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In Search of Lost Time
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In search of lost time: investigating the temporality of student engagement, the role of learning technologies, and implications for student performance

Full Research

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Abstract

Much has been written about the importance of engaging students in the learning process. However, studies have shown that students today spend significantly less time on their studies than their forebears. Given the limitations of the existing body of knowledge, this study reviews what is currently known about full-time college students' time use and its consequences in terms of exam performance and skill acquisition. In particular, the results of our initial investigation suggest the ubiquity of today's technologies, especially the Internet, has significant and frequently overlooked consequences for student engagement in general and for their consumption of content for learning in particular. Further, future studies are needed to unravel the complex relationship that exists between learning technologies, students' time use and their academic performance. The paper concludes by highlighting a number of possible avenues for future research in this area.

Keywords

Student engagement, temporality, learning technologies, performance

INTRODUCTION AND PROBLEM STATEMENT

Much has been written about the importance of engaging students in the learning process and a variety of studies have empirically investigated the impact of student engagement, which is conceptualised as the time and effort students invest in educational activities (see Kuh, 2009), on educational outcomes (see Junco, 2012). Studies in this area have shown that both time spent studying (George et al., 2008) and time management skills (Krause and Coates, 2008) are significant predictors of academic success. At the same time, a great deal has been written about the exciting possibilities of emerging and future technologies to support learning and stimulate student engagement. The ubiquity of today's technologies, especially the Internet, has led to the emergence of new forms of learning including blended and online learning, effectively challenging the concept of the classroom as the primary place of learning. Indeed, there is mounting evidence of dramatic shifts in knowledge practices amongst both educators and learning, many of which have been triggered by the adoption of comparatively simple learning technologies (e.g. slideshow presentation software and learning management systems).

Despite these advances, studies have shown that student study time is decreasing (Mortenson, 2011; Babcock and Marks, 2010; Young, 2002), that a growing number of students work (Nonis et al., 2006), and that the number of hours these students work is increasing (Curtis and Lucas, 2001). Further, there are growing concerns that students are experiencing significant challenges in managing their time effectively (Yorke and Longden, 2007) and are under increased time pressure (van der Meer et al., 2010). Yet knowledge of the relationship between students' study time, perhaps the most basic input in the education process, and student learning remains "virtually non-existent" (Nonis and Hudson, 2010; Stinebrickner and Stinebrickner, 2004).

Given the limitations of the existing body of knowledge, this study reviews what is currently known about full-time college students' time use and its consequences in terms of exam performance and skill acquisition. In particular, the results of our initial investigation suggest the ubiquity of today's technologies, especially the Internet, has significant and frequently overlooked consequences for student engagement in general and for their consumption of content for learning in particular. This is a significant finding because it is by means of

technological change that educators are most likely to be able to increase students' study time and maximise their engagement in their studies. The paper concludes by highlighting a number of possible avenues for future research in this area and calling for future research to unravel the complex relationship that exists between learning technologies, students' time use and their academic performance.

RESEARCH DESIGN

In this study, our research objective was to generate an initial analytical framework to better understand the phenomenon of college students' time use, its implications in terms of student performance and the impact of technology-related and other factors on it. We achieved our objective by applying a grounded theory approach to several 'found' practitioner texts on the subject and then analysing the existing literature according to that framework. This approach was deemed appropriate because of the dearth of published research on college students' time use and the factors affecting it.

Grounded theory is "a general methodology of analysis linked with data collection that uses a systematically applied set of methods to generate an inductive theory about a substantive area" (Glaser, 1992). One of the main strengths of grounded theory methodology (GTM) is that it results in theory derived from data, and 'is more likely to resemble the "reality" than is theory derived by putting together a series of concepts based on experience or solely through speculation (how one thinks things ought to work)' (Strauss and Corbin, 1990).

Grounded theory methods are typically applied to empirical data gathered through interviews and field observation. However, it may begin with data of any kind, including documents such as trade and academic journal articles, newspaper articles, and other media materials (Strauss and Corbin, 1990). Thus, whilst unconventional, this approach is not entirely without precedent (cf. Rowe, 2014). For example, Wolfswinkel *et al.* (2013) illustrated how GTM could be used to review literature. Similarly, Kumar and Stylianou (2014) used secondary data in the form of articles from practitioner publications and online sources to develop a process model for IS flexibility and management. The key strength of this approach in this instance is that it is a useful way of developing an empirically grounded analytical framework in an emerging domain as it facilitates a successive reinterpretation of (previous) theory and empirical data in the light of each other.

Data collection

In the course of conducting our initial literature review, we came across a rich and extensive forum discussion on a paper published by Babcock and Marks (2010) documenting the extent to which college students' study time had decreased between the 1960s and the 1980s. We chose to base our analysis on this forum discussion for two main reasons. First, the forum discussion was highly relevant to our study as it focused specifically on the factors that affect the amount of time that students spend on their studies. Second, the forum discussion consisted of comments from a heterogeneous set of participants from contrasting milieus and backgrounds. Because of this diversity, participants articulated a wide variety of arguments and perspectives so there was a conceptual richness in this data that we wanted to be able to capture and analyse. Two other sources were mentioned in the forum discussion and upon inspection, we found that one of these (S2) was also relevant to our investigation. Taken together, the two sources (S1) and (S2) were over 8,000 words in length.

Data analysis

In grounded theory studies, theoretical categories (concepts) and their qualities (properties) are generated from the data rather than the researcher's hypotheses and preconceptions (Hallberg, 2006). This is accomplished using an hierarchical coding processes during analysis (Hallberg, 2006). This process is based on three types of coding. The initial coding is done on a line-by-line basis and represents the initial the "opening up" of the text in order to uncover ideas and meanings it holds (Strauss and Corbin, 1990). This is followed by axial coding, which leads to the development and linking of concepts into conceptual families. The final stage of the coding process is known as selective coding which is where the relationships identified during the axial coding are formalised into theoretical frameworks. Throughout the process, the researcher records detailed memos about the ideas, theorised associations between ideas and any other theoretical reflections that emerge during the process (Hallberg, 2006). The process terminates once theoretical saturation has been achieved, which means that the researcher has arrived at a point where they do not believe that new data adds new information (Hallberg, 2006).

In this study, the coding process was carried out using MS Excel. Each source was initially coded individually. In the first round of coding, segments of text were coded using a wide variety of keywords that were derived from the segments themselves. In the second round of coding, the keywords and associated texts were grouped into three categories: *core phenomenon*, *causes*, and *consequences*. Then, by means of an iterative process, the codes within each of these three main categories were grouped into subcategories. For instance, segments that had been grouped into the consequences category, were subsequently broken down into consequences related to exam

performance and also consequences related to actual skill acquisition. Once this stage had been completed, we aggregated the coding results of both sources, ensuring that the same coding conventions had been applied to both sources.

Once we felt that theoretical saturation had been reached, we gathered fresh data by soliciting responses from members of the IS community (cf. Source 4, listed in the Appendix) having satisfied ourselves that our framework could take account of fresh data, we concluded our data analysis. At this stage, we were able to revisit the existing literature and to frame our interpretation of the literature around an empirically grounded analytical framework. In this way, our analysis starts from an empirical basis but also facilitates a successive reinterpretation of (previous) theory and empirical data in the light of each other (cf. Alvesson and Sköldbberg, 2009, p. 4).

FINDINGS

This section is structured according to the analytical framework that emerged during the coding process (Figure 2). The analytical framework hinges upon a single core phenomenon (college students' study time), a core category in the language of grounded theory (cf. Hallberg, 2006). As the figure illustrates, the forum participants focused on the impact of this core phenomenon on students' academic performance and skill acquisition and they also speculated that college students' time use is affected by a variety of factors, including student factors, institutional factors and technology use factors. In addition, forum participants also identified three main contextual factors that are likely to affect the nature of these associations. These factors relate to the students' (i) faculty and discipline, (ii) academic level (e.g. undergraduate versus postgraduate), and (iii) the particular historical, political, social, economic and cultural contexts. The remainder of this discussion considers each element of the analytical framework in turn in light of both the empirical data and the relevant academic literature.

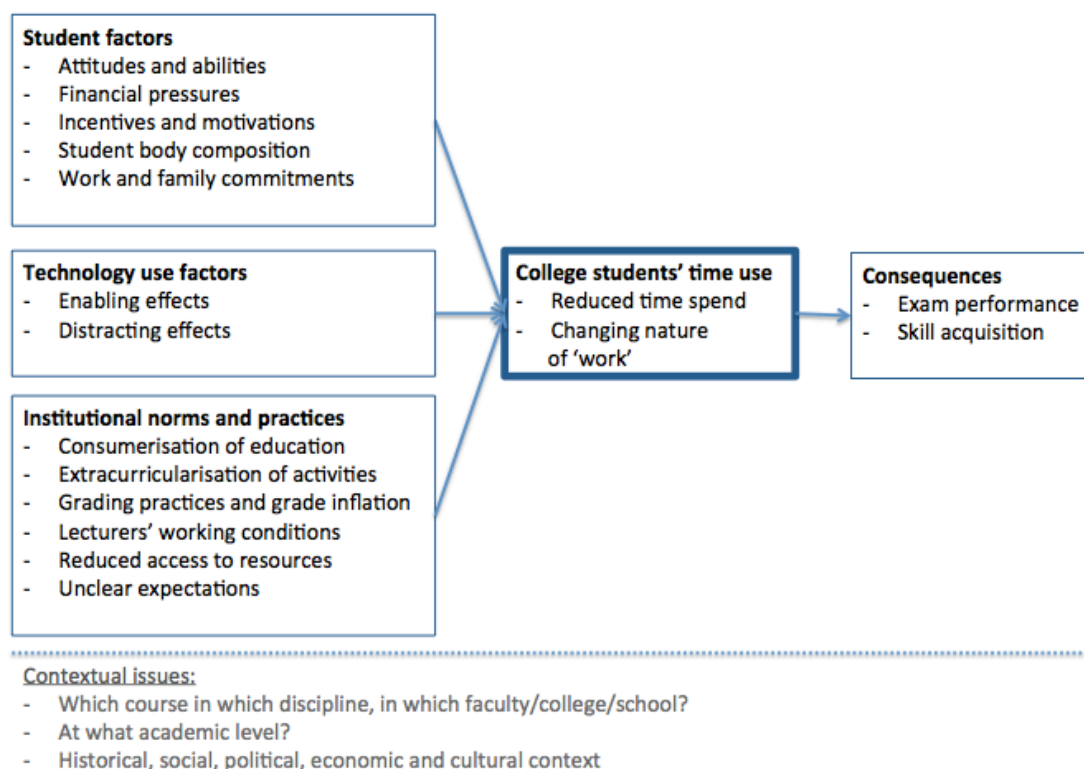


Figure 1: Developing an initial understanding of college students' study time

The core phenomenon: full-time college students' study time

In GTM, a core category is identified and is used to integrate other categories into a conceptual framework or theory that is grounded in the data (Hallberg, 2006). In our study, the core category relates to full-time college students' study time. Both of the sources that we analysed were reacting to a research paper that had been published by Babcock and Marks (2010) which analysed academic time investment by full-time college students in the United States between 1961 and 2003. Their study indicates that college students, in the US at least, are

spending far less time on their studies than their counterparts in the past. What also emerged from our analysis was that it is as important to consider how students are spending their time as it is to ask how much time they are spending on their studies. For this reason, our analytical framework distinguishes between reduced time spend and the changing nature of the work.

In terms of *time spend*, many participants agreed with the assertion that students are spending less time on their studies than ever before. Indeed, several participants suggested that based on their own personal experience, the figures were conservative: Nate (S1), for example argued that he had graduated from a top forty school with a 'decent' GPA having "put in no more than ten hours per week on average" - including time spent in class. However, a vocal minority suggested that these figures would not be accurate for science and engineering students who were likely to spend much more time in class and studying. Turning to the academic literature, there is overwhelming evidence that students are devoting less time to their studies (Nonis and Hudson, 2010; cf. Mortenson, 2011; Babcock and Marks, 2010; Young, 2002). Most recently, Mortenson (2011) analysed revealed that a full-time commitment required an average of only 3.3 hours per day for taking classes and doing homework and research activities between 2003 and 2009. Further, this finding holds for males (3.1 hours) and females (3.4 hours), students from families with low incomes (3.7 hours), students from high income families (2.9 hours), students at age 18 (2.8 hours), age 20 (3.5 hours), age 22 (3.0 hours) and age 24 (3.6 hours). As the author points out, this is a significant issue that "does not appear to be reflected in current policy discussions about the important issues confronting [American] higher education".

Though there is strong evidence that students are spending less time on educational activities, there is very little discussion on what those educational activities consist of. According to Matt (S1), it is erroneous to assume that most (undergraduate) study time is dedicated to writing research papers. Instead, he argues, the "work of college students seems to be: (1) reading assignments; (2) class attendance; (3) memorizing and repackaging the materials presented in #1 & 2 in an exam or essay format". Another anonymous contributor (S1) recalls "reading before class, taking notes in class, reviewing and annotating notes after class, more reading and review throughout the week and on weekends. With the research and writing of papers mixed in with that". Turning to the academic literature, some studies (e.g. Young, 2002; Junco, 2012) distinguish between in-class activities and class preparations, indicating that lecturers typically recommend that students engage in at least two hours of class preparation for every hour spent in the classroom. However, very few studies make any attempt to establish the kinds of educational activities that students engage in or to establish what proportion of their study time is typically allocated to different types of educational activity. Further, few studies have investigated the extent to which students can effectively manage their time (Trueman and Hartley, 1996; Macan *et al.*, 1990). One notable exception is presented in Head and Eisenberg (2011) and reports that the nature of students' educational activities shifts dramatically at exam time. This finding is commensurate with Gersick's (1988) argument that individuals and groups don't work at a steady pace but experience transitions between periods of inertia and periods of progress as deadlines loom.

Consequences

Our analysis indicated that forum participants were aware of at least two areas that would likely be affected by changes in full-time college students' use of time: exam performance and skill acquisition. However, the main focus of these discussions was on understanding what was causing changes in full-time college students' study time rather than understanding the consequences of that change.

In terms of actual *exam performance*, several participants observed that the amount of time students spend studying did not seem to have affected student grades overall and that this was surely a sign of decreasing academic standards. One anonymous participant cynically asked whether college students today read and comprehend twice as fast as students did in the 1970s, for example. However, one participant, Rahul, asked whether the number of hours spent studying was a good predictor of performance. His argument was that it is the productivity of the work that matters, rather than its duration. Turning to the academic literature, a number of authors have highlighted the scarcity (Menge and Heijke, 2005) and mixed results (Nonis and Hudson, 2010) of literature addressing the relationship between the allocation of time and students performance directly (cf. Krohn and O'Conner, 2005; Lahmers and Zulauf, 2000; Romer, 1993). Like Rahul (above), Schmidt (1983) argues that it may inappropriate to assume that units of time are homogenous for students because there can be significant differences amongst students in terms of the intensity of their study. Young (2002) makes a similar point, arguing that one can spend long hours accomplishing very little and can do a lot in a few moments and that students' capacity to effectively manage their time is more significant than the amount of time they invest. Nevertheless, there have only been a few empirical studies that have investigated students' time management behaviours and the time management studies that have been published have not investigated the impact of students' time management practices on exam performance (Macan *et al.*, 1990).

In terms of the impact of full-time college students' study time on their *skill acquisition*, a number of forum participants observed that students were leaving college with fewer skills than in the past. Butch (S1), for example, wrote that in his role as a manager, he had the opportunity to assess the preparedness of today's graduates. His comment was: "they are not (as a group) well prepared or, in my estimation, well educated". Turning to the academic literature, there have been some studies that have tried to measure skill acquisition rather than exam performance (e.g. Bennett *et al.*, 2000). However, we were unable to find any study that attempted to empirically measure the impact of students' study time with skill acquisition.

Explanatory Factors

Our analysis suggested three main types of factor that are thought to affect full-time college students' study time: we labelled these Student Factors, Technology Use Factors, and Institutional Factors.

Student factors:

These days pretty much anyone who wants to go [to college] can get in somewhere

- Jolly, S1

Nearly 40% of our explanatory factor codes identified some reason why students themselves – either individually or as a collective – were responsible for the changes taking place in full-time college students' study time. More specifically, we identified five distinct arguments in the data.

The first argument is that the composition of the student body itself has changed over time. Micah (S1) argues that students today come from "a wider variety of social and economic backgrounds than 50 years ago" and "many of these students are 'weaker'" than before so that it requires "less effort for the 'A' students to stand out" in a large, curve-graded classroom. Similarly, Jolly (S1) argued that in 1961, "there were [sic] a select group of quite bright people going to college [but] these days pretty much anyone who wants to go can get in somewhere". The elitist undertone of this argument underpinned many of the comments addressing the students themselves. However, Babcock and Marks (2010) indicate that the declines in students' study time were extremely broad based and could not easily be accounted for by work choices, major choices or compositional changes in students or schools. Responding to the general feeling that less privileged students must surely do worse than others, Philip Babcock quipped: "it would seem to us a subtle and very peculiar variety of privilege that proves invisible every related measure" (S3).

The second argument is that today's students face greater work and family commitments than in the past. Anastasia (S1) argues that as funding for education has decreased and tuition rates have increased, more students are working rather than studying in order to pay for tuition, books, rent etc. At the same time, today's students, she argues, are less likely to have financial support from their families than in the past. This argument is echoed by Elizabeth (S2). In a similar vein, Anastasia (S1) she points out that students studying professional subjects like business are likely to spend at least some of their time gaining professional experience through internships etc. Though it may well be the case that nearly two-thirds of all college students now hold jobs while enrolled (Mortenson, 2011), one of the forum participants (Thorfinn, S1) reminds us that the decline in study time was detected in full time college students who don't work at all in the Babcock and Marks (2010) study.

The final three factors that were mentioned in the empirical data relate to students' attitudes and motivations, their abilities, the incentives they are offered and the financial pressures they face. In terms of student attitudes and motivations, several forum participants suggested that today's students simply do not value a university education to the same extent that their forebears might have and that for many of them, a third level education was a means to an end rather than something they were intrinsically interested in. This is described by Fabio Rojas in S2 as 'vocationalism'. It was also argued that a third level education is not likely to be held in such high esteem when it is available to everyone. In terms of students' abilities, UnrepentantGunner (S1) pointed to a "leftward shift in the quality/ability distribution of students today" whilst several other participants (e.g. DanH, S1; Jack, S1; Trey, S2) provide anecdotal evidence of decreasing student abilities.

Technology-use factors:

As a current college student, I often wonder what people did with their free time and/or to procrastinate before the invention of the Internet and television. I mean, I suppose "we did our work" is an answer, but I mean....that can't be right, can it?

- Colin, S1

Educators have far more control over the kind of technologies that are used to support teaching and learning than they do over the student-based and institutional factors affecting full-time college students' study time. It is therefore by means of technological change that educators are most likely to be able to enhance students' study time and maximise their engagement in their studies.

In our study, roughly 30% of the explanatory factor codes identified some reason why emerging technologies are driving the changes in college students' study time. The comments on technology use differed from the other comments in two ways. First, forum participants were undecided about the impact of technology use on students' study time. A strong cohort felt that emerging technologies enable higher levels of productivity and thereby drive down study time. Several participants counter argued that social media in particular are distracting students from their work. Second, several commentators observed that technology could not have been a salient factor in the Babcock and Marks (2010) study at least (upon which the forum discussion was based) because the decline in study time that they report took place before the emergence and widespread adoption of email and the Internet (e.g. Jlohnsdale, S1; John, S1; Michael Bishop, S2;). For example, John (S1) writes that "everyone brings up word processors, but... numbers are steady at ~38h/week from the 20s to 1965, then they begin their precipitous demise".

In terms of the kinds of *efficiencies that are enabled by technology*, Matt (S1) is surprised that students have only saved 30% of their time. He observes that writing a paper in 1961 meant going to the library, searching through the catalogue, writing down the references and the notes, composing the paper in long hand, and then typing, editing and re-typing it on a typewriter. As he observes, the situation would not have been much better for other kinds of college work. Engineering and science students would have had to consult logarithm tables in books and calculate using their slide rules. Similarly, computer science students would have had to compile boxes of punch cards. Bill Harshaw (S1) also argues that lecturers are able to impart knowledge more efficiently today than in the past. However, this argument is challenged by Dan H (S1) who is highly critical of PowerPoint ("PowerPoint makes you stupid"). His point is that the content has simply been slimmed down into bullet points.

In terms of *technology-enabled distractions*, Butch (S1) asks if students "spend all of their time texting and playing games on their computers". At the same time, Thorfinn (S2), a recent college graduate, confirms that students today are in fact spending their time on Facebook, watching TV and texting rather than studying or engaging in extracurricular activities. When students have the option to engage in so many other fun activities besides study, he feels this is the "rational choice". His argument does seem to have some merit. An online infographic based on data collected by the Bureau of Labor Statistics in the US shows that students spend an average of 24.5 hours per week e-mailing, IM-ing and web surfing. The infographic also compares Facebook users and non-users, revealing that users spend 1-5 hours a week whereas non-users spend 11-15 hours per week studying¹. Thorfinn (S2) concludes by suggesting that whilst we may be more productive because of technology, we are probably wasting all of the benefits on ESPN.com. Turning to the academic literature, there seems to be a general consensus that students' engagement with universities has changed as a consequence of technological developments and increased numbers of students who work or are enrolled as part-time students (van der Meer *et al.*, 2010). In particular, a number of studies have shown that today's students have developed new forms of technology use patterns and approaches to learning (Thompson, 2013). More specifically, Prensky (2001, p. 442) argues that digital natives exhibit (i) a craving for speed, (ii) a desire to multitask, (iii) a preference for collaboration and constant connectivity, (iv) an expectation of immediate feedback and 'payoff' for their efforts. This argument has been supported by the empirical data presented by Emanuel *et al* (2008) which indicates that emerging technologies are affecting how college students spend their time and choose to communicate with one another and to interact with learning materials. Indeed, Waycott *et al.* (2010) suggest that these trends are as true for lecturers (digital immigrants) as they are for students (digital natives). At the same time, a growing number of studies point to the negative effects that technology use is having on student engagement and performance. In terms of student engagement, Junco (2012) found that there was a significant negative relationship between frequency of engaging in Facebook chat and time spent preparing for class. Kirschner and Karpinski (2010) also showed that regular Facebook users report lower average GPAs and spend fewer hours studying each week than nonusers. In terms of academic performance, researchers have found that recreational Internet use is strongly correlated with impaired academic performance (Kubey, Lavin, and Barrows, 2001). Ultimately, however, the academic literature remains silent about whether or not technologies in general and learning technologies in particular are enabling or preventing more efficient learning.

Institutional norms and practices:

Lower grading standards lead to less studying. They also lead students to give better course evaluations

- Michael Bishop, S3

Roughly 30% of our explanatory factor codes identified some reason why higher education institutions are responsible for the changes taking place in full-time college students' study time. More specifically, the prevailing view seems to be that as a result of changing grading practices and grade inflation, students are able to get the same grades as before but with less effort. In effect, standards have slipped. A related argument on the forums is that lecturers themselves have been put into a particularly vulnerable position because their career

¹ The infographic is available at <http://visual.ly/how-do-college-students-use-their-time>

advancement now depends upon student satisfaction scores (e.g. Eli, S2). Bill (S1), for example, refers to an “implicit reward system for faculty members [who] get good student reviews”. An alternative view was that it was not so much that students study less but that there is a greater expectation on students today to engage in more extra curricular activities. Nicholas Nirowlan (S2), for example, asks why we are surprised that students are more active in non-academic endeavours when “college admissions boards SELECT students according to non-academic criteria now more than ever”. Turning to the academic literature, we found several studies that examined the phenomenon of grade inflation, though these studies did not specifically examine the impact of grade inflation on students’ study time or their skill acquisition. According to Johnson (2003), “grade inflation runs rampant at most colleges and universities”. However, a closer analysis reveals that it is more prevalent in some disciplines than in others (Lomas and Tomlinson, 2000; Sabot and Wakeman-Linn, 1991²). A variety of factors are thought to cause grade inflation. We found several studies linking grade inflation to the rise of student satisfaction surveys (e.g. Eiszler, 2002) and also to universities’ increasing reliance on temporary, part-time instructors (Sonner, 2000). However, Elton (1998) suggests that the rise of grade inflation is instead associated with a rise in continuous assessment in particular disciplines rather than with broader trends occurring across disciplines.

Conclusion

At a time when there is overwhelming evidence that students are devoting less time to their studies, educators who want to encourage and motivate their students to engage in productive study behaviour are striving to better understand the factors that are driving this change and its consequences for students’ academic performance, skill acquisition and work place preparedness (Nonis and Hudson, 2010).

Our aims in this study were (i) to investigate full time college students’ study time, (ii) to identify the factors that affect college students’ study time, particularly the technology-related factors, and (iii) to evaluate the extent to which college students’ study time affects students’ academic performance. Given the dearth of literature in this area, we conducted a grounded theory analysis to a set of ‘found’ practitioner texts on the subject (listed in the appendices). This approach is not without precedent but is somewhat uncommon in our field. As this paper illustrates, it is a useful way of developing an empirically grounded analytical framework in an emerging domain and also facilitates a successive reinterpretation of (previous) theory and empirical data in the light of each other. In this paper, we used this analysis to generate an initial analytical framework and we then analysed the existing literature according to that framework. Our intent here was to ensure that future research in this area would be built on a more solid foundation and we were also keen to develop a perspective that would be grounded in the everyday lived experiences of students and lecturers.

The results of this initial investigation pave the way for several future studies on college students’ study time, the factors that affect it and its consequences for students’ academic performance, skill acquisition and ultimately, their preparedness to enter the work place. By juxtaposing forum participants’ comments with the academic literature, we were able to identify some clear gaps in the academic literature that should be addressed in future studies.

- i) In terms of this paper’s core phenomenon (college students’ study time), there is a pressing need to know more about how college students are spending their time. This goes beyond the need to simply count the number of hours students spend on their studies. Instead, we need to develop a clearer understanding of what exactly it is that today’s students spend their study time doing and what impact are learning technologies having on those time investments? To what extent are students equipped to effectively plan and manage their time? How can students maximise the return on the time they invest in their studies? Ultimately, if we are to meaningfully advise students, we must have some basic understanding of what it is that they do all day and what role IS/IT plays in shaping these knowledge practices.
- ii) Future studies are also needed to better understand the impact of college students’ time use on both exam performance and skill acquisition. Today’s students seem to be spending less time on their studies and still achieving the same or higher grades as in the past but it remains unclear whether this is because standards have slipped or because technological change has increased the efficiency of today’s learners. For now, the academic literature remains silent about whether or not technologies in general and learning technologies in particular are enabling or preventing more efficient learning. On the one hand, these tools enable students to support one another’s learning. On the other hand, they are a genuine

² The Sabot and Wakeman-Linn (1991) study is particularly interesting: it provides evidence of divergent grading practices across departments and links this divergence to falling enrollments in STEM courses. More specifically, the authors reveal that across eight department, the number of students receiving a B+ or higher rose from 11.9% to 20.6% between 1962/3 and 1985/6.

distraction. In attempting to address this question, the results of our analysis suggest that it is important that researchers carefully distinguish between academic or exam performance, skill acquisition, and work place preparedness: today's students might be achieving good results but that is not to say that they are any better equipped for the workplace when they leave college than their forebears. Researchers should also bear in mind that not all units of time are created equal and so the relationship between study time and performance is not likely to be linear. As Young (2002) puts it: "you can spend long hours accomplishing very little or you can do a lot in a few moments".

- iii) Educators have far more control over the kind of technologies that are used to support teaching and learning than they do over the student-based and institutional factors affecting full-time college students' study time. It is therefore by means of technological change that educators are most likely to be able to enhance students' study time and maximise their engagement in their studies. For this reason, the next stage of this research project specifically probes the impact of a number of specific technology-related factors on college students' study time. Going forward, there is a need for future research that also addresses the interplay between student-related, institutional and technological factors. For example, it would be useful to compare and contrast the relationship between technology use, time spend and performance for privilege and disadvantaged students in order to make more informed policy decisions around equitable access to learning technologies.
- iv) Finally, our analysis identified several important contextual factors that must be brought to bear in any future research on college students- study time. These future studies must, for example, take into account that the types of activities that students engage in differ across modules, disciplines and faculties.

In conclusion, this paper highlights an important anomaly that is frequently overlooked in mainstream research: if student engagement is defined in terms of time and effort invested in learning, then today's students are less engaged in learning than ever before. Education worldwide may indeed be experiencing a once-in-a-generation change as a result of technology-based innovations but as this paper argues, it is time to fully explore the implications of these changes for 21st century learners.

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