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MEDIA USE, LEARNING APPROACHES AND ACHIEVEMENT

Media multi-tasking and learning approaches as predictors of academic success – is students' use of media counter-productive?

Concerns have been raised about the potential for media multi-tasking to distract young people from the business of obtaining a good education. It seems likely that if students are off-task during studying (or during class), because they have received a text message, or could not refrain from checking for updates on their Twitter feed, then they will encode less of the information that they are meant to be learning, and/or take longer to achieve the academic tasks that they have been set (see Sana, Weston and Cepeda, 2013). A number of applied experimental studies within an educational context point to this conclusion. For example, Sana *et al.* (2013) investigated learning in a simulated classroom and found that students took in less information when they were asked to complete online tasks (e.g., web searches) on a laptop during the lecture. Media multi-tasking while studying may be just as disruptive as media multi-tasking in the classroom.

Another approach has been to survey students' self-reported media multi-tasking behaviour and to correlate this against measures of academic performance. A large-scale survey of American college students (N = 1774) found that their Grade Point Average was negatively correlated with certain types of self-reported media multi-tasking (using Facebook and texting) while studying (Junco and Cotten, 2012). Using the more objective data of computer time-logs, rather than relying on self-reporting, Judd (2014) has also demonstrated that Facebook is a main culprit in promoting multi-tasking behaviour among students. These studies are based on self-reported multi-tasking behaviour, but the findings concur with an observational study by Rosen, Carrier and Cheever (2013), where researchers watched children and young people from middle school, high school and university while they studied at home. Participants who opened Facebook at least once during the 15-minute observed session had lower (self-reported) grade point averages than those who stayed away from it.

Karpinski, Kirschner, Ozer, Mellott and Ochwo (2013) also found a negative relationship between the use of social networking sites and academic performance for American college students, but that



Participants who opened Facebook at least once during the 15-minute observed session had lower grade point averages than those who stayed away from it



this was moderated by the degree of multi-tasking that students reported. Therefore, it may be that some students are using social media at appropriate times and not attempting to combine it with academic work and are faring better in terms of academic outcomes. Interestingly, Karpinski *et al.* did not find this moderating effect in the sample of European students that they tested, for whom social networking was disruptive regardless of whether they multi-tasked while they engaged with it. Overall, these studies suggest that any disruption arising from social media may be tied to the use of social media in particular, rather than media multi-tasking in general.

Media multi-tasking and dealing with distraction

Some authors suggest that media multi-tasking is fundamentally changing the way the cognitive system processes information (Ophir *et al.*, 2009). Ophir *et al.* published a widely-cited study that developed a new measure of media multi-tasking (the Media Use Questionnaire, from which a Media Multi-tasking Index or MMI can be derived) and compared heavy and light media multitaskers (HMMs and LMMs) on a number of cognitive measures. Somewhat counter-intuitively they found that heavy media multi-taskers were worse in a traditional test of task-switching (that is, switching from one task to another affected their overall performance more) than light media multi-taskers. Ophir *et al.* suggest that this 'switch-cost' is due to HMMs having trouble filtering out irrelevant distractions. They presented evidence of this from an attentional filtering task where participants had to remember a display of red shapes while ignoring irrelevant blue shapes presented at the same time, and a version of the Continuous Performance Test where they had to ignore white distractor letters while attending to a stream of red letters. In both these tasks, HMMs were more affected by the irrelevant shapes or letters than LMMs. In light of these differences, Ophir *et al.* argued that HMMs may be more prone than LMMs to distraction from irrelevant information in the environment and irrelevant representation in working memory.

However, it may be that the differences between HMMs and LMMs have been overstated initially. Two papers have failed to replicate Ophir *et al.*'s (2009) task-switching finding, with one showing no difference between heavy and light media multi-taskers (Minear *et al.*, 2013), and the other showing a lower switch-cost for heavy media multitaskers (Alzahabi and Becker, 2013). Meanwhile, there have also been conflicting findings with regard to working memory capacity. In their attentional filtering task, Ophir *et al.* found no difference in memory performance on trials where there were no distractors present. However, this task simply involved storing information in short-term memory; there was no requirement to manipulate the information or engage in another processing task at the same time. The study by Minear *et al.* (2013) included a measure of reading span (which should tax the same cognitive resources as operation span), but they found no significant differences between HMMs and LMMs.

In summary, findings relating to the relationship between media multi-tasking, attentional control and working memory have been mixed. Also, it is important to consider that even if some of these aforementioned differences were to be established as reliable, one still does not know the direction of causality. Does media multi-tasking really change the way we process information, or is it the case that people with a particular information-processing style are more likely to enjoy and engage in media multi-tasking? It could be that media multi-tasking will be taken up to a greater extent by the participants who naturally tend towards breadth-based cognitive processing, or who are good at deploying their attention across multiple locations.

Media multi-tasking and study approaches

Returning to the field of higher education, it could be that students who have a particular way of approaching their studies are also the students most likely to engage in media multi-tasking.

There are a number of established tools available for measuring the ways in which students prefer to learn, to manage information, and/or are motivated for learning. The construct of interest here

is study processes (also known as study approaches), which give information about the way in which participants choose to tackle learning tasks, within a given context. They are therefore not direct measures of personality, but of the way in which the student is currently approaching their own learning.

Biggs and colleagues (Biggs *et al.*, 2001) show that students may adopt either a 'deep' or a 'surface' learning approach, with the former being focused on achieving understanding, while the latter focuses on memorising content. These approaches have been associated with academic achievement, with deep learning tending towards a positive relationship (Newble and Hejka, 1991, cited in Diseth and Martinsen, 2003) and surface tending towards a negative relationship (Diseth and Martinsen, 2003). These relationships are often weak, however. Additionally, it is possible that one type of assessment can lead to higher grades from one or other approach to learning (Diseth, and Martinsen, 2010). Multiple choice exams, for instance, may be best tackled through the memorising, 'surface' approach.

The relationship between deep/surface learning approaches and media multi-tasking has not previously been investigated, although Yilmaz and Orhan (2010) find that those reporting surface learning use the internet more, and specifically more for non-learning based activities.

The current study

To investigate the relationship between study approaches and media multi-tasking, the current research utilised well established measures, namely the revised two-factor Study Process Questionnaire (Biggs, Kember and Leung, 2001), and Ophir *et al.*'s (2009) Media Use Questionnaire, which was used to derive a Media Multi-tasking Index (MMI).

Academic performance was measured using the participants' overall grade for the academic year during which data was collected. In this way, a range of coursework and exams contributed to the grade, giving a rounded picture of the student's achievements. Information on previous academic performance was also obtained where possible.

To summarise, the current study aimed to identify any relationship between study approaches, media multi-tasking, and academic achievement. Based on the relationships previously reported between academic performance and *ad hoc* measures of media multi-tasking (e.g., Junco and Cotten, 2012), it was predicted that MMI would be negatively predictive of academic performance (as would a surface approach to learning). Furthermore, it was predicted that MMI would correlate positively with a surface approach to learning and negatively with a deep approach.

Method and Results

A total of 224 participants took part. All were students from either The University of West London (UWL) or from a comparable post-92 institution in the North West of England. They completed two measures – the Media Use Questionnaire (from which the Media Multi-tasking Index is calculated, Ophir *et al.*, 2009), and the Revised Two-Study Factor Study Process Questionnaire (R-SPQ-2F; Biggs, Kember and Leung, 2001), which measures the learning approaches of students within a given context, in this case their degree programme. The researchers also obtained permission from each participant to use their mean grade for the academic year, to be used as a measure of academic success.

It was found (through multiple regression – see Table 1) that the MMI did not predict poor academic performance in the sample, and nor did it show any relationship to either surface or deep learning approaches ($p_s > .05$). However, as predicted, surface learning did predict poor academic performance.

Predictor	Beta	t
MMI	.02	< 1
Deep Learning	-.07	< 1
Surface Learning	-.21	-2.75**
Regression model: $F(3, 202) = 2.61, p = .05, R^2_{adj} = 2.3\%$		

** $p < .01$

TABLE 1

Summary of multiple regression analysis



Overall, the current study adds support to the suggestion that any worry about multimedia use and its effect on UK students' academic performance may be over exaggerated



Discussion

As summarised above, a number of predictions were made regarding the MMI, deep and surface approaches to learning, and academic achievement.

The predicted negative relationship between MMI and the deep approach, and positive relationship between MMI and surface approach were not found. The MMI was also not a negative predictor of academic achievement. The only prediction fully supported by the current study is that a surface approach to learning does negatively predict grade – that is, the more strongly someone identifies their learning approach as surface, the lower their current academic grade.

That a surface approach to learning was a negative predictor of grade is supportive of the findings by Diseth and Martinsen (2003), and the current study also found this to be the case in courses which do utilise multiple choice tests in a significant number of assessments, something which Diseth and Martinsen, (2010) suggest may mediate this relationship.

The predicted relationships between MMI and learning approaches had stemmed in part from the findings of Yilmaz and Orhan (2010), who found that those reporting surface learning do use the internet more. It was proposed that media multi-tasking will be taken up to a greater extent by the participants who naturally tend towards breadth-based cognitive processing, or who are good at deploying their attention across multiple locations – surface learners. The current findings suggest that while they may use the internet more, they are not any more likely to do so in conjunction with other forms of media.

As identified in the literature review, there are mixed findings regarding MMI as a predictor of academic performance. In finding no such predictive relationship, the current study appears to conflict with findings by Sana *et al.* (2013), who all noted that such multi-tasking did negatively affect academic outcomes. However, Sana *et al.* focused on immediate outcomes, and in particular on an intervention directly requiring participants to multitask in situations where they might not usually do so. In contrast, those studies measuring reported use over a period of time (e.g. Junco and Cotten, 2012) and observing students studying as they normally would (Rosen *et al.*, 2013) found much more mixed results, with evidence that social media, and in particular social media used while studying, are the media that are most disruptive.

Overall, the current study adds support to the suggestion that any worry about multimedia use and its effect on UK students' academic performance may be over exaggerated, and that students' day to day use of media may not be a concern in this context. This is in agreement with the findings by Karpinski *et al.* (2013) when examining a European sample, but contradicts findings by Junco and Cotten (2012) whose participants were in North America. This suggests that there may be something different about the way American students are using Facebook and other media. Students at UWL are known to create their own Facebook groups specifically to invite each other to discuss their academic assignments, and it may be that multi-tasking in this way has

much more positive outcomes for them than purely social use of media. This leads to the recommendation that future research needs to find a valid and reliable way to not only monitor the use of Facebook (and other sites) but to discriminate between productive and counterproductive usage. Experimentally this is very challenging as such monitoring can often lead to changes in the very behaviour being observed – especially in the case of a behaviour which student participants may feel they should not be showing while studying.

When the current results – that self-reported use over a period of time does not link to achievement – are examined in context with more interventionist studies (e.g. Sana *et al.*, 2013) it does lead to the conclusion that inviting students to multi-task in situations where they would not usually do so – tweet your ideas with this course hashtag! Comment on the module Facebook page as you complete this exercise! – may well be counterproductive, and in particular to those students who are not used to such media use. Furthermore, the current study provides support to the idea that students should be steered away from an over reliance on a surface learning approach throughout their university careers.



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