reported. This finding could be problematic for research comparing the effectiveness of various study strategies, when not accounting for any additional time associated with the use of more elaborative or multiple types of studying strategies.

Limitations and Implications

These results are tempered by a number of limitations. The first is the reliance on self-report to measure studying time. Although widely used in survey research, this may be problematic due to the difficultly in accurately estimating such information, particularly when interspersed with multitasking (Bjork, Dunlosky, & Kornell, 2013). A second potential limitation is data was only sampled once, late in the semester, which could have had an impact on accuracy rates. A more comprehensive examination could have recorded data at several points during the semester (e.g., Blasiman et al., 2017; Taraban et al., 1999). A third potential limitation is the representativeness of our sample population of college students. The campus sampled is a small, open-admissions college campus primarily offering a mixture of associate and bachelor degrees. Hence, any specific differences between various types of courses may not be reflective of the pattern found within other college populations, as different pre-entry qualifications, and educational approaches may influence this variable (factors suggested by Masui et al., 2014). There were also a limited number of personal characteristics examined in the current research, with others (e.g., full time/part time student status, career paths) potentially offering as great or greater influence on time spent studying.

Together, these limitations may be considered problematic when trying to determine the precise number of hours of studying students are actually engaged in. Using the examined factors to predict length of studying time would be problematic. However, the important finding here is differences in study duration can be found based on the type of classes being examined and students' personal characteristics, such as gender and academic status. Careful consideration of the variability of hours of studying between course types for a researcher's own subject pool should be taken into account for future research where hours of studying is used as subject variable instead of a manipulated variable.

Despite these limitations, the results provide students and teachers with information that may be helpful. Students, despite their intentions, study less than they think they will (Blasiman et al., 2017) and less than they believe a good student should (Susser & McCabe, 2013). Explicit, quantitative information about the actual number of hours their peers have spent studying for courses given at the beginning of a semester may be a reminder to students that putting off studying until the day before a test is not a route to getting in the studying time they would prefer. Faculty routinely overestimate the amount of time students spend studying as well (Zinn, Magnotti, Marchuk, Schultz, Luther, & Varfolomeeva, 2011). The current study's quantitative data can be a reminder to faculty that average students may not be engaging in studying behavior at the level assumed.

At a practical level, if instructors want to increase the amount of time students spend studying, they should spend more time discussing the effectiveness and utility of elaborative study strategies to students. As noted by Smith, Holliday, and Austin (2010), this is something that many college faculty do not have time nor training for. However, most undergraduate students have not put together a coherent plan of effective strategies to use when studying (e.g., Dunlosky et al., 2013), often relying on trial-and-error methods of selecting from what has worked in the past (e.g., Shanahan, 2004). Elaborative study strategies, while requiring more effort on the student than the use of simple study strategies, are typically much more time-efficient for students (Dunlosky et al., 2013). Providing information on these strategies may not be enough, however, as students tend to prefer the simpler strategies even after training (Agarwal, Karpicke, Kang, Roediger, & McDermott, 2008). Thus, increasing the number of tests within a semester may also increase study-time duration, with practice tests being a particularly effective form of elaborative study strategy (e.g., Roediger, Putnam, & Smith, 2011).

In conclusion, the current study provides initial evidence that course type, student personal characteristics of gender and academic status, and student strategy use may be associated with the reported amount of time spent studying. In addition, the proximity of a test also significantly impacts this time. These findings suggest future research conducted on variables impacted by student studying time, such as the effectiveness of student strategy use, should keep these personal characteristics and course types in mind. In addition to being potential guideposts to designing methodology and selecting participants for research, these findings may also illuminate potential sources of variance in student scores.

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