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ABSTRACT

A study examined self-reported studying and quiz performance in a college course. Subjects, 22 female and 5 male students in an educational psychology class, were quizzed on 4 supplementary reading assignments across the semester. Quizzes were scored for three types of learning: definitions, recall of factual information, and transfer of information to educational situations. Immediately following each quiz, students were surveyed about their preparation for the quiz. Surveys were scored for the amount of studying, the level of reproductive or memory-oriented studying, and the level of productive or generative studying. Except for this survey, classroom procedures were kept as normal as possible. A replication study during a different semester and using four different reading assignments was also conducted. Results of both experiments indicated moderate correlations between self-reported studying and quiz performance. Survey results are generally inconsistent with models of self-regulation, as students were relatively stable in their studying despite relatively poor quiz performance. Findings suggest that situational variables, such as being too tired to study or having a test ir another class, play a larger role than is accounted for in current models of academic studying. (Contains four tables of data and nine references.) (Author/CR)

Self-regulation of Reading Strategies in a College Course

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Abstract

Do college students actively regulation their own learning as they prepare for tests and quizzes? Models of self-regulation (Van Meter, Yokoi, & Pressley, 1994; Winne, 1995) describe learners as actively controlling their cognitive and affective states and strategies, but educators often observe studying that is quite passive and less-than-optimal. To explore the level of self-regulation in a college class, students were quizzed on four supplementary reading assignments across the course of the semester. Quizzes were scored for three types of learning; definitions, recall of factual information, and transfer of information to educational situations. Immediately following each quiz, students were surveyed about their preparation for the quiz. Surveys were scored for the amount of studying, the level of reproductive or memory-oriented studying, and the level of productive or generative studying. Except for this survey, classroom procedures were kept as normal as possible, with the regular instructor selecting the articles, designing and grading the quizzes, returning the quizzes the following class, etc. A replication study during a different semester and using four different reading assignments was also conducted. The results of both experiments show moderate correlations between self-reported studying and quiz performance. Survey results are generally inconsistent with models of self-regulation, as students were relatively stable in their studying despite relatively poor quiz performance. Survey comments suggest a larger role for situational variables (being too tired to study or having a test in another class) in studying than current models of academic studying can account for.

Self-regulation of Reading Strategies in a College Course

After decades using an experimental, quantitative approach, researchers of academic studying are using more diverse methods and investigating spontaneous strategy use in natural settings. For example, a recent study (Lonka, Lindblom-Ylanne, & Maury, 1994) correlated self-reported strategy use during the reading comprehension portion of a medical school examination, with performance on that exam. These authors, along with others in the field (Mayer, 1992; Wade & Thrathen, 1989) argue that student choice of strategies (rather than experimenter imposition) and high levels of motivation are important elements for ecologically valid research. Laboratory studies that assign people to strategy conditions and then administer an immediate test of no real consequence to students are unlikely to produce results that generalize to classrooms.

Models of self-regulated learning (Borkowski, Carr, Rellinger, & Pressley, 1990; Winne, 1995; Zimmerman & Martinez-Pons, 1993) assume that learners actively control their own learning. These self-regulated learners set goals, select strategies, and assess progress towards their learning goals. A recent example of research in this vein is an ethnographic interview study by Van Meter, Yokoi, and Pressley (1994), who explored note taking in college classes. One important finding was that students adapt their note-taking strategies to reflect course demands, such as content difficulty and anticipated test questions. Van Meter et al. concluded that students are reflective, metacognitive learners, actively controlling their own learning.

While students may be capable of shifting strategies in sophisticated ways, it is possible that students are not always so reflective. As Rothkopf (1988) observed, the important question for study skills is whether or not students are disposed to use them. During the course of a semester, personal problems, social activities, and competing course requirements may prevent students from optimal self-regulation of learning.

While the reintroduction of qualitative methods into Educational Psychology may invigorate studying research, limitations must still be considered. Self-report data are not always reliable (Nuthall & Alton-Lee, 1995) and must be interpreted cautiously. Students in the Van Meter et al. (1994) may well have responded to the demand characteristics inherent in the interview situation. Statements are more likely to be valid if they are contiguous with the event and if the self-report is tied to a specific behavior (Nuthall & Alton-Lee).

To explore the level of self-regulated learning in a college course, the present study examined self-reported studying and quiz performance in an actual college course. Quizzes did count towards students final grades, insuring motivation. Study surveys were completed immediately following each quiz. If students engage in self-regulated learning, then study tactics should change across the course of the semester. Further, these changes in studying should be reflected in improved quiz scores.

Experiment 1

Methods

Participants. Twenty-seven students (22 female, 1 African-American), constituting one section of an Educational Psychology class, participated in this study. Students read and were quizzed over four articles assigned as part of the regular course requirements.

Procedures. Student were given copies of the article prior to the assignment date and were quizzed at the beginning of class on the assigned dates. Immediately after each quiz, students completed the study survey. All notes taken and article copies were collected along with these quizzes. Since the quizzes were part of the regular course, they were constructed, administered and graded by the course instructor. All surveys and study materials were handled by research assistants, to insure the

confidentiality of student survey responses.

Materials. The four articles were selected to supplement the textbook and were part of the required readings for the course. The topics were multiculturalism , learning theory , motivation, and quality leadership. Two of the articles had been assigned in previous semesters, while the other two had not.

The quizzes contained short-answer questions tapping three kinds of knowledge. Students were asked to define three technical terms (Definitions). Three items tested the main ideas or arguments (Facts), such as why one author believes cooperative learning is beneficial. Finally, two items required students to evaluate or apply what they had read (Transfer). Definitions and Facts questions were worth 1 point each. The two Transfer questions were each scored on a scale of zero to 2, resulting in a 10-point quiz.

The initial study survey contained four items. Students were first asked to report how much they studied the article. On the second item, students checked the study tactics (e.g. highlighting and underlining, concept maps, studying with a peer) they employed. The third item asked students to explain how they used the study technique, with "highlighted only the main ideas" or "constructed an outline using key terms" listed as examples of appropriate responses. Finally, students were asked why they studied as they did. "To help them attend to the text" and "to use the highlighted material for review just before the quiz" were suggested as two possible reasons for highlighting. After the first assignment a fifth question, asking students if they studied differently from the previous reading assignments, was added.

Scoring. All quizzes were scored by the regular classroom instructor, who was "blind" to all student self-reported study activities. The study surveys were scored in three ways. The first item (amount of study) asked students to rate their amount of study on a scale of 1 to 5, where 5 was " read and studied the material" and 1 was

"honestly never touched the article". Second, student use of reproductive study strategies, aimed at memorizing and recalling information, was rated on a scale of 0 to 2, where a zero meant no attempt at memory and 2 would represent elaborate memory techniques. Finally, student use of productive or generative study techniques, such as concept mapping or making up a series of questions and then quizzing a peer, were also scored on a scale of 0 to 2, where a high score implied elaborate attempts at understanding, not just memorizing the material. A sample of 24 surveys (6 from each of the 4 occasions) were scored by two researchers. Inter-rater reliability was .94 for the reproductive scale and .90 for the productive scale.

Results

The relationship between studying and achievement was assessed by correlating ratings from the study survey and quiz scores across the four assigned readings. As can be seen in Table 1, generally moderate correlations (in the .30s) were found. The correlations between amount of studying and quiz scores scales ranged from .17 to .40. Reproductive studying produced weaker correlations (mostly in the .20s), with achievement, regardless of how it was measured. Productive studying was strongly correlated with transfer (.25 to .65), but not as strongly with the learning of definitions (3 of the 4 correlations were below .20) and factual information (3 of the four correlations were below .25).

The second issue addressed was changes in studying across the semester. Differences in ratings in the amount of study, reproductive studying, and productive studying across the four quizzes were tested via repeated measures ANOVAs. Statistically significant differences ($p<.05$) were found on all three measures. Descriptive statistics for this analysis can be found in Table 2. The amount of studying varied across assignments, $F(3, 54)=3.11$, $p<.04$. Post hoc comparisons using the Scheffe procedure found that students studied more for Quiz 1 and 2 than for 3. The

amount of studying for Quiz 4 did not differ from any of the other quizzes. Reproductive studying also changed over the course of the semester, $F(3, 54)= 45.46$, $p<.001$. Use of strategies for memorized dropped significantly after the first quiz. The second, third, and fourth quizzes did not differ in the use of reproductive strategies. Finally, productive studying also dropped across the semester, $F(3, 54)=18.42$, $p<.001$, with significant drop from the first to the second quiz, and from the second to the third. Studying did not differ from the third to the fourth quiz.

Results from the quiz scores are similar to the results from the study survey, in that quiz scores begin high and drop significantly across the semester, $F(3, 54)=10.22$, $p<.001$. This pattern was similar regardless of the learning outcome measured.

Student survey comments are consistent with results presented here. On the fourth quiz, the majority of students (58%) said they did not study differently across the articles, although they admitted they hadn't worked very hard on the third and longest of the assigned articles. A second group (29%) said they studied less as the course progressed, citing outside pressures and commitments as the cause. Finally, 13% said they had tried new techniques to facilitate attention and retrieval of information.

Experiment 2

The purpose of the second experiment was to replicate the first study, using different articles with a new group of students. This kind of replication is necessary in classroom research, given the ideosyncracies and dynamics that all teachers have observed after teaching multiple sections of the same course. The same college course, taught by the same instructor, was employed for this replication.

Method

Forty-five students (31 females, 1 African-American), again constituting one section of an Educational Psychology course, participated in the study. The study was virtually identical to Experiment 1 in that all articles were assigned by the regular

course instructor as part of the assigned reading for the semester, quizzes were given, and students were surveyed about their studying immediately following the quiz. In an attempt to expand the range of scores on the survey scales, the reproductive and the productive scales were scored on a 1-4 scale, where 1 meant no attempt and a 4 represented a strong attempt. The four articles were on multiple intelligences, multiculturalism, learning strategies, and the Hunter model of instruction.

Results

As can be seen in Table 3, moderate to strong correlations were found between self-reported study activities and quiz scores. Of particular interest are the strong correlations between the amount of study and quiz scores, especially after the first quiz. Similarly strong correlations were found for the use of reproductive strategies and quiz scores. Correlations for productive studying were strong for transfer scores, but were much lower when definitions and factual information was tested.

As in the first experiment, studying changed across the semester, $F(3, 96)=3.08$, $p<.05$. The amount of studying was significantly lower on the third article, but equal on all three others. The use of reproductive studying also changed, $F(3, 96)=6.14$, $p<.001$. Post hoc comparisons reveal that the use of memory strategies were significantly lower on the third and fourth quizzes compared to the first two. Finally, there were no changes in the use of productive study strategies, $F<1$.

Analysis of quiz scores produced a curious pattern that does not match changes in studying. No significant differences were found on definitions scores across the four tests, $F(3, 99)=1.03$, $p=.38$. Differences were found however on factual information questions, $F(3, 99)=20.37$, $p<.001$. Scores were significantly higher on the second quiz than on the fourth quiz, and these scores were in turn significantly higher than first and third quiz (which did not differ significantly from each other). Transfer scores also varied across quizzes, $F(3, 99)=18.18$, $p<.001$. Transfer scores were significantly

higher on the second than the other quizzes, and significantly lower on the first. The fourth and third quizzes did not differ significantly from each other.

Student comments suggest two ideas that may help explain the pattern of studying across the semester. First, students studied more strategically after the first test. The generally low scores shocked several students, who modified their studying for the later quizzes. The second quiz occurred only about a week after the first one, and students do appear to have strategically modified their studying. Second, students often cited situational factors as playing a role in their studying (forgetting an assignment, having a test that same day, etc.). Citing these factors was especially common on the third article.

Discussion

The results of these two experiments found little evidence of self-regulated learning and thus contradict the portrayal of students as active, mindful learners. The students we examined were quite adamant they studied a particular way (and never changed) because "it just works for me." While study tactics varied only slightly, the amount of studying declined across assignments, possibly due to situational factors such as exams in other classes and work schedules. A second explanation involves the motivational level of students. Self-regulation is rather effort intensive and these quizzes, although they counted towards the students' final grades, may not have the same level of importance to students as textbook chapters and lecture notes. Researchers such as Van Meter et al. (1994) interviewed students about textbooks, lectures, and tests, where the motivation for self-regulation may be stronger. Another methodological problem with the present study is that the four articles were relatively similar in that they were written for professionals, summarized some research, and gave recommendations for improving education. Changes in studying might be more apparent if the articles had varied more in content or style. Finally, students may have

actually changed their studying without their awareness. For example, most students highlighted their articles. It is possible that they changed the amount of highlighting or the specific content (for example, highlighting more definitions) without awareness of the changes. However, informal analysis of student underlinings and notes does not appear to support this. Further research, using a wider range of materials and study situations, an higher level of motivation, and more sensitive measures of cognitive processes, such as "think-aloud" protocols, may be required to clarify the issues raised in this paper.

One final note concerning the teaching and learning of study skills should be added. Most students employed very traditional study tactics, such as underlining, for the purpose of generating a reduced text for later review. Few students used concept maps, outlines, or studying with a peer. Since this was an Educational Psychology class, these strategies, along with others such as PQR4 were demonstrated in class or explained in their text. One of the assigned articles in Experiment 2 listed several tactics and strategies, as well as explaining why they work. That very few students even tried to use any of these techniques reminds us of the difficulty of teaching strategies effectively.

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Table 1

Correlations between study strategies and performance on the class quizzes

	Amount of study	Reproductive studying	Productive studying
Quiz 1 Scores			
definitions	.26	.27	.17
factual info	.17	.24	.19
transfer	.47	.37	.25
total	.43	.42	.30
Quiz 2 Scores			
definitions	.18	.28	.42
factual info	.17	.10	.22
transfer	.28	.22	.32
total	.40	.25	.38
Quiz 3 Scores			
definitions	.28	.18	.15
factual info	.33	.23	.37
transfer	.34	.20	.41
total	.40	.25	.39
Quiz 4 Scores			
definitions	.37	.38	.18
factual info	.38	.20	.21
transfer	.18	.34	.65
total	.31	.36	.42

Table 2
Changes in self-reported studying and in quiz performance across the semester in Experiment 1

	Studying			Quiz Performance		
Quiz 1	Amount	Reproductive	Productive	Definitions	Facts	Transfer
M	4.32	2.21	1.16	1.79	2.37	2.68
s	1.11	.86	.38	.86	.68	.89
Quiz 2						
M	4.42	.79	.79	1.42	1.21	1.90
s	.86	.71	.71	.69	.79	1.10
Quiz 3						
M	3.74	.37	.21	1.53	1.32	1.90
s	.81	.50	.42	.77	1.00	1.05
Quiz 4						
M	4.21	.53	.26	2.11	2.11	2.47
s	.79	.51	.45	.88	.81	.91

Note: Amount of studying was scored on a scale of 1 to 5. Reproductive and productive studying were scaled from 0 to 2.

Table 3

Correlations between study strategies and performance on the class quizzes

	Amount of study	Reproductive studying	Productive studying
Quiz 1 Scores			
definitions	.24	.15	.09
factual info	.17	.20	.44
transfer	.40	.22	.47
total	.27	.17	.31
Quiz 2 Scores			
definitions	.28	.12	.19
factual info	.43	.24	.12
transfer	.34	.42	.39
total	.48	.37	.34
Quiz 3 Scores			
definitions	.42	.36	.09
factual info	.39	.35	.09
transfer	.46	.42	.25
total	.52	.47	.19
Quiz 4 Scores			
definitions	.49	.40	.06
factual info	.67	.48	.35
transfer	.37	.56	.45
total	.59	.59	.31

Table 4
Changes in self-reported studying and in quiz performance across the semester in Experiment 2

	Studying			Quiz Performance		
Quiz 1	Amount	Reproductive	Productive	Definitions	Facts	Transfer
M	4.02	2.65	1.37	1.63	1.30	1.35
s	.94	1.02	.58	.87	.86	1.00
Quiz 2						
M	3.98	2.39	1.34	1.84	2.55	2.96
s	1.25	1.04	.57	.71	.63	1.01
Quiz 3						
M	3.45	2.03	1.34	1.54	1.32	2.24
s	1.43	1.03	.67	.87	1.04	1.34
Quiz 4						
M	3.67	1.95	1.31	1.56	2.23	2.49
s	1.26	1.05	.61	.82	1.01	1.36

Note: Amount of studying was scored on a scale of 1 to 5. Reproductive and productive studying were scaled from 1 to 4.