

Distance Education in Ghana: Assessing Students Readiness for Information Communication Integration

Éducation à Distance au Ghana: Évaluation de la Préparation Des Étudiants à l'Intégration des Technologies de l'Information et de la Communication

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Abstract

Distance education is increasingly becoming a major alternative to traditional education with higher institutions vying for global students over the past decade. This article assesses students' readiness for information and communication technology in distance learning in Ghana. Students from higher institutions were surveyed using the cluster sampling method. The SPSS version 21 software was used to analyse the data and generate both descriptive and inferential statistics such as cross-tabulation, chi-square and one-way ANOVA. The findings of the study included low computer literacy of computer-based online learning systems, high expenditure on internet data, and low but effective online study community using social media. Online resource usage categories were found to differ between students for different institutions. Also, confidence in using computer to learn does not correlate with internet usage history. The study concluded that solid foundation in computer literacy at the preceding educational level is critical to easy adoption and integration of ICT at the tertiary level. Finally, we recommend

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the promotion of more online learning communities for learners and with their lecturers.

Keywords: ICT, Distance Education, Information Literacy, online community, internet cost, LMS

Résumé

L'enseignement à distance devient de plus en plus une alternative majeure à l'enseignement traditionnel, les établissements d'enseignement supérieur se disputant les étudiants du monde entier au cours de la dernière décennie. Cet article évalue l'état de préparation des étudiants aux technologies de l'information et de la communication dans le cadre de l'enseignement à distance au Ghana. Les étudiants des établissements d'enseignement supérieur ont été interrogés à l'aide de la méthode d'échantillonnage en groupes. Le logiciel SPSS version 21 a été utilisé pour analyser les données et générer des statistiques descriptives et inférentielles telles que les tableaux croisés, le chi-carré et l'ANOVA à sens unique. Les résultats de l'étude comprennent une faible connaissance informatique des systèmes d'apprentissage en ligne basés sur l'ordinateur, des dépenses élevées en données Internet, et une communauté d'étude en ligne peu nombreuse mais efficace utilisant les médias sociaux. Les catégories d'utilisation des ressources en ligne diffèrent d'un étudiant à l'autre en fonction de l'établissement. En outre, la confiance dans l'utilisation de l'ordinateur pour apprendre n'est pas en corrélation avec l'historique de l'utilisation de l'internet. L'étude conclut qu'une base solide de connaissances informatiques au niveau éducatif précédent est essentielle pour faciliter l'adoption et l'intégration des TIC au niveau tertiaire. Enfin, nous recommandons de promouvoir davantage de communautés d'apprentissage en ligne pour les apprenants et leurs professeurs

Mots-clés : TIC, Enseignement à distance, Alphabétisation informationnelle, communauté en ligne, coût d'Internet, LMS

Introduction

The merger of Information and Communications Technologies (ICTs) and distance education has unleashed the full potential of infinite possibilities of educating both the masses and specific individual needs. The educational landscape is drastically shifting from the brick-

and-mortar environment to the interactive and customized learning environment. According to Hanna (2010) ICTs have the potential to aid economic growth and the improvement of social conditions in the developing world. Mensah and Owusu-Mensah (2002) also noted that the use of such technologies provides the opportunity for global networking, increased interactivity and more control for learners in a highly cost-effective manner. COL (2001) identified interactive ICT to support course delivery and learning as the fourth generation of distance education. The main mode of accessing distance education in sub-Saharan Africa is manually driven by face-to-face tuition and textbooks (Mensah & Owusu-Mensah, 2002; Agbanu, et al., 2018; Leary & Berge, 2007). Information and communication technology (ICT) is an innovative approach for delivering well-designed computer mediated, learner-centred and interactive learning environments ubiquitously by utilising the internet technologies concerned with instructional design principles (Moore & Kearsely, 2005).

Distance Education refers to the provision of opportunities to and eliminating unnecessary barriers for a diverse range of students in order to assist them to succeed in their education or training according to their specific needs and diverse learning settings (Butcher & Wilson-Strydom, 2008). ICT tools comprises of electronic devices which are utilised for information, by teachers and students. There have been several advocates for information technology (IT) integration into Distance learning to enhance the delivery of services to students by the main public universities in Ghana. However, several challenges need to be overcome ranging from political, institutional, self-efficacy, financial, human capacity to infrastructural issues. Several web-based distance education systems exist in addressing some of these challenges stated above. The features and benefits of learning management systems (LMS) have been enumerated (Watson & Watson, 2007; Learning Circuits, 2005; Pappas, 2014). The slow adoption of technology by distance education institutions in in Ghana continues to deny many senior high school (SHS) students from accessing tertiary education. LMS promoting social factors along with cognitive and behavioural components in increasing more adoption of

distance-learning systems (Leontyeva, 2018; Keller, et al., 2018; Liaw, et al., 2007; Chow & Croxton, 2017).

The Large class sizes, due to lack of adequate number of lecturers, continue to widen the existing large student-lecturer ratio in the traditional mode of tertiary institutions. Although distance educational departments of higher educational universities in Ghana are gradually integrating some of their services, several challenges persist. The purpose of this study is to assess the readiness of students for transitioning to technologically enhanced learning method. Many students have techno-pedagogical shock in the sudden transformation from paper-based instructional delivery to paperless one. DE institutions does not offer extensive help as these students transition from traditional mode to digital form of learning. A cursory investigation revealed that some DE students usually convert softcopies of lecture notes into hardcopies before studying them. Due to lack of internet facilities in some homes and learning centres, students often miss assignment deadlines and vital institutional information. Affordability of internet data and instructional electronic gadgets such as computers and modems have also been cited by students as a challenge in pursuing distance education.

Research Questions

1. What is the computer information literacy of the distance education students?
2. What is the effectiveness of distance education student's online community?
3. What is the online resource usage categories of distance education students?

Hypothesis

H₀: There is no difference in the internet expenditure of distance education students

H₁: Students confidence in using computer to learn do not correlate to with internet usage history

H₂: There is no difference in the online usage categories of distance education institutions

Literature Review

Prior knowledge of a field of study by learners portends the acceptability, operational and successful completion of an educational experience. Computer technology savvy teacher has the capabilities to use instructional technology to help students advance their computer literacy via technology and use technology as a teaching tool (Jou & Wu, 2012; Anderson & Petch-Hogan, 2001). Computer literacy, Information Literacy, Media Literacy, Communication Literacy, Communication Literacy and Technology Literacy are sub disciplines of digital literacy (Özdamar-Keskin, & Royle, 2015). They also stated that learners believe that they have problem solving and project working skills to deal with educational difficulties although the learners had only basic competences. Internet Society (2017) noted that technology understanding can have a positive influence on funding and purchasing decisions about educational and information technology resources in schools and universities. Aralu and Adetimirin (2014) identified low computer literacy and cybercafé as the most available internet access point among 255 DE students of University of Legos. The importance of computer literacy and competency in online environments has been discussed in a number of studies (Lam, 2000; Oh & French, 2004; Shin & Son, 2007). Computer literacy is essential for participating in fourth and fifth generation distance education delivery technologies (Farajollahi, et al., 2015). Hussain and Farooq (2016) found that majority of student-teachers in ODL were not capable of using computer skills like Ms Word, Ms Power point, Ms excel and internet for their better professional growth. Loan (2011) stated 44.67 percent of students (302 out of 676) use the internet and more than half of the students — 55.33 percent (374 out of 676) do not use it at all. Poor technology skills is the top problem area of students compared to poor time management, poor online research skills and courseware problem. (Bozarth, et al., 2004). Belief in their own abilities influences students' willingness to use technology (Compeau & Higgins, 1995).

Funding distance education by students presents both covert and overt cost. The overt cost such as admission, school and transportation fees are usually budgeted for while the covert costs of feeding, internet cost, photocopies, supplementary instructional material, etc. left to vagary. 67% of respondents indicated higher distance education costs compared to face-to-face course costs (Poulin & Straut, 2017). Potential students are attracted to less burdensome options if institutions were to offer more flexible approaches to study that have a lower cost of provision and hence lower fees (Yuan, et al., 2014). Financial incapacity of students to meet internet data cost for instruction can result in student attrition. High student attrition have been well researched (Kember, 1989; Park & Choi, 2009; Diaz, 2002; Packham, et al., 2004; Bean & Metzner, 1985). The poor national socio-economic infrastructure poses a challenge to quality learner support in the developing countries (Gulati, 2008; Ouma, 2003).

The popularity of social media has spawned new forms of personal and social interactions in distance education. These online learning communities provides opportunity for large to small interactive discussions among students. Mahesh and Adithya Kumari (2014) observed rigidity and pedagogically over-structured, limits of teaching creativity, interactions and the methods used to prepare content by instructors. Social media facilitate collaborative and cooperative learning. The popular social media include Facebook, YouTube, wikis, twitter, WeChat, Skype, Duo, Zoom, Instagram, Google+ and Whatsapp. Current students are considered as the Net Generation or the digital natives. Students actively interact with their peers and lecturers as well as time engaging in active and collaborative learning activities (Kennedy, 2000; Laird & Kuh, 2005). There is a positive relationship between the use of purposeful social media and student engagement (Laird & Kuh, 2005; Zhao & Kuh 2004).

Online categories frequently engaged by DE students is indicative of their cyber preferences and perception. Armed with this knowledge, instructional designers can tailor instructions to enhance students' adoption. The ICT systems should also be designed in such a way that they fulfil the demands of the student. (Mafa & Mpofu, 2013),

Removal of barriers to effective online usage needs to be addressed at the macro level Tiwari and Tiwari (2010). Challenges such as lack of sufficient time for study, difficulties in access and use of ICT, ineffective feedback and lack of study materials were identified by Musingafi, et al., (2015).

Research Methodology and Design

The authors used the research survey design method to obtain quantitative data for a quantitative analysis using descriptive and inferential statistics. A survey design is an approach that collects data through sampling from the population and uses statistical analysis to make inferences about the population (Curtis & Curtis, 2011). The target population was all distance education students of the four universities of Ghana including the University of Ghana (UG), University of Cape Coast (UCC), University of Education, Winneba (UEW) and Kwame Nkrumah University of Science and Technology (KNUST). The cluster sampling method was used to select the learning centres across 16 region of the country due to the wide geographical spread of learning centres. Out of the many questionnaires sent out, 297 students responded which included 26.2% (n = 77) from KNUST, 20.7% (n = 61) from UCC, 25.2% (n = 74) from UEW students and 27.9% (n = 82) from UG students. Questionnaires was the main sampling tool used to collect the data and it included close-ended and Likert scale questions. It was designed using both online using Google forms and paper format containing 19 questions separated into 4 main subheadings: demographics; computer literacy; online learning community; and online resource usage categories. A pilot study was done involving 51 participants, after permission was sought from relevant DE authorities and ethical considerations were done, to test the validity and reliability of the research sample tool. After modification and creation of a manual version of the questionnaires due to difficulty encountered by some participants, the sampling was done. The Cronbach's alpha test (α) was done to assess the internal consistency of the research data. α values if 0.6 and above is deemed acceptable. The Cronbach's alpha scores for modes of instructional delivery was 0.72, level of IT infrastructure integration was 0.68 and online learning tools self-efficacy was 0.85. Data analysis was done

using the SPSS version 21. Both descriptive statistics (such as mean, bar charts, frequency distribution tables, cross-tabulations and pie-charts) and inferential statistics (One-Way analysis of variance (ANOVA), chi-square, and Tukey homogeneity test) were used to explore relationships, effects, and/or comparisons among the research variables being investigated.

Results

Computer literacy of Participants

The computer literacy of participants is investigated using their knowledge of the Internet and how it is accessed as well as knowledge of e-learning and LMS.

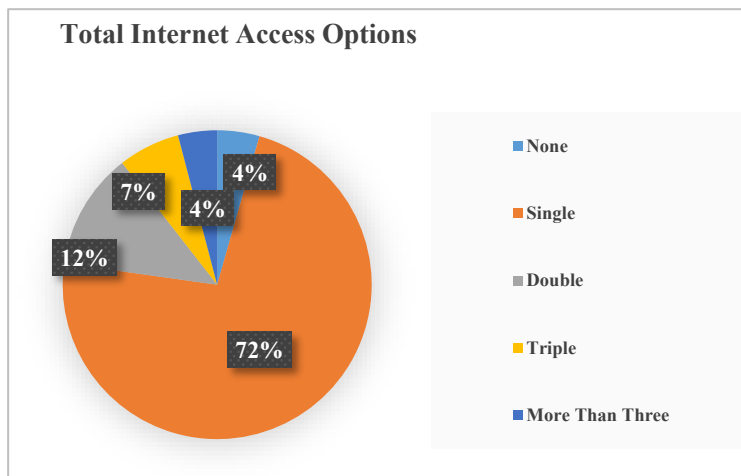


Figure 1: Total Internet Access Availability

Figure 1 represents total internet options (smartphones, computer tablets, modems, internet café, school laboratories and office internet) available to the DE students. Only 13 (4%) participants had no internet access. Also, majority of them 214 (72%) had single access, 36 (12%) had dual access, 19 (7%) had triple access the rest 12 (4%) had more than three access.

Table 1: Individual Internet Access Mode

	N	Sum	Percent (%)	Mean	Std. Deviation
Via Smartphone	294	157	53.4	.53	.500
Via Tablet	294	90	30.6	.31	.462
Via Modem	293	96	32.7	.33	.470
Via Café	294	27	9.2	.09	.312
Via School lab	294	20	6.8	.07	.252
Via Office Network	294	4	1.4	.01	.116
Valid N (listwise)	293				

On individual access mode, the smartphone was the main internet access device 157 (53.4%), followed by Wi-Fi modems 92 (32.7%), and tablet 90 (30.6%) as **Table 1**. The least used options were internet cafés, school laboratories and office network with 27 (9.2%), 20 (6.8%) and 4 (1.4%) respectively.

Table 2: Institutions offering E-Learning services

	Distance Education institution.									
	KNUST		UCC		UEW		UG		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	17	14.5	50	42.7	46	39.3	4	3.4	117	41.2
Yes	53	40.5	1	0.8	8	6.1	69	52.7	131	46.1
Not Sure	5	13.9	10	27.8	15	6	41.7	6	36	12.7
Total	75	26.4	61	21.5	69	24.3	79	27.8	284	100.0

Table 2 shows whether DE offered e-learning services to students. 117 (41.2%) participants said no, 131 (46.1%) participants said yes and 36 (12.7%) participants were not aware of it. KNUST and UG had more participants intimating e-learning services than absence compared to UCC and UEW participants.

Table 3: Awareness of Learning Management System (LMS)

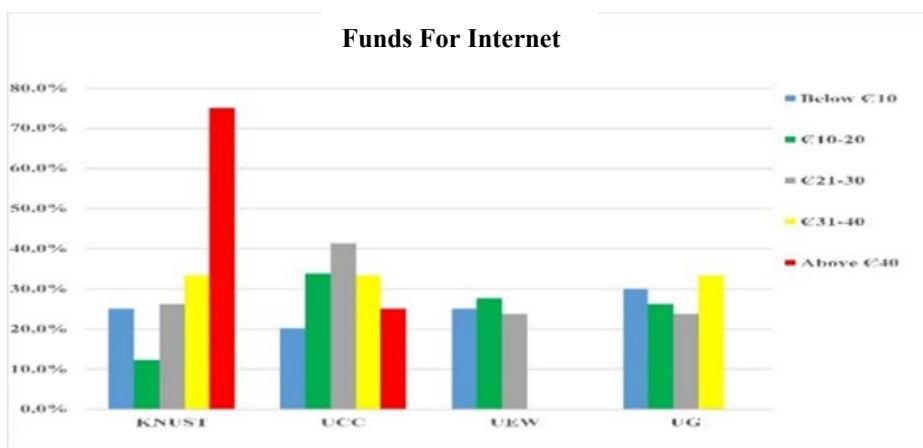
	KNUST		UCC		UEW		UG		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	57	27.9	55	47.0	50	24.5	42	20.6	204	74.2
Yes	18	25.4	6	8.5	16	22.5	31	43.7	71	25.8
Total	75	27.3	61	22.2	66	24.0	73	26.5	275	100.0

Table 3 shows participants' knowledge of LMS. 204 (74.2%) students started in the negative while 71 (25.8%) stated in the affirmative. UG had more participants who knew about LMS than the other institutions. For the yes group, UCC had 8.5%, UEW had 22.5%, KNUST had 25.4% and UG had 43.7%.

Funding Internet Cost

This section assessed the funding of internet cost by distance education students.

Figure 2 shows the average money (in cedis) DE participants spend on data. 257 (86.5%) answered it while 40 (13.5%) declined. For every week 164(63.8%) spent less than 10 cedis, 65(25.3%) spent between 10 and 20 cedis, 21(8.2%) spent between 21 and 30 cedis, 3(1.2%) spent between 31 and 40 cedis and finally 4(1.5 %) spent above 40 cedis. It was observed that majority of participants in institutions spent less than 31 cedis on data per week: 57 (93.4%) for KNUST, 58 (96.7%) for UCC, 64 (100%) for UEW and 71 (98.6%) for UG.



**Figure 2: Average weekly Internet cost by Institutions (in cedis)
Effectiveness of Students' Online learning Community**

This section investigated the utilisation of IT (specifically social media) for effective peer studies.

Table 4: Number of Online learning Community

	KNUST		UCC		UEW		UG		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No	41	28.5	30	20.8	39	27.1	34	23.6	144	51.2
Yes	34	24.8	30	21.9	31	22.6	42	30.7	137	48.8
Total	75	26.7	60	21.4	70	24.6	76	27.0	281	100.0

Table 4 shows the participants that used IT for peer studies and those who did not. 144 (51.2%) stated positive and 137 (48.8%) stated negative. There were less users of online study groups among the participants. For the online study group, 34 (24.8%) were from KNUST, 30 (21.9%) from UCC, 31 (22.6%) from UEW and 42 (30.7%) from UG.

Table 5: Effectiveness of Online learning Community

	KNUST	UCC	UEW	UG	Total
Very Effective	4(50.0%)	0(0.0%)	3(37.5%)	1(12.5%)	8(4.7%)
Quite Effective	17(27.9%)	13(21.3%)	12(19.7%)	19(31.1%)	61(35.9%)
Effective	15(31.9%)	12(25.5%)	8(17.0%)	12(25.5%)	47(27.4%)
Not Effective	1(4.8%)	3(14.3%)	6(28.6%)	11(52.4%)	21(12.4%)
Not Sure	3(9.1%)	0(0.0%)	16(48.5%)	14(42.4%)	33(19.4%)
Total	40(23.5%)	28(16.5%)	45(26.5%)	57(33.5%)	170 (100%)

The usefulness of the study group by participants is shown in **Table 5**. 8(4.7%) of the participants stated that the study group very effective, 61(35.9%) stated quite effective, 47(27.4%) stated effective, 21(12.4%) stated not effective, and 33(19.4%) stated not sure. Majority of participants 116 (68.2%) stated some level of usefulness and 54 (31.8%) did not find it beneficial. Also, for study group users 36 (31.0%) were in KNUST, 25 (21.6%) in UCC, 23 (19.8%) in UEW, and 32 (27.6%) from UG.

Students' Online Resource Usage Categories

This session investigated the categories of participants' using online resources which include email, social network and search engines. Downloads, online music, online games, online videos, online shopping and News.

Table 6: Internet Usage for research purposes by Institutions

	KNUST	UCC	UEW	UG	Total
Every time	25(35.2%)	5(7.0%)	18(25.4%)	23(32.4%)	71(25.7%)
Most Times	38(31.1%)	22(18.0%)	24(19.7%)	38(31.1%)	122(44.2%)
Some times	7(10.3%)	23(33.8%)	25(36.8%)	13(19.1%)	68(24.7%)
Never	2(16.7%)	9(75.0%)	1(8.3%)	0(0.0%)	12(4.3%)
Don't know	1(33.3%)	0(0.0%)	1(33.3%)	1(33.3%)	3(1.1%)
Total	73(26.4%)	59(21.4%)	69(25.5%)	75(27.2%)	276(100.0%)

The frequency of internet usage for research purposes by the DE institution is shown in **Table 6**. 71(25.7%) used the internet every time, 122(44.2%) used the internet most times, 68(24.7%) used the internet occasionally, 12(4.3%) never used the internet and 3(1.1%) were not sure of internet use. 261 (94.6%) used the internet for research purpose while 15 (5.4%) did not. Institutionally, 70 (95.9%) were KNUST students, 50 (84.7%) were from UCC, 67 (97.1%) were UEW students and 74 (98.7%) were from UG.

Table 7: Internet Usage for checking mail by Institutions

	KNUST	UCC	UEW	UG	Total
Every time	36(41.9%)	12(14.0%)	22(25.6%)	16(18.6%)	86(31.2%)
Most Times	26(27.1%)	25(26.0%)	16(16.7%)	29(30.2%)	96(34.8%)
Some times	10(11.6%)	21(24.4%)	25(29.1%)	30 (34.9%)	86(31.2%)
Never	0(0.0%)	1(20.0%)	3(60.0%)	1(20.0%)	5(1.8%)
Don't know	1(33.3%)	0(0.0%)	1(33.3%)	1(33.3%)	3(1.0%)
Total	72(26.1%)	59(21.4%)	67(24.3%)	78(28.3%)	276 (100.0%)

Table 7 shows the frequency of using the internet to check e-mail. 86(31.2%) participants checked their emails every time, 96 (34.8%) checked their emails most times, 86(31.2%) checked their e-mail sometimes, 5(1.8%) never checked their mails and 3(1.0%) did not know. 268 (97.1%) participants checked emails and 8(2.9%) never or did not know email. Institutionally, participants who checked emails were 71 (26.5%) from KNUST, 58 (21.6%) were from UCC, 63 (23.5%) were from UEW, 76 (28.4%) were from UG.

Table 8: Internet Usage for Search Engines by Institutions

	KNUST	UCC	UEW	UG	Total
Every time	20(28.6%)	13(18.6%)	17(24.3%)	20(28.6%)	70(25.6%)
Most Times	24(30.0%)	12(15.0%)	18(22.5%)	26(32.5%)	80(29.3%)
Some times	18(31.3%)	20(29.0%)	14(20.3%)	17 (24.6%)	69(25.3%)
Never	4(10.8%)	7(18.9%)	14(37.8%)	12(32.4%)	37(13.6%)
Don't know	4(23.5%)	4(23.5%)	6(35.3%)	3(17.6%)	17(6.2%)
Total	70(26.5%)	59(20.5%)	69(25.3%)	78(28.6%)	273(100.0%)

Table 8 shows the frequency of using search engines. 70(25.6%) used search engines every time, 80(29.3%) used them most times, 69(25.3%) used them sometimes, 37(13.6%) never used them, and 17(6.2%) did not know of them. 216 (80.2%) were search engine users and 57 (19.8%) were not search engine users. Institutionally, 62 (28.7%), 45 (20.8%), 49 (22.9) and 63 (29.2%) were from KNUST, UCC, UEW, and UG respectively.

Table 9: Internet Usage for social networks by Institutions

	KNUST	UCC	UEW	UG	Total
Every time	28(23.7%)	25(21.2%)	25(21.2%)	40(33.9%)	118(42.9%)
Most Times	20(24.7%)	21(25.9%)	21(25.9%)	19(23.5%)	81(29.5%)
Some times	22(37.3%)	10(16.9%)	15(25.4%)	12(20.3%)	59(21.5%)
Never	2(20.0%)	1(10.0%)	5(50.0%)	2(20.0%)	10(3.6%)
Don't know	1(14.3%)	1(14.3%)	1(14.3%)	4(57.1%)	7(2.5%)
Total	73(26.5%)	58(20.5%)	67(25.3%)	77(28.6%)	275(100.0%)

Frequency of social networks usage is in **Table 9**. The participants used social media 118 (42.9%) every time, 81(29.5%) most times, and 59(21.5%) sometimes. Also 10(3.6%) never used them and 7(2.5%) did not know them. Social media users were 258 (93.8%) and non-social media users were 17 (6.2%). For the social media users, 70 (27.1%) were from KNUST, 56 (21.7%) from UCC, 61 (23.6%) from UEW and 71 (27.5%) from UG.

Table 10: Internet Usage for Ecommerce by Institutions

	KNUST	UCC	UEW	UG	
Every time	4(18.2%)	9(40.9%)	2(9.1%)	7(31.8%)	22(8.1%)
Most Times	2(9.1%)	6(27.3%)	9(40.9%)	5(22.7%)	22(8.1%)
Some times	15(36.6%)	7(17.1%)	9(22.0%)	10(24.4%)	41(15.0%)
Never	47(28.3%)	34(20.5%)	40(24.1%)	45(27.1%)	166(60.8%)
Don't know	4(18.2%)	4(18.2%)	7(31.8%)	7(31.8%)	22(8.1%)
Total	72(26.4%)	60(22.0%)	67(24.5%)	74(27.1%)	273(100.0%)

Patronage of ecommerce by participants is shown by **Table 10**. 22(8.1%) used ecommerce sites every time, 22(8.1%) used them most times, 41(15.0%) used them occasionally, and 22(8.1%) were not aware of them. Generally, 85 (31.1%) buy and sell items online while 188(68.9%) did not indicating low ecommerce patronage. For ecommerce users, 21 (24.7%) were from KNUST, 22 (25.9%) from UCC, 20 (23.5%) from UEW and 22 (25.9%) from UG.

Hypothesis 1

H₀: There is no statistical difference in the internet expenditure of distance education students

Table 11: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.252 ^a	12	.108
Likelihood Ratio	19.718	12	.073
Linear-by-Linear Association	3.174	1	.075
N of Valid Cases	257		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .70.

The cost of internet is on ascendancy due to the popularity of smart phones with myriad of social media. It was observed from **Table 11** that majority of participants in institutions spent less than 31 cedis on data per week. Averagely, DE students spend 40 cedis monthly for their internet use. The Pearson chi square ($\chi^2 [12, 257] = 18.257, p > .05$) implied that there is no statistical difference among the DE students' funds for internet from the different institutions. Hypothesis 1 therefore not rejected.

Hypothesis 2

H₁: Students confidence in using computer to learn do not correlate to with internet usage history

Table 12: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.571 ^a	12	.005
Likelihood Ratio	29.029	12	.004
Linear-by-Linear Association	12.653	1	.000
N of Valid Cases	274		

7 cells (35.0%) have expected count less than 5. The minimum expected count is .32.

From **Tables 12**, it is acceptable to predict that the DE students who have had a minimum of two years computer experience would embrace an educationally integrated learning environment with Pearson Chi-Square ($\chi^2 [12, 274] = 28.571$). The $p < .05$ implies the result is statistically significant. We therefore reject the null hypothesis. The UCC and UEW can confidently implement LMS for their distance education sectors to minimize bottle necks and utilise the huge advantages these software suits offers

Hypothesis 3

H₂: There is no statistical difference in the online usage categories of distance education institutions

Table 13: One-Way ANOVA

	df	F	Sig.
Mostly Internet Uses For Email	3	.224	.880
Mostly Internet Uses For Research	3	5.251	.002
Mostly Internet Uses For Social networks (e.g. Facebook)	3	1.364	.254
Mostly Internet Uses For Downloads	3	12.052	.000
Mostly Internet Uses For Online music	3	.187	.905
Mostly Internet Uses For Online games	3	2.853	.038
Mostly Internet Uses For Online videos (e.g. YouTube)	3	5.763	.001
Mostly Internet Uses For Online shopping	3	.753	.521
Mostly Internet Uses For News	3	1.914	.127
Mostly Internet Usage (Cumulative)	3	3.465	.017

Table 13 shows the One-Way ANOVA of the online usage categories of distance education institutions. The sum total of the internet usage of all online categories was $F [3, 297] = 3.47$, with a p-value of .017, indicating a statistically significant difference among participants from the four universities. Hypothesis 3 is therefore rejected. DE students who mostly used the internet for research was $F [3, 297] = 5.25$, $p = .002$; downloads was $F [3, 297] = 12.05$, $p = .000$; online gaming was $F [3, 297] = 2.85$, $p = .038$; and online videos was $F [3, 297] = 5.76$, $p = .001$, were statistically significant. These online usage categories did not support the hypothesis 3. However, there was no statistically difference between the DE participants in terms of using email was $F [3, 297] = 0.22$, $p = .880$; social network was $F [3, 297] = 1.36$, $p = .254$; online music was $F [3, 297] = 0.187$, $p = .905$, online shopping was $F [3, 297] = 0.75$, $p = .521$; and online news was $F [3, 297] = 1.91$, $p = .127$. The hypothesis 3 would not be rejected based on these categories. For homogeneous subgroups, all participants were similar in email, online music, and online news usage according to Tukey^{HSD} post hoc test in **Table 14**. Post hoc test for research also showed that UEW and KNUST in one subgroup with UG and UCC in the other subgroup. For downloads, participants from UEW and KNUST were similar, KNUST and UG were also similar with UG and UCC in a third group. Finally, for online video usage, UEW, KNUST and UG were similar with UG and UCC also in another group.

Table 14: Tukey^{HSD} Homogeneity Test

	E-mail	Research		Download			E-music	Online video		E-Shop	News
	1	1	2	1	2	3	1	1	2	1	1
UEW	.49	.58		.20			.08	.03		.03	.04
KNUST	.53	.60		.29	.29		.11	.10		.05	.13
UG	.53		.79		.48	.48	.12	.17	.17	.08	.14
UCC	.56		.80			.62	.12		.25	.08	.15

Discussion

Research question 1

What is the computer information literacy of the distance education students?

The study revealed that 82.0% of the DE students had more than 3 year's internet experience. Loan (2011) found internet illiteracy as the major limitation in using the internet. Akande (2011) reported 49.0% computer literacy among sandwich students. Although this high percentage does not necessarily suggests DE student's acceptance and seamless interaction with LMS, it serves as good indicator introducing online programs by institutions. The study agrees with that of Edumadze, et al. (2017) who reported 92.5% internet access and 53.6% internet skills. The study also found that 73% of the students have more than three internet access options with smart phones being the dominant access device. The awareness of e-learning awareness was also found to be high (87.1%) but majority of the students (53.9%) were neither unaware nor sure of their institutions deploying such services. This observation was further confirmed by 74.2% of students' unaware of LMS. This low information literacy among university students was in conformity with findings of Aralu and Adetimirin (2014), Gui (2007), Ouma and Nkuyubwatsi (2019), and Musingafi, et al. (2015)

Research question 2

What is the effectiveness of distance education student's online community?

Collaborative online learning among DE student of Ghana was largely average (48.8%). Although class WhatsApp social network groups were available, they were mainly for social and informational purposes. However, students with small online study groups indicated 68% effectiveness. Several factors such as unfocused or off-track discussions, lack of encouragement from leader, technical difficulties, time and work constraints could account for this phenomenon (Dennen, 2000; Precce, et al., 2004).

Research question 3

What is the online resource usage categories of distance education students?

Majority of the distance learners involved in the study were active internet users. The internet users were 211(75.1%) compared the non-internet users were 70 (24.9%) when the cumulative frequency of usage of some online resources (i.e. email, research, Wikipedia, search

engines, ecommerce, social media) were analysed. This finding 94.6% DE students frequently used the internet research; 97.2% DE students frequently checked their email; 70.2% DE students frequently used Wikipedia; 80.2% DE students regularly used search engines; 93.9% DE students frequently social media; and conversely, only 31.2% DE students used ecommerce. This findings agreed with that of Ojokoh and Asaolu (2005) and Anasi (2006) who noted high internet facilities usage among undergraduate students.

The differences in the expenditure on internet data among the different institutions prompts several reasons such as differences in online instructional durations, internet devices, work and family obligations and level of computer literacy. Furthermore, the study could not establish a correlation between students' confidence in using computer to learn and internet history. According to Jumia Annual Mobile Report (2018) there is a high smartphones penetration of 119% with about 35.57 million subscribers in Ghana. Many students can't browse the internet but are completely illiterate about using computer applications. With the rapidity of versioning of both software and hardware in the computer industry, old knowledge does not imply new skills due to evolution of new gadgets. Finally the diversity in frequency of online usage categories could be attributed to divers work, academic and social demands as well as personal preferences.

Limitations

Several limitations of this study should be noted. First, the results of this study were mainly derived from four universities undergraduates in Ghana.

Also, only two learning centres were chosen from each of the University for Data Collection. Finally, only students' views were captured in this study without considering that of the administrators and their instructors.

Conclusion

The future demand distance education in Ghana is far from its peak level. The huge senior high school students who fail to gain admission into the regular enrolment virtually opt for distance options coupled with workers furthering their education without quitting jobs. A solid foundation in computer literacy at the preceding educational level is critical to seamless integration in online learning. Effective online learning communities in necessary for students' inclusiveness and discussion of reading assignment purposes. Funding of digital equipment and internet cost needs to be addressed to prevent widening the digital divide among students. Finally, distance students' online resource usage categories need to be enhanced.

Recommendations

Distance Education continues to be the preferred option form students with work and other demanding obligations. Statistics on enrolment trends shows increasing growth in distance learning with universities investing more funds on global scale in order to gain competitive advantage. National policies and supervision need to be reviewed to enhance the quality of distance education in Ghana. The National Accreditation Board (NAB) needs a national information technology platform to streamline, standardize courses/programs and integration of distance education colleges/faculties of universities.

Computer literacy forms a solid background for eLearning. The low computer literacy of distance learners is indicative of the quality of the Information and Communication Technology (ICT) subject at the Senior High Schools (SHSs) A comprehensive review of the course content, provision of robust and easily accessible IT infrastructure in all SHSs and adequately trained technical staff needs consideration from the Ministry of Education (MOE). The increasing digital divide due to lack of funding for internet data need to be addressed through allocation of either free or highly subsidized. MOE can initiate DE institutions and telecommunication companies' cooperation to provide free or low-cost data for distance education.

Finally, more online learning communities need to be encouraged among DE students with guided support form lectures to make them very effective for academic purposes.

Recommendations for Future Research

Future studies could investigate the perception of distance education students on the quality of support services and general administration provided by their respective universities.

Furthermore, the relationship between student persistence and family support needs to be investigated.

Also, the effects of employers' support on distance education students their academic performance can also be investigated.

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