

Changing Minds: Multitasking during Lectures

Liz Coulter-Smith¹

¹ University of Northampton, Northampton
NN2 6JB, UK

liz.coulter-smith@northampton.ac.uk

Abstract. Multitasking students is a common topic amongst academics. Many studies focus on *how* students multitask while this study investigates *why* students multitask in formal lectures. A questionnaire was used to discover student perceptions around multitasking amongst computing students. The results indicate most students are adequately motivated to improve their multitasking behavior if it influences their grades. Results show that most students claimed boredom as a significant reason for multitasking in class. This study suggests we inform students about the effects of multitasking as it relates to their academic achievement.

Keywords: Multitasking · Attention · Communication

1 Introduction

There are many related factors that impact student focus, attention, distraction and academic work in the classroom [1, 2]. Three out of four students believe technology improves their educational experience [3] and since 2015, ninety percent of all students have both laptops and smartphones¹. This study asks *why* students are

² multitasking during the formal lectures, what are some of their beliefs and will it continue to increase. It also aims to, where possible, raise the awareness of the effects on student performance and discuss potential improvements and changes to consider during in-class lectures. More broadly this study contributes to the ongoing multitasking debate in the context of teaching computing in higher education.

¹ Between 2011 and 2017 smartphone use doubled from 21.6 to 44.9 million in the United Kingdom [17]. ² Multitasking is defined in this paper as involving the “concurrent performance of two or more functionally independent tasks with each of the tasks having unique goals involving distinct stimuli (or stimulus attributes), mental transformation, and response outputs” [18].

2 Background

In 2009 Stanford University held a significant meeting of some urgency. It involved participants gathered from neuroscience, child development, cognitive science, communication, education fields, including business, government policy, and other advocates. They met in order to consider the critical impact of multitasking on learning and development [4]. In that meeting multitasking was described as “a challenge to human cognition” [5] and at that point multitasking took on a clearly multidisciplinary approach to solving issues around technology. Even though learning was the focus of this group at this time, most of the general population was already familiar with the perils of multitasking, driving and texting [6, 7]. Multitasking has also been recognised as both a “multidisciplinary and a young area of inquiry” for research [4].

2.1 Information foraging

Information foraging theory makes sense of what drives all of us to multitask. Humans used to forage for food, now they forage for information. The theory asserts that we have evolved using information to solve problems that threaten our environments. The theory explains that humans have adapted cognitive solutions for survival. The technological need for survival has formed the basis for human interaction with information technologies like the World Wide Web [8]. Early discussions about media multitasking borrowed heavily from the biological sciences in Pirolli and Card’s (1995) ACM paper [8]. The book, ‘Information Foraging Theory’ was published twelve years later in 2007 [9]. One of the most recent influential works, ‘The Distracted Mind’ [10] was published in 2016 and further develops the information foraging theory thesis by closely aligning it to the neurosciences and recent technological advancements.

3 Methods

A questionnaire was devised for the purposes of surveying multitasking in lectures. It was carried out between March 21st -31st 2017. There were sixty student respondents from the computing department at the University of Northampton. All students were undergraduates. The questions were designed to discover current perceptions about multitasking behaviors and began from observations and comments made by students over a six-month period. The questions were written in the same plain language students used. A Likert scale was used for twenty-two questions that gauged sentiment from strongly agree to strongly disagree. An optional question was asked at the end about whether they would like to share their thoughts; twenty-five responded. Questions were grouped into three sections; belief questions ‘I believe multitasking during lectures [...]’, reasoning/feeling questions ‘I multitask during lectures because [...]’ and behavioural change questions ‘I would change my mind about 'multitasking' 3

if research proved it could [...]’. There were twenty-two questions overall; twenty-one were used. There were sixty responses in total. Q1 was omitted; it was a device question and could not be converted. Q5 was similar to Q2, however there is some variation so it remains relevant. Both Q2 and Q5 are central to the study and appear at the top of the

table below. The last four behavioral questions at the end of the questionnaire Q20-Q22 were similar in order to see which driver, the grade or learning, was more motivational.

Table 1. Questions ordered by groupings

Q2	I regularly use one or more electronic devices while formal lectures are happening				
Q5	I regularly use electronic devices while formal lectures are happening				
Belief Questions		Reasoning/Feeling Questions		Behavioural Change Questions	
<i>I believe multitasking during I multitask during lectures because I would change my mind lectures [...] [...]</i>				<i>research proved it could [...]</i>	
Q3			helps me learn Q4	I like keeping in touch with	
Q6	is a smart thing to do	Q8	it will make me more employable	Q19 improve my ability friends	Q20 harm my ability to learn
Q7 helps me combat Q12 the lecturer reads from the Q21 lower my grades boredom	Q9 improves my learning	Q13 it makes me more efficient	Q14 I can get more done	Q22 slides improve my grades	
Q10 is an important skill	Q11 improves my memory	Q15 I've always done it this way	Q16 I feel pressured by time		
Q17 feel pressured by the lecturer	Q18 I feel it is expected from me by the course				

4 Results

The idea of multitasking to lower or improve grades appears to have been more motivating. Q21 and Q20 both scored sixty percent suggesting a willingness to change if multitasking proved to either improve or harm grades. The highest score was Q22 with sixty-six percent suggesting that the strongest motivator could be if multitasking was proven to improve their grades. Q22 may be prone to confirmation bias given the reassuring nature of finding out a well-loved habit is good rather than the reverse.

In Q14 fifty-five percent believed they could get more done with forty-three percent believing it made them more efficient in Q13. Just fifty-eight percent said that they were using one or more devices to multitask during their formal lectures. The reason for this appeared to be that they felt they could get more done. Also, scoring highly with sixty-two percent were those that multitasked because lecturers were reading from slides, and in a similar vein fifty-five percent were multitasking to combat boredom during formal lectures. In some respects, this is encouraging as a change in teaching approach away from slides may result in more active or participatory learning. Perhaps unsurprisingly there were students felt pressured to multitask by their lecturers with Q17.

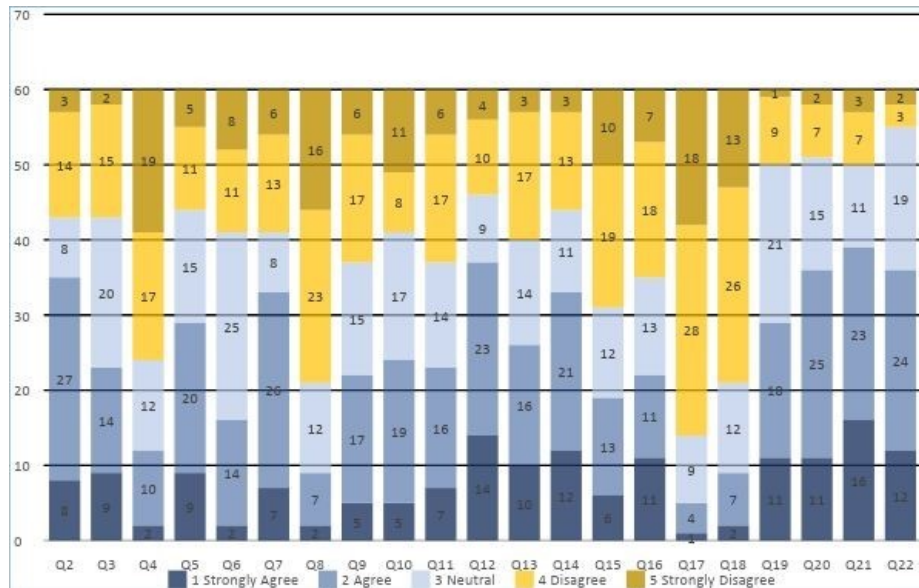


Fig. 1. Showing the frequency across the questions sentiments

Just twelve percent of the respondents thought multitasking would make them more employable. Considering this it may be useful to raise awareness with students for employability purposes. In contrast, forty percent of respondents said they believed multitasking to be an important skill. There has been an increasing frequency ‘multitasking’ as a listed skill in UK job postings for software developers in the last few years. This despite evidence that multitasking skills are commonly sought after skills by employers. Cliff Nass (2012) states that “companies now create policies that force their employees to multitask”. There does appear to be a difference in emphasis between the United States, and the United Kingdom. Respondents did not consider multitasking to be an employability factor as highlighted in some research [11, 12].

³ Searching the word "multitasking" indeed.com and "multitasking" indeed.co.uk show a difference of 73,300 US compared to 6,760 UK. This may suggest a difference in educational and employment emphasis. It could also be just a reflection of population differences.

5 Discussion

This small study shows that some computing students in the UK have varied views on whether multitasking during class lectures is positive or negative. This suggests that

students need current and focused information about multitasking. There is some evidence that teaching methods may be encouraging multitasking during the crucial parts of formal lectures. Students also appear to be interested in the facts about multitasking given some of the discussions and comments collected. Do lecturers have a responsibility to inform students about the effects of multitasking on performance? Is there some slippage we can address between student beliefs and clinical evidence? There is little doubt that some intervention might be considered with studies and professional development. Do we wait and see, as Susan Greenfield asserts, for the brain to adapt? [13] Perhaps it will adjust over time or possibly enhancements will evolve us into foraging information ‘supertaskers’[14]. A small minority do demonstrate that multitasking does not always mean poor performance as some researchers assert [15]. Given the choice, recent studies into child development are focusing on how we *learn* to pay attention as we grow into adults—the findings are stark and disturbing [16]. We may see the impact as an increasing number of students enter higher education.

6 Conclusions

When approaching this topic, several questions were considered. Do we need to help students understand how they can optimise their work by understanding how multitasking can affect performance? Are students experiencing difficulties managing attention with devices and without them? The questions were simple and based on informal observations and conversations with students. Several of those conversations revealed a pattern of student pride both in technical speed and multidevice ability. Some students commented that they had a superior multitasking abilities. This was in stark contrast to observations witnessed in the classroom where students seemed distracted, unfocussed and often tentative about simply *reading* instructions or exploring content in the lecture or workshop.

This study has possibly brought up more questions than it has answered. It has made a few small contributions in the niche area of multitasking within computing in higher education in the UK. More broadly it has tried to underscore the need for educators to consider the current research and cognitive deficits that students may be both facing and completely unaware of. Many will experience the often-severe impact the lack of focused attention brings as well as the consequences on their academic achievement. Since 2010 the number of mobile devices in the classroom has been exponential and there is every sign that will continue and ultimately test educators, but more importantly it will be the students who will need guidance about the risks and benefits of multitasking in order to manage their courses, careers and lives.

References

1. Sana, F., Weston, T., Cepeda, N.J.: Laptop multitasking hinders classroom learning for both users and nearby peers. *Comput. Educ.* 62, 24–31 (2013).
2. Junco, R.: In-class multitasking and academic performance. *Comput. Human Behav.* (2012).
3. VitalSource/Wakefield: Fifth Annual VitalSource/Wakefield Survey Finds College Students Want More - and Better - Classroom Technology,

- <https://www.vitalsource.com/press/fifth-annual-vitalsource-wakefield-survey-finds-college-students-want-more-and-better-classroom-technology>.
4. Wallis, C.: The Impacts of Media Multitasking on Children's Learning & Development. Rep. from a Res. Semin. Joan Ganz Cooney Cent. Sesame Work. 30 (2010).
 5. Ophir, E., Nass, C., Wagner, A.D.: Cognitive control in media multitaskers. *Proc. Natl. Acad. Sci.* 106, 15583–15587 (2009).
 6. Salvucci, D.D., Taatgen, N.A.: *The Multitasking Mind*. (2011).
 7. Thornton, B., Faires, A., Robbins, M., Rollins, E.: The mere presence of a cell phone may be distracting implications for attention and task performance. *Soc. Psychol. (Gott)*. 45, (2014).
 8. Pirolli, P., Card, S.: Information foraging in information access environments. *Conf. Hum. Factors Comput. Syst. - Proc.* 1, 51–58 (1995).
 9. Pirolli, P.: *Information Foraging Theory: Adaptive Interaction with Information*. Oxford University Press, Oxford ; New York (2007).
 10. Gazzaley, A., Rosen, L.: *The Distracted Mind: Ancient Brains in a High-Tech World*. The MIT Press, Cambridge, Massachusetts (2016).
 11. Burak, L.J.: Multitasking in the University Classroom. *Int. J. Scholarsh. Teach. Learn.* 6, 1–13 (2012).
 12. Crenshaw, D.: *The Myth of Multitasking: How Doing it All Gets Nothing Done*. Jossey-Bass: A Wiley Imprint (2008).
 13. Greenfield, S.: *Mind Change: How Digital Technologies Are Leaving Their Mark On Our Brains*, (2015).
 14. Strayer, B.D.L., Watson, J.M.: Supertaskers and the multitasking brain. *Sci. Am. Mind*. 23, 22–29 (2012).
 15. Bellur, S., Nowak, K.L., Hull, K.S.: Make it our time: In class multitaskers have lower academic performance. *Comput. Human Behav.* 53, 63–70 (2015).
 16. Akpan, N.: Toddlers' screen time linked to slower speech development, study finds | PBS NewsHour, <http://www.pbs.org/newshour/rundown/toddlers-screen-time-linked-slower-speech-development-study-finds/>.
 17. Statista: UK: Number of smartphone users 2011-2018, <https://www.statista.com/statistics/270821/smartphone-user-in-the-united-kingdom-uk/>.
 18. Sanbonmatsu, D.M., Strayer, D.L., Medeiros-Ward, N., Watson, J.M.: Who Multi-Tasks and Why? Multi-Tasking Ability, Perceived Multi-Tasking Ability, Impulsivity, and Sensation Seeking. *PLoS One*. 8, (2013).