



# Off-Task Media Use in Lectures: Towards a Theory of Determinants

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**Abstract.** A growing body of evidence indicates that university students frequently engage in off-task media use (OTMU) during lectures. While the bulk of research in this area has considered the frequency and impact of such behaviour, little work concerning the subjective and contextual factors that determine OTMU in academic settings has been conducted. In this study we adopt a qualitative approach to consider the determinants of this behaviour. Seven key factors that determine students' OTMU in lectures are identified: OTMU policy, OTMU norms, Fear of missing out, Grit, Control over technology, Quality of lecture, and Visibility of peers' OTMU. We propose a model which specifies the relationships between these factors and discuss how institutions and lecturers can navigate the challenges posed by OTMU in lectures.

**Keywords:** Off-task media use · Cyber-slacking · Media multitasking

## 1 Introduction

Extensive use of digital media has become a distinguishing feature of today's university students [20]. A growing collection of studies investigate the influence of this behaviour on students' academic activities [15, 19, 22, 34]. From these studies a body of evidence has emerged indicating, firstly, that students frequently interact with a variety of digital media while engaging in academic activities, secondly, that these interactions are mostly *off-task* (unrelated to their academic work), and finally, that they have come to change how students approach learning. Fried, for example, reports that during a 75-min lecture students used their laptops for off-task activities for an average of 17 min [15]. Junco reports that 69% of students engage in texting during lectures [19], while Roberts and Rees found that 66% of students engage with email, instant messaging and social networking during lectures [31]. In a subset of these studies researchers have investigated the implications of media use for academic performance [19, 20, 22, 35]. Van der Schuur et al., through a review of studies examining the effect of media use on academic performance, found evidence of a negative correlation between media use in academic settings and academic performance [38]. While these findings underscore the importance of understanding the dynamics of students' behaviour

with media in learning settings, there remains uncertainty about how learning processes are influenced by media use.

While many studies consider the frequency of media use in academic settings [15, 19, 20], or the relationships between this use and academic performance [19, 20, 22, 35], little work concerning the subjective and situational factors that determine *off-task media use* (OTMU) or *cyber-slacking* [40] in academic settings has been conducted. This is particularly the case in developing countries. Additionally, with few exceptions, researchers in this domain have opted for quantitative methodologies, utilising data collected through surveys or quasi-experiments. Against this backdrop this paper reports the findings of a qualitative investigation of media use during university lectures. The aim of this study was to develop a rich descriptive account of the OTMU patterns students adopt in lectures. To this end we conducted five focus groups involving a total of 30 undergraduate students at a large, residential South African university.<sup>1</sup> We analysed the resulting data in accordance with grounded theory principles and identified seven factors that underlie OTMU in lectures.

## 2 Related Work

We briefly review literature concerning the ubiquity of media in students' lives, followed by research into the motivations for media use in academic settings.<sup>2</sup>

Studies of student media use suggest that, on average, students spend between one and two hours of their days online [20]. In a survey study Jacobsen and Forste found that two-thirds of students use media while in class or studying [18]. Rosen et al. similarly, found that students averaged less than six minutes on a task before switching to another task [32]. Specifically, a number of studies [7, 15, 19, 22] indicate that OTMU has become increasingly common during university lectures.

While data is limited, South African students seem to be little different from their peers in developed countries. North et al. found that, in their sample of 362 South African students, only 1% did not own a mobile phone, or had not owned one recently [25]. In another study of South African students, Leysens et al. found that over 95% of students use instant messaging at least once during a lecture [22]. This was followed by social networking with over 20% of students using it at least every ten minutes during a 50-min lecture. As is the case in other studies, they found that few students engaged in task-related media use.

Guo et al. identified seven dimensions of motivation for media use in academic settings [17]: (i) information seeking; (ii) convenience; (iii) connectivity; (iv) problem solving; (v) content management; (vi) social presence; and (vii) social context cues. In a subsequent study Zhang found that different needs predicted different types of media use [43]. They clustered these needs into three

<sup>1</sup> The university is currently ranked among the top 400 on the 2017/2018 Times Higher Education World University Rankings.

<sup>2</sup> Our use of the term 'academic setting' is inclusive of formal lecture environments, practical or tutorial classes, group work settings or personal study sessions.

categories. The first, and most common category—‘convenient/easy/instant’—includes gratifications which are only possible given media’s technical capabilities (e.g., instant messages), as well as those possible without media (e.g., maintaining social connections). The second category—‘control/habitual’—suggests media gratifies both habitual needs, and that it allows personal control over the pace of information intake. The third category—‘social/affective/relaxation’—emphasises the emotional needs associated with media use. Interestingly we found that, while differences in intentions exist, they do not moderate any relationships with academic performance [27].

Following a series of semi-structured interviews Blackburn et al. report that, for students, use of technology is an active process voluntarily engaged in [7]. Interviewees described using their laptops in class for multiple tasks, switching between on or off-task activities. Congruent with [26], participants acknowledged that in-lecture media use is often an attempt to be entertained in response to experiences of boredom. Likewise, Annan-Coults found that, in addition to academically-related tasks, students reported the usage of laptops for off-task purposes whilst in lectures, particularly when becoming bored or disengaged with lecture content [3]. Williams and Cox found that students defend their in-lecture media use by arguing that content covered during the lecture could be attained from other sources at a later time [42]. This awareness devalued the lecture and created a justification for students to engage in OTMU.

Through a series of semi-structured interviews Aagaard found that OTMU in a lecture is seen to be normal [1]. Upon considering the rationale for this behaviour the author notes that, in contrast to theories of reasoned action, for instance the *Theory of Planned Behaviour* (TPB) [2], and Blackburn et al.’s findings [7], students reported that they engage in OTMU automatically, without conscious choice. Two lecture-related factors were reported to increase the likelihood of this behaviour. First, students reported that, when they considered material to be ‘too hard’, they distracted themselves. Second, boredom was reported to precede instances of OTMU. Aagaard offers two interpretations of his findings [1]. First he suggests that OTMU is a *habitual distraction* for students. He argues, accordingly, that allocation of attention to OTMU is neither endogenous nor exogenous—it occurs as a “*deeply sedimented relational strategy*” [1] (p. 5). Second, he suggests that instances of boredom ‘triggering’ OTMU occur as a result of a *mediated impatience*. A lecture is perceived to be boring not because of the content of the lecture itself, but rather, it is viewed as boring because students can readily access more entertaining mediated stimulation.

This constant presence of potentially rewarding mediated experiences has prompted consideration of a specific form of anxiety, the *fear of missing out* (FoMo), or the “*pervasive apprehension that others might be having rewarding experiences from which one is absent*” [28] (p. 1841). This form of anxiety is characterised by a desire to stay continually updated with the activities of ones’ social connections. Consequently, people feel that they ‘miss out’ on potentially rewarding experiences when they are off-line. Rosen et al. investigated relationships between media use and a number of psychiatric symptoms, finding the

highest prevalence of anxiety related to an inability to check text-messages and social media feeds [33]. Moreover, symptoms of obsessive compulsive disorder were predicted by media-anxiety, media use, and task-switching frequency. Commenting on this outcome, they postulate that the need to stay connected, and the anxiety related to missing out foster an ‘obsession’ to check media for updates.

Taneja et al. considered students’ attitudes and intentions to engage in OTMU during a lecture [40]. Adopting the TPB as a theoretical framework, they proposed a model describing students’ intentions to *cyber-slack*, or engage in OTMU. The model includes attitudes, subjective norms, descriptive norms and perceptions of behavioural control as predictors of the intention to cyber-slack. Evaluation of the model through a survey study involving 267 students revealed that it could explain  $\approx 52\%$  of the variation in intention to cyber-slack, while  $\approx 40\%$  of this variation could be explained only by students’ attitudes towards this behaviour. Specifically, they found that consumerism, escapism, and lack of attention positively predicted such attitudes. In contrast, OTMU related anxiety and peer-related distractions negatively predicted attitudes towards OTMU. Taneja et al. found that a lack of attention to a lecture was positively predicted by apathy towards the class material [40]. In contrast, both intrinsic and extrinsic motivation, as well as class engagement negatively predicted a lack of attention.

### 3 Research Design

Grounded theory presents an inductive approach to the study of social life [16]; theory is derived through the analysis of patterns and themes present in qualitative data [4]. A study using grounded theory may commence with the specification of a research question, or with the collection of qualitative data. As researchers review the data collected, repeated ideas or concepts become apparent, and are tagged with codes, which have been extracted from the data. To guide our investigation we formulated a single, primary RESEARCH QUESTION:

*What are the determinants of students’ off-task media use during lectures?*

Our study extends the body of qualitative research concerning students’ OTMU in lectures by investigating the determinants of such behaviour through a series of focus groups. This approach allowed us to interpret the meanings, explanations and personal narratives students attach to their behaviour. Mason explains that a qualitative approach is interpretative [23], considering both the individuals in question, and the social context in which the data is produced. As such, an interpretivist ontology is adopted in this study: meaning is seen to be socially constructed and subjective.

During focus groups data are produced through a process of interaction between the participants and researchers. While not providing the data necessary for statistically determining the strength of the emergent relationships, such an approach is, nonetheless, capable of producing valid causal descriptions of behaviour. Participants’ accounts of the relationship between actions and subsequent events provide an understanding of cause-effect processes, as they perceive and interpret them. In the broader context of an increasing number of studies reporting negative correlation between media use and academic

performance, obtaining a textured understanding of the range of factors that influence OTMU is a desired outcome. In particular, it is our view that understanding the subjective, normative and environmental factors that interact to produce OTMU in lectures, will serve to enlighten the manner in which personal media use impacts the learning process. Kitzinger explains that one of the key tenets of a focus group methodology is the ability of group processes to aid the participants in exploring and explaining their perceptions and experiences [21]. The group dynamics at play in a focus group allow for the emergence of unexpected narratives and interpretations. As a consequence of the social and normative nature of this behavioural phenomenon, the subjective, interpretative procedures characterising focus groups were deemed appropriate to address the specified aim of the study.

### 3.1 Participants

To obtain participants for the study several advertising techniques were used. These included: Posters placed in each academic building of the main campus of the university; announcements in four undergraduate modules;<sup>3</sup> and a radio interview on the campus radio station. While some of these procedures were indiscriminate in their targeting, with any eligible student standing a chance of becoming aware of the opportunity, others, *unintentionally* restricted this possibility. Participation was incentivised through an amount of 50 · ZAR ( $\approx 5 \cdot$  USD). These procedures may have affected the representativity of the sample, with some students missing one or more of these techniques. Nonetheless, it is believed that sufficient measures were put in place to ensure adequate diversity in the sample and, therefore, representativity of the population on the campus.

Following these calls 30 students ( $n = 15$  female; eight 1<sup>st</sup> year, 17 2<sup>nd</sup> year, and five 3<sup>rd</sup> year) responded, all meeting the inclusion criteria of being enrolled in an undergraduate program at the institution. As the number of respondents matched the intended sample size, a convenience approach was adopted. Each participant selected one of five available sessions. With the exception of session one (six participants) and session four (nine participants), the remaining three sessions included five participants each. These sizes are in line with the prescriptions of Morgan, who explains that focus groups must be small enough to provide each participant with an opportunity to provide input, while still being large enough to enable a diversity of views [24]. The participants represented four of the eight faculties at the main campus of the university: Education, Law, Arts and Social Sciences, and Economic and Management Sciences. Therefore, in terms of representativity, only 50% of the faculties were accounted for in the sample. However, these four faculties represent over 60% of all students on campus. While this may provide a limitation for this study, it is believed that, given a focus group methodology, and the homogeneity of the population in this regard, the sample achieved is representative enough to capture the nature of the phenomenon under study.

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<sup>3</sup> Reaching over 3000 students, from first to third year in three faculties.

### 3.2 Procedures

A topic guide to direct the discussion in each session was developed. This guide included prompts to initiate discussion relating to attitudes towards, beliefs about and motivations for media use in lectures, perceptions of social and subjective norms associated with media use, beliefs about the factors which trigger, facilitate or hinder media use, as well as beliefs about the potential consequences thereof.<sup>4</sup> The topic guide was developed based on, firstly, the relevant literature reviewed, and, secondly, the objective of the study. The suitability of the topic guide was assessed through a pilot study involving a single focus group conducted with five students several weeks prior to the primary focus groups. Following this procedure several prompts in the topic guide were rephrased to avoid ambiguity.

Each focus group was moderated by the primary researcher of this study and lasted between 60 and 70 min. The five focus groups took place over a two week period, with two in the first week and three in the second week. This number of sessions is in line with the suggestions of Richie et al., who state that such a number should achieve a saturation point in terms of new findings [30]. All focus groups were recorded using a 360° digital recorder. The focus groups took place in a large classroom-style venue at a round table in the centre of the room. All participants sat around the table, with a recording device in the centre, and the researcher amongst them. No-one else was present in the room. The primary researcher, who moderated the focus groups, is a ‘white’ male in his mid-twenties who conducted his undergraduate and postgraduate studies at the same institution where the study was performed. The participants were unknown to him prior to the sessions.

### 3.3 Data Analysis

The data were analysed using an inductive thematic analysis method [8]. Adopting the constant comparative method proposed by Glaser and Strauss [16] as part of the grounded theory methodology, analysis occurred in an iterative manner through data collection, open coding, and code integration, to a point of theoretical saturation. In the first phase of analysis the audio recordings were transcribed into a textual format using *Atlas.ti*, with each participants’ quotes associated with an anonymous identifier. Next, guided by recurring elements in the data, preliminary codes were produced. Subsequently, these codes were then applied to the data. Where necessary, these preliminary codes were either modified, or augmented with additional codes as the analysis proceeded. Finally, through considering patterns in emergent codes, initial themes were identified. Through considering these initial themes in relation to the relevant coded extracts final themes were produced. This process of constant comparison with the data was

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<sup>4</sup> Ethical clearance for the study was granted by the institution’s research ethics board. Prior to the commencement of the focus groups each participant provided informed consent, in full knowledge of the study procedures, the voluntary nature of their participation, data protection measures, and reporting confidentiality.

conducted in four rounds of inductive analysis: open coding, a priori coding, theme development, and theme refinement through data checking.

In addition to the provision of rich, thick descriptions of participants' accounts presented in the findings section, the credibility and trustworthiness of the findings presented in this study were supported through three strategies. First, credibility was strengthened through data triangulation which, as argued by Twining et al. [41], involves comparing data from different participants, in different groups, conducted at different times. Second, as Elliott et al. explain [11], in involving two researchers in the coding process a degree of investigator triangulation is achieved. To further support inter-rater reliability cross checking of codes and peer debriefing procedures were conducted. Third, as Babbie suggests [4], the processes of data collection, coding, and thematic analysis were documented to provide an audit-trail of decisions made.

## 4 Findings

We present our findings in three subsections. First we consider a theme relating to norms surrounding OTMU in lectures. Second we consider three themes concerning the role of stable, personal traits. Finally we consider two themes concerning subjective situational factors. Within each of these subsections descriptions of the themes are provided, accompanied by a sample of associated supporting quotes using a coding system to identify contributions made by participants. Each participant was coded as  $Px - y$ , where  $x$  is the number of the focus group and  $y$  is the individual within that group. In this way a data-grounded interpretative narrative is provided.

### 4.1 OTMU Norms

Models of human behaviour broadly acknowledge the role of social norms in determining behavioural intentions [12]. Norms reflect what “people approve and disapprove within the culture” and serve to “motivate action by promising social sanctions for normative or counter normative conduct” [29] (p. 104). Our data revealed that the prevailing norm at the institution was that OTMU is an acceptable, though not endorsed, form of behaviour during lectures. This norm functioned as a justification (even a motivation) among students to initiate instances of OTMU. Based on our data few lecturers at the institution explicitly forbid OTMU during their lectures. In the absence of such top-down mechanisms, OTMU norms were established through group behaviour.

**P2-3:** *In a lecture room you can hide behind other people, not physically, but mentally. It's a group behaviour so you feel like it's okay to do it. It's not disrespect aimed at the lecturer, it's a group mentality. If everyone else is doing something then obviously more people are going to pick up on that behaviour.*



- P4-9:** *It's scary when you look back and you see how many people are actually listening to the lecturer: everyone's like [indicates looking down at phone under desk]; you see someone in front of you on Instagram.*
- P4-6:** *Sometimes I feel really bad actually, that I'm on my phone in class, and I'll stop and then I look around me, everyone else is on their phone.*
- P4-4:** *In all my classes there are at least like 20 laptops out at any given point. I can count, there is at least like 90% of those people are not on the page of the slides.*

## 4.2 Personal Traits

Our data suggest that three traits of individual subjects determined their OTMU intentions. The first is the experienced need to stay connected or up to date with online activities to avoid missing out on potentially rewarding experiences. In accordance with previous studies [9, 28, 33] we refer to this factor as 'FoMo' and argue that it is a key determinant of students' OTMU intentions. An interesting aspect of this factor is subjects' awareness of the accessibility of their devices. Awareness of the ease with which the device can be accessed (i.e., the *nearness* of the online experience) seemed to influence experiences of FoMo. This effect is highlighted by Sapacz et al. who found that subjects' anxiety increased when their devices were present as opposed to out of sight [37].

- P2-1:** *Most of the time, I open it. I mean, it's like sitting right there, looking at me, I need to see what's happening.*
- P1-4:** *If you're not part of that conversation, you come in, like after the lecture. Even just an hour later. You're like I could say something now, but it doesn't matter, the conversation has passed.*
- P2-4:** *I think if you see someone using their phone, it's just an automatic thing. I wonder what's going on, on my phone; let me just check quickly.*
- P1-2:** *Although they're teaching you, I'm not paying any attention. I may be writing down what you're saying. But I'm actually thinking: "I wonder what's happening on Facebook" and "oh I saw this was trending on Twitter and I'm missing it because I'm doing this".*

The second trait which emerged from our data related to students' attempts to suppress their FoMo and remain focused on their academic goals (i.e., paying attention to lecture material). The success of these attempts typically depends on their ability to resist the various triggers (intrinsic and extrinsic) directing their attention to OTM. Duckworth et al. use the notion of *grit* to express an individual's "perseverance and passion for long-term goals" [10] (p. 1087). Individuals high in grit "do not swerve from their goals, even in the absence of positive feedback". In the context of our data we believe grit can be used as an indicator of a student's ability to remain focused on his/her academic goals despite the lure of OTM. "The gritty individual approaches achievement as a marathon, his or her advantage is stamina. Whereas disappointment or boredom signals to others that it is time to change trajectory and cut losses, the



*gritty individual stays the course*" [10] (p. 1088). Our data suggest that students are aware of the negative impact OTMU during lectures will have on attempts to attain their academic goals. Consequently, instances of OTMU typically followed conscious deliberation of the costs, mostly expressed in terms of future study time, that may result from not paying attention in a lecture. This trend corroborates earlier findings by Flanigan and Babchuk [13].

**P1-4:** *It's not like we don't know that we are doing the wrong thing. We're aware of the costs, but, at that point in time, that immediate satisfaction factor is just too high.*

**P2-4:** *When I'm listening to the lecturer if I don't really find it useful, or they're just losing me. Then I'll go on my phone.*

**P1-1:** *I know that if I need to stay up to four in the morning to finish this work, I will do it, because this is what I get for playing on my phone and not working.*

**P2-1:** *I think social media, it effects in the fact that we don't listen in class and all these things, but I know that I'm gonna do the work at the end of the day.*

**P1-4:** *We're all pretty conscious of the fact that when we decide to postpone, we are postponing the work. Meaning, we're going to have to do it, we're going to regret it later that we didn't do at at that point in time.*

**P3-2:** *I keep wanting to go on Instagram and Facebook. If it's still in front of me and on, then the resistance is very low.*

The third trait we identified relates to students' exertion of some form of control over their devices in an attempt to protect themselves from OTM distractions. We refer to this factor as *control over technology* (CoT) and argue that it plays a significant role in determining OTMU behaviour. Among our subjects CoT often involved limiting the visibility or proximity of media for particular time segments when academic goals received priority. It also involved manipulation of the features or settings of devices and applications to limit the triggers that may lead to instances of OTMU. The emerging behavioural pattern, also reported by Aagaard [1], is characterised by planned segments of on-task (work) time punctuated by OTMU sessions. OTMU, in this pattern, is framed as a *reward* that is earned by completing a certain amount of on-task time.

**P4-2:** *Do not disturb mode is the only thing getting me through exams.*

**P3-2:** *I put my phone completely away, out of sight, because it's distracting.*

**P4-4:** *I have to put it away, otherwise I'll check it every two seconds; I have to put it somewhere else.*

**P3-1:** *I typically have a piece of paper, a pen, a highlighter and my laptop and then everything switched off, like no WiFi, I switch my phone off otherwise I will get distracted.*

An interesting dimension of this theme is students' inability to control the *amount* of content that is presented to them. The manner in which many content providers design interfaces to present a *never-ending stream* or *feed* of content kept students engaged in OTMU longer than they initially intended.

**P2-3:** *It's like a snowball effect; it's a conversation and next thing you know you've spent an hour talking to one person.*

**P4-9:** *It's also because it's unlimited. I think, say, for instance you have a newspaper, one article and you're done. But with Instagram, you look at one photo and then it's like there's still a million more, I can just continue scrolling.*

### 4.3 Subjective Situational Factors

Our data revealed that instances of OTMU were often initiated in response to experiences such as boredom or disengagement. It is important to frame these experiences as the products of both subjective factors (e.g., a lack of interest in the subject area) and situational factors (e.g., the enthusiasm, preparedness and presentation style of the lecturer). Now we turn our attention to the role of these factors in determining OTMU.

As found by Flanigan and Babchuk as well as Taneja et al. [13,40], there was a clear relation between the degree to which a lecture is perceived as *engaging* and the tendency to initiate OTMU. We use the term *engaging* here to refer to a combination of the lecturer's presentation skills (which includes aspects like enthusiasm and authoritativeness) and the nature of the content taught. It is acknowledged, however, that this is a subjective factor—students' preferences play an important role in determining perceptions of a lecture or lecturer.

**P4-5:** *It depends on the lecturer's enthusiasm. Because if the lecture is going to be boring, I'm not going to want to listen, and then I'll be Whatsapping.*

**P4-8:** *Well I started out in the beginning of the year taking notes on my laptop, but then by the second semester I was so bored with all my classes, so I just record all my classes and then I just spend all my time on social media.*

**P1-3:** *Most of the lectures are quite boring to say the least. It's stuff that you can read when you're at home. It's basically someone reading slides that you have. So, it's not engaging. So then I'm like: well, I'm not going to do anything, so I'm gonna play on my phone.*

**P4-2:** *If it's a theoretical subject, I tend to take notes while the lecturer speaks on my laptop. But, as soon as it gets boring or I lose focus, I tend to go onto other sites that I've opened, so like Instagram or Pinterest on my phone or social communication like Whatsapp.*

**P4-3:** *During lectures or tutorials I would prefer to, if I do get bored, use social media. But if a lecturer is compelling, I'll be like yes! That is wonderful, please don't ever stop talking.*

An important finding which emerged from the data is the effect that peers' OTMU had on subjects. Our data suggest that awareness of peers' OTMU has three effects. The first is that it strengthens norms around OTMU during lectures. Subjects' awareness that their peers engaged in OTMU often provided the justification they needed to initiate OTMU themselves; (see Sect. 4.1). The second is that students often follow their peers' screens (as opposed to the lecturer), taking interest in whatever is displayed there. The third is that it acts as a trigger for the initiation of OTMU. When students see their peers engaging in OTMU they frequently follow suit, often in response to experiences of FOMO. This confirms previous findings in this regard [15,36].

- P1-2:** *You see someone else on Youtube and then I'm like: you know what, actually, that's a better idea. The people around you influence you and stuff. Also, in class if you see other people on their laptop or phones, and then you're like: "ooh that video!"*
- P2-1:** *If I have somebody sitting right next to me and they're on 9Gag, I want to see what meme that is. I don't want to listen to the lecture right now. I get distracted very easily.*
- P2-3:** *I have a friend who is always on his phone in class, always. I think sometimes it does disrupt me to a certain extent. He doesn't even have to say look, I just start looking at what he's doing. I think that disrupts me.*
- P1-6:** *If someone's like scrolling through their pictures. I don't think I could stop watching. If someone is on their laptop in front of me and they're doing other things, that's where my eyes are.*

## 5 Discussion

We discuss our findings in two sections. The first proposes a model for OTMU in lectures. In the second section, on the basis of this model, we discuss a number of recommendations for higher educational institutions and lecturers to navigate the challenges posed by students' OTMU use in lectures.

### 5.1 A Proposed Model for OTMU in Lectures

We propose that the factors elicited from our data can be expressed in the form of a model describing the determinants of OTMU in lectures. Our proposed model is presented in Fig. 1 and discussed below.

Our data suggest that lecturers at the institution where the study was performed tended not to formulate explicit OTMU policies in their classes. This aligns with findings by Berger who reports that the majority of university lecturers adopt a passive stance towards OTMU in their classes despite being aware of its occurrence [6]. Consequently, we have little empirical evidence to support the argument that establishing and enforcing a specific OTMU policy would influence student behaviour. However, Beland and Murphy investigated the effects of policies *banning smartphone use at high schools*,<sup>5</sup> and found that students performed significantly better when these are enforced [5]. It is conceivable that higher education institutions may adopt similar policies in future (some already have [39]) and we therefore include the construct in our model. We envision that such policies will influence OTMU norms.

Our data provides evidence of the role social norms for OTMU play in determining the OTMU behaviour of individuals. An awareness that peers are engaging in OTMU during a lecture encourages the initiation of OTMU sessions and provides a basis for the retrospective justification of the decision to do so. In accordance with the TPB [2] we envision norms to influence intentions to engage in OTMU.

<sup>5</sup> Note, for instance, the newest legislation on this matter in France, 2018.

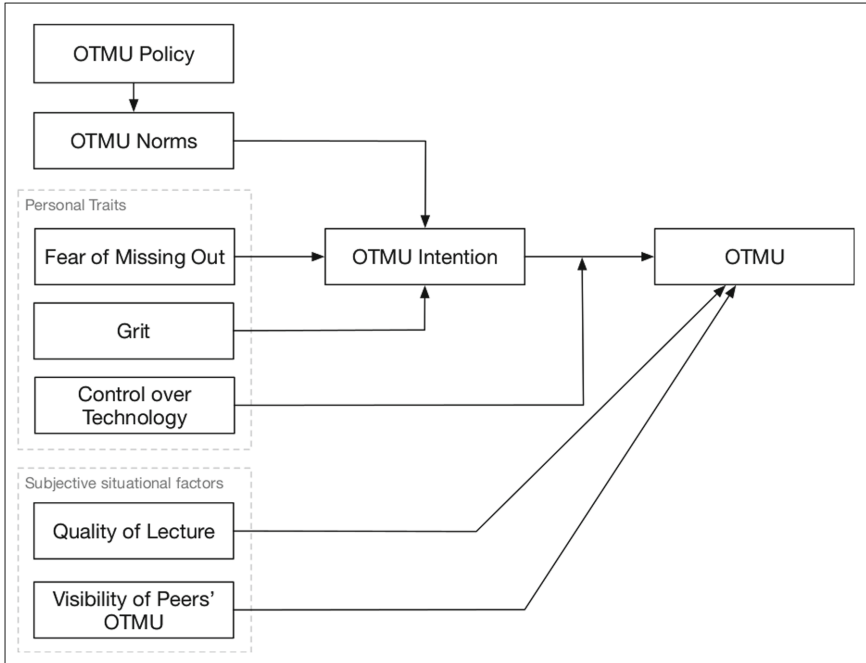


Fig. 1. Proposed model of OTMU determinants in academic environments

Our model includes the three personal traits emerging from our data. We argue that FoMo, together with Grit, influence OTMU intentions. The interaction between these two constructs produce, what may be termed, the individual's *attentional strategy* in the academic environment. This strategy is jointly shaped by the individual's academic performance goals and the desire to engage in rewarding online experiences. Consequently, we propose that individuals with high FoMo and low Grit are likely to engage in OTMU more frequently than their peers, and *vice versa*. The model also includes control over technology as a moderator of the relationship between OTMU intention and OTMU. This construct has not received explicit attention from researchers in prior studies. We argue that the exertion of control over devices and applications moderates OTMU by manipulating the triggers which typically precede instances of OTMU. Importantly, this exertion of control is a combination of both the preference and ability to take control over device and application settings. There is also an emerging trend to use smartphone applications which enable tracking and control of usage volume (e.g., Moment and QualityTime).

Two subjective situational factors which we deem to be determinants of OTMU are included. Both factors are applicable at the level of a particular academic setting (e.g., a lecture or tutorial). Quality of lecture describes the degree to which the lecture is perceived as stimulating and engaging. This construct includes aspects of the lecturer, the content and the style of presentation.

Our data provided evidence that feelings of disengagement or boredom trigger OTMU. The second factor is the visibility of peers' OTMU which, we argue, is largely determined by the physical attributes of the lecture theatre. In theatres where rows increase in height towards the back, students are likely to have a clear view of the screens of devices of peers' sitting in the rows in front of them. In traditional class rooms where seats are at an equal height the visibility of peers' screens would be lower.

## 5.2 Recommendations for Institutions and Lecturers

On the basis of our findings we briefly discuss how institutions and lecturers can navigate the challenges posed by OTMU in lectures. While there is evidence of increased academic performance at institutions enforcing a ban on smartphones, we acknowledge that this is neither an attractive nor practical policy for many institutions. Not only does it nullify the potentially valuable role these devices can play in the learning process, but it also creates an artificial environment. Flanigan and Kiewra suggest rather than enforcing a ban and “*verbally reprimanding students when they violate it, instructors should explain how the policy benefits student learning*” [14] (p. 5). This can be done by highlighting the detrimental effects of frequent task switching on primary task performance (in academic and other settings).

We also support the views of Flanigan and Kiewra who state that “*although enforced course policies might alleviate the temptation to cyber-slack in the classroom, such policies have no direct influence on students' out-of-class behavior*” [14] (p. 8). Lecturers should strive to “*train students to be self-regulated learners*” and monitor how they spend their attention. In accordance with our model, one way to encourage self-regulation among students is through increasing their ability to exert control over their devices. This, we suggest, can be done by providing guidelines to control device and application settings to minimise distracting notifications.

Although lecturers typically have minimal control over the physical structure of their theatres (classrooms), we propose a strategy to decrease the distracting effects of the visibility of peers' screens. By dividing the class into halves and declaring one half to be a *device-free zone*, students that feel they are easily distracted by devices can be supported in their self-regulation efforts. If the class does not allow easy left-right division, the front half of the class can be used for this purpose. At our institution this policy was recently employed with success [publication forthcoming].

## 6 Conclusion

Our study utilised qualitative data collected through focus groups involving 30 undergraduate students to investigate the determinants of OTMU in lectures. Based on the results of thematic data analysis we propose a model describing these determinants and their interrelationships. Unlike the theory-derived model

proposed by Taneja et al. [40], we derived our model from the results of our qualitative data analysis. Based on the model we discuss various recommendations for institutions and lecturers to encourage self-regulation of OTMU among students.

While qualitative data enabled us to gain rich descriptions of students' experiences in lectures, the limitations of this form of research should be acknowledged. In particular, students' interpretations of their own experiences and, in turn, our interpretations of their expressions thereof, imply that our findings (like those of all qualitative studies) are necessarily infused with the frames of reference of the researchers. This includes, of course, our personal experiences as lecturers. Additionally, limitations resulting from the representativity of our sample should be acknowledged. In particular, the convenience sampling technique and self-selection of participants may imply biases in the data produced. Additionally, as the focus group moderator was a lecturer at the institution, this may have introduced a degree of moderator bias into the sessions, with participants potentially being reticent to share their experiences. Notwithstanding these limitations, the findings provide valuable insights into students' OTMU patterns and their perceptions of this behaviour. Future research building on the findings should endeavour to test the validity of the model we propose. In some cases (e.g., OTMU Policy) some work is required to identify or establish appropriate instruments for measurement at the individual level.

## References

1. Aagaard, J.: Drawn to distraction: a qualitative study of off-task use of educational technology. *Comput. Educ.* **87**, 90–97 (2015)
2. Ajzen, I.: From intentions to actions: a theory of planned behavior. In: Kuhl, J., Beckmann, J. (eds.) *Action Control*. SSSSP, pp. 11–39. Springer, Heidelberg (1985). [https://doi.org/10.1007/978-3-642-69746-3\\_2](https://doi.org/10.1007/978-3-642-69746-3_2)
3. Annan-Coultas, B.D.L.: Laptops as instructional tools: student perceptions. *TechTrends* **56**(5), 34–42 (2012)
4. Babbie, E.: *The Practice of Social Research*, 13th edn. Cengage, Boston (2012)
5. Beland, L.P., Murphy, R.: Ill communication: technology, distraction & student performance. *Labour Econ.* **41**, 61–76 (2016)
6. Berger, P.: Beyond plain acceptance or sheer resistance: a typology of university instructors' attitudes to students' media use in class. *Teach. Teach. Educ.* **67**, 410–417 (2017)
7. Blackburn, K., Lefebvre, L., Richardson, E.: Technological task interruptions in the classroom. *Fla. Commun. J. Technol. Interruptions* **XLI** (2013)
8. Braun, V., Clarke, V.: Thematic analysis revised. *Qual. Res. Psychol.* **3**(2), 77–101 (2006)
9. Cheever, N.A., Rosen, L.D., Carrier, L.M., Chavez, A.: Out of sight is not out of mind: the impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Comput. Hum. Behav.* **37**, 290–297 (2014)
10. Duckworth, A.L., Peterson, C., Matthews, M.D., Kelly, D.R.: Grit: perseverance and passion for long-term goals. *J. Pers. Soc. Psychol.* **92**(6), 1087–1101 (2007)
11. Elliott, R., Fischer, C.T., Rennie, D.L.: Evolving guidelines for publication of qualitative research studies in psychology and related fields. *Br. J. Clin. Psychol.* **38**, 215–229 (1999)

12. Fishbein, M., Ajzen, I.: *Predicting and Changing Behavior: The Reasoned Action Approach*. Taylor & Francis, Milton Park (2010)
13. Flanigan, A.E., Babchuk, W.A.: Social media as academic quicksand: a phenomenological study of student experiences in and out of the classroom. *Learn. Individ. Differ.* **44**, 40–45 (2015)
14. Flanigan, A.E., Kiewra, K.A.: What college instructors can do about student cyber-slacking. *Educ. Psychol. Rev.* **30**(2), 585–597 (2017)
15. Fried, C.B.: In-class laptop use and its effects on student learning. *Comput. Educ.* **50**(3), 906–914 (2008)
16. Glaser, B.G., Strauss, A.L.: *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine, Chicago (1967)
17. Guo, Z., Tan, F.B., Cheung, K.: Students' uses and gratifications for using computer-mediated communication media in learning contexts. *Commun. Assoc. Inf. Syst.* **27**(1), 339–378 (2010)
18. Jacobsen, W.C., Forste, R.: The wired generation: academic and social outcomes of electronic media use among university students. *Cyberpsychol. Behav. Soc. Netw.* **14**(5), 275–280 (2011)
19. Junco, R.: In-class multitasking and academic performance. *Comput. Hum. Behav.* **28**(6), 2236–2243 (2012)
20. Junco, R., Cotten, S.: A decade of distraction? How multitasking affects student outcomes. In: *Proceedings of Symposium on the Dynamics of the Internet and Society*, pp. 1–38. Oxford Internet Institute (2011)
21. Kitzinger, J.: Qualitative research: introducing focus groups. *B. M. J.* **311**(7000), 299–302 (1995)
22. Leysens, J.L., le Roux, D.B., Parry, D.A.: Can I have your attention, please? An empirical investigation of media multitasking during university lectures. In: *SAIC-SIT 2016 Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists*, Paper #21 (2016)
23. Mason, J.: *Qualitative Researching*. SAGE, Newcastle upon Tyne (2002)
24. Morgan, D.: Focus groups as qualitative research. *Qual. Res. Methods Ser.* **16**(2), 6–17 (1997)
25. North, D., Johnston, K., Ophoff, J.: The use of mobile phones by South African university students. *Issues Informing Sci. Inf. Technol.* **11**, 115–138 (2014)
26. Parry, D.A.: *The digitally-mediated study experiences of undergraduate students in South Africa*. M.-Thesis, Stellenbosch University (2017)
27. Parry, D.A., le Roux, D.B.: In-lecture media use and academic performance: investigating demographic and intentional moderators. *S. Afr. Comput. J.* **30**(1), 85–107 (2018)
28. Przybylski, A.K., Murayama, K., Dehaan, C.R., Gladwell, V.: Motivational, emotional, and behavioral correlates of fear of missing out. *Comput. Hum. Behav.* **29**(4), 1841–1848 (2013)
29. Reno, R.R., Cialdini, R.B., Kallgren, C.A.: The transsituational influence of social norms. *J. Pers. Soc. Psychol.* **64**(1), 104–112 (1993)
30. Ritchie, J., Lewis, J., McMaughton-Nichols, C., Ormston, R.: *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. SAGE, Newcastle upon Tyne (2013)
31. Roberts, N., Rees, M.: Student use of mobile devices in university lectures. *Australas. J. Educ. Technol.* **30**(4), 415–426 (2014)
32. Rosen, L.D., Carrier, M., Cheever, N.A.: Facebook and texting made me do it: media-induced task-switching while studying. *Comput. Hum. Behav.* **29**(3), 948–958 (2013)



33. Rosen, L.D., Whaling, K., Rab, S., Carrier, L.M., Cheever, N.A.: Is Facebook creating 'iDisorders'? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Comput. Hum. Behav.* **29**(3), 1243–1254 (2013)
34. le Roux, D.B., Parry, D.A.: A new generation of students: digital media in academic contexts. *CCIS* **730**, 19–36 (2017)
35. le Roux, D.B., Parry, D.A.: In-lecture media use and academic performance: does subject area matter? *Comput. Hum. Behav.* **77**, 86–94 (2017)
36. Sana, F., Weston, T., Cepeda, N.J.: Laptop multitasking hinders classroom learning for both users and nearby peers. *Comput. Educ.* **62**, 24–31 (2013)
37. Sapacz, M., Rockman, G., Clark, J.: Are we addicted to our cell phones? *Comput. Hum. Behav.* **57**, 153–159 (2016)
38. van der Schuur, W., Baumgartner, S.E., Sumter, S.R., Valkenburg, P.M.: The consequences of media multitasking for youth: a review. *Comput. Hum. Behav.* **53**, 204–215 (2015)
39. Strauss, V.: Why a leading professor of new media just banned technology use in class. Technical report (2014). <https://goo.gl/hzejkd>
40. Taneja, A., Fiore, V., Fischer, B.: Cyber-slacking in the classroom: potential for digital distraction in the new age. *Comput. Educ.* **82**, 141–151 (2015)
41. Twining, P., Heller, R., Nussbaum, M., Tsai, C.: Some guidance on conducting and reporting qualitative studies. *Comput. Educ.* **106**, 1–9 (2017)
42. Williams, J.A., Cox, D.: I got distracted by their being distracted. *East. Educ. J.* **40**(1), 48–56 (2011)
43. Zhang, W., Zhang, L.: Explicating multitasking with computers: gratifications and situations. *Comput. Hum. Behav.* **28**(5), 1883–1891 (2012)