UNDERSTANDING MEDIA USAGE PATTERNS OF STUDENTS AND FACULTY VIA A MEDIA ACCEPTANCE APPROACH: A CASE OF A MULTI-CAMPUS UNIVERSITY IN GHANA

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Abstract

The study explores media usage configurations primarily of students (n = 221) but also lecturers (n = 82) in a multi-campus university in Ghana. Constructs measured comprised the ownership and access to digital devices, the frequency of use, and the usage satisfaction of 53 media tools and services relevant for learning which were categorized as: digital devices and hardware, text media, general web tools and e-learning tools and services. Based on the responses, media acceptance was established by means of a media acceptance model. Results suggest mobile digital devices and mobile Internet, particularly cellular mobile data are ubiquitous, yet internet at homes remain scarce. Intensely used media by students and lecturers are not remarkably differentiated, however, significant differences exist between students at the main campus and satellite campuses, regarding the acceptance of some media tools. E-learning tools and services were the least accepted media, which to a large extent can be attributed to a deficit in the internet infrastructure on the campuses, however the lines that delineate the acceptance of digital devices, text media and web tools appear blurred. Preferences for external media ranked higher compared to the university's internal media offerings although they were mostly communication media. Investments in Internet technologies and infrastructure could increase the intensity in the use of e-learning tools and services, and enhance the opportunities for technology enhanced learning across all campuses.

Introduction and Purpose

An arrangement that emerged within the Ghanaian higher education (HE) landscape in response to the inequality regarding access to higher education was the introduction of multi-campus universities (MCUs). MCUs typically have campuses that are geographically separated from each other but combined in a single university system (Nicolson, 2004). Given that the categorizations for MCUs are varied in context (Pinhero & Berg, 2016), this study is concerned with MCU systems that have resulted from campus-based universities, establishing a number of satellite campuses in so-called peripheral areas to optimize life chances among people who may otherwise have been excluded (Scott, Grebrennikov, & Johnston, 2007; Pinheiro, Charles, & Jones, 2015; Pinhero & Berg, 2016); the version more prevalent in the Sub-Saharan Africa (SSA) region which has attracted recent research attention (Dhliwayo, 2014; Langa, 2017).

Similar to distance education programs, technology remains an important consideration for effective implementation of multi-campus programs (Harrison, Congdon, & DiPiro, 2010). Utilizing technology to expand access to education especially in the light of increasing demand for HE has also been argued as a viable option in SSA (Karsenti & Collin, 2012; Kashora, van der Poll, & van der Poll, 2016). Indeed, various studies have applied technology acceptance models (e.g. Davis, 1989; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003) to measure technology acceptance regarding information systems in HE globally and also within SSA (e.g. Averweg, 2008; Bere & Rambe, 2013). The strengths of these models were found to be limited to measuring the adoption potential of single media tools or services. However, a unique form of technology acceptance model known as the media acceptance model (MAM) was developed by Grosch (2011) to measure acceptance of multiple media tools and services relevant for learning and has been applied in a number of studies (e.g. Grosch, Berger, Gidion, & Romeo, 2014; Zawacki-Richter, Müskens, Krause, Alturki, & Aldraiweesh, 2015; Gerd, Capretz, Grosch, & Meadows, 2016).

In spite of the clear convergence of motives between the two streams of research – MCU and technology acceptance in HE – literature on the two have largely developed independent of each other especially in the SSA context, where challenges regarding e-learning implementation are well documented (Asunka, 2013; Conole, 2014; Gulati, 2008; Mtebe, 2015). This study attempts to bridge this gap by employing the media acceptance model (MAM) to investigate the level of acceptance regarding media tools and services relevant for learning in a multi-campus university in the SSA region. The purpose of such a study is to provide foundational understanding of possible media usage patterns on typical multi-campus universities in the SSA region with the aim of understanding current level of media acceptance for learning in complementing the education expansion drive of such universities. Insights from this study will possibly provide an exploratory understanding of the interaction effects between geographical distribution and media acceptance for the improvement of technology enhanced learning (TEL) in HE especially in the SSA context.

Research Questions

To understand the media usage patterns of undergraduate students and lecturers in a Ghanaian multi-campus university (referred to in this study as Ghana TU), the study addressed the following research questions:

- What digital tools and devices do students and lecturers of Ghana TU have access to?
- Which media tools and services do students of Ghana TU often use for academic purposes and how do these media rank in comparison to their lecturers?
- Which media tools and services do students of Ghana TU accept? What are the commonalities and differences? How does the acceptance of students relate to factors such as the campus of study (main campus versus satellite campus)?

The Research Context and Methodology

The organisational context of this study is a public Ghanaian multi-campus university college that has existed since 2006, with undergraduate and postgraduate program offerings in collaboration with local and international partners. The University College has rapidly established itself as a major multi-campus university in Ghana, by opening four satellite campuses around the country and extending its technology based education to locations further from the nation's capital. With a total student population of about 6000 and faculty strength of 153, the institution prides itself as being at the fore front of utilizing the affordances of ICT for teaching and learning since the establishment of the Centre for Online Learning and Technology (COLT) in 2012 to spearhead the implementation of online learning. Ghana TU is mainly a campus-based university, although the campuses are regionally dispersed. The university does not run any fully online programs however, close to 40% of courses are either deployed online or through blended formats for students at the main campus.

The survey adapted and utilized a fully standardized questionnaire first developed and used in 2009 at Karlsruhe Institute of Technology (KIT) in Germany (Grosch & Gidion, 2011). The questionnaire has since been administered and validated in more than 15 follow up surveys. Between the period of June 2 to 30, 2018, responses were solicited from undergraduate students and lecturers through their official emails and WhatsApp groups with several reminders. However, due to the low response of the online survey (students: 113, lecturers: 31), paper-based versions of the questionnaires were sent out to students and lecturers to complement the online survey. Liebenberg, Chetty, and Prinsloo (2012) adopted a similar approach when they found it challenging to reach a section of their respondents through an online survey. In all, total of 221 students (Male, 71.4% and Female, 28.6%) and 84 lecturers (Male, 85.4% and Female, 14.6%) across the 5 campuses completed the survey (see Table 1). More than half of the students (54.8%) and lecturers (58.5%) belonged to the Faculty of I.T Business (FoIB), while students and lecturers from the Faculty of Computing and Information Systems (FoCIS) and the Faculty of Engineering (FoE) constituted (35.7%, 29.3%) and (9.5%, 12.2%) respectively.

The survey specifically measured the usage frequency and usage satisfaction of 53 media tools and services. They included: a) Digital devices and hardware, b) Text Media, c) Internet and General Web Tools and d) E-learning tools and services which were conceptualized along the lines of Grosch and Gidion (2011) and Zawacki-Richter et al. (2015). A five point Likert scale comprising *very often* (5) to *never* (1) was used to measure usage frequency while *very useful* (5) and *not useful at all* (1) measured usage satisfaction. Media acceptance, which has a connotation of media quality, was measured by evaluating the usage frequency and usage satisfaction in the form $\{(\text{Value }_{\text{frequency of use}} + \text{Value }_{\text{usage satisfaction}})/2\}$. Due to the low sample size, the findings in this study cannot be generalized, and must therefore be interpreted with caution, however some meaningful implications can be derived for digital education within technologically challenging contexts.

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Results

The overall mean age of students was 26.8, however, students in Accra (main campus) were averagely younger (24.7), compared to students from the satellite campuses (27.3). The average number of semesters completed by students was reported as 3.8. Non-traditional students, thus, students employed and therefore prefer flexible lecture session, delayed in enrolling into HE, 25 years and above (USDE, 2002) were found to be statistically significant ($p < 0.05$) among satellite campus students. Most lecturers (53.7%) were between 31 and 40 years, clearly suggesting there was no generational gap between students and lecturers. Lecturers had spent a period of (m = 3.7 years) at Ghana TU but with an overall teaching experience of (m = 6.3 years) in HE. Table 1 shows the distribution of participating students and lecturers across the various campuses of Ghana TU. As expected, participants from Accra constituted the largest share (35.7% and 43.9%) of students and lecturers respectively.

Table 1: Distribution of survey participants by campus

Category	Accra*		Ho		Koforidua		Kumasi		Takoradi		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Students	79	35.7	32	14.3	26	11.9	32	14.3	53	23.8	221	100
Lecturers	36	43.9	10	12.2	8	9.8	12	14.6	16	19.5	82	100

*Main campus

What digital tools and devices do students and lecturers of Ghana TU have access to?

As shown in Table 2, both groups are fairly equipped with digital devices and hardware. More than half (54.7%) of students own between 4 and 5 devices. While portable mobile devices such as laptops, notebooks and smartphones are extremely popular among students and their lecturers, penetration is however low regarding ownership and access to tablet computers and e-book readers (e.g. Kindle). Mobile Internet was the most accessible Internet access for students and faculty. Although lecturers had a higher access rate compared to their students, fixed broadband in homes in general, are uncommon.

Table 2: Distribution of rate of access to digital devices and hardware. Students versus Lecturers

Digital devices and Hardware	Group Category	Desktop	Printer	Laptop	Tablet	E-Book Reader	Smartphone	MP3 Player	Internet @Home	Mobile Internet
Access Rate (%)	Students (N = x)	70.3	73.8	95.2	42.5	45.0	100.0	40.5	26.1	100.0
	Lecturers (N = x)	78.1	80.5	95.1	11.8	26.8	95.1	21.9	48.8	100.0

Which media tools and services do students of Ghana TU often use for academic purposes and how do these media rank in comparison to their lecturers?

To identify which media tools and services were intensely used for academic purposes, students and lecturers were asked to rate on a scale of *very often* (5) to *never* (1), how often

they used a list of 53 media tools and services. We defined intense as media with usage frequency mean values between 3.5 and 5. Tables 3 and 4 presents the results for students and lecturers respectively. 15 media tools and services were identified to be intensely used by students with presentation slides from lecturer and students' online portal services being the only internal media offerings of the university. Compared to the ranking of their lecturers no distinct differentiation was revealed. As many as 11 out of the 15 intensely used media by students are shared in common with the lecturers.

Table 3: Ranking of intensely used media tools and services by students of Ghana TU

Media tools and services	STUDENTS				
	Type	Rank	N	M	SD
Smartphone (Android, iOS)	D	1	221	4.67	.52
Search engines (e.g. Google Search, Yahoo etc.)	W	2	221	4.52	.55
Presentation slides (from lecturer)	T	3	221	4.45	.73
Laptop/Notebook/Netbook	D	4	221	4.45	.63
Presentation software (e.g. PowerPoint, Keynote)	E	5	221	4.36	.61
Instant messaging (e.g. WhatsApp, Viber, Line)	W	6	221	4.33	.87
Word processing software (e.g. MS Word, Pages)	E	7	221	4.33	.87
Laptop/notebook on campus	D	8	221	4.24	.61
Personal Mobile Internet	D	9	221	4.17	.87
E-Books (PDFs or other formats)	T	10	221	4.12	.82
Portal for students' online services	E	11	221	4.10	1.00
Social Networks (e.g. Facebook, Twitter, Google+)	W	12	221	3.88	1.20
E-mail account (external e.g. Gmail, Hotmail)	W	13	221	3.88	.76
Spreadsheet software (e.g. MS Excel, Numbers)	E	14	221	3.86	.78
Wikipedia	W	15	221	3.71	1.08

Table 4: Ranking intensely used media tools and services by lecturers of Ghana TU

Media tools and services	LECTURERS				
	Type	Rank	N	M	SD
Use of Laptop/notebook on campus	D	1	82	4.83	.38
Search engines (e.g. Google Search, Yahoo etc.)	W	2	82	4.76	.43
Presentation software (e.g. PowerPoint, Keynote)	E	3	82	4.73	.54
Laptop/Notebook/Netbook	D	4	82	4.71	.46
E-mail account (external e.g. Gmail, Hotmail)	W	5	82	4.63	.66
E-Books (PDFs or other formats)	T	6	82	4.59	.67
Presentation slides (from lecturer)	T	7	82	4.59	.54
Word processing software (e.g. MS Word, Pages)	E	8	82	4.41	.54
Spreadsheet software (e.g. MS Excel, Numbers)	D	9	82	4.39	.77
Personal Mobile Internet	T	10	82	4.34	.93
Bibliographic software (e.g. Endnote, Mendeley)	E	11	82	3.73	.92
E-version journals	W	12	82	3.68	1.16
University created e-mail account	W	13	82	3.66	1.03
Smartphone	E	14	82	3.61	.66

Which media tools and services do students of Ghana TU? What are the commonalities and differences?

Acceptance values were computed for the 53 media tools and services along media types (see Table 5). The mean values of the frequency of use and usage satisfaction correlate ($r = 0.45$, $p < 0.01$). For devices and hardware, smartphones emerged as the most accepted device with fixed broadband internet at home recording the least acceptance value. An interesting revelation was that the acceptance value of mobile internet completely pales campus wifi acceptance as was the case of computer terminals on campus. Presentation slides from lecturers and e-books recorded the highest acceptance values within the text media category but print journals are down the pecking order of accepted text media. Handouts from within the institution are more accepted than external handouts.

External media offerings such as search engines, instant messaging and social networks (e.g. Facebook) lead the pack in terms of the highest acceptance values for general web tools and services. Similarly, wikipedia and video sharing sites (e.g. YouTube) obtained high acceptance values. However, e-mail accounts provided by the university appear non-existent compared to external e-mail services (e.g. Gmail, Yahoo Mail, etc.). Acceptance values computed for e-learning tools and services revealed office applications such as presentation, word processing and spreadsheet software as the highly accepted tools. Students online portal services for course registration and retrieval of course grades are highly accepted but not so much for internet-based learning management system.

Table 6 depicts the differences regarding highly accepted media of students at the main campus compared to students from satellite campuses. Despite recording high acceptance values in the case of the two groups, significant differences were found in the use of smartphone, mobile internet and laptop/notebook in favour of students on the main campus regarding digital devices and hardware. The use of laptop/notebook on campus was however significant among satellite campus students. Electronic text (e.g. E-books, pdf, etc.) were found to be significant among students at the main campus, just as instant messaging, video sharing and information from the university website.

Table 5: Accepted media tools and services by students

Digital Devices & Hardware	M SD	Text Media	M SD
Smartphone	4.75 .37	Presentation Slides	4.49 .56
Laptop/Notebook	4.56 .55	E-Books	4.21 .49
Laptop on campus	4.33 .55	Printed Textbook	3.55 .63
Mobile Internet	4.31 .70	Printed Handout	2.80 .79
Campus wifi	2.49 .65	(Intl)	2.70 .77
Desktop PC	2.44 .83	E-Journal	2.50 .82
Campus computer labs	2.25 .70	Printed Handout	2.43 .82
Tablet PC	2.04 .99	(Extl)	2.35 .77
E Book Reader	2.04 .84	Online Notes	
Internet at home	1.71 .59	Print Journal	
Category Mean	3.08 .27		3.11 .35

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General Web Tools & Serv.	M SD	E-learning Tools & Serv.	Category Mean M SD
Search Engines	4.62 .41	Presentation	4.42 .48
Instant Messaging	4.45 .64	Software	4.40 .58
Social Networks	4.11 .75	Word Processing Soft.	4.17 .84
Email (External)	4.07 .58	Students Online	3.90 .55
Wikipedia	3.90 .91	Portal	3.57 .68
Video Sharing Sites	3.71 .57	Spreadsheet	2.86 .82
Online Dictionary	3.40 .79	Software	2.83 .72
Presentation Sharing Sites	3.17 .74	Learning Mgt. System	2.35 .66
Online Collaborative tool	2.95 .56	Online library	2.28 .67
File Storage and Sharing	2.81 .78	(Internal)	2.26 .77
University Website	2.52 .72	Online library	2.14 .75
Email (internal)	2.42 .52	(External)	2.06 .80
Students Response Syst.	2.12 .72	Online Comp. of	2.06 .78
Online Materials (External)	2.10 .78	course	2.01 .80
Professional Networks	1.81 .55	Learning Software	1.78 .56
Online Newsgroups	1.53 .47	Video Software	1.73 .60
		Game-based learning	1.68 .43
		Lecture Recording	1.62 .51
		Mobile apps for	1.02 .09
		learning	
Category Mean	3.12 .33	Online Exams	2.72 .21
		Synchronous virtual class	
		Bibliographic software	
		E-Portfolio	
		Dictionary Software	
		Augmented reality apps	
		Category Mean	

Table 6: Comparison of medial tools and services with high acceptance values

Medium Type	Significantly higher acceptance among main campus students (p<0.05)	Significantly higher acceptance among satellite campus students (p<0.05)
Devices and Hardware	-Smartphone -Mobile Internet -Laptop/Notebook	- Laptop/Notebook use on campus
Text Media	-E-Books	
General Web Tools and Services	-Instant Messaging -Video sharing sites -University Website	

E-learning Tools and Services	-LMS	-Online portal services -Online library services (external)

Discussions and conclusion

Notwithstanding the challenges within the context of Ghana, students and lecturers have tremendous access to digital devices, with mobile devices such as smartphones, laptops or notebooks, the most pervasive, which is a positive signal for e-readiness. The ubiquity of mobile devices in Ghana TU reflects the trend both in SSA (e.g. Conole, 2014; Byungura, Hansson, Muparasi, & Ruhinda, 2018) and the developed countries (e.g. Zawacki-Richter et al., 2015; Grosch et al., 2014; Rodrigo et al., 2013). The key disparity between the two contexts however, was Internet at home, which recorded low acceptance values compared to the global studies where MAM was applied simply due to the fact that there is poor landline Internet connection outside the main cities. Students and lecturers preferred the use of 3G and 4G mobile internet devices through the use of dongles, mobile wifi (mifi) and hotspots compared to campus wifi. Computer labs on campus were also deemed irrelevant, since students and lecturers use personal laptops on campus frequently, possibly connected to their private mobile internet devices despite the high cost it imposes on the users. A possible reason for this occurrence could be low quality of internet service and infrastructure.

Additionally, there was a general affinity towards electronic text media (e.g. E-book, pdf) which seem to be gradually replacing printed text (e.g. Textbooks and handouts) comparable to what was found in a similar study by Zawacki-Richter et al. (2015). The explanation may be found in the intensive use of search engines, possibly for literature and information search, and the use of other communication media such as email, social networks (e.g. Facebook) and instant messaging (particularly WhatsApp) which has been found to be an easy and convenient medium for students to look for information and circulate learning materials. However, unlike in other comparable MAM studies (e.g. Grosch et al., 2014; Rodrigo et al., 2013; Zawacki-Richter et al., 2015) results in this study showed a strong preference for the use of external media offerings, both at the main campus and satellite campuses, mainly because the university's internal provision of media services was low; probably suggesting a low TEL capability maturity. The situation is likely to be more precarious in satellite campuses as low acceptance of e-learning was significant among satellite campus students. This prediction is borne out of findings by Harrison, Congdon, and DiPiro (2010) in their study of a multi-campus in an advanced country which found disparities between the main campus and other campuses regarding technology.

In general, e-learning tools and services acceptance was lowest but digital devices were as accepted as general web tools and text media for learning purposes. Since MAM explains quality from the perspective of the user (Grosch, 2011), low acceptance could be interpreted as low quality and therefore confirms the findings in studies that found service quality to be a significant factor in increasing students' satisfaction towards usage of e-learning systems (Wang & Chiu, 2011; Mohammadi, 2015). It came to light in the course of this study that the

university's internet-based learning platform (Moodle LMS) is currently not deployed to students at the satellite campuses, however, open source options such as Moodle cloud and schoology are used. This could be attributed to the personal innovativeness of the lecturers, which has an influence on the perception of usefulness as found by Lu, Yao, and Yu (2005).

The pervasiveness of digital mobile devices within this MCU case reveal a "mobile citizenry" (Mohammadi, 2015) and presents tremendous opportunities for technology enhanced learning (TEL). MCUs whose provisions are parallel on their campuses such as what pertains at Ghana TU can leverage the affordances of technology as noted in Harrison, Congdon, and DiPiro (2010). This can lead to achieving a certain degree of parity in terms of quality across campuses. This requires investments into Internet infrastructure, computer laboratories, support services etc.., since such facilitating conditions have been established to be a good predictor of the behavioural intention to adopt technology (Venkatesh et al, 2003). It is instructive that the profiles of a greater number of students found in the satellite campuses were non-traditional students, i.e. going along with USDE (2002) and Zawacki-Richter et al. (2015). This category of students is constrained by distance, time, work, and family responsibilities and are most likely to desire flexible learning approaches such as blended learning. In light of this, there is a need for the university to understand how its micro and macro context aligns with the affordances of the various e-learning media to achieve the desired success as explained in Mtebe (2015).

Overall, the application of MAM in a multi-campus university within the SSA context reveals that students at the main campus have a relatively higher acceptance of media tools and services compared to students at satellite campuses. Challenges in terms of institutional provision of internet and technological infrastructure exist and most likely accounted for the low intensity of use and acceptance of e-learning tools and services. More revelatory was also the fact that external media offering were more preferred, and the scales were tipped heavily in favour of communication media over content and collaboration media which by all indications suggests media usage is largely for information and communication purposes rather than creation or co-creation of knowledge and higher order learning activities. This study together with other studies where MAM was applied did not take into consideration the e-learning and technology enhanced learning (TEL) adoption status of the institutions as well as the main teaching profile adopted by the university. It would be worthwhile for future studies to examine media acceptance with due regards to the TEL capability maturity contexts of the institutions including the teaching styles the institutions are identified with.

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