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A survey of student and instructor perceptions of personal mobile technology usage and policies for the classroom

Ieda M. Santos[1] · Otávio Bocheco[2] ·
Claudine Habak[3]

Abstract This study explored student and instructor perceptions of personal mobile device usage and policies for appropriate practices in the classroom at a Brazilian higher education institution. The study also explored significant differences in perceptions, and relationships between perceptions and demographic data. A total of 176 undergraduates and 13 instructors completed a survey. Descriptive statistics, t-tests, and correlations were performed. A thematic approach was used to analyse the open questions from the survey. Results suggested students' occasional use of WhatsApp or similar applications to engage in content and non-content activities, and a tendency for occasional use of a few other applications for content, despite the strict policies adopted by many of the instructors, and student awareness of disruptions. Participants' perceptions significantly differed regarding a number of policy statements and device usage. Significant correlations were found between student age, usage, and some of the policy statements. The study suggests ongoing discussions between instructors and students, and among students themselves to develop acceptable BYOD policies for the classroom to help minimize distractions and promote effective learning.

✉ Ieda M. Santos
   isantos@ecae.ac.ae

   Otávio Bocheco
   otavio.bocheco@ifc.edu.br

   Claudine Habak
   Claudine.Habak@ecae.ac.ae

1   Emirates College for Advanced Education, P.O. Box 126662, Abu Dhabi, United Arab Emirates

2   Federal Institute Catarinense Campus Rio do Sul, Abraham Lincoln Street, 210, Jardim América, Rio do Sul, SC CEP:89160 – 202, Brazil

3   Cognitive Neuroimaging Unit, Emirates College for Advanced Education, P.O. Box 126662, Abu Dhabi, United Arab Emirates

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1 Introduction

The concept of "bring your own device" or BYOD enables students to use their personal mobile devices to facilitate learning (Johnson et al. 2015; Sharples, et al. 2014). Recently, the BYOD model has been identified as one of the key technological trends in higher education (Johnson et al. 2015; Karnad 2014). While this model can potentially support teaching and learning (e.g. Forkosh-Baruch and Meishar-Tal 2016; Gikas and Grant 2013), it can also disrupt lectures and learning (e.g. Ravizza et al. 2014; Sharples 2002). Such disruption is a wide concern expressed by many instructors (Brooks 2016; Kuznekoff and Titsworth 2013) that may impact their decision to allow devices in the classroom (Graham and Gillies 2016; Thomas and O'Bannon 2013).

Research has investigated BYOD usage in the classroom with the purpose of understanding disruptions caused by students' devices. Findings revealed that students engage in both academic and non-academic activities during class time (e.g. Campbell 2006; McCoy 2016; Tindell and Bohlander 2012). McCoy (2016), for instance, indicated an increase in student use of mobile devices for non-academic purposes compared to a previous study conducted in 2013 (McCoy 2013). Although some of these studies have also explored policies to manage devices in the classroom from either students', instructors' or both perspectives (e.g. Jackson 2013; McCoy 2013, 2016; Santos and Boheco 2017), it is still a growing area of research. It is worth continuing to investigate BYOD usage and policies, especially from instructor and student perspectives as studies have reported differing viewpoints (Berry and Westfall 2015). As noted by Tindell and Bohlander (2012), when students help create a policy for a class, they are more likely to comply. Therefore, more research is needed that draws upon the views of both students and instructors regarding mobile technology in the classroom and policies to promote effective implementation of BYOD.

The present study investigated perceptions by students and instructors, of in-class use of personal mobile technology and of policies for appropriate practices, and whether there were significant differences in perceptions between groups. In addition, research indicates that perceptions of mobile technology in the classroom can be impacted by variables such as age and gender (e.g. Langmia and Glass 2014; Wang et al. 2009). Thus, this study also explored correlations between participant perceptions, usage, and policies to enrich the findings. The survey was conducted at a Brazilian higher education institution in the 2015–2016 academic year. Participants consisted of 176 undergraduates and 13 instructors. This study aims to add to the literature and inform practice on how students and instructors perceive the use of BYOD in class, and identify policies for appropriate practices that are consensual and acceptable.

2 Background literature

The BYOD trend began in the 1980s with universities allowing students to bring laptops to the classrooms (Crompton 2013); however, discussions of laptop usage have

shifted to tablets and mobile phones or smartphones, (Sharples, et al. 2014). These small devices bring both educational benefits and concerns to the classroom (Santos 2015). The educational benefits of BYOD in the classroom have been discussed in the literature (e.g. Forkosh-Baruch and Meishar-Tal 2016; Green et al. 2016; Imazeki 2014). Despite its benefits, a key disadvantage related to a BYOD model is the disruption it causes when the devices are used inappropriately in the classroom (Traxler 2010). During class time, students were found using mobile technologies not related to class content, to send or receive text messages, check emails, websites, and social media, or have their phones ringing or vibrating (e.g. Aagaard 2015; Langan et al. 2016; McCoy 2016; Pettijohn et al. 2015; Tindell and Bohlander 2012).

Due to inappropriate uses of the devices, instructors may show reluctance to allow them in class, or might adopt strict policies. Thomas and O'Bannon (2013), for instance, found that many pre-service teachers identified class disruptions as the main barriers for not allowing mobile phones. More recently, Brooks (2016) reported that those instructors who perceived BYOD usage as distracting, were more likely to ban or discourage its use in class. Mboga et al. (2016) similarly found that instructors in Kenyan universities enforced strict policies by banning student devices in class. However, research has suggested that students do not support policies that ban or limit their devices in class (Jackson 2013; McCoy 2016; Tindell and Bohlander 2012). A study by Jackson (2013) showed that students considered banning mobile phones altogether as an ineffective policy. This contrasts with an early study by Campbell (2006) where participants supported formal policies restricting mobile phones in class. However, further analysis indicated that the youngest students were not only more tolerant of phone ringing but also were less supportive of policies restricting their use.

Researchers have investigated instructor perceptions of policies to manage the devices in class, and found mixed results. A study by Bayless et al. (2013), for instance, surveyed instructor perceptions of policies concerning personal devices in the classroom and found inconsistent results, with some instructors banning the devices, some ignoring them, and others using the devices to enhance instructional activities. Langmia and Glass (2014) similarly found that the majority of instructors adopted different measures to handle smartphones in the classroom (e.g. banning, tolerating, vibrate mode); however, most them favoured a uniform university-wide smartphone policy. In the same study, results revealed that all instructors, independently of years of teaching experience, followed strict policies regarding smartphone usage; however, females were stricter than male instructors. These studies, although informative, were conducted from the instructors' viewpoints only. Other researchers like Santos and Bocheco (2016) drew on student and instructor perspectives, and found that the instructor and many of the students favoured a policy that set the devices on silent or vibrate mode during lecturing. The instructor also recommended student involvement in policy development as they would generate discussion among them and might generate useful ideas to consider. Jackson (2013) reported similar recommendation based on students' viewpoints where they would like instructors to consider their opinions when creating policies for the classroom.

Further work by Baker et al. (2012) surveyed both instructor and student perceptions of mobile technology usage and policies at three American universities. Significant differences between the two groups appeared: instructors and students had different views regarding the appropriate use of the devices, disruptions and policies to handle

the devices in class. The authors also reported gender differences in perceptions for a large number of survey questions, where female students found the devices more disruptive and less appropriate than male students. In their conclusion, Baker et al. recommended considering student and instructor opinions in the development of policies for in-class mobile technology. More recently, Berry and Westfall (2015), who surveyed students and instructors across public and private universities in the US regarding perceptions of mobile phone usage and policies set by instructors, also found discrepancies in perceptions. For example, while instructors believed their policies were effective, students suggested low levels of policy effectiveness, pointing out that only policies such as grade reduction were more successful. In addition, compared to instructors, students seemed less concerned with disruptions caused by mobile phones. These studies suggested that different viewpoints need to be discussed and accommodated into acceptable policies. Given the limited studies that consider instructors and student perceptions of in-class BYOD usage and policies, this study investigated the following research questions:

1. What are instructor and student perceptions of mobile device usage in the classroom?
2. What are instructor and student perceptions of BYOD policies for the classroom?
3. Is there a correlation between participants' demographic data, perceptions of mobile usage and policy?
4. Is there a difference between student and instructor perceptions of mobile device usage and policy?

3 Methodology

3.1 Context and participants

The survey was implemented at a governmental institution in the Southern region of Brazil. This institution offers higher education programs, and was created to meet the demands of the region with approximately 250 thousand inhabitants. The majority of the students are predominantly white, and from middle class. All students are Brazilian, and courses are taught in Portuguese. The majority of students attend evening courses and are working students (e.g. Math and Physics courses), though some working students take morning and noon classes. Students enrolled in Agronomy do not generally work as it is offered full time. A total of 176 students (43% female, 57% male) enrolled in four different undergraduate programs, and 13 instructors (38% female, 62% male), who taught these students, gave their consent to participate, and signed a consent form. These participants were chosen because of easy access to the researchers. Participation was entirely voluntary. Of the 176 undergraduates, 41% were enrolled in Agronomy, 23% in Math, 20% in Physics, and 16% in Computer Science. As seen in Table 1, most of the students (82%) were 25 years old or less, with 40% under the age of 20. Regarding the instructors, 46% were 26–30 years-old, with 31% over 46 years old. In addition, 62% of instructors had a Master's Degree, 31% a Doctoral Degree, and one had Bachelor's Degree in Math.

Table 1 Participant demographics

Age group	Student (n = 174*) %	Instructor (n = 13) %
Under 20	40	
20–25	42	
26–30	9	46
31–35	5	8
41–45	3	15
>46	1	31

*Two students did not answer the question

3.2 Data collection and analysis

We adopted the enhanced version of the student survey by Santos and Bocheco (2017), which evolved from a previous study (Santos and Bocheco 2016). It includes demographic data, and two scales - a 4-point scale ranging from frequently used (1) to never used (4) to determine how often students used their mobile devices in class to perform academic and non-academic activities (seven statements respectively, Table 4), and a 5-point Likert scale (strongly agree (1) to strongly disagree (5)) that covers statements related to observations of in-class use of mobile devices (six statements, Table 5), and policy recommendations (10 statements, Table 6). The survey also includes three open-ended questions namely, 1- policy recommendation to own institution, 2- main advantages, and 3- disadvantages of using mobile devices in class. Finally, it included a scenario where participants choose the appropriate policy. The instructor survey is similar to the students', except for the two sections on mobile device use for content and non-content activities, which were excluded. The two surveys were developed in both English and Portuguese. The translation and questions were reviewed by a colleague for content validity and clarity. Both surveys were administered face-to-face. A total of 176 students and 13 instructors completed and returned the surveys.

We examined the returned surveys for completion. The total numbers reported for each question or statement in the student survey do not always equal the total number of respondents (n = 176) because a few students did not answer some questions. Quantitative data analysis was performed using SPSS Statistics software. Descriptive statistics including frequency, percentages, means and standard deviations (SD) were calculated. Correlations were tested using Pearson's product moment, and alpha levels for two-tailed tests of significance were set at 0.05. Perceptions of device usage (Tables 4 and 5) and policy (Table 6) between instructors and students, were carried out on each question. Data were tested for normality using Shapiro-Wilk and were not normally-distributed, however, Levene's test revealed homogenous variances across groups. Group comparisons were carried out using both the Mann-Whitney U (for non-normal distributions) and two-tailed independent sample t-tests on each question; similar items were found to be significant using both tests, with only borderline-significance items varying somewhat. For these group comparisons, results are reported for items that were significant using both tests, but using the t-statistic only in Tables 4, 5 and 6, with corrected p's where necessary based on Levene's test. Qualitative analysis involved typing participant responses to the open questions in a word document, and later uploading to NVivo software. We adopted a thematic analysis approach (Braun

and Clarke 2006) to look for themes in the data. We approached the data without a prior list of codes. The first author of the paper read the student responses and created a preliminary list of codes, which was refined after re-reading the document. Data were then assigned under the appropriate codes, followed by looking for main themes inside and across codes. Analysis of instructor responses followed a similar procedure. The first two authors of this paper, who are bilingual, reviewed and discussed the codes, and coding samples to validate interpretations. Results were translated into English, and were also reviewed by these two authors for accuracy.

4 Results

4.1 Quantitative data

Table 2 shows that 58% of students usually brought a smartphone to class followed by mobile phones (39%), with a similar pattern for instructors. Most of the instructors (92%) and students (93%) had Internet access on their devices. Many of the students (61%) and instructors (77%) had their devices on silent (Table 3). Compared to instructors, higher percentages of students had their devices on vibrate mode, and a few had them turned off.

Perceptions of device usage To answer research question 1, "What are instructor and student perceptions of mobile device usage in the classroom?", Table 4 shows the frequency with which students used their mobile devices to perform class-content and non-class-content activities. Table 4, suggests a clear tendency for occasional use of WhatsApp for content and non-content (M = 2.16, SD = 1.08; M = 2.05, SD = 1.09, respectively), and a tendency to occasionally send/receive email, and surf the Internet for content (M = 2.40, SD = 0.96, M = 2.26, SD = 0.94, respectively), while there is a slight trend for rare use of these two applications for non-content (M = 2.66, SD = 1.02, M = 2.51, SD = 0.98, respectively). There is a trend for rare use of the devices for content and non-content for remaining activities (Table 4). Of note, is the low response rate for the "other activities" option; it is possible that many students did not understand the statement, which needs improvement. To complement findings from Table 4, Table 5 presents student and instructor observations of in-class use of mobile technology. Overall, both groups tended to neutral opinion regarding statements 1 (seen send/receive text messages) and 5 (been interrupted by student use of the devices). Both groups agreed with statement 6 (the devices used for non-content is generally disruptive for learning), although there is a slight tendency for instructors to strongly agree

Table 2 Mobile devices brought to class	Devices	Student (n = 175*) %	Instructor (n = 13) %
	Mobile phone	39	31
	Smartphone	58	69
	Tablet	1%	
*One student did not answer the question	Other devices	2%	

Table 3 Status of mobile devices in class

Statement	Student (n = 176) %	Instructor (n = 13) %
Turned-off	3	8
On vibrating	34	15
On silence	61	77
Set to ring	2	

(M = 1.54, SD = 0.66). As seen in Table 5, instructors tended to disagree with statements 2 (have heard phone ringing or vibrating), and 4 (been distracted by own use of device), while students tended to no opinion for these two statements. Instructors tended to no opinion regarding statement 3 (seen students using social media), whereas students agreed (M = 3.38, SD = 1.39; M = 2.24, SD = 1.10, respectively).

BYOD classroom policy Table 6 displays the results for instructor and student perceptions of policies, which answer research question 2. Overall, both groups tended to agree with statements 6 and 7 (allow the devices for emergency; allow the devices for content, respectively), and tended to disagree with statements 5 and 9 (collect devices; devices not permitted, respectively). Table 6 suggests a slight tendency to strong agreement by instructors about statement 8 (no access to social media; M = 1.46, SD = 0.52), whereas students tended to agree (M = 2.43, SD = 1.01). Results show a tendency for students to agree with statements 1 (allow the devices on silent) and 2 (answer phone calls outside class) (M = 2.40, SD = 1.06; M = 1.97, SD = 0.77, respectively), and clearly agree with statement 10 (consider students' opinions when creating policies; M = 2.07, SD = 1.10), while instructors tended towards a neutral opinion about these three statements (M = 3.46, SD = 1.20; M = 2.77, SD = 1.17, M = 2.54, SD = 0.88, respectively). Regarding statement 3 (turn-off devices in class), there is a slight trend for disagreement by students (M = 3.63, SD = 0.93), and neutral opinion by instructors (M = 2.77, SD = 0.93). Finally, there is a

Table 4 In-class mobile device usage by students

Statement (Scale* 1–4)	Content related activities			Non-content related activities		
	Frequency (n = 176)	Mean	SD	Frequency (n = 176)	Mean	SD
Send and receive phone calls	175	3.33	0.64	175	3.27	0.76
Send and receive text message (SMS)	175	3.09	0.78	175	3.16	0.85
Send and receive phone emails	173	2.40	0.96	174	2.66	1.02
Access WhatsApp or similar application	175	2.16	1.08	174	2.05	1.09
Access Twitter or Facebook	173	3.38	0.82	172	3.33	0.90
Surf the Internet	173	2.26	0.94	175	2.51	0.98
Other activities	73	2.96	1.16	64	3.30	0.97

*Frequently (1), occasionally (2), rarely (3), never (4)

Table 5 Student and instructor observations of in-class use of mobile devices and *t*-tests for independent samples

Statement (Scale 1 Strongly Agree/ to 5 Strongly Disagree)	Instructors (*n* = 13)		Students (*n* = 176)		*t*-test
	Mean	SD	Mean	SD	
1. I have seen students sending or receiving phone text messages	3.15	1.52	2.68	0.97	.290
2. I have heard mobile phones ringing or vibrating#	3.58	1.38	2.89	1.12	.105
3. I have seen students using social media (e.g. Twitter, Facebook, & WhatsApp)	3.38	1.39	2.24	1.10	.012*
4. I have been distracted by my own use of a mobile device	4.23	0.93	2.84	1.11	< .0001*
5. I have been interrupted by students' use of mobile devices##	3.31	1.55	3.16	1.02	.620
6. The use of mobile devices in class for non-content related activities is generally disruptive to learning	1.54	0.66	2.13	1.06	.009*

* Significant differences at alpha < .05, two-tailed # One and ## four students did not respond

tendency for instructors to disagree with statement 4 (the devices may be used for text messages) (M = 3.77, SD = 1.01), while students tended to neutral opinion (M = 2.52, SD = 1.06). To complement Table 6, students and instructors were asked to choose a policy in case a student used his/her device and caused disruption. About 45% of the instructors and 50% of the students chose a policy that involves speaking with the student. Some instructors (27%), and students (24%) suggested asking the student to leave the class. About the same percentage of instructors (27%) and students (26%) suggested asking students to switch off the device.

Correlations Regarding research question 3, "Is there a correlation between participants' demographic data, perceptions of mobile usage and policy?", correlations between student demographics (age group, gender and program) and device usage related to course content were performed, and indicate a significant relationship between age and WhatsApp or similar applications ($r = .31$, $p < .0001$), and age and surfing the Internet ($r = .18$, $p = .02$), where younger participants displayed higher usage of these applications. All other correlations were not significant. Similarly, correlations between student age group, gender, and program and device usage for non-content suggest a significant relationship between age group and WhatsApp or similar application ($r = .29$, $p < .0001$), and age group and surfing the Internet ($r = .20$, $p = .008$), where younger participants displayed higher usage of these applications. All other correlations were not significant and not reported in the results. Furthermore, correlations between student demographics (age group, gender & program) and observations of device usage indicate a significant relationship between age and seeing others send/receive text messages ($r = .36$, $p < .0001$), between age and hearing phones ringing or vibrating ($r = .29$, $p < .0001$), and between age and seeing others using social media ($r = .30$, $p < .0001$), where younger students observed more of these activities. There was no link between instructor demographics (age group, gender & degree) and their observations of device usage (all $p_s > 0.1$).

Correlations between student demographics and policies were performed, and suggest that the younger the student, the more they disagreed with the statements that mobile devices must be turned-off during class (statement 3; $r = .19$, $p = .01$), and that

Table 6 Student and instructor perceptions of policy recommendations and *t*-tests for independent samples

Statement (scale-1 Strongly Agree/5 Strongly Disagree)	Instructors ($n = 13$)		Students ($n = 176$)		
	Mean	SD	Mean	SD	*t*-test
1. Instructors should allow the use of mobile devices in class as long as the devices are in silence mode	3.46	1.20	2.40	1.06	.001*
2. Students should be able to answer a phone call as long as they leave the classroom	2.77	1.17	1.97	0.77	.031*
3. Mobile devices must be turned-off during class time[#]	2.77	0.93	3.63	0.93	.008*
4. Mobile devices may be used to send and receive text messages during class as long as the devices do not distract other students	3.77	1.01	2.52	1.06	.001*
5. Instructors should collect students' mobile devices during class time[##]	4.23	0.73	4.27	0.90	.884
6. Students should be allowed to use the devices in class in emergency situations (e.g. illness)	1.92	0.76	1.65	0.84	.231
7. Students should be allowed to use their mobile devices in class for content related activities	1.85	0.55	1.80	0.76	.076
8. Mobile devices must not be used to access social media during class to discuss non-content related activities	1.46	0.52	2.43	1.01	<.0001*
9. Mobile devices should not be permitted in the classroom under any circumstances[###]	3.92	0.76	4.20	0.90	.27
10. Instructors should consider student opinions when creating policies about the use of mobile devices in the classroom.	2.54	0.88	2.07	1.10	.1

*Significant differences at alpha < .05, two-tailed [#] Two students, [##] three students, and [###] one student did not respond

mobile devices should not be permitted under any circumstances (statement 9; $r = .18$, $p = .016$). In addition, males were in stronger disagreement for both of these statements than females ($r = .17$, $p = .026$, and $r = .17$, $p = .021$, respectively). Finally, there was a trend for younger students to agree more strongly that mobile devices may be used to send and receive text messages during class as long as the devices do not distract other students (statement 4; $r = .15$, $p = .055$). All other correlations were not significant and not reported. Furthermore, correlations between instructor age group, gender, and degree and policies indicate that the younger the instructors, the more they disagreed with the statement that students should be able to answer a phone call as long as they leave the classroom (statement 2; $r = .586$, $p = .035$), suggesting that older instructors are more lenient in this area. All other correlations were not significant.

Differences in perceptions To answer research question 4, "Is there a difference between student and instructor perceptions of mobile device usage and policy?" *t*-tests for independent samples were performed to determine whether the difference between the means of the two groups was statistically significant. Table 5 shows differences for three statements. Instructors did not observe students using social media as much as students saw other students doing so ($t(185) = 2.91$, $p = .012$). Instructors were not distracted by their own use of a mobile device, whereas students were ($t(186) = 5.14$, $p < .0001$), and instructors found mobile device use for non-content related activities to be significantly more disruptive than students did ($t(184) = -2.94$, $p = .009$).

Perceptions of statements 1, 2 and 5 did not differ between the two groups (all $p_s > 0.1$; Table 5). Further, Table 6 shows significant differences in perceptions between the two groups for five policy statements. Instructors agreed more strongly with statement 8 than students (t(185) = 5.96, $p < .0001$). As seen in Table 6, there were also significant differences in perceptions for statement 1 (t(185) = 3.11, $p = .001$), statement 2 (t(185) = 2.43, $p = .031$), statement 3 (t(185) = −2.97, $p = .008$), and statement 4 (t(185) = 3.8, $p = .001$). Note, variances were equal between groups for each item, except for statements 2 and 8, in which case the corrected p is reported (more conservative than uncorrected).

4.2 Qualitative data

In the open questions of the survey, participants suggested policies to manage mobile devices in the classroom. Analysis of student responses revealed three main themes described next.

1. *Device usage* - 39 students recommended a policy allowing the devices for content, as exemplified by participant A45, "Using the devices as teaching tool and, through them, encourage research and reading about [class] content." Among these students, 24 said more specifically the devices should be allowed for content only, with five stressing that permission was needed from the instructors, and for content and other uses such as emergency ($n = 8$). Other students ($n = 12$) recommended permitting the devices for emergency only. Further, 30 students suggested allowing the devices in class without detailing for what purposes, where some observed the devices should not disturb peers ($n = 9$), lectures ($n = 8$) or lectures, peers or instructors ($n = 7$), and students should respect the freedom given to use the devices in class ($n = 2$). In contrast, two students felt mobile technology should be avoided in the classroom, while nine recommended some restrictions during class regarding the use of social media ($n = 3$), access to the Internet ($n = 2$) and applications ($n = 2$), and limiting its use during lecturing ($n = 2$). A few suggested that phone calls ($n = 2$) and personal use should be done outside the class ($n = 2$). In addition, 40 students recommended setting the devices on silent mode, while four suggested leaving them either on silent or vibrate mode. Student A151 observed that "The student enters the classroom only with [his or her] mobile device set to silent mode. Three participants favoured a policy asking students to turn-off their devices during classes.
2. *Actions by instructors* – 17 students suggested policies to implement in case a student disturbed lecturers or peers, including asking students to leave the class ($n = 5$), leave the class or turn-off the device ($n = 2$), prohibit device usage ($n = 3$), and turn-off the device ($n = 3$). Participant A103, for instance, believed that "In case a student disturbed the class, [he or she] should be asked to turn-off the phone." Other measures included talking individually with the student, asking to put away the device, warning the student, and confiscate the device from the student. Two students recommended instructors to implement measures only when the devices were used inappropriately and disturbed the class.
3. *Joint created policies* – 18 students recommended instructor and student involvement in the development of BYOD policies for the classroom. Participant A11

said, "Evaluate the pros and cons. Study cases of emergencies. Listen to both sides (instructors and students)." Among these 18 students, five stressed the need for an agreement concerning policies. Student (A127), for instance, said, "Reach a consensus between students and instructors, which could be an advantageous alternative for both parties."

Analysis of instructor data revealed two main themes regarding BYOD policies, which are discussed next.

1. *Current policies* - nine instructors discussed policies they currently implemented in their classes to manage mobile technology. Three prohibited the devices, of which two made exceptions for emergencies. Three others allowed the devices only with their permission. Instructor P6 exemplified, "Prohibited, unless there is an indication from me for them to use [the devices]. Another instructor banned access to social media, and the other allowed for emergencies or "when the discipline/ content requires such resources." A further instructor permitted the devices as long as students did not lose attention to lectures or disturbed peers. Three had student devices set to silent, with two noting that phone calls should be attended outside the class. Another instructor asked students to set their devices on silent or vibrate mode, and did not allow their use during lecturing. One believed that her/his classes did not need policies as "common sense should be sufficient," while the other did not face any problems, although s/he observed a few students looking and responding to SMS messages.

2. *Recommended policies* - five instructors recommended allowing the devices only for content; among these five, two observed that devices usage for content needed to be previously planned or coordinated by the instructors, and another said it needed his/her permission. Other suggestions included permitting the devices for emergency ($n = 2$), setting the devices to silent mode ($n = 3$), instructors deciding, whether or not, to allow the devices ($n = 2$), all instructors applying similar in-class policies ($n = 1$), introduction of policies early in the academic year ($n = 1$), and mobile device use only with instructors' permission ($n = 1$).

In addition to policy recommendations, participants commented on advantages and disadvantages related to a BYOD model, as described next.

1. *Advantages* – 60 students viewed mobile devices as allowing them to search information. Among these students, 26 specifically mentioned search information related to content such as "to search and go beyond content taught in class" (Student A75). The devices facilitate quick access to information ($n = 24$), where seven specifically stressed quick access to content, and use in case of emergency ($n = 13$). Other advantages included search for clarification of issues ($n = 9$), access to content ($n = 7$) and information ($n = 6$), exchange of ideas ($n = 8$), communication ($n = 6$) and send or receive emails. Ten students did not see any advantages of using mobile technology in class. Student A131 stated, "I do not see any reason to use the devices in class. If necessary to use the Internet, there are computers that are more appropriate". As for the instructors, advantages of mobile devices included searching information ($n = 5$), accessing applications and resources

(n = 6), quick access to information (n = 2), clarifying issues (n = 1), and facilitating communication between students and instructors (n = 1).

2. *Disadvantages* – 80 students saw mobile devices as causing distraction in class. Among these students, 19 said it causes distraction to oneself, and 14 felt the devices distract not only oneself but also others. Student A42, for instance, said that the "student moves away almost completely from lectures." Fifty-eight students believed the devices affect attention to lectures. Student A44 said, "Most of the time, mobile devices are used in class to access social networking and WhatsApp...With a mobile phone or smartphone there is the greatest "temptation" to use it and not to pay attention to lectures." A further disadvantage referred to the devices disturbing peers (n = 15) and lectures (n = 9). Other disadvantages included the use of social media (n = 7), sound made by the devices (n = 3), access to non-content (n = 3), and effect on the learning process (n = 4). One student did not see any disadvantage in using mobile devices in class. Seven instructors also saw mobile devices as causing distractions, whereas six believed they would affect student attention to lectures. For example, "Students can easily disperse when using tools that do not contribute to learning." Another instructor noted that "students tend not to complete the activities as they are busy [interacting] with their devices."

5 Discussion

Results indicated that students and instructors arrived in class equipped with a mobile device, and the majority of devices had Internet access (Table 2). Similar to previous studies (e.g. Jackson 2013; McCoy 2016), students tended to occasionally use WhatsApp or similar applications to engage in content and non-content activities (Table 4), and a few other applications for content. Qualitative data indicated that many of the instructors implemented strict in-class policies; yet these policies may have not prevented students from using their devices, although they did occasionally. In addition, students used the devices for non-content despite being aware of the disadvantages of mobile devices in class, and that they are disruptive for learning (Table 5). Mboga et al. (2016) also found that students used their devices regardless of the ban policy. Furthermore, Table 5 suggested that instructors and students tended to neutral opinion regarding some of the statements related to observations of in-class use of the devices (Table 5). This study cannot explain this pattern. Further investigation is required, perhaps using in-depth interviews, and revising the survey statements for clarity. However, students tended to agree with having seen others using social media in class (Table 5), possibly because they were closer to their peers and devices.

The study revealed that, while the instructors agreed with a policy allowing student devices for content (Table 6), and saw advantages of having these devices in class, many adopted strict measures, and some recommended allowing the devices within restrictions such as obtaining instructor permission first. Strict policies may be a reaction to potential disruptions caused by the devices, which agrees with previous studies (Brooks 2016). This is supported by their qualitative comments on the disadvantages of student devices in the classroom, and Table 5 where there was agreement that when used for non-content activities, the devices disrupt learning. In the current

study, qualitative and quantitative data indicated that students similarly agreed with allowing the devices for content; however, students also tended to favour a policy allowing the devices on silent mode (Table 6), with many already implementing this policy (Table 3). Overall, there was a preference by students not to turn-off their devices during class. Further, while Table 6 indicated common agreement between the two groups related to some of the policy statements, the students, overall, tended to have more opinion about the policies than the instructors. Students, for instance, clearly agreed that their opinions should be considered when creating BYOD policies, which is supported by their qualitative comments, whereas the instructors tended to neutral opinion. More research is needed to explore further instructor perceptions of policies using other data sources. Both groups, however, had similar opinions regarding implementing a policy in case of disruption caused by student devices.

Significant differences in perceptions between the two groups in relation to five policy statements (Table 6) were found, which support previous studies (e.g. Baker et al. 2012). The two groups also differed in opinions regarding observing others using social media in class, being distracted by own device, and whether off-task activities were generally disruptive for learning (Table 5). This finding suggests that uniform in-class BYOD policies applied across the institution (Langmia and Glass 2014) or policies that are decided by instructors only, (e.g. Jackson 2013) may not be effective. A closer look at qualitative data suggest that the students themselves presented different ideas related to policies (e.g. some recommending turning off the devices; others using for emergency only). To add to the complexity, correlations performed showed that age was a significant factor that may impact on how students perceive BYOD usage in class and policies. In this study, the younger students used applications more and observed activities more, and disagreed more with policies that turn-off the devices in class, and tended to agree more strongly with text message usage. This result may be connected to Table 1 where most of the students were digital natives (born after 1980), and mobile technologies play a key role in their lives (Chen and Denoyelles 2013). The study did not find significant correlations between student gender or program and mobile device usage, except for two policy statements (3 & 9) where males agreed more; however, gender was a significant factor affecting perceptions in other studies (e.g. Baker et al. 2012). Further, no significant correlations between instructor demographics and perceptions of mobile device usage and policies were found, except that the younger instructors disagreed more with a policy allowing students to answer phone calls outside the class.

5.1 Implications for practice

Findings from this study has implications for the adoption of a BYOD model. Implementing strict BYOD policies for the classroom to avoid disruptions or distractions may not prevent students from using their devices, and may take away learning and teaching opportunities facilitated by those devices. Also, student awareness of the disadvantages of mobile technology in class alone may not prevent them from using their devices for non-content. Due to the different ideas on how to use and manage mobile technology in the classroom

by instructors and students, this calls for discussions between instructors and students, and among students themselves to develop appropriate practices for the classroom that help minimizing distractions and disruptions, and enable effective learning. Such discussions should be ongoing as the devices and expectations of usage will evolve. For example, new applications and hardware will emerge and students will be entering the classroom using wearable devices, which will impact their habits and behaviours (Santos and Bocheco 2017). In addition, the discussions might be beneficial for those students who did not see advantages of using their devices in class, or those supported policies that turn-off the devices during class. Finally, the way students and instructors perceive mobile technology use and policies may be influenced by their age, gender or other variables. By understanding these relationships, it can inform the discussions regarding the development BYOD policies for the classroom.

5.2 Limitations and recommendations for future research

While this study adds to understanding how students and instructors perceive BYOD usage and policies, some limitations need to be acknowledged. The study used a convenience sample, was based on a single Brazilian institution, and the number of instructors was small, which limit generalisation. The survey needs more detailed demographics to allow for richer analysis, along with further refinement to clarity some of the statements. It would be useful to replicate this study at other universities across Brazil and in other countries to compare results. Future studies could use interviews or other qualitative tools to explore more in-depth participant perceptions of BYOD usage and policy. Further research could also focus on exploring the implementation of in-class BYOD policies agreed upon by both instructors and students to determine policy effectiveness in managing devices.

6 Conclusions

This study surveyed student and instructor perceptions of in-class BYOD use and policies at a Brazilian institution, and found that students occasionally used a few applications, independently of instructors' strict policies and awareness of the disadvantages of mobile technology in class. While both groups tended to neutral opinion regarding some of the statements related to observations of in-class use of the devices, students clearly agreed having observed peers using social media. In addition, both groups favoured a policy allowing the devices for content, and that restricts social media usage. However, results suggested significant differences in perceptions between the two groups regarding a number of policy statements in the survey, and perceptions of usage. Correlations performed between demographics, usage and policies suggested that student age significantly correlated with some of the policy statements, and usage. Overall, no significant correlations between instructor demographics and perceptions of mobile device usage and policies were found. This study reinforces previous findings where instructor and student viewpoints differ on how they perceive mobile technology in the classroom, and how they should be managed. Implications for practice and future research were discussed.

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