Peering Inside the Black Box of Undergraduate Study Habits:

The Centrality of Self-regulated Learning in a Digitized World

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Peering Inside the Black Box of Undergraduate Study Habits: The Centrality of Self-regulated Learning in a Digitized World

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As concerns mount regarding the quality of undergraduate education in the United States, policymakers, educators, and student affairs professionals increasingly focus on how to support student learning and success throughout their academic careers. Researchers are paying considerable attention to students' underlying psychological attributes and behaviors associated with academic success such as engagement (Carini, Kuh, & Klein, 2006), self-regulated learning (Zimmerman & Schunk, 2001) and perseverance towards goals or "grit" (Duckworth, Peterson, Matthews, & Kelly, 2007), as well as how instructors think about teaching and learning (Hativa & Goodyear, 2001). While these lines of inquiry shed light on key aspects of the complex dynamics that constitute teaching and learning, these foci leave a central component to student learning unexamined—what students actually do when they leave the classroom and go home to their apartments, go online, to coffee shops, or to the library to study for their classes. Thus, the mechanisms of students' actual learning remain a black box for the field of higher education, with far more attention paid to inputs and outputs of the learning process.

This lack of knowledge regarding how today's undergraduates study is problematic for two reasons. First, mounting evidence exists regarding which study strategies are most (and least) effective in facilitating learning. For example, experimental research from cognitive psychology indicates that strategies such as repeated practice testing over an extended period of time is most effective while the oft-used rereading of textbooks and notes is rather ineffective (Dunlosky, Rawson, Marsh, Nathan, & Willingham 2013). Evidence from the learning sciences also indicates that techniques such as self-explanation, peer instruction, and the effective use of instructional technology—all techniques that can be incorporated into students' study skills repertoire—can help students learn (Bransford, Brown, & Cocking, 1999). Thus, descriptive research would provide the field insights regarding whether students use (or not) effective strategies. Second, understanding student practices related to technology is particularly important. Facilitating students' use of technology and social media is particularly important given the ubiquitous nature of technology in early 21st century life (Collins & Halverson, 2009). Besides providing new empirical evidence, descriptions of practice can be used to inform the design of educational interventions so that they are aligned with the preexisting behaviors and norms of students and educators (Spillane, Reiser, & Reimer, 2002). Yet, at the present time, educators and student affairs professionals lack empirical research that sheds light on the prevalence and underlying nature of these phenomena.

Promising areas of research that do examine student study habits include research on students' cognitive styles (Riding & Cheema, 1991) and approaches to learning and studying (Biggs, 1987), both of which highlight important determinants of study habits. Further, evidence exists regarding the prevalence of specific study techniques, such as rereading textbooks (Karpicke, Butler, and Roediger III, 2009). Yet, these bodies of research are limited in that they

focus on narrowly specified variables or aspects of studying, particularly those pertaining to cognitive or "in the head" characteristics of students. This limitation is critical because research from the learning sciences demonstrates that the organizational, sociocultural, and technological contexts in which individuals function play critical roles in how they interact with and learn particular forms of information and social practices (Greeno, 1998). Thus, any account of study habits is incomplete if it fails to account for the complex dynamics among specific strategies, the contexts in which students work, and the tools they use.

In this exploratory study, we draw upon a situative theory of cognition and learning to conceptualize studying as an activity that is distributed—"stretched over, not divided among"—mind, tools, and social and organizational contexts (Lave, 1988, p. 1). Using this framework we analyzed the study behaviors of 60 undergraduates at three research universities in the United States and Canada who were enrolled in biology, physics, earth science, and mechanical engineering courses. Using a structured approach to grounded theory we analyzed data from 22 focus groups to answer the following questions: (1) What behaviors do undergraduates engage in when studying? (2) What underlying contextual factors, if any, influence these behaviors?

Background

Discussions regarding the state of undergraduate education in the early 21st century often focus on the role of the instructor and his or her pedagogical acumen in the classroom (e.g., Bok, 2009). While instructors certainly play an important an role in facilitating student learning by crafting experiences that engage students in these ways (or not), researchers have questioned whether enough attention has been placed on the other actor involved in the learning enterprise—the student. As Entwistle and Tait (1990, p. 170) observed, student behaviors are "part of a broader academic environment which affects learning probably as much as, if not more than, the classroom skills of the lecturer." While the relative importance of teacher and student behaviors in facilitating learning is an empirical question, the fact that students bear some responsibility for their own learning is less debatable. This focus on students' roles in their own learning is evident in the extensive literature on the psychological attributes associated with academic success such as involvement (Astin, 1984) or engagement (Carini, Kuh, & Klein, 2006). While an underlying assumption in these bodies of literature is that students can consciously change their behaviors in college to become more successful, other researchers have focused on more subtle or subconscious psychological traits associated with student learning (see Coffield, Moseley, Hall, & Ecclestone, 2004 for a review). For example, researchers have argued that people have stable cognitive styles, or "typical or habitual mode(s) of problem solving, thinking, perceiving, and remembering" (Riding & Cheema, 1991, p. 194). Another oft-used construct is that of learning styles, which refers to more changeable approaches and preferences for studying and learning (Entwistle & Tait, 1990). Early work on learning styles identified two distinct approaches to learning whose basic outlines persist to the present time: deep approaches to learning that involve searching for meaning, and surface approaches that involve rote memorization (Marton & Säljö, 1976; Biggs, 1987). While approaches to learning are theorized as being relatively

stable within an individual, contextual factors may influence how individuals approach learning in different situations (Ramsden, 1979).

Earlier work in this area also found that some students actively sought information in the environment (e.g., textbooks, lecture content) and then studied in what was called "cue-seeking" behavior, whereas others were more "cue-deaf" or worked to succeed without seeking hints about exams (Miller & Parlett, 1974). This focus on the origins of student's motivation to initiate studying is similar to long-standing line of inquiry that examines the degree to which learners are able and willing to assume control of their own learning process in what is known as self-regulated learning (Zimmerman & Schunk, 2001). A self-regulated learner engaged in a process of setting goals, identifying appropriate strategies, and reflecting on his or her own task performance, which includes attributing the causes of success or failure to either themselves or other circumstances—all of which ultimately lead to a decision to enact changes in future behaviors or to maintain current practices (Cassidy, 2011).

In terms of research examining the precise nature of these study practices, researchers in the psychological sciences have been pursuing research to identify the most effective study techniques that lead to learning, some of which involve first documenting current study practices as they currently exist. In a survey-based study of 177 undergraduates, Karpicke and colleagues (2009) found that the preferred study strategy of 84% of their respondents was rereading textbooks and lecture notes. Unfortunately, a study examining the utility of 10 learning techniques in the empirical literature found that common study habits such as rereading and highlighting text were not effective, in contrast to techniques including practice testing and distributed practice (practice over time) (Dunlosky et al., 2013). Researchers have also focused on time as an important variable related to studying. A study focusing on time spent studying as an important indicator of student learning, based on the idea that time invested in intentional, found that academic-centered activities will lead to more learning (Astin, 1984; Pascarella & Terenzini, 2005). For example, researchers found that hours spent studying has declined from 24 hours a week in 1961 to 14 hours a week in 2003 (Babcock & Marks, 2010). Finally, another group of researchers have focused on the role of technology in student learning and studying. In a study exploring student use of digital and "traditional" resources, researchers found that 39% and 44% of students search Wikipedia and Google respectively if they need help with coursework, with only 36% seeking out a faculty member (Morgan et al., 2012). Rosen, Carrier and Cheever (2013) describe "Net Generation" students (those born between 1980 and 2009) as unable to remain on task for 6 minutes before being tempted by Facebook or texting, but that younger students were better able to multitask than older generations.

However, the literature on study skills, strategies, and habits is limited by a reductionist approach to the very phenomena of studying itself. That is, the complex and multifaceted behaviors that constitute a student engaging in studying are often reduced to a temporal measure that cannot capture in precise terms how and why students study (i.e., hours spent studying), or focus on single strategies (e.g., rereading) at the expense of other possible behaviors. In other cases, a variety of these behaviors are acknowledged but subsumed under latent variables such as

"academic-related skills" (Lotkowski, Robbins, & Noeth, 2004). Perhaps the single largest limitation to the extant literature, however, is the lack of attention paid to the contexts within which students' actually study. While some scholars have focused on the environmental contexts of studying (Kuo, Hagie, & Miller, 2004), few studies have used a comprehensive conceptual framework of learning and activity that encompasses mind, context, and activity. This is both a conceptual and practical problem, as the field needs more theoretically informed and ethnographically grounded accounts of studying that could inform both instructional design and student support services.

Situated cognition theory offers a way to think about study behaviors in such a manner, where "activity is a continual negotiation of people with each other and with the resources of their environments" (Greeno, 1998, p. 9). In this theory, attunements to constraints and affordances that people perceive in their environment trigger certain scripts or schemas and also become part of the decision-making process itself. Situated cognition theory has been used extensively in education to study how teachers learn (Borko, 2004) and the effectiveness of study skill interventions (Hattie, Biggs, & Purdie, 1996). In fact, Hattie and colleagues (1996) argue for supporting student learning by promoting metacognitive skills as part of a "balanced system" (p. 131) comprised of the student, task-appropriate strategies, and specific teaching context. In this way, learning and studying are seen not as the enactment of strategies that individuals employ in isolated situations, but as behavior that "wraps around" individuals, tools, and other features of local contexts (Lave, 1988). Using situated cognition theory we explore how and why students approach studying for their courses amid their complex environment and available resources, which together represent a larger system of activity.

Methods

In this exploratory qualitative study we adopt a stance that emphasizes describing the lived experiences and subjective interpretations of individuals and groups, or what cultural anthropologists call an "emic" account of social life (Merriam, 2014). The study took place at three large, public research universities in the United States and Canada that had similar undergraduate populations (approximately 25,000 students). These sites were selected due to the presence of instructional reform initiatives, which was a criterion for the larger study on instructors' data driven decision-making upon which this analysis is based. The disciplines included in this study are biology, geology, physics, and mechanical engineering. As part of the larger study, a non-random purposive sampling procedure was used to identify faculty study participants. Faculty were included in the study population if they were listed as instructors in each institution's course listings for the 2013 spring semester. We contacted 165 instructors via email requesting their participation in the study, and 59 participated (36% response rate).

These instructors represented the initial pool of courses from which we selected student participants for the focus groups. Of the 59 participants in the larger study we asked 30 instructors if they would recruit students for participation in focus groups, of which 22 instructors agreed. Those instructors sent email requests to their classes, and students contacted the research team if they were interested in participation. There was a $20 incentive, and 60 students participated (see Table 1).

***Table 1*. Sample Characteristics (*N*=60, 22 courses)**

Sample characteristics	*n*
Gender	
Female	36
Male	24
Field of study	
Biology	32
Mechanical Engineering	12
Physics	10
Geology	6
Level of course	
Lower division	34
Upper division	26

Data collection

A team of four researchers conducted the student focus group interviews using a semistructured interview protocol, with each group led by one or two moderators depending upon scheduling constraints. The key question posed to participants was: "Please imagine for a moment how you typically study for this course—can you describe in as much detail as possible your study situation?" This question was followed by probes regarding the types of materials used for studying, whether participants studied alone or with others, and any additional details not yet described. While the open-ended nature of the questions resulted in detailed observations about study practices, it also led to idiosyncratic accounts that were not always comparable across individuals. Each focus group included between one and six students and lasted approximately 45 minutes. These focus groups were audio recorded and transcribed.

Data analysis

Transcripts were entered into NVivo qualitative analysis software and then segmented into manageable units, or discrete statements by participants that encapsulated a single thought or idea (Gee, 1986). First, a code list was created to segment the data that aligned with the research questions guiding the analysis. We were interested in segments related to "study strategies" and "study situations" and thus any utterances pertaining to these two categories were sought out. Both analysts reviewed five transcripts with these two codes in mind, highlighted text fragments related to both codes, and then met to ensure a common understanding of the relationship between the codes and the raw data (i.e., inter-rater reliability). Upon ensuring that the codes were being applied similarly, the second author then segmented the remainder of the dataset. Second, we followed a structured approach to grounded theory that involved using a combination of a preexisting "coding paradigm" and the inductive analysis of transcripts to develop a code list with which to analyze the entire dataset. The second author developed a preliminary code list

using an inductive open-coding approach where terms or ideas mentioned by study participants themselves (e.g., rereading textbooks) were used to create code names (Glaser & Strauss, 1967), while the research questions and theoretical framework were also kept in mind (Strauss & Corbin, 1990). After developing the initial code list, we met to discuss the codes and revised them while reviewing text fragments and discussing the applicability of codes to the data. During this process we attempted to derive codes that maintained as much fidelity to respondents' own language and descriptions of study behaviors as possible. The second author then developed the final code list using the constant comparative method, where each occurrence of a code was compared to each previous instance of that code in order to confirm or alter the code and/or its definition (Glaser & Strauss, 1967), after which the final code list was applied to the entire dataset. Finally, we examined the resulting themes to explore any patterns in the data and identified the model reported in this paper as well as the core category of self-regulation.

The self-selected nature of the sample limits generalizability of the findings to other undergraduates. Additionally, the focus group method may introduce an element of self-censoring by participants due to the public setting, which can result in incomplete answers to facilitator's questions. Also, because participants discussed their studying with varying degrees of specificity it was difficult at times to ascertain whether similar behaviors were being reported.

Results

It is important to note that several participants had differing notions of what activities actually constituted "studying." For some, it meant any exposure to course material such as attending a class, whereas for others studying implied completing assigned tasks. For yet other cases, studying referred to activities that were not assigned and took place outside of class. As one student said, "I see studying more as something that I do separate from any assigned material." In addition to these task-oriented conceptions, some reported "folk" theories of the learning, or ideas about phenomena that are not necessarily grounded in evidence. For example, one student stated, "Studying to me means stressing out your brain so that it realizes that the information is significant." Thus, for these participants "studying" was not easily distilled into a set of strategies, and students' disparate views of studying as involving a variety of acts, settings, and tools echoes a core idea of situated cognition: that activity is best understood as distributed across mind, task, and context (Greeno, 1998). To maintain a consistent definition for this analysis we view "studying" as any interaction with course material outside of the classroom.

Why study in the first place? Cues that trigger study behaviors

Prior to engaging in particular study activities, students frequently discussed *why* they started studying, which centered on the core idea of "cues" that trigger study behaviors. These cues were either provided by the instructor or internally generated.

Instructor generated. Throughout a given semester students reported that instructors often provide cues regarding when and what they should be studying. The most important cue for students tended to be the announcement of an upcoming assessment, thus initiating the process

of studying. For some, an impending assessment was the only reason for studying. Similarly, instructors' discussions about assessments (e.g., topics that would be covered) served as a primary rationale for some students to attend class. One participant said, "I go to class to [hear] the professor say this week on the exam you will see this subject or that subject." Consequently, for some students the classroom becomes a venue in which cues pertaining to assessments are sought and then applied to their studying.

Self-generated cues. Participants also discussed self-initiating the study process. For example, several participants studied after realizing they did not fully grasp a particular topic. One participant explained that he studied after realizing that he did not understand a concept, which then set in motion a series of study behaviors that lasted until he felt conversant with the material. He said, "[A]nd then I realize, 'Oh man, I don't understand pulleys so well,' so last week I studied pulleys until I understood them." Others reported a strong desire to learn certain skills and material so they could reach their career goals.

***Table 2*. Resources Participants Accessed While Studying (*N*=60)**

	n
Digital resources	
Laptop/Computer	57
Google	19
Wikipedia	13
Facebook/Facebook group	12
Course website	11
YouTube	5
Calculator	5
Print resources	
Textbook	34
Notes	33
Pieces of paper	8
Notebook/Notepad	7
Cue cards	5
Human resources	
Instructor	8
Teaching Assistant	8
Tutoring	4
Other resources	
Writing instruments/Highlighters	11
Calculators	5
Whiteboards	3

The Three Stages of Studying: Resources, Time and Setting, and Study Strategies

We identified three distinct yet interrelated stages that constitute the studying process: (1) marshaling resources, (2) selecting a time and setting, and (3) employing study strategies. In reporting these stages we do not claim that all 60 participants progressed through each of these steps, but students often reported engaging in one or more of these stages in the sequence outlined below. We also provide frequency counts for the primary themes comprising the three stages of studying.

Stage 1: Marshaling resources. Participants reported collecting a variety of resources as an initial part of studying. These included digital tools, text-based resources, human resources, and other miscellaneous tools (e.g., calculators). In describing students' use of resources, we draw on sociological frameworks that consider resources in terms of both material tools and objects, as well as the knowledge and capabilities represented by people (Gamoran et al., 2003). Students described these resources as providing information and analytic capabilities that enhanced their studying. Importantly, instructors provided some of these resources, whereas others were self-procured by students themselves. In other words, many participants engaged in a

self-motivated and directed process of identifying, securing, and using resources in order to support their studying. The most commonly reported resources are depicted in Table 2.

Digital resources. The most commonly reported digital tool included laptops or desktop computers (57 participants), which were used for many purposes including note-taking and searching the Internet. Students frequently reported accessing web-based resources such as Google (19), Wikipedia (13), Facebook (12) and course-specific websites (11). These websites helped students expand upon lecture notes or clarify concepts or steps in solving problems. For example, one participant noted that in lecture he listened for key words that could be included on exams and then looked them up online, because "With the Internet and Wikipedia you just need to know a few keywords and you can learn about anything." Thus, the Internet represents a resource that provides information extending beyond course-provided materials.

Students also reported course websites as a resource, though the impact of these websites on studying varied depending upon its design. For example, some websites were described only as platforms for posting course-related materials such as syllabi while others were described as multidimensional learning environments where a variety of resources (e.g., class slides, podcasted lectures, online discussions) were provided that enabled students to select study resources according to their learning preferences. In providing multiple points of entry into a field of inquiry, one student described such a site as enabling her to "tackle problems from all different angles."

That said, the evidence suggests that technology can also play a disruptive role. Eighteen participants reported that some digital resources, usually cell phones and Facebook, disrupted their studying. One student noted, "[When studying] I look up sports stuff, any excuse not to be studying…. [A]t a computer I can just click on whatever I want." With the distractions posed by digital media it is notable that 13 students mitigated the negative influence of these tools by deliberately removing them from their study space. The optimal studying situation for one student was in an isolated cubicle in the library basement with no cell phone reception, and he would turn off his laptop's wireless Internet signal. Overall, digital resources can both enhance and detract from an individual's studying, and whether or not students monitor the role that technology plays in their studying may be a crucial aspect of their academic performance.

Print-based resources. Another type of resource that participants regularly used was print-based resources such as textbooks (34) and lecture notes (33). Lecture notes took many forms including notes taken by student in class as well as notes and/or PowerPoint slides provided by the instructor, both of which were reported as important resources for studying.

Human resources. Skilled and knowledgeable instructors (8), teaching assistants (8), and tutors (4) were discussed as valuable human resources that students sought out while studying. Participants reported approaching an instructor outside of class to obtain assistance with homework, upcoming or previous assessments, and challenging concepts or problems. For

students who were especially struggling with material, these individuals provided expertise and one-on-one instruction students viewed as an important form of academic support.

Stage 2: Selecting a time and setting. Participants discussed selecting a time and social setting in which to study, primarily in terms of preparing for exams.

Timing for assessment preparation. Preparation for an assessment typically took place close to the actual assessment, with 16 participants studying less than 1 week and nine waiting until the final day or night, popularly known as "cramming." While empirical evidence indicates that cramming is an ineffective way to study (e.g., Kornell 2009), and some students recognize its limitations because afterwards the information "is not still in my brain," this mode of preparation remains common. Nine participants reported studying throughout the term, although in some cases this approach was instigated by course-specific factors such as an instructor's use of weekly quizzes.

The social setting in which studying occurs. With whom participants studied also represented an important part of the study process. The decision of with whom to study (if anyone) was largely based on personal reasons, such as the participant finding the perspectives of others helpful (studies in a group) or feeling distracted around others (studies independently). In terms of more general studying throughout the term (e.g., for homework), the majority of participants studied both alone or in a group (31), thus suggesting flexibility among participants regarding the social aspect of their study habits.

Stage 3: Employing study strategies. Participants often described the strategies they chose with imprecise or idiosyncratic terminology, such that it was often not possible to align their strategies with those discussed in the literature (e.g., Dunlosky et al., 2013). Yet, it was possible to identify several core strategies used by this group of undergraduate students. We elaborate on the most commonly referenced strategies (see Table 3).

Reviews notes/course material. Thirty-eight participants reread or reviewed course material or notes taken in class. This strategy was discussed as both a general practice throughout the term and an initial step in preparing for exams. For example, one participant said he reread all of his lecture notes before working with old test materials "to try to understand what the professor had said fully" before taking practice tests.

Does homework. Given the broad conception of studying used in this analysis (i.e., any interaction students have with course material outside of class), we include the strategy of "doing homework," which 25 participants reported. As one participant put it: "My method of studying is pretty much to do any homework or review questions." Homework also provided a litmus test of understanding—one participant explained how he learned a lot in class, but that learning really became clear when he answered the homework questions correctly.

***Table 3*. Reported Study Strategies**

Strategy	N
Reviews notes/course material: reviews or rereads instructor-provided notes, worksheets, quizzes, other materials, and study guides, also re-watched videos shown in lecture	**38**
Does homework: does "homework" (does not specify what that means) and completes assigned homework problems or homework questions	**25**
Creates study artifacts outside of class time: creates cue cards, combines notes from a variety of sources, writes down topics to remember, takes notes on readings/videos, takes notes while studying, creates concept maps, cheat sheets, study guides, and games—note-taking is done outside of class time	**22**
Reads the textbook: reads and consults the textbook	**20**
Works with practice tests and exams: does practice exams, practice midterm questions, review questions, previous exams, and reads old test materials—all associated with an upcoming assessment	**19**
Works on problems: does problems, problem sets, practice problems	**17**
Works on questions: does study questions, practice questions, book questions, end-of-chapter book questions, discussion questions, and practices	**11**
Takes quizzes covering course material: does pre-lecture pre-reading quizzes covering course material, takes quizzes based on in-class material, and does quizzes from DVD that came with textbook	**11**
Replicates aspects of lecture/class: rewrites lecture slides or lecture notes taken in class—participants are likely making exact copies; gives lecture that professor gave when studying with others, goes through notes and replicates examples, questions, answers, etc.	**6**
Rewords problems: rewords problem in own words to better understand it	**2**

Creating study artifacts outside of class time. While students reported reviewing lecture notes from class, this particular strategy involved 22 students creating their own artifacts such as cue cards, consolidating notes from different sources (some instructor-provided, others self-procured) into one set of notes, and so on. For example, one participant explained, "I write myself notes and everything is in my notes, including the textbook material and the prof's slides and what the prof said or the stuff I found in Wikipedia or everything." Others created study aids (e.g., games or cheat sheets) that they used throughout the term.

Reading the textbook. Twenty participants reported rereading the textbook as a key aspect of their studying. Importantly, the depth with which students read textbooks appeared to vary based on their intentions. In one case a student explained, "Sometimes I just go through the chapter we're going to go through in class and I just read all the captions for the images [to prepare for the lecture] so I know what we're going to talk about, and then afterwards I'll read through the chapter." In most cases, however, students spoke more ambiguously about reading.

Works with practice tests and exams. Nineteen participants reported working with test materials provided by the instructor or students who had previously taken the course. One participant reported her routine as taking practice exams in a simulated test-taking environment, followed by an item-by-item analysis of her performance. Another talked about reviewing tests from previous years and randomly selecting problems to complete for practice. In both cases, the materials provided the students with an opportunity to monitor their level of understanding (or lack thereof) while also becoming attuned to the test-maker's approach.

Works on problems. Working on problems was a strategy reported by 17 participants. Although ambiguous, the specific nature of the term "problems" likely refers to mathematical or computational problems given that many of these participants were enrolled in science or engineering courses. As one participant said, "I just find every single practice problem that I can get my hands on and do it."

Works on questions. Eleven participants reported working on a variety of questions while studying. In one class, students worked on study questions or short essay prompts that review that day's lecture. Further, instead of relying on practice exams one student in that class reported, "I've found the best way to do well on the test is not to do all of her practice exams, but do [the] study questions." Others reported working on end-of-chapter questions and completing discussion questions as an effective study strategy.

Takes quizzes covering course material. Taking quizzes related to course material outside of class was another method of studying reported by 11 participants. Sometimes the instructor provided the quiz to test comprehension after a reading assignment. One student who takes biweekly extra-credit quizzes provided by her instructor said, "I take them pretty seriously, I'll prep a little bit before them even though they're only five questions and if I get something wrong I'll read [about it]."

4. Importance of the Situation: Contextual and Personal Factors Shaping Study Behaviors

Participants emphasized how certain contextual and personal factors played a role in shaping how they thought about and engaged in studying.

Aspects of the course. Participants described how disciplinary content and course structure influenced the strategies and resources they used. Some students perceived that different disciplines required different approaches to studying. One participant said, "You can't study math how you would study biology," explaining how in math ones does more practice whereas in biology courses one does more reading. The type of assessments used in a course also influenced the way participants studied. For instance, one student explained how her approach to preparing for multiple-choice exams emphasized a surface knowledge of selected topics: "Instead of looking at a topic and being able to discuss it for paragraphs at a time in like an essay format, I'll try to memorize details that I feel are important."

Participants also explained how their approach to studying for a particular course varied depending on how it was taught. A student noted that his studying "tends to match the style of the class" so that in a class taught with PowerPoint slides, his studying entails "a lot of time looking at slides," whereas a more interactive class involves focusing on concepts and hands-on activities. This student's approach to studying suggests that an instructor's teaching style may have consequences for student learning not only through in-class comprehension of material, but also by sending messages to students regarding the best way to study.

Personal situations and dispositions. Participants also alluded to personal factors that influenced their studying such as the lack of time due to heavy course loads and/or work schedules, family situations, and health-related issues. Additionally, participants brought to a course preexisting dispositions and experiences that influenced their approach to studying. One of these pertains to historic study habits from high school, where some students attempted to alter their "old" study behaviors to fit with the "new" expectations and demands of the university, while others simply continued using what had worked for them previously. A student's personal reasons for taking a course (e.g., to satisfy degree requirement, curiosity) also shaped how participants approached their studying.

Discussion

The field of higher education in general and student affairs in particular continues to grapple with how to best facilitate student success. Does the answer lie in structural responses such as financial aid policies or is success dependent upon student attributes such as engagement? Or, are active learning techniques used in the classroom the key? What these questions do reveal is that students' experiences in college are shaped by many influences and that the intersection among policy, students, and instruction provides a more accurate frame for thinking about student success than a search for a "magic bullet" solution. In this section we advance a framework for thinking about study habits in such a comprehensive manner, with a focus on the centrality of self-regulated learning and digital media. But first we address this question: Are students using effective strategies when they study?

Exploring the Degree to Which Students Are Using Effective Studying Strategies

The answer is a qualified "sometimes" based on a comparison between our participants' strategies to the techniques determined to be "high utility" or demonstrably proven to be effective in the literature by Dunlosky and colleagues (2013). While a one-to-one mapping of strategies between their analysis and our dataset was not possible due to the idiosyncratic accounts provided by our participants, in many cases there was enough similarity to draw tentative conclusions. For example, the strategy most frequently reported by our participants was that of reviewing and rereading notes (n=38) and textbooks (n=20), which are "low utility" activities due, in part, to the lack of research on its efficacy as well as the existence of other proven study techniques (Dunlosky et al., 2013). Students' reliance on rereading as a strategy is echoed by other research (e.g., Karpicke et al., 2009) who propose that repeated reading conveys

the "illusion of competence" to students (p. 478), and its prevalence raises questions about how to convince students to adopt more effective approaches to studying.

That said, many participants reported using high-utility study habits such as practice testing, completing practice problems, or practice questions, although the degree to which such practice was distributed over time and/or "interleaved" across topics is unclear in our dataset (Dunlosky et al., 2013). Further, most of our participants employed more than one strategy (*n*=56) such that few students could be said to solely rely on reading or practice testing alone, varying their study habits based on the type of assessment or other extenuating factors. When reviewing the prevalence with which participants used "best practices" from the literature, then, it is clear that while such insights are valuable they are limited in their focus on ascertaining the presence or absence of a single, de-contextualized set of behaviors. So what is missing?

Self-regulated Learning: Can Students Self-monitor and Manage Distractions?

We suggest that two aspects of undergraduate study habits be carefully considered by researchers, policymakers, and practitioners: whether students exhibit characteristics of self-regulated learning and the role that digital media plays in their studying and learning. In reviewing the data in terms of studying as an activity that is "stretched over, not divided among" mind, tools, and social and organizational contexts (Lave, 1988, p. 1), we were struck by terms such as "cue-reading," "self-testing," "self-monitoring," and "managing distractions," which suggested a student who was taking charge of their own learning situation and condition. Thus, the stance of the student within his or her learning environment—either as a passive or active agent—emerged as a pivotal initial stage to the study process. In the latter case, the learner is actively engaged in controlling his or her thoughts, feelings, and actions to continually improve task performance—what is known as self-regulated learning (Boekaerts & Corno, 2005).

We suggest that, while the use of effective strategies is important, the ability to self-regulate one's own learning may be even more so. Self-regulated learning is a valuable idea in college student success, with empirical research in this area indicating that students who exhibit high degrees of self-regulated learning have higher rates of academic achievement as measured by persistence and grades (Boekaerts & Corno, 2005). But one of the most important (and often overlooked) aspects of self-regulated learning is that it speaks less to figuring out how to succeed, and more to how to "interpret strategy failure and [the] knowledge of how to buckle down to work" (Boekaerts & Corno, 2005, p. 206). Thus, the self-generation of a cue to initiate studying appears to be a critical mechanism that warns the student of potential failure.

Self-regulation itself is a strategy that implicates a complex array of knowledge (of self, course topic, and study habits), volition or "will power," and the motivation to learn—all of which can be used to guide and monitor performance (Cassidy, 2011). Indeed, we observed participants' will power (or lack thereof) to manage distractions while studying, particularly those represented by digital media such as cell phones and social media. Although students recognized the deleterious effects of digital devices on their studying, few were able or willing to do anything about it. With research suggesting that digital media can distract students' academic

pursuits (e.g., Rosen, Carrier, & Cheever, 2013), it seems that students would be well served by being more self-regulated when it comes to technology.

We are not arguing against the use of instructional technology, as ample evidence exists pertaining to its constructive role in facilitating learning (e.g., Collins & Halverson, 2009). Indeed, our data indicate that well-designed course websites offer students many learning resources such as lecture slides, podcasts, practice exams, and links to other web-based tools. Thus, course websites could facilitate student's self-regulated learning by providing digitally savvy students with a plenitude of tools to pursue their studies on their own terms. Besides providing students with digital libraries of resources, instructors can help support and develop self-regulated learning through classroom activities. These include modeling learning strategies such as self-monitoring and summarizing in front of students in what is known as a "cognitive apprenticeship" (Palincsar & Brown, 1984), using small group work tasks (Fitch, Marshall, & McCarthy, 2012), directly teaching students about effective study skills and strategies for dealing with distractions, and assigning open-ended tasks and assessments requiring students to choose strategies and take control of their learning (Boekaerts & Corno, 2005).

Consequently, much of the attention being placed on instructors and their pedagogical acumen as key facilitators of student learning is well-placed, but by peering inside the black box of undergraduate study behaviors, we argue that the relationship between teaching and learning is anything but direct, linear, and/or causal. Instead, students' behaviors and ability to self-regulate their study habits and learning environments act as a critical intermediary between what the instructor does in the classroom and students' ultimate performance in college. Instructors and student affairs professionals still matter, and they can influence students by crafting a learning environment that is supportive and empowering.

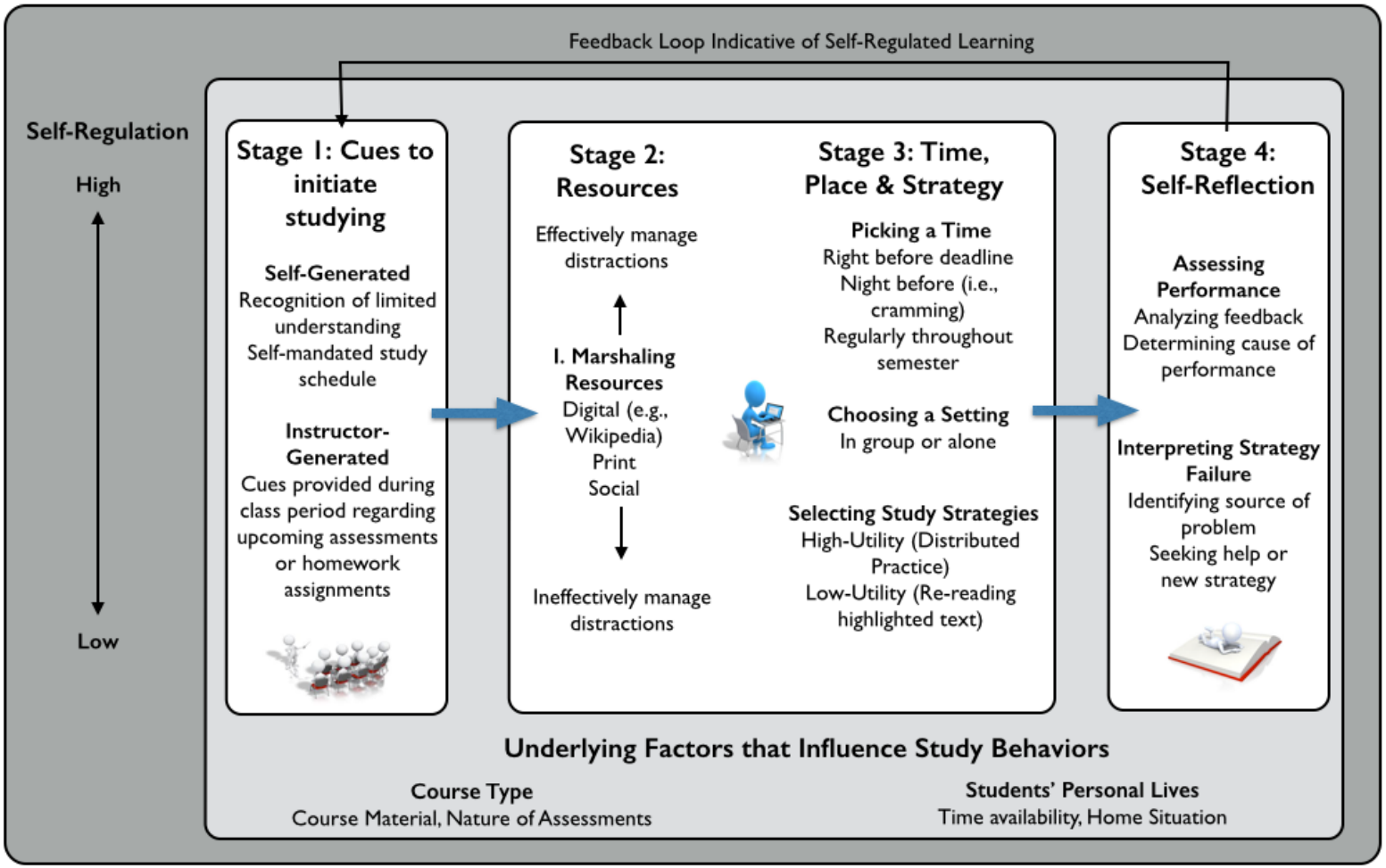
A New Conceptual Framework for Understanding Undergraduates' Study Behaviors

The results from this exploratory study also provided the basis upon which we advance a new conceptual framework for thinking about study habits. Underlying the framework are two theoretical premises: that studying is distributed among mind, tool and activity, and that self-regulated behavior is a critical aspect to successful studying. The framework itself is grounded in the accounts of students themselves and includes a series of steps that include: (1) recognizing the situation and detecting cues to initiate studying, (2) marshaling resources and managing distractions (or not), (3) selecting a time and social setting to study, and then selecting specific strategies, and (4) engaging in a period of self-reflection. Each of these steps is embedded in the unique situation represented by the course and students' personal lives (see Figure 1, below).

We suggest that this framework can be used as a diagnostic tool to describe and document how students approach their studies in your institution and classroom. Why is this important? Because descriptions of study habits "in the wild" of real colleges and universities provides researchers with a robust understanding of behavioral phenomena that are poorly understood—here, the study habits of undergraduates (Slavin, 2002). Once the basic phenomena are better understood, more in-depth research should explore issues such as the role of context on study

habits (e.g., Hadwin, Winne, Stockley, Nesbit, & Woszczyna, 2001) and the management of digital distractions (Rosen et al., 2013). Descriptions of practice are also valuable in the design of educational interventions, which are more likely to be effective when designed in response to local cultural norms and practices (Spillane et al., 2002). This idea applies equally to institution-level reforms, as well as initiatives targeted at improving students' academic success in college, because "How can we teach students if we do not know how they learn?" (Coffield, Moseley, Hall, & Ecclestone, 2004, p. 1). To this we add: "How can we best support student success if we do not understand how they go about studying when they leave our classrooms?"

***Figure 1*. Conceptual Framework to Explain the Mechanisms of Study Behaviors**



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