Undergraduate mobile phone use in the Caribbean

Implications for teaching and learning in an academic setting

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Abstract

Purpose – The purpose of this paper is to present the results of a survey regarding undergraduate students' mobile phone usage patterns and its implication for teaching and learning in the Caribbean higher education academic environment.

Design/methodology/approach – A total of 144 students participated in the survey. The survey method utilized a structured questionnaire design comprising 24 items which was completed by students. A quantitative research methodology was used to analyze the data on student mobile phone usage patterns in an educational setting.

Findings – The results indicate that students find mobile phones to be an indispensable tool inside and outside the classroom environment. More interestingly, it revealed that despite unique socio-economic factors, students' mobile phone adoption, usage and perception patterns in a developing country mirror those of their counterparts in developed states. This has profound implications for education policy in the region.

Originality/value – Little research has been done on students' mobile phone use in the developing world context. Even less work has been done exploring mobile phone usage patterns of university students in the Caribbean region. Given the similarities with developed states, this paper shares ideas with university management and administration how they can incorporate mobile phone technology into their teaching methods, to enhance the learning experience in the Caribbean and the wider developing world context.

Keywords Teaching, Caribbean, Technology, Mobile phone, Learning, Developing

Paper type Research paper

Introduction

Mobile phones have become a necessary tool for communication and interaction in the twenty-first century. The rapid growth in mobile technology has altered many aspects of modern life impacting how we communicate, access information, acquire knowledge and learning. Statistics point to the increasing ownership and usage across various demographic groups and countries (Poushter, 2016).

Interestingly, young adults and students have the highest adoption and usage rates, driven mainly by the ubiquitous nature of this technology, lower costs, access and affinity displayed by this demographic group, to these devices (Prensky, 2001).

Young people's use of mobile phones is also expanding exponentially across the developing world (Porter *et al.*, 2016). Cell phone adoption among students in the developing world has also increased significantly, with many reporting ownership and penetration rates exceeding 100 percent (Lawton, 2010; Salisbury *et al.*, 2015).

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Earlier research indicates that students in developed countries regard their devices as essential for assisting in their educational pursuits as well as a critical component of their social lives (Campbell, 2006). On the other hand, lecturers and university administrators view their use during lecture hours as a serious source of disruption and distraction to learning (Tindell and Bohlander, 2012).

However, ongoing research point to the myriad of potential benefits of integrating mobile phones use for teaching and learning including mobile learning, inquiry-based learning, the use of learning pedagogies such as smart mobile methods TPACK (Ahmad, 2018; Almaiah and Alismaiel, 2019; Kukulska-Hulme and Viberg, 2018; Traxler, 2018) to stimulate collaboration and engagement.

The increased adoption of mobile phones in the higher education landscape of developing countries has significant implications for teaching and learning in these institutions. The objective of this paper is to present a study of mobile phone usage patterns of university students from a developing country located in the Caribbean.

This study aims to address this research gap, while making contributions to the current literature in a number of ways. First, the author articulates the importance of a unique study of Caribbean higher educational systems. This identifies and evaluates the major similarities and differences between developed and developing countries' university education system in the context of mobile phone usage among the student populations.

Second, the author theorizes that given the potential benefits of incorporating its use in learning as evidenced by universities in developing states, similar benefits can be derived from its replication by institutions in the Caribbean and developing world.

In doing so, this paper attempts to afford university management such opportunities to re-examine existing policies surrounding mobile phone use in the class environment and, by extension, assist in shaping future educational policies to improve the teaching and learning experience in Caribbean academic institutions. The research procedure, results and discussion, conclusion and limitations are presented in subsequent sections.

Literature review

Caribbean context

A study of the higher education landscape of countries comprising the Anglophone Caribbean community (CARICOM) within the context of mobile technology diffusion presents an opportunity to effectively highlight some of the important differences with developed states, and to test the feasibility, relevance and practical applicability of infusing mobile devices into academic learning environments in the English-speaking institutions in the region.

A number of tertiary institutions offer higher education and university level training in the Caribbean. These include the University College of the Caribbean, University of Technology, University of Trinidad & Tobago and the University of the West Indies (UWI). However, the UWI is considered to be the leader in the delivery of higher education in the English-speaking Caribbean.

This regional institution has campuses located in the larger island states of Jamaica, Trinidad & Tobago and Barbados, which also allow an intake of students from the smaller islands in the region. The UWI is seen as a symbol of regional and economic cooperation emerging from the integration process and formation of the CARICOM in the early 1970s.

From an historical perspective, its mandate and objective centered on the development of Caribbean leadership skills, the advancement of cultural, social and economic advantages of the citizens in the region in the post-colonial period following the British rule.

However, rapid changes in technology and globalization have forced a rethink of the role, functions and objectives of the institution. The emphasis on providing a "Global Citizen

Education" and the drive for internationalization (Green, 2016) with the objective of becoming a "globally recognized, regionally integrated and competitive university" (Craig, 2017) continues to be the catalyst forcing UWI to accelerate initiatives to integrate innovative methods within its current educational systems.

The use of technology and, in particular, mobile technology is seen as a viable tool in achieving the objectives of raising standards of learning, teaching and research at the UWI in the context of the twenty-first century higher education. While less formal research exists on the subject for this region, recent literature points to a number of initiatives pursued by territorial campuses to embrace mobile phone use into educational polices and instruction.

These include the rollout of Bring Your Own Devices and mobile learning projects at the UWI School of Education Saint Augustine, Trinidad, text messaging services are also used to update students on financial and administrative matters pertinent to their course of study at the Jamaica campus. We also have the implementation of the Caribbean Mobile Innovation Project (CMIP) which UWI Consulting assists in coordinating with innovation hubs (mHubs) to encourage the development of mobile enterprises and foster the growth of mobile entrepreneurship throughout the region.

Such initiatives in the Caribbean context help to inform the design and successful implementation of educational polices which are distinctive and relevant to our university systems. As we have seen in numerous research studies in developed countries, the literature continue to demonstrate the potential for disconnect between willingness to embrace its use in classroom setting and the constraints to effective implementation of such technologies (Bjornsen and Archer, 2015; Farley *et al.*, 2015; Moreira *et al.*, 2018; Sharples, 2013; Tessier, 2013).

A separate study of Caribbean student mobile phone use and willingness to adopt it as a tool of learning is equally important as it enables us to more readily identify unique challenges in developing strategies and relevant policies for easier facilitation to education systems in this region.

Context is very important in any study of student mobile phone use. Researchers point to the role which "context" plays in any country in driving motivation and the appropriation of cell phone use among younger generation. By context, it is meant those situations or scenarios which enable and increases interaction, motivation and appropriation between the user and device in a given environment (Kukulska-Hulme and Wible, 2008; Martiz, 2015).

Other important factors unique to the developing and Caribbean world experience such as socio-economic considerations (Mtebe and Raisamo, 2014; Sharples, 2013) cultural and institutional issues (Blair and Inniss, 2014), along with dynamic changes in the global economic, legal and regulatory framework which may increase the "digital divide" (Waycott *et al.*, 2010; West, 2015) between developed and developing states, and must also be incorporated in any assessment of its usage in an educational setting.

Mobile phone usage patterns in Caribbean and developing countries

Mobile penetration and ownership rates in the developing world continue to outpace those in developed countries (Poushter, 2016). Changes in the economic, legal and regulatory framework have enabled greater availability and affordability of mobile handsets among lower income earners (Alzaza and Yaakub, 2011; Mtebe and Raisamo, 2014).

In some parts of the Caribbean, mobile ownership and penetration rates have exceeded 100 percent (Lawton, 2010), with Jamaica experiencing the fastest mobile phone adoption rate in the region. Portability and affordability provide unique advantages for the developing world leading to significant productivity gains by facilitating business, customer and personal connections (Horst, 2006; Lawton, 2010).

Young adults are especially fast adopters utilizing the instant messaging and information component of their devices most frequently. University students also use it for recording classes, retrieving and sharing educational material (Dunn, 2009). We already alluded the importance of context in describing mobile phone usage patterns.

Specifically, we refer to physical and social context (i.e. scenarios and situations) which encourage use. For Caribbean and developing countries, this may pertain to unique social, physical and learning factors. One study, conducted in the Spanish speaking Caribbean country of Dominican Republic, found that physical factors such as mobility, portability, the ability to access and share content, along with social influences, such as students' personal taste, appeal, ability to network and collaborate, heavily influenced mobile phone usage patterns (Martiz, 2015).

In her extensive study on cell phone use for language learning, Martiz (2015) found that that information "sharing," "communication" and "collaboration" ranked high as critical factors for adoption in a higher education setting, while, outside the classroom, significant secondary benefits were derived from its use as a tool for assessment (both peer and self), time management, scheduling and planning purposes (Martiz, 2015).

Earlier studies confirm the importance placed on mobile phone use as an interpersonal communications, social connectivity, networking and "linkup" tools (Horst, 2006; Horst *et al.*, 2005), in the lives of the younger generation in the Caribbean and developing world. Most utilize the cell phone to establish extensive systems of networks, aka "linkups," which are considered essential for maintaining social and economic ties. In fact, the study conducted in Jamaica identifies its use as essential for economic survival in terms of commercial and entrepreneurial activities along with vital social connection uses as child rearing, relationship building with families abroad and self-reliant coping strategies (Horst *et al.*, 2005).

In fact, from a developing world perspective, more recent literature attest to the importance of cell phone use tied to socio-economic and cultural factors specific to these countries (Ahmed and Kabir, 2018; Hossain *et al.*, 2016; Mtebe and Raisamo, 2014; Sey and Ortoleva, 2014).

In many parts of South East Asia, Latin America and Africa, mobile phone features as a prominent source social networking, leisure and revenue via mobile gaming industry. It is considered to be an important driver of social capital building and development, in terms of providing socio-economic benefits in the form of increased employment opportunities, workplace and ICT skills. For example, it provides employment and income generation through outsourcing of work, the facilitation of mobile banking and public health services in rural communities in South East Asia (Sey *et al.*, 2013) (Table I).

In a higher learning context, although students have an overall positive perception of mobile phone use for academic activities, a higher percentage use devices more as an academic support tool. In particular, smartphone use is tied to internet, with the priority placed on searching for academic information, recording class notes, with entertainment and social networking purposes ranking next.

On the African continent, student mobile usage is heavily determined by the degree of "social influence" and "facilitating conditions" factors (Mtebe and Raisamo, 2014). Students are more likely to adopt mobile phone use depending on their peer and group members' perception about the positive impact of devices in the given context.

Similar to users from developed countries, the literature indicates that young adults in the developing world consider mobile devices to be an indispensable tool in their lives, needed for social connection, communication, informal learning and personal identity purposes (Gikas and Grant, 2013). Universities in these countries are now actively increasing their experimentation with its integration in teaching and learning (Matimbwa and Anney, 2016; North *et al.*, 2014; Winthrop and Smith, 2012).

Research themes and issues	Areas of focus	Authors	Year
Caribbean context	Historical development of Caribbean HE systems Birth of HE institutions in Anglophone Caribbean	Green	2016
	Impact of globalization – redefining role in age of technology and change	Craig	2017
	Role, mandate and objectives of regional university – UWI	Green	2016
	Initiatives to infuse mobile technology at university level	World Bank-Caribbean Mobile Innovation Project	2014
Mobile phone usage patterns	Caribbean Countries (English and non-English-speaking)	Martiz	2015
		Horst	2006
	Physical, social and cultural factors	Horst *et al.*	2005
	Developing world (Asia, Latin America and African Continent)	Ahmed and Kabir	2018
		Duncombe	2016
	Socio-economic and cultural factors	Sey and Ortoleva	2014
		Mtebe and Raisamo	2014
		North *et al.*	2014
		Sey *et al.*	2013
		Donner	2009
		Donner and Escobari	2009
		Duncombe and Boateng	2009
		Donner and Tellez	2008
Constraints to greater mobile phone use in developing countries	Socio-economic	Nye	2015
	Cost, affordability, connectivity and infrastructural support	West	2015
		Thomas *et al.*	2013
		Galperin and Ruzzier	2011
	Digital divide	Soo Ting	2016
	Non-access to higher levels of innovative mobile learning tools in learning	West	2015
		Waycott *et al.*	2010
	Institutional and cultural issues	Lwoga and Sangeda	2019
	Readiness of implementation, policy coordination, resistance, engagement	Zagami *et al.*	2018
		Blair and Inniss	2014
		Wallet and Melgar	2014

Table I.
Literature review summary

However, there exist substantial differences with developed countries with respect to degree of acceptance and suitability of mobile technology across education systems in developing world. Much of research identify factors pertaining to rates of adoption, readiness of implementation and degree of ICT penetration as possible constraints to effective incorporation of mobile phones into university education (Sey *et al.*, 2013).

Constraints to greater mobile phone adoption in developing countries

Physical and social factors are important constraints to cell phone integration into learning. From a developing world perspective, socio-economic and institutional factors are especially relevant. Although these may also pertain to developed countries, they pose more acute limitations for developing states. Cost factors such as applicable hardware and software infrastructure support, internet connectivity, portability and accessibility are some factors which will limit the pace of adoption in the short run (West, 2015).

Other factors such as Institutional features and extent of the digital divide are considered greater barriers to cell phone adoption and appropriation in the developing world setting. Teacher resistance, proper policy coordination, restrictive cell phone policies on campuses, mixed signals regarding the extent to which mobile devices can be integrated into class activities remain ongoing concerns in contemporary research (Tessier, 2013).

A number of important studies have cited the limited data and the lack of internet connectivity. High mobile penetration rates have not necessarily translated to high internet connectivity due to the cost to access these services (Galperin and Ruzzier, 2011; Nye, 2015; West, 2015).

Moreover, a distinction needs to be made between cell phone and smartphone access and affordability. This is especially important in developing countries since the ability and affordability to access features relevant for learning activities is a critical factor for successful adoption (West, 2015).

Factors relating to infrastructure and support services to utilize cell phones in the classroom are also relevant to the Caribbean experience. While many developing countries now boast access to more affordable and improved mobile technology and communications infrastructure (Mtebe and Raisamo, 2014), research indicates that with respect to the education sector, other developing states, including those in the Caribbean, continue to struggle with limitations as it pertains to sufficient Wi-Fi and data coverage up to date equipment, technical support and maintenance across its many student learning campuses (Thomas *et al.*, 2013).

Such issues speak to the pervasive digital divide which exists between western developed countries and developing economies. Mobile and wireless technologies play an increasingly important role in the information age and twenty-first century learning. More developed Western education systems are operating at much higher levels utilizing innovative tools integrating mobile technology in learning such as social networking, blogging, media creation, social bookmarking and Web 2.0 (Soo Ting, 2016), supported by greater levels of internet connectivity.

The institutional environment in which students operate must also be factored. Related cultural issues (e.g. readiness, communication and engagement) have been identified as significant constraints to integration of mobile technology at institutions across this region (Blair and Inniss, 2014; Figaro-Henry and James, 2016).

Teachers and university administrators' readiness, communication and buy in will determine the extent to mobile technology integration into learning will be successful. Willingness to incorporate mobile technology in class, along with flexibility and adoption of less formal teaching styles will serve to foster greater mobile and ICT-driven modes of learning in these institutions (van Rooij and Zirkle, 2016).

Research methodology

The methodology used a quantitative approach. The research study used a survey method consisting of a structured questionnaire which included both open-ended and closed-ended questions. The survey instrument was created and developed from previous work conducted by Tindell and Bohlander (2012), and replicated for the purposes of this study. The questionnaire consisted of 4 major sections with a total of 26 questions posed.

Section I: Contained questions on students' general experience with texting, which included other general questions pertaining to ownership, types of messages sent and usage patterns in class:

- Section II: sought to gather observational statistics and data of the use of cell phones by other students, within the classroom environment.

- Section III: gather observational data on the use of cell phones in the classroom environment by students being surveyed. Detailed usage patterns were studied by gaining data in various classroom scenarios. Likert scales were used to gain responses to these close-ended responses, and such responses were analyzed using general statistics.
- Section IV: contained a number of important open-ended questions where students' opinions on issues related to cell phone use in the classroom were sought. Questions ranged from students' perceptions, beliefs and recommendations, which could be used to guide future policy regarding the use of cell phones in a university class setting; variations in sample size exist in some cases for such open-ended questions in the event of multiple responses received for questions posed.

The data were collected from a group of young students attending The UWI in Jamaica including students who are nations of countries situated in the English-speaking Caribbean. A total of 145 structured questionnaires were distributed among students, of which 144 were received, reflecting a response rate of 99.3 percent. All the information gathered was at the convenience of the researcher. Participation was voluntary and no personal or identifying information was gathered to ensure confidentiality and a high participation rate.

The demographic profile of respondents is summarized in the table and figures in the next sections. It shows that those who surveyed the data comprised of 71 males and 73 females, or a ratio of 49 percent: 51 percent and ranging in ages 19–22. All were enrolled in a normal undergraduate degree program (Figures 1 and 2).

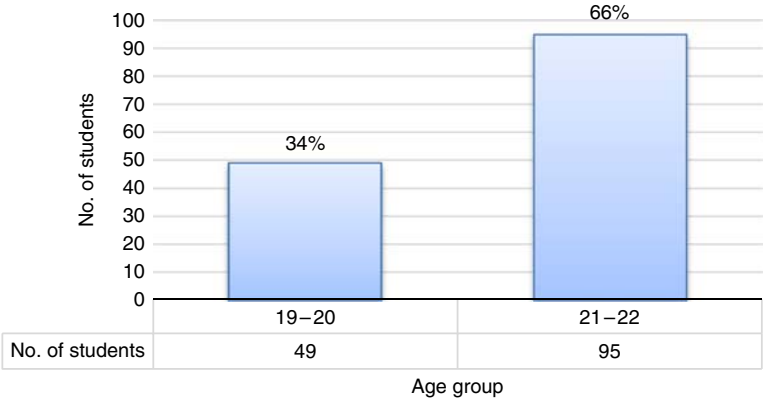

Figure 1.
Student age group

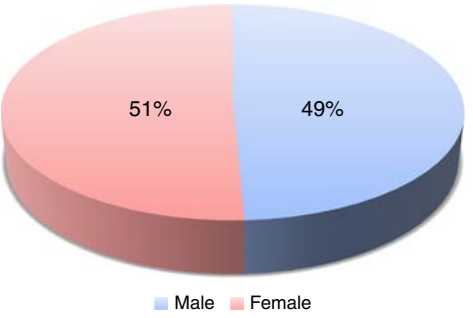

Figure 2.
Gender composition of students

Results and findings

The results for Section I as depicted in the tables indicate that cell phone ownership rates are high among undergraduate students. An overwhelming majority of 99 percent owned a cell phone with texting capability. In addition, a majority of 32 percent used standard text as the primary method of messaging. In terms of use in the classroom environment, a large percentage (83 percent) of students' surveyed report that they always bring their cell phones to class.

Furthermore, of those who brought them to class, we find an overwhelming majority of 92 percent, as 132 of the 144 students sampled responded that they set their instruments to vibrate, while smaller numbers of 6 percent or 9 students, and 2 percent or 3 students, reported the status of their cell phone as "turned off" or "set to ring."

Interestingly, these results mirror precious findings of developed countries which reflect the importance of cell phone devices in the social and learning environment (Table II).

Sections II and III reveal the results of the use of cell phones by individual students surveyed and their observation of other students in and outside class scenarios (Table III).

After a breakout and comparison of the numbers into "almost daily/daily" vs "on occasion/at least once," this research finds that twice as many students texted at least once/on occasion vs almost daily/daily whether during or before class (31 vs 65 percent and 27 vs 65 percent).

On the other hand, the opposite is true for the students who have observed others engaged in texting during and before class. Twice as many are observed engaged in texting almost daily/daily vs at least once/on occasion (65 vs 33 percent and 68 vs 31 percent) (Figure 3).

As expected, a majority of students (94 and 81 percent) report that they have never engaged in texting or observed another engaged in texting during exams. These results seem to corroborate other research studies in developed world regarding the importance which students place on their devices as a tool of communication. It also shows the potential of cell phones to encourage compulsive, addictive and dependent behavior among young adults and students.

Question	Yes	No					
Do you have a cell phone that can be used for text messaging?	143	1					
Percent	99.3	0.7					
Question	I do not send any type of text message	Standard text	Email	Facebook	Twitter	Pictures	Total
What types of messages have you sent with your phone?	1	139	90	78	46	83	437
Percent	0.2	31.8	20.6	17.8	10.5	19.0	100.0
Question	Yes, always	Yes, sometimes	No, never				
Do you bring your cell phone to class?	120	22	2	144			
Percent	83.3	15.3	1.4	100			
Question	My cell phone is turned off	My cell phone is on vibrate	My cell phone is set to ring				
When you are in class, what is the typical status of your cell phone?	9	132	3				
Percent	6.3	91.7	2.1				

Table II.
Section I: general experience with text messaging

Survey item	Never	Frequency Once or twice	On occasion	Almost daily	Daily
Student has seen another texting (%)					
Before class ($n = 144$)	1	8	23	27	41
During class ($n = 144$)	1	8	25	29	36
During exam ($n = 144$)	81	13	2	3	1
Student has him/herself texted (%)					
Before class ($n = 144$)	5	32	33	18	13
During class ($n = 144$)	8	27	38	17	10
During exam ($n = 144$)	94	3	1	2	0

Notes: This table examines the texting behavior of students in the classroom setting. In terms of frequency observed by the students themselves and other students, 92 percent have themselves engaged in texting during class, with a slightly higher 95 percent engaged in texting "at least once" before class. An even higher 99 percent of the respondents have observed other students engaged in texting before and during class "at least once"

Table III.
Percentage students engaging in texting while in the classroom

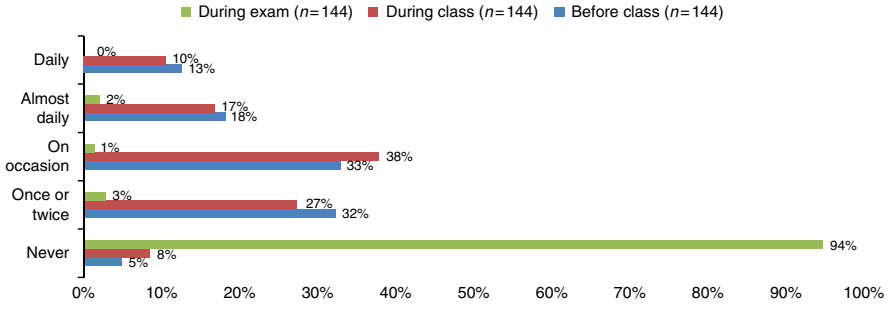

Figure 3.
Percentage students him/herself engaged in texting

Section IV examines the results about students' perceptions regarding the ease of the use of cell phones along with teacher awareness and attitudes in the classroom. These are summarized in Tables IV and V.

It is slightly easier to receive than to send text, with more than half of the respondents or 58 percent saying that it is easier in some and difficult in other circumstances, with about 11 percent saying it has about the same difficulty level.

How easy is it to text without the instructor being aware?	Perceived difficulty Do not know	Very easy	Somewhat easy	Neutral	Somewhat difficult	Very difficult	Depends on class
During class ($n = 144$)	0	75	43	18	6	2	0
Percent (%)	0.00	52.08	29.86	12.50	4.17	1.39	0.00
During exams ($n = 144$)	66	6	10	5	17	37	3
Percent (%)	45.83	4.17	6.94	3.47	11.81	25.69	2.08

Notes: During lectures, 82 percent found it easy/somewhat easy to text without the instructors' awareness as opposed to much smaller 6 percent who expressed some kind of difficulty; During exams, 28 percent found it difficult as opposed to 11 percent who expressed relative ease. As expected, a much larger percentage, almost 46 percent, responded that they do not know the difficulty level, implying that they don't engage in such a practice during exams

Table IV.
Perceived difficulty of texting without the instructor's awareness

Table V.
Perceived relative difficulty of sending or receiving texts

Is it easier to send or receive?	Easier on some difficult in others	Do not know	Perceived relative difficulty: Much easier to send	Somewhat easier to send	Equal	Somewhat easier to receive	Much easier to receive
During class ($n = 144$)	83	9	5	10	15	7	15
Percent (%)	57.60	6.25	3.48	6.94	10.41	4.88	10.44
During exams ($n = 144$)	0	94	0	2	11	11	26
Percent (%)	0.00	65.30	0.00	1.40	7.64	7.64	18.02

Note: This table summarizes students' perceived relative level of difficulty of sending and receiving texts

Open-ended questions

Tables VI and VII showcase opinions from students using open-ended type questions about how lecture room layout and instructor teaching styles facilitate easier text messaging during class hours.

Instructors' teaching style seems to be the biggest contributing factor in students' ability to text in class. We see that preoccupation with the lecture material, lack of interaction and focus on student behavior garnered the highest responses (16), followed by lack of specific policy regarding cell phone use and a laid-back relaxed teaching style with 12 responses.

Table VI.
Most common open-ended responses to the question: "what instructor characteristics make it easier to text during class"

Response category	Number of respondents
Instructor does not have specific policy and does not seem to mind texting behavior, more laid back and relaxed	12
Instructor stays in front of the class, not circulating	9
Instructor turns back to the class to write on board	8
Instructor focuses on computer or projection screen; does not make eye contact	2
Instructor focuses on lecture, and not on the students behavior	16
Instructor does not require students' participation, non-interactive	16
Instructor does not gain the interest of the students, making them want to text more	5
Instructor allows time for group discussion	4

Table VII.
Most common open-ended responses to the question: "What characteristics of the classroom layout make it easier to text during class?"

Response category	Number of respondents
Large classroom/lecture hall	17
Barriers between student and faculty (this included other desks, other students, pillars, purses, computers, etc.)	17
Room has large, lab-style tables, rather than small desks	7
Large number of students	12
Students crowded together	11
Ability to sit near a wall, corner or in the back of the room	5
Instructor is far away from students	7
Sitting is in traditional row/column configuration (seat in front blocks the one behind)	2
Seating is stadium style	2

Notes: $n = 80$. Students could have more than one response

Classroom layout is also a factor. Large lecture halls, natural barriers between students and teachers, along with a large number of students per lecture, afford opportunities for texting as seen with the highest number of respondents at 17, 17 and 12, as represented in Table VII.

In Tables VIII–X, this author asked a series of questions pertaining to the use of cell phones for potential disruptive, distractive and inappropriate behavior in the classroom setting. Much research exists from a developed world perspective detailing the potential use of these devices to encourage certain negative psycho/social behavior, namely, addiction, obsession, dependency, preoccupation, cheating in class, along with other anti-social effects (Campbell, 2006).

We can see that from Table VIII, the frequency of texting during exams is pretty low, with a very small percentage (1.39 percent) actually receiving and even smaller sending any communication. We are of the view that students may perhaps be behaving in a similar manner as their counterparts in developed countries in not reporting higher instances of texting during exams for the fear of punitive measures or risk of severe sanctions.

In terms of the distractive effects, Tables IX and X indicate that the instances of phones ringing in class and texting, whether by the students' own phone or another student's, exceeds by 55 percent in both cases. The majority of students (39 and 35) are of the view that texting can be distractive and result in poor grades.

Table VIII. Percentage of students texting exam information

Type of message texted	Frequency			
	Never	Only once	Few times	Regularly
Sent exam information to another student ($n = 144$)	142	1	0	1
Percent (%)	98.61	0.69	0.00	0.70
Received exam information from another student ($n = 144$)	140	2	1	1
Percent (%)	97.22	1.39	0.69	0.70

Table IX. How often do cell phones ring in class?

Phone has "Gone Off" during class	Frequency		
	Never	At least once	At least a few times
Another student ($n = 144$)	13	85	46
Percent (%)	9	59	32
Own phone ($n = 144$)	47	80	17
Percent (%)	32.64	55.56	11.81

Table X. Open-ended responses to the question: "Do you think that text messaging causes any problems in the classroom?"

Response category	Number of respondents
Students sending text is affected through loss of attention and/or poor grades	39
There are no problems caused by texting in class	8
Texting causes a distraction to those sitting nearby	35
Phones ringing/vibrating is a problem	1
Texting is a problem during exams	0
Texting annoys the instructor	2
Strongly object to use in class/or only used in urgent situation	2

Notes: $n = 87$. Students could have more than one response

With regards to their opinions on formulation of appropriate cell phone policy during class (Table XI), we see that, by far, most disagree with restrictive, prohibitive policy with the largest number of 94 agreeing that phones should be left in students possession but placed on vibrate. The second highest number of 26 responses was received for students agreeing that cell phones be in their possession but turned off, and the third highest number of 15 responses agreeing that students should be allowed to receive and make calls as long as it does not pose a distraction to others.

When asked about what measures university administrators and instructors can take about developing and implementing sensible and workable cell phone policy on university campuses, students appear to be somewhat conflicted in their views. Table XII illustrates that while 51 see no problem with texting as long as it does not disturb others, an almost equal number of 54 were of the opinion that texts should only be allowed for emergency situations. Interestingly, the third highest number of responses of 32 indicated that it is never appropriate to text during class, while a smaller number of 10 said it could be used, if related to class material/activity.

When asked for their own personal views regarding ideas for developing a good cell phone policy, students seemed to adopt a surprisingly indifferent, non-responsive approach, as depicted in Table XIII.

Only 21 responses were received, with the largest number of 9 saying that they have no ideas for workable policy. Three students responded that policy should dictate that phones be set to vibrate, while another three said that an outright ban policy should be enforced. It would seem that students are also conflicted in their views regarding an appropriate policy. However, written responses reveal that students prefer that any future policy should be context based and not applied generally as their devices are a vital tool in "the modern age."

Discussion and implications

A study of cell phone usage patterns of Caribbean and developing world students is important in devising appropriate and relevant policies for mobile technology integration

Table XI.
Open-ended responses to the question: "Do you think should be the policy on cell phone use during class?"

Response category	Number of Respondents
Cell phones are not permitted in the classroom under any circumstances	4
Cell phones must be turned off and placed on the desk in front of each student	6
Cell phones may be kept on the student, but must be turned off	26
Cell phones may be kept on the student, but must be placed on vibrate	94
Cell phones may be kept on the student, and may be left on ring, but not used	1
Cell phones may be used to send and receive text messages during class, as long as this is not distracting other students or is not exam material	15

Note: $n = 146$

Table XII.
Open-ended responses to the question: "Do you think that students should be allowed to text message during class?"

Response category	Number of respondents
Yes, I should be allowed to send a text anytime I want	14
Yes, I see no problem with using a cell phone to text in class as long as I am not disturbing other students	51
Yes, but only in emergency situations	54
Yes, but only if the message is pertains to class discussion	10
No, it is never okay to send a text message during class	32

Notes: $n = 161$. Students could have more than one response

into educational systems in these countries. As discussed, the research conducted so far in this area points to a number of important socio-economic, cultural and institutional factors which account for distinct differences in usage, adoption and perception patterns for cell phone between more advanced Western developed countries and developing states. Higher education policy makers and university administration would be wise to incorporate such differences in fashioning workable and appropriate procedures which are relevant to our educational setting.

However, the results of this study yielded some interesting findings. Foremost is the fact that irrespective of the stated socio-economic, cultural and institutional constraints, we find that students in this region exhibit quite similar cell phone behavior to those in developed countries. A key finding is that students, across all cultures and countries, view their mobile devices as an indispensable tool in their social and learning life. In the developed Western countries, they are seen as critical tools for enhancing social interaction, communication and maintaining contact with family and friends (Harrison and Gilmore, 2012). It remains an important social status symbol (Blair and Fletcher, 2011), with its use overlapping many aspects of social life such as social connecting and communicating, formal and informal learning (Gikas and Grant, 2013).

Caribbean students are no different from students in more developed societies. Such "digital natives" (Prensky, 2001) have grown up accustomed to the technology, the ubiquitous nature of cell phones, and have developed an affinity and comfort with its use, irrespective of the time or location (Traxler, 2010).

However, whereas students in the developed world utilize mobile devices more as tools to enhance social interaction and communication, developing world students emphasize its critical importance for economic and social survival. Portability and affordability are major factors in ensuring business, economic and personal "linkups" (Horst, 2006; Lawton, 2010).

In the class environment, studies show that devices also provide secondary important functions. Many Caribbean university students utilize cell phones for recording classes, retrieving and sharing educational material (Dunn, 2009). Others use it as a clock or alarm mechanism, and for lighting purposes. This illustrates its growing importance as a "time management" and "emergency power back-up tool," "especially in developing regions" (Martiz, 2015).

Potential benefits of mobile technology integration

Such characteristics have important implications for the ease of implementation of mobile technology learning and teaching into Caribbean higher education systems. This could provide enormous benefits for institutions in this region. We have already established from a recent small survey at UWI in Jamaica that students are willing to incorporate mobile

Response category	Number of respondents
No, I have no response or ideas for good cell phone policy	9
Cell phones use should be allowed only for research or academic purposes	2
Cell phones can be kept by student but used only in emergency situations	1
During class cell phones should be on vibrate	3
During class cell phones should be on silent	1
Absolute ban – no cell phones allowed in class-text or call outside	3
Should be allowed if not disturbing anyone or used in exams	1
Policy should be tailored to context or circumstances	1

Notes: $n = 21$. Students could have more than one response

Table XIII. Responses to the open-ended question regarding ideas for good cell phone policy

phone devices as a tool in learning (Ahmad, 2018).The majority of students who were encouraged to utilize mobile phones during lecture sessions to search for information did not perceive it as a distraction during the learning process. Similar findings exist at universities in some developing countries which are now actively increasing their experimentation with its integration in teaching and learning.

For instance, an important application is in the area of mobile-assisted language learning (MALL) which appropriates the use of cell phone technology for language learning in many teacher college institutions throughout the world. Studies indicate the use of such approaches is highly driven and motivated by the users' own unique needs and circumstances.

Advantages include greater flexibility in mobility and travel, the ability to augment in class teacher-led instruction by independently finding and sharing information with their peers in a collaborative and interactive manner (Sharples, 2007; Traxler, 2010).

Although in its infancy, many researchers are of the view that MALL has the potential to disrupt existing approaches to teaching and learning by replacing "teacher-learner" styles with a more independent, individual, "learner-learner" style which emphasizes collaboration and interaction among users supported predominantly by mobile and cell phone technology.

In an extensive study on cell phone use for language learning in a Caribbean higher education class, devices are utilized to enhance collaboration and unique learning styles. It reinforced earlier studies conducted in developed states, showing the potential for the adoption of similar approaches into existing Caribbean higher education systems (Martiz, 2015).

However, unique cultural, social, physical and contextual differences must be incorporated to ensure relevance and applicability for developing countries' higher education systems. Martiz (2015), in her study, emphasizes the importance of "context" in any social environment (e.g. learning), and how it affects the pace of adoption, appropriation and integration into existing social practices. Physical and social factors such as mobility, portability, the ability to access and share content, along with social factors including students' own unique personal taste, appeal, the ability to network and collaborate will influence appropriation and ultimately views, opinions, perceptions and receptiveness toward mobile technology integration for learning activities in this region (Martiz, 2015).

Others emphasize the importance of distinctions between formal and informal learning – is it in the context of a structured classroom setting or does it constitute unstructured and informal classroom activities? (Traxler, 2010). Consideration also needs to be given to the capabilities of mobile devices – are they really smartphone devices with the full range of services, or cell phones with basic internet and browsing features? In addition, are the learning styles and methods similar or significantly different among institutions?

Such nuances are important to a critical assessment of the usefulness of cell phone technology integration in any learning environment (Gikas and Grant, 2013). All these factors need to be considered to ensure relevance and applicability of mobile technology into teaching and learning pedagogies in developing countries.

Integrating mobile technology into higher education teaching and learning can also help to reduce the digital divide and afford students access to the twenty-first century ICT skills to take advantage of economic opportunities relevant to Caribbean culture and economy. The benefits accrued from technology education can be strengthened by integrating mobile technology into the national policy of education especially in developing countries (Wallet and Melgar, 2014). An important objective of the UNESCO charter is the promotion of sustainable development goals, one of which is the use of mobile technology and ICTs in education as a method to reduce poverty, economic inequalities, and improve well-being and human conditions of developing countries (Lwoga and Sangeda, 2019).

More recent work point to the growing importance which mobile phones play in the sustainable development domain, particularly in enhancing small micro enterprises, agricultural and rural development, mobile banking financial services and entrepreneurial activities in developing countries (Duncombe, 2016; Donner, 2009; Duncombe and Boateng, 2009; Donner and Tellez, 2008).

The implementation of the CMIP, financed through the World Bank in partnership with the UWI, represents a perfect example of new responses to dynamic and evolving higher education paradigms which are attempting to accelerate the use of technology in education to increase student learning outcomes, which will directly benefit the needs of Caribbean economies and culture.

As stated in their policy project document published in 2014, the main objectives are to "strengthen the Caribbean mobile innovation system and enable sustainable and competitive mobile enterprises to grow" (World Bank, 2014). The university will assist in providing funding, training and technical support services to young mobile app entrepreneurs who are natural adaptors of technology in their starts up and managing their small enterprises with the ultimate aim of encouraging the "economic growth and sustainability of high quality jobs" throughout the English-speaking Caribbean.

Mobile cell phone policy

Approaches to developing appropriate mobile cell phone policies illustrate another stark difference between developed and developing countries. Differences in cultural and societal norms may be strong factors which account for recommended methods used in tackling issues of disruption, distraction and misuse of devices during lecture hours.

From the perspective of more developed countries, it seems that institutions have to grapple with more pronounced forms of negative psycho/social behavior, ranging from addiction, obsession, dependency, preoccupation (Campbell, 2006) to now more serious challenges such as "cyber-slacking" (Flanigan and Kiewra, 2018), where the more tech savvy, sophisticated "net- generation" students utilize their cell phone and smartphone devices more often to engage in "off task" uses during lecture and classroom hours and outside of class.

Some consider it more deleterious than multitasking, and is manifested in a number of ways which impair the learning process. It leads to reduced concentration or focus on class material and less note taking (Kuznekoff and Titsworth, 2013).

Many continue to insist that the presence of cell phones during lecture impairs learning, and reduces performance in tests. Multitasking, receiving notifications and the constant checking and anxiety displayed by the fear of missing out can severely lower performance and impair learning (Lee *et al.*, 2017; Mendoza *et al.*, 2018).

Hence, attempts at crafting suitable cell phone policies appear to resort to more drastic and punitive measures. For example, many of the recommendations to curb cyber-slacking, as outlined by Flanigan and Kiewra (2018), appear to adopt a more zero tolerance to use of mobile devices in a class setting.

Caribbean university students and administration continue to display a more ambivalent indifferent, undecided and mixed signaled approach to adopting coherent rules or guidelines for cell phone use on campus. Therefore, such hard line and restrictive recommendations in developed countries would not be workable for institutions in this region.

The results indicate that cultural and institutional factors may be at play in explaining the response. Caribbean and developing world institutions may be exhibiting a far more accommodative, tolerant, easy-going approach toward its use in class. The data suggest that lecturers are largely unaware or choose to ignore the extent of widespread use of devices in class. In addition, as alluded to before, institutional issues in terms of

implementation readiness, communication and engagement (Blair and Inniss, 2014; Figaro-Henry and James, 2016), are significant constraints to integration and coordination of policies and pedagogies relating to mobile technology across this region.

Conclusion and recommendations

The fundamental issue or question to be addressed is to what extent do Caribbean university stakeholders have in terms of an understanding, awareness and appreciation of the full potential of the benefits of integrating mobile technology into teaching and learning to produce higher educational quality and student outcomes? (Wallet and Melgar, 2014). There are increasing calls for a rethink of the mission and vision for university teaching methods in the light of increasing technology and in particular with digital and mobile technology (Zagami *et al.*, 2018).

For the twenty-first century learning institutions, education systems are evolving at a rapid pace with special emphasis on the growth of learner-centered and student engagement pedagogies to replace traditional methods of instruction. This is occurring in both developed and developing institutions. The strategies will differ among countries according to how students interact and use mobile technology within the learning environment.

For developing countries, the type of educational policies and learning activities pursued will be greatly dictated by the level of supporting ICT infrastructure, cost and access, and changes in the nature of global economies which will necessitate a move toward knowledge-based and lifelong learning education systems (Gibson *et al.*, 2018).

In this regard, Caribbean universities have begun to utilize technology initiatives into teaching and learning methods. However, a concerted, deliberate approach with respect to policy approaches is required to fully exploit its full benefits. Higher education institutions may wish to consider the following measures:

(1) Focus more on the use of mobile phones to engage in educational activities rather than a preoccupation with the devices, features or policies to restrict and prohibit during lecture hours.

(2) Experiment with learning and teaching methods which can be applied to Caribbean culture, namely:

- Inquiry-based learning – which incorporates the use of devices to search for information and at same time equip students with additional skills to function in an increasingly digital and data-driven, knowledge-based world.
- Utilizing more fully existing pedagogical frameworks to increase desired learning outcomes for students in this region. Irrespective of the resource and ICT constraints, institutions could exploit more fully, already established learning methods which can facilitate mobile modes of delivery such as e-learning and distance learning.
- Mobile learning or "m-learning" methodology which uses device features to engage in learning irrespective of time or location. Factors which may influence the increased adoption of m-learning integration in developing countries such as "perceived playfulness" and "social influence" (Iqbal and Qureshi, 2012) should be explored within the Caribbean context.

(3) In terms of the implementation of an appropriate mobile phone policy for the use on campus, university administrators and lecturers could consider adopting the softer strategies as espoused by Flanigan and Kiewra (2018) as against the harsher policies of strict enforcement and bans. As suggested, measures which include incorporating mobile phone as a teaching tool, providing incentives which foster an active learning

atmosphere, and to encourage students' motivation to self-regulate compulsive use during class are preferred options for Caribbean institutions.

(4) Caribbean policy makers may want to update themselves with newer mobile technology learning models being used worldwide to test relevance for education systems and culture. Prior research such as the one conducted in Guyana higher education (Thomas *et al.*, 2013) may become outdated over time. For instance, newer models such as the technology acceptance model investigate "systems, information and service quality factors" (Almaiah and Alismaiel, 2019) playing important roles in determining the level of acceptance of mobile learning methods in any region or environment. Criteria such as the ease of use, perceived usefulness, intention to use and overall user satisfaction may be more relevant and important, given Caribbean/developing countries' infrastructural and financial resource constraints.

Finally, there is growing criticism that most of the literature about mobile technology and ICT adoption seems to focus more on its benefits of investing rather than of leveraging the technology to derive benefits relating to broader sustainable issues (e.g. health, education, economic growth, etc.) Policy makers in education and government need to appreciate the "linkage" (Lwoga and Sangeda, 2019) between ICT/mobile use and sustainable development issues.

One suggestion is that policy design for mobile and ICT adoption must be aligned with multiple objectives of economic growth, community needs and national goals. One concrete way of attaining this for developing countries in the Caribbean is to train its university undergraduates and younger generation in the delivering of sustainable benefits from the creation of mobile apps for people of this region.

Caribbean universities can spearhead and guide this process. We have seen that current models of technology integration such as TPACK and SAMR are especially useful as they integrate current advanced smartphone and high-end mobile devices in learning and can be used to "create high possibility classrooms" (Hunter, 2015) and drive the production of apps. Such models have distinct advantages in enhancing both student and instructor collaboration and shared experiences, while enhancing the twenty-first century skills.

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