To What Degree are Undergraduate Students Using their Personal Computers to Support their Daily Study Practices?

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Abstract

This scoping study examines the degree to which twenty two undergraduate students used their personal computers to support their academic study. The students were selected based on their responses to a questionnaire aimed at gauging their degree of computer skill. Computer activity data was harvested from the personal computers of eighteen students and video footage of the students personal study sessions was gathered from a further four students. Three core themes emerged: (1) Academic Use vs. Non-academic Use; (2) Computer Orientated vs. Paper Orientated; and (3) Self-reports of Practice vs. Actual Practice. Overall results suggested three fundamental behaviors relating to technology use: 1] they were more likely to engage in non-academic work than academic work on their personal computer; 2] they were more inclined to use paper-based approaches compared to digital ones despite the high rate of personal computer ownership and internet access; 3] there was a disparity between students' self-reports of the degree to which they used their personal computers for academic purposes (high) and non-academic purposes (low) to what we found from computer logs which showed academic use as low and non-academic use as high. From these results we conclude that for this group of students computers played an important role in their day to day lives, but the degree to which they were used in their academic study was lower than we had expected.

Keywords: Student learning; E-learning; Higher education; E-literacy; Student study habits.

Introduction

As universities become more digital and computer technologies become increasingly sophisticated and ubiquitous, understanding the extent to which students integrate these technologies into their daily study practice is essential if we wish to understand their future potential to advance learning (Butson and Thomson, 2011). Nevertheless, there has been little research to date that explores students' first-hand experiences of using new technologies to support their academic practice (Sharpe et al., 2005). For example, the degree to which students today can be regarded as competent computer users in terms of utilising academic software in order to excel in their studies is hazy. While the literature shows an increasing number of undergraduate students own a computer and have a broadband connection (Aspden and Thorpe, 2009, Guidry and BrckaLorenz, 2010, Smith and Caruso, 2010, Dahlstrom, 2011), it is unclear to what extent these personal computers are utilised in the academic study practices of students. The typical assumption is that these 'digital natives' (Prensky, 2001) have a high level of computer literacy and are therefore likely to utilise their laptops to support their learning in advanced ways.

It is also worth noting that much of the research we found into student use of computer technologies has been based on surveys and interviews (perception data). By this we mean students reporting on what they believe they do through post-event recollection. The primary endeavor in regard to this investigation was to explore the use of datasets other than post-event recollections. This would require us to locate data collection as close as possible to the students' daily studying practices. Two approaches were explored and subsequently used: 1) computer usage data was extracted from the student laptops (Computer Activity Data) and 2) student's used video cameras to film their study sessions within their home study space (Cohort Behavioral Data). To ascertain if there was a difference between perception data and naturally occurring data a traditional self-report questionnaire was included.

Prior to the commencement of the study, three core areas of inquiry were established:

- The degree to which students utilised their personal computers for academic purposes as compared with non-academic use,
- The extent to which computer use had been adopted over traditional paper-based approaches,
- The degree to which student self-reports (post-event recollections) align with data capture of their actual practice.

Method

Given the exploratory nature of the study and the researchers social constructivist orientation, the study adopted the interpretive, naturalist enquiry approach of Guba and Lincoln (1989), and the analysis approach of Constructivist Grounded Theory of Kathy Charmaz (2006). This approach unpins the decision for the selection of a small number within a particular context to understand their experiences rather than a focus on generalisable findings. Two separate cohort groups were used from conveyance and not for any particular purpose, one capturing usage data from their computers (Computer Activity Data) and the other filming their home-based study practices (Cohort Behavioral Data) with considerably more input being required by this cohort. All participants were undergraduates and all completed the Self-report survey. ***The Self-report Data was gathered through a short questionnaire that ascertained the student perceptions of their degree of computer use. The top scoring students, those that self-reported as skilled computer uses, were invited to participate in the study.***

The Computer Activity Data: Eighteen students who self-reported as being skilled computer users were selected for this part of the study. A software programme (ManicTime) was installed on their personal computers. This software captured usage information on applications used, websites visited, documents accessed and the associated times and durations involved. The data was gathered over the duration of their first six studying weeks in semester one 2012. We were confident that this naturally-occurring activity data was going to yield rich information that was

going to be very different to the traditional perception data. It would allow us to review the applications used, documents accessed, websites visited and periods of use. However, the numerical nature of this data meant it couldn't tell us much about the context in which these digital activities were occurring. It was envisaged that the video capture that the students were generating of their home-based study practice would help situate the Computer Activity Data.

Cohort Behavioural Data: A second cohort consisted of four third year undergraduate students who also rated themselves as being skilled computer users. Each student was asked to capture a series of short video clips of their home study practices over a three month period. Over twelve hours of video footage resulted. Our interest was on the context(s): to what extent did the participants integrate and interact with computer technology in their daily undergraduate study habits.

These two datasets represented a mixture of students' actual computer practices (Computer Activity Data) and behaviours associated with study practice (Cohort Behavioural Data). While Computer Activity Data captured what students used their computers for, Cohort Behavioural Data was used to elicit data on how students used their computers within their study routines, and it gave us an insight into the context. Through these two datasets we hoped to gain some insight into what students used their computers for.

Findings

Guided by our three core areas of interest, an analysis of the three data sets (Self-reported skill level, Computer Activity Data, Cohort Behavioral Data) using the coding processes of grounded theory resulted in three themes:

- Academic Use versus Non-academic Use
- Computer Orientated versus Paper Orientated
- Self-Reports versus Actual Practice

Academic Use vs. Non-academic Use: From the Computer Activity Data (computer logs) we analyzed the top three software applications, documents used and web sites accessed. The most obvious classification was the academic or non-academic use. Academic refers to software, documents or web services that were related to the participants' academic study. Non-academic includes all other uses, such as banking, entertainment sites, Facebook groups, etc. As shown in table 1 the computer logs revealed much higher non-academic use compared with academic use.

Table 1:

Computer log data: breakdown between academic vs. non-academic use.

No. of Students	**Percentage (%)**	
	Academic	**Non-Academic**
15	10	90
2	20	80
1	90	10

For clarity values have been rounded to the nearest whole number

Paper Orientated vs. Computer Orientated: From the Cohort Behavioral Data, we analyzed the four participants' behaviors from their self-created 12 hours of filming. Coding the students activity while they were studying revealed a clear distinction between behaviors that were paper orientated and behaviors that were computer orientated. By paper orientated we are referring to repetitive behaviors that did not include the use of their computer. By computer orientated behavior we are referring to repetitive behaviors that did include the use of their computer. As shown in table 2 we found these students engaged in more paper-based activities during study sessions than computer-based.

Table 2:

Percentages for comparison of paper orientated vs. computer orientated activities

Participants	Percentage (%)	
	Paper Orientated	**Computer Orientated**
1	14	66
2	56	19
3	92	0
4	17	57

Note: The percentages do not distinguish between academic and non-academic activities and for clarity values have been rounded to the nearest whole number

Self-Reports of Practice vs. Actual Practice: We found a considerable difference between what students thought they used their computers for from what they actually used them for. While the self-report questionnaire indicated students believed they used their computers mainly for academic purposes the results from the computer logs suggested a very different story. As shown in Figure 1 the data shows students generally believed they used their computers more for academic purposes rather than non-academic (red). However, the computer logs revealed that 17 out of 18 of the students used their computers significantly more for non-academic purposes than for academic.

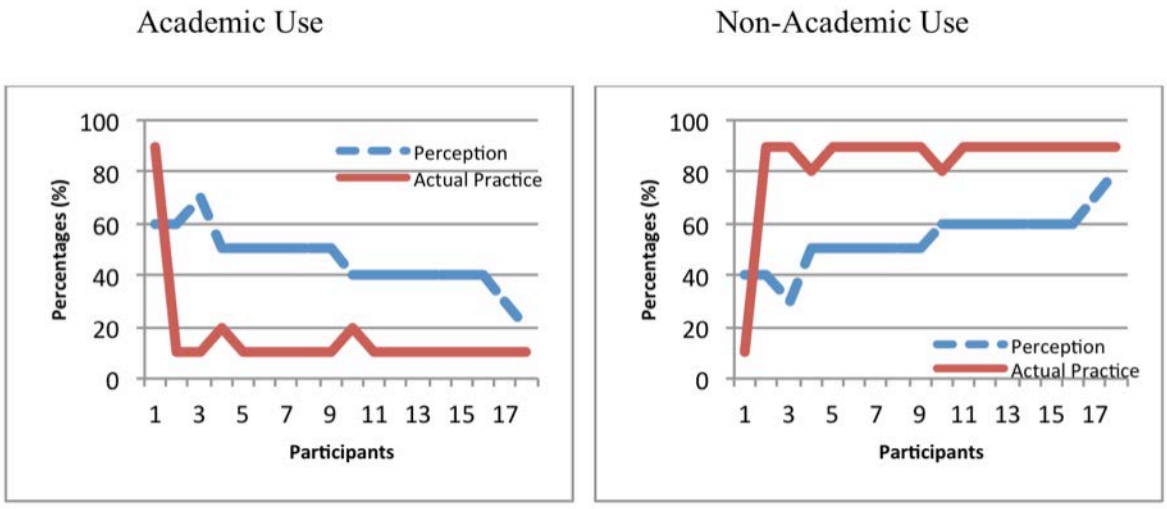

Figure 1: Actual and perceptual data of Academic and Non-Academic Use

This was reinforced from the Cohort Behavioral Data where students spent considerable time during their home-based study sessions on a variety of applications not associated with academic practice. As shown in *Figure 2* below, this student often played around with music software (as in the illustration on the left) and regularly checked her emails (as in the illustration on the right), while others had Facebook permanently on screen.

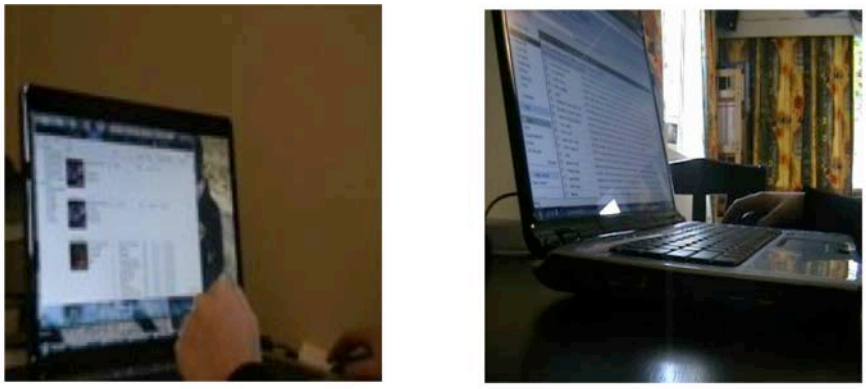

Figure 2: Non-academic work with technology[8]

The Cohort Behavioral Data also revealed that when these students did use their computers for academic purposes they exhibited a more limited degree of proficiency than we were expecting.

[8] Consent was granted by participants for the use of the film files for research purpose.

For example, we had footage of a student manually adding references for an assignment. The footage also captured her saying, “I’m just doing my psychology assignment … first of all I’m going to compile a list of references just using Microsoft Word …” She continued at this task for some time, repeatedly deleting large section when an error was made. She also commented about her expectations of the process before she started typing, “This is probably going to take me ages”. In the process, she said, “This is really time consuming”; “This is boring”; “God that is so annoying”; and “I’ve done this so many times I’ve just memorized reference lists”. The footage duration showed that she took more than one hour to add one page of references. When questioned later about her knowledge of software programs that automate much of this process, she replied she had heard of these but hadn’t used them.

Findings

As mentioned earlier, the core findings contributed to the development of three main themes, namely, Academic Use vs. Non-academic Use, Paper Orientated vs. Computer Orientated, and Self-Reports vs. Actual Practice.

All participants stated in the self-report questionnaire that computers played an important role in their undergraduate academic practice. This is not surprising given the rapid increase in the ownership of personal computers over the past five years by students enrolled in higher education (Aspden and Thorpe, 2009, Guidry and BrckaLorenz, 2010, Smith and Caruso, 2010, Dahlstrom, 2011). It seems reasonable then to assume that these students would be leveraging the benefits that computer technologies afford. However, our results did not support this. In fact we found the dominant use of their personal computers was for socialising (social networks such as Facebook and email), personal web services (auction sites and online banking) and entertainment (YouTube, music and movies). This was followed closely by web services such as retail, news, health, television, movies, information on pubs, air tickets, etc. Academic use on the other hand was

generally limited. This was a surprise given the growth of study resources such as PowerPoint slides, academic articles, and assignment guidelines being distributed in digital formats.

An analysis of the Cohort Behavioral Data (video footage) revealed that the participants exhibited only rudimentary awareness and skills concerning the capabilities of their computers to enhance their academic work (e.g., file management, bibliographies, planning, word-processing, databases, and analytical packages). In fact, the students in this study were completely unaware of the many academic-related software applications either on their computers or available through applications offered by the institution such as bibliography programmes (i.e., Endnote, Zotera, Mendley), planning programmes (e.g., Outlook, Evernote, OneNote), analysis packages (i.e., SPSS, NVivo, and MATLAB), and more generally (e.g., spread sheets, graphics software, programmes to support PDF annotation).

Given the wide-ranging conscience in the literature on student's computer savviness, we were taken aback by the degree to which these students were using paper-based approaches. It was clearly the preferred means of engagement regarding study. While the common format for course materials for these students was text based and digital (i.e., Microsoft Word, PowerPoint and portable document formats), all engaged in extensive indiscriminate printing of these materials. We were puzzled by this behaviour. We had assumed these students would exhibit high levels of digital orientated behaviour, instead we found they preferred to print material and apply traditional study techniques associated with paper-based form. We wondered if this was due to a lack of awareness of annotation and mark-up facilities, and the storage and retrieval capabilities that digital formats offer or did it signal something deeper about student's preference to use paper-based approaches.

It is interesting to speculate whether students' preference for paper-based approaches is the lack of skill/knowledge with the technology or whether it could be due to a dependence on paper-

based approaches inherent in higher education. It seems reasonable to assume that the way in which an institution embraces and implements technology is going to have a bearing on the way in which students will engage with technology in their higher education learning. Although students are comfortable with technology and see it as integral to higher education (Dahlstrom, 2011), they may expect that teaching staff will model the academic use of technology (Smith and Caruso, 2010).

Given the dominance of paper-based approaches it is not surprising that the ***Cohort Behavioural Data (video footage)*** showed that students were very reliant on their printers. In fact you could say that for academic use the computer was of little use without an attached printer. From the video footage it appeared that the computer was simply a device that was used to access documents that the student then printed and stored in ring binders. Incidentally, all used ring binders to store and categorise their printed resources.

Finally, it is worth noting that much of the literature we found on the role of computer technology in supporting learning in higher education was based on perception data. Part of this study was to explore the validity of this approach by examining whether there is a difference between students' perceptions and actual practice in relation to their computer use and their computer literacy. The results from Computer Activity Data suggest that there is considerable difference.

Studies employing perception data are typically optimistic regarding student dependency on personal computers for supporting study. A vast array of studies claim that computer technology now plays a significant role in supporting undergraduate education (Aspden and Thorpe, 2009, Dahlstrom, 2011, Guidry and BrckaLorenz, 2010, Smith and Caruso, 2010) and that this increased use is resulting in learning efficiencies for students (Smith et al., 2009). There is a degree of acceptance from much of this material that presupposes students "use technology in academia to give them access to resources and progress reports, make them more efficient as

students, facilitate connecting with others, and make learning more relevant and engaging" (Dahlstrom, 2011).

The naturally-occurring practice data captured in this study did not support these claims. Why were our findings different? When we looked only at the perception data (self-report questionnaire) gathered from our participants we found the conventional pattern appearing. The difference only occurs when we accessed the naturally occurring student activity. It gave us a way of 'seeing' what students did (and did not do) rather than what they said they did or did not do. As Starr and Fernandez (2007) noted, self-reported behaviours can be quite inaccurate for describing practice and thus we believe there are grounds to question the veracity of studies that use post-event capture to represent actual practice. Furthermore, participants' "perspectives in action" (records of behaviour) and/or "perspectives of action" (accounts of behaviour) (Belk and Kozinets, 2005, p. 132) should be taken into consideration when studying practice.

In summary

The aim of this study was to explore third year undergraduate students' practice of using their personal computers in their independent study sessions. While the findings from this study are specific to the cohort groups involved and are therefore not generalisable, the results do offer new understandings and insights into the use of computers to support undergraduate study. From this study, students were found to be active computer users and highly computer literate in non-academic use. Their academic use, in terms of practice and literacy, however, was low and limited. Students were also found to favour working in a paper-based manner rather than a digital one. Finally we found a clear difference in outcomes from perception data to naturally occurring data. We believe this finding brings into question the current dependence on perception data to reveal authentic, situated practice.

We are confident that this study will promote a deeper conversation about the role of technology in higher education and the use students currently make of personal computers/devices to support their study. Perhaps more research on larger and more diverse groups of students could be considered. Additionally, authentic and situated behavioural data should be employed in researching technology use. The difference found between perception and practice data signals the need for a substantial shift in the way we understand and gather data in this emerging field.

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