Assessing the Computer Literacy Level of Distance Education Students in Ghana

Valentina Arkorful
University of Cape Coast, Cape Coast, Ghana
ORCID: 0000-0001-6658-3067

Kwaku Anhwere Barfi
University of Cape Coast, Cape Coast, Ghana
ORCID: 0000-0001-5015-2641

Simon-Peter Kafui Aheto
University of Ghana, Legon, Ghana
ORCID: 0000-0001-9777-6005

Eunice Ayensu
University of Cape Coast, Cape Coast, Ghana
ORCID: 0009-0005-0740-8636

Received: 16th August 2024 - Revised: 3rd April 2025 - Accepted: 25th April 2025

DOI: https://doi.org/10.4314/glj.v30i1.3

Abstract

The concept of computer literacy in distance education or learning continues to be an integral area of research due to the importance of digital literacy in the academic performance of distance learners. The study examined the level of computer literacy among distance education students in Ghana. Differences in the level of computer literacy based on area of residence and gender among the distance learners were also examined. The study adopted quantitative analysis with a cross-sectional survey design. The study used a census-based method to choose its participants. Out of the 4236 undergraduate level 400 or final year students adopted for the study, 3003 responded using the link on the class WhatsApp platform. The level 400 undergraduate students were selected because the researchers assumed they would be aware of their computer literacy levels due to the number of years they have spent and engaged in the university. The findings revealed that there was a generally low level of computer literacy skills among the participants. It was further revealed that there was no significant difference between males and females in their level of computer literacy. However, there were differences in their level of computer literacy based on area of residence, where urban settlers were found to have higher computer literacy than rural settlers. It was recommended that distance education administrators apply a multifaceted approach to enhance skills in digital communication, data privacy, information literacy and software application in distance education. It could be achieved through providing training and support for both students and educators, integrating digital literacy into the curriculum, and fostering a supportive online learning environment that encourages collaboration.

Keywords: Computer literacy, digital literacy, computer skills, distance learners, information literacy.

Introduction

The importance of distance education in the contemporary acquisition of knowledge and skills in formal education cannot be overemphasised. Many institutions are embracing distance learning while many others are designing online-based programmes to suit the need of the emerging large demand for online certifications (Barfi, Imoro, Arkorful & Armah, 2023; Martin, Stamper & Flowers, 2020; Kumi-Yeboah, Sallar, Kiramba & Kim, 2020). According to Seaman, Allen and Seaman (2018), demand for distance education has been on the rise, and about 13% of students are either fully or partially enrolled on an online programme. Kumi-Yeboah et al., (2020) noted that in 2016, over six million students enrolled on online programmes and became distance students, and this constituted a 3.9%

increase from the previous year. The rapid growth in demand for distance education is mostly attributed to rising tuition costs and an evolving workforce that seeks to balance work life with education (Simonson, Zvacek & Smaldino, 2019; Mahlangu, 2018; Palvia, Aeron, Gupta, Mahapatra, Parida, Rosner & Sindhi, 2018). Palvia et al., (2018) also emphasised the growth in technology and the use of digital tools in the delivery of instructional materials in most institutions of higher learning.

According to Kumi-Yeboah (2018) and Kumi-Yeboah, Dogbey, Yuan and Smith (2017), the population of online learners is diverse. It includes older students who are more stable and receptive to technology advancements as well as younger students who are dynamic and responsive to employment. In addition, a high trend of varied student populations has been seen with the expansion of distance learning in universities and colleges. In order to address the diverse learning needs of these students, teachers are developing instructional strategies which are digital-centred.

These digital instructional strategies are aimed at providing quality education to distance learning students, as would regular students. However, to benefit fully from these digital instructional strategies, students should be digitally competent and understand the nuances of using digital technologies in learning. Computer literacy is the ability to access, organise, understand, use, and disseminate digital resources in various forms from various sources accessed through computer devices (Yeşilyurt & Vezne, 2023; Abrosimova, 2020). Bhebhe and Maphosa (2016) intimated that computer literacy must be understood as basic skills to use computers confidently, safely, and effectively. It also includes the ability to use software such as word processing, presentations, and email, the ability to create and edit images, audio, and video, and the ability to use search engines for information retrieval and dissemination (Bertiz & Karoglu, 2020). With modern trends in communication, the concept of computer literacy has been explained to include the essential abilities of social participation, collaboration and effective communication, critical thinking, and problem-solving using digital technology and information (Shin & Hickey, 2021; Landrum, 2020).

The implication of the definitions of computer literacy indicates that if distance students are not competent in its usage, they cannot utilise it for learning purposes. However, research studies on application of computer technologies in open distance education have focused on the relevance of digital technologies (Martin, Stamper & Flowers, 2020), teachers and instructors' adoption of digital technologies (Greenhow, Lewin & Willet, 2021; Gao & Zhang, 2020), integration of online and e-learning (Kara, 2022; Clark, 2020), while little emphasis has been given to the extent of students' competency in computer literacy.

However, distance education students have diverse backgrounds and social characteristics, which requires that their level of computer literacy be examined. Although these students need a relatively higher level of computer literacy to thrive in their distance education programmes, the ability of students to develop computer skills in addition to their busy schedule becomes difficult (Sever & Çatı, 2021). Moreover, while some of the distance students live in urban communities where access and use of digital technology are easier (Ümmühan & Orçun, 2020), others live in rural communities where developing digital skills could be difficult owing to arrays of barriers (Zandi & Sarmadi, 2016). Moreover, Yeşilyurt and Vezne (2023) intimated that there are differences in the computer literacy levels of students concerning age and gender. The exactitude of these differences among distance education students needs to be examined to provide practical solutions to address these differences. To examine the computer literacy level of distance education students, the study specifically investigates:

1. The current level of digital literacy among distance education students.
2. The differences in computer literacy among distance education students based on gender.
3. The differences in computer literacy among distance education students based on the area of residence (rural and urban).

Literature

Computer literacy

In the digital age, computer literacy has become an indispensable skill that empowers individuals to navigate, communicate, and thrive in an increasingly interconnected world. From basic tasks like sending emails and browsing the web to complex endeavours such as programming and data analysis, computer literacy encompasses a broad range of competencies that are essential for success in modern society. The prerequisite for using a technology learning environment is computer literacy. The need for instructors and students with the necessary skills is

rising in tandem with the speed at which technology is developing.

Teachers and students with extensive technological knowledge and proficiency in areas like instructional technology application have aided students in need of utilising technology as a teaching tool and developing computer literacy through technology (Stopar & Bartol, 2019; Simonson, Zvacek & Smaldino, 2019; DiSessa, 2018). Gender is a significant factor in mathematics and technology because of natural disparities as well as societal effects. There may be differences in men's and women's computer knowledge. Research by Tsai, Liang and Hsu (2021) revealed that men teachers outperformed female teachers in terms of Internet attitudes, knowledge, and information consumption. Compared to female graduate students, male students demonstrated more computer literacy and more positive views towards computers. Additionally, it was discovered that various age groups had diverse social and cultural backgrounds; as a result, there can be variations in computer literacy.

In terms of document processing and file management, older users performed worse than younger users, according to Simonson et al., (2019). Compared to older professors, younger educators had more computer ability. According to Fidalgo, Thormann, Kulyk and Lencastre (2020), instructors under 30 had a more favourable opinion than instructors over 30. Furthermore, there is a correlation between computer literacy and the amount of time spent on computers, the number of computer-related courses taken, and computer ownership. According to Nambiar (2020), more computer use and online time led to better computing attitudes and accomplishments. Furthermore, Ferri, Grifoni and Guzzo (2020) discovered that senior high pupils who spent more time online had greater levels of Internet literacy. Technology and computer experience also help with skill acquisition (Simpson, 2018). According to research from Forson and Vuopala (2019), junior high pupils who had more computer experience demonstrated improved attitudes towards computer learning and higher achievement. According to similar findings (Simonson et al., 2019; Zandi & Sarmadi, 2016), students who had greater access to off-campus computer resources, the Internet, computer learning, and computer clubs also showed better levels of computer literacy.

Factors Affecting Distance Online Learning

Reluctance to engage in online learning is frequently caused by a dislike of computers (Segbenya, Bervell, Minadzi & Somuah, 2022; Adarkwah, 2021; Quaicoe & Pata, 2020). Lack of computer proficiency, feelings, and attitudes prevent people from using information technology willingly. Personal attitudes towards remote learning have been found to have an impact on online learning, according to research (Segbenya et al., 2022; Quaicoe & Pata, 2020; Andoh, Appiah & Agyei, 2020). When faced with a novel learning environment, students frequently discover their most productive learning style. Online learning is impacted by learning styles as well (Williamson, Eynon & Potter, 2020). Personal characteristics, including aptitude, activity or passivity, independence or dependence, and deep or superficial processing that have an impact on online learning, according to studies by Adarkwah (2021) and Quaicoe and Pata (2020). Because online learning is asynchronous, there have been some questions about its interactivity. Online students may choose to avoid interaction on the Web because they feel alone, absent, and alienated from it (Andoh et al., 2020). Additionally, the instructor will monitor the student's progress in self-learning, and the evaluation of each group's task schedule should be made public to address the lack of peer interaction (Segbenya et al., 2022; Andoh et al., 2020; Williamson et al., 2020).

With the use of cutting-edge gear and software, distance education diversifies the methods of learning and information distribution. Students are free to choose how they want to learn (Adarkwah, 2021; Castro & Tumibay, 2021). Numerous viewpoints regarding the benefits of online learning have been established by empirical studies. Online learning offers the following benefits: rapid information dissemination, no time or space restrictions, respect for individual privacy, equitable learning opportunities, competency in instructional management, horizontal and two-way communication (Segbenya et al., 2022). According to Burns (2023), online learning can be less expensive than hiring a professional and saves time because it is accessible at various times and locations. Online learning can replace traditional training at a 50% to 70% lower cost (Segbenya et al., 2022; Andoh et al., 2020). According to Chiang's (2002) research, the hypermedia system enables students to enroll in courses based on their own needs or interests by upending the demanding and standard instructional style. However, Chou, Sun and Ju (2020) discovered that students'

inability to maintain self-discipline, the complexity of the online resources, or their inability to keep up with the course curriculum all hindered their ability to learn online. Without face-to-face communication, it is challenging to build strong relationships and self-confidence.

Methodology

The study was conducted at the College of Distance Education (CoDE) in UCC. The study setting was purposefully selected because it is one of the public distance education universities in Ghana with more study centres for distance education students and also has a high number of students (Qua-Enoo, Bervell, Nyagorme, Arkorful & Edumadze, 2021). The university has a well-developed technological infrastructure that provides hybrid online distance education support services for all its students. Thus, the university was a more promising setting for practical consideration. The study employed a quantitative method where the use of numerical data was employed to examine the level of computer literacy among undergraduate distance education students. To support the quantitative approach, the study design was a cross-sectional survey, which was characterised by a one-off data collection approach to gather data on the study objectives.

Every undergraduate UCC distance education student enrolled was included in the study's population. The study used a census-based method to choose its participants. The study selected all final year or undergraduate level 400 students of the CoDE at UCC. The level 400 undergraduate students were selected because the researchers assumed they would be aware of their computer literacy levels. There are 4236 undergraduate-level 400 students enrolled in the CoDE overall across all centres nationwide. Social media announcements posted on students' WhatsApp platforms were used to enlist responders or participants. Three thousand and three (3003) students answered the online survey questions using the link. As a result, the response rate was 70.9%. An online poll was used to collect the data. During the collection process, the online questionnaires were revised and verified for accuracy. Once the data collection was over, the questionnaires were coded and keyed into the Statistical Package of Social Sciences (SPSS). The study followed a standard multiple regression. The statistical procedures were conducted using mean scale analyses and inferential analysis estimated with correlational analysis T-test analysis was employed to test the differences between study variables.

Measurement of variables

Computer literacy was measured using eight (8) different indices. Each of these indices dealt with a component of computer literacy. The indices have been explained in Table 1.

Table 1: Components of computer literacy indices

Variable (indices of computer literacy)	Code	Brief explanation
Basic computer operations	BcO	understanding file management, and navigating the user interface like macOS, Linux and Windows
Internet navigation	IN	Ability to evaluate website credibility, bookmark favourite sites, understand internet safety and security practices
Digital Communication	DC	composing and formatting emails, participating in online discussions and forums, utilizing video conferencing tools for remote communication
Software Applications	SA	in using various software applications for different purposes, such as word processing (e.g., Microsoft Word, Google Docs), spreadsheet manipulation and presentation software like Microsoft PowerPoint, Google Slides

Troubleshooting and Problem-Solving	TPS	diagnosing and resolving common technical issues encountered while using computers and digital devices, such as troubleshooting software errors
Data Security and Privacy	DSP	Awareness of best practices for protecting personal data and maintaining privacy while using digital devices and online services, including setting strong passwords, implementing security measures
Digital Citizenship	DZ	Conforming to rights and responsibilities, and ethical considerations associated with using digital technology, including respecting intellectual property rights
Information Literacy	IL	Understanding how to critically evaluate and assess information obtained through digital sources, including distinguishing between credible and unreliable sources

NB: Participants were asked to rate their level of computer literacy on these variables or indices on a Likert scale of 1-7, with 1 being the lowest and 7 being the highest.

Data Analysis and Results

Background characteristics

Due to the objective of examining the differences in the level of computer literacy based on age, gender and area of residence, this information formed the basis of the background characteristics of the respondents. The results are presented in Table 2.

Table 2: Background characteristics of the respondents

Background data		Frequency	Percentage
Gender			
	Male	1537	51.2
	Female	1466	48.8
Residence			
	Rural	1700	56.6
	Urban	1303	43.4
Age			
	20-25	400	14.2
	26-30	1120	40.1
	31-35	825	29.4
	36-40	405	14.4
	40+	253	0.9

The background information shows that the majority of the respondents were males. This constituted 1537 which was represented by 51.2% as against 48.8% of females. Similarly, Table 2 indicates that 56.6% of the respondents were from rural communities while 43.4% resided in urban areas. Concerning age, it could be observed from Table 2 that the majority of the respondents were between the ages of 26 – 30 (40.1%), while those above 40 years formed the least, with less than 1%.

Level of computer literacy

The level of computer literacy was analysed using the mean scale analysis proposed and used by Avcı and Oruç (2020) to determine the level of computer literacy among distance education students. The principle holds that on a scale of 1-7, a region of 1-3.4 denotes a low level, while a region of 3.5-7 denotes a higher level or higher region. The level of computer literacy is presented in Table 3.

From Table 3, it could be observed that the variables that met the higher region of computer literacy were Basic computer operations and internet navigation. Both had a mean score of 4.5365 and 4.6040, respectively. The remaining indices used in measuring the computer literacy level of the students had a lower mean score. The overall score for computer literacy was 3.1561, which falls within the lower region

of computer literacy. The implication, therefore, is that computer literacy among distance education students is low.

Table 3: Level of computer literacy

Literacy levels	N	Minimum	Maximum	Mean	Std. Deviation
BcO	3003	1.00	7.00	4.5365	.93000
IN	2998	1.00	7.00	4.6040	.37958
DC	3003	1.00	7.00	3.3561	.62075
SA	3003	1.00	7.00	3.3636	.48178
TPS	2996	1.00	7.00	2.1397	1.06823
DSP	3003	1.00	7.00	2.1515	.71298
DZ	3003	1.00	7.00	2.1341	.68343
IL	3003	1.00	7.00	2.1197	.60851
Overall CL	**3003**	**1.00**	**7.00**	**3.1561**	**.62075**

PS: BcO = Basic computer operations; IN = Internet navigation; DC = Digital Communication; SA = Software Application; TPS = Trouble-shooting and Problem-solving; DSP = Digital security and privacy; DZ = Digital citizenship; IL = Information literacy.

Gender-based differences in computer literacy among distance education students

In examining the gender-based differences in computer literacy among distance education students Kruskal-Wallis Test was used because none of these variables were normally distributed. The results are presented in Table 4.

Table 4: Differences in level of computer literacy based on gender

	Gender	N	Median	z	*P-score*
BcO	Male	1537	115.12	-2.83	0.770
	Female	1466	112.56		
In	Male	1537	108.52	-4.64	0.152
	Female	1466	121.08		
DC	Male	1537	115.41	-1.84	0.712
	Female	1466	112.18		
SA	Male	1537	111.45	-2.19	0.506
	Female	1466	117.30		
TPS	Male	1537	112.38	-2.49	0.672
	Female	1466	116.10		
DSP	Male	1537	131.45	-2.58	0.501
	Female	1466	117.30		
DZ	Male	1537	112.38	-2.18	0.406
	Female	1466	116.10		
IL	Male	1537	111.45	-2.38	0.306
	Female	1466	127.30		

PS: BcO = Basic computer operations; IN = Internet navigation; DC = Digital Communication; SA = Software Application; TPS = Trouble-shooting and Problem solving; DSP = Digital security and privacy; DZ = Digital citizenship; IL = Information literacy

From Table 4, it can be observed that the P value for each of the constructs used in measuring the level of computer literacy is more than 0.05. The implication is that there is no significant difference in the level of computer literacy between males and females, and therefore gender of distance education students does not determine their level of computer literacy. However, the median score showed that while males performed better in some of the constructs, females also performed better in others. For instance, while males performed better in basic computer operations, females did better in internet navigation. Furthermore, while males performed better in digital security and privacy, females did better in information literacy than males.

Residence-based differences in computer literacy among distance education students

The difference in the level of computer literacy based on the area of residence was analysed using Levene's T-test, and the results have been presented in Tables 5 and 6.

Table 5 Group Statistics: Urban and Rural

	Gender	N	Mean	Std. Deviation	Std. Error Mean
CL	Urban	1303	2.6680	.73292	.06478
	Rural	1700	2.6734	.68217	.06856

Table 6 Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	MD	Std. Err Diff
SMA	Equal variances assumed	.003	.024	-.457	225	.000	-.00543	.09520
	Equal variances not assumed			-.058	217.392	.000	-.00543	.09432

From Table 6, the F value of 0.003 produced a significant value (0.024) and is less than 0.05. Since the sig value is less than 0.05, equal variances are not assumed. The sig value for equal variance not assumed is 0.000, which is significant. The mean and df score for students living in urban areas is higher than those living in rural areas. The implication here is that there is a significant difference in the level of computer literacy among distance education students based on their areas of residence. The findings show that students living in urban areas have high literacy levels as compared to those living in rural areas.

Discussion of Findings

Overall, the study highlights critical gaps in computer literacy among distance education students in Ghana, particularly in digital communication, software applications, data security, and information literacy. While students have basic computing and internet navigation skills, their lack of proficiency in other key areas hinders their ability to effectively participate in online learning. The absence of significant gender differences suggests that interventions should target all students equally, while residence-based disparities point to the need for greater infrastructural support for rural students. The findings emphasize

the importance of integrating digital literacy training into distance education curricula, improving access to technology, and implementing strategic interventions to enhance students' technological competencies. The findings from the study indicate that the overall level of computer literacy among distance education students was low, with an average mean score of M = 3.1561. However, among the different constructs used to assess computer literacy, students demonstrated a relatively higher level of proficiency in basic computer operations and internet navigation. This suggests that most students are comfortable with file management and navigating user interfaces such as macOS, Linux, and Windows (Burns, 2023). Additionally, students have developed some competence in evaluating website credibility, bookmarking important sites, and understanding internet safety and security practices. These skills are particularly essential for distance learners, as they facilitate access to learning materials, help students retrieve information for assignments, and enable them to download course content from various online platforms (Castro & Tumibay, 2021; Tsai et al., 2021; Quaicoe & Pata, 2020).

Despite these strengths, the study revealed significant weaknesses in digital communication and software application skills. The lack of digital communication skills has several implications for distance learners. One major challenge is the difficulty in accessing course materials and engaging in online learning activities. Quaicoe and Pata (2020) observed that students with limited digital communication skills often struggle to navigate online learning platforms, access course materials, and interact effectively with instructors and peers. This can negatively impact their participation in the learning process. Furthermore, Williamson et al. (2020) emphasized that in distance education, where face-to-face interaction is limited, digital communication skills are crucial for fostering engagement and a sense of belonging. Without these skills, students may feel isolated and disconnected from the learning community, which can, in turn, affect their academic performance. Additionally, Burns (2023) noted that collaborative projects and group discussions are common in online learning environments. Students who lack proficiency in digital communication tools may struggle to collaborate effectively, share ideas, and contribute meaningfully to group work.

Similarly, the study found that students lacked proficiency in software applications, such as word processors, spreadsheets, presentation tools, and subject-specific software. Previous studies (Nambiar, 2020; Tsai et al., 2021) have shown that many assignments in distance education require the use of specialized software. Without adequate skills in these applications, students may struggle to complete assignments efficiently and accurately. The current study suggests that due to their limited proficiency in software applications, students face challenges in completing coursework, communicating effectively with instructors, collaborating on group projects, and actively participating in online activities. Fidalgo et al., (2020) emphasized that distance education often includes virtual classrooms, online discussions, and collaborative projects, all of which require basic to advanced software skills. The inability to use such tools effectively could lead to reduced engagement and lower academic performance.

In addition, the findings highlight that students have a low level of awareness and skills in data security and privacy. This has serious implications, as a lack of knowledge in this area can compromise the confidentiality of educational materials, assessments, and communication in distance learning environments. Poor data security practices can lead to intellectual property theft, unauthorized access to sensitive information, and cybersecurity breaches. These concerns align with previous studies by Simpson (2018) and Sever and Çatı (2021), who emphasized the importance of online security in protecting confidential academic records from intrusion. Kara (2022) and Ümmühan and Orçun (2020) further noted that the vulnerability of distance learning platforms to cyber threats increases when students lack proper data security skills. Given the increasing reliance on online learning platforms, ensuring students are trained in data protection measures is crucial for maintaining a secure and trustworthy learning environment.

The study also found that students demonstrated a low level of information literacy skills, which can lead to challenges such as increased plagiarism and poor research skills. The inability to properly cite and attribute sources can result in academic integrity violations, which may undermine students' credibility and negatively impact the institution's reputation. Martin et al. (2020) observed that without strong information literacy skills, students struggle with conducting thorough and effective research, leading to poorly researched assignments, inaccurate data interpretation, and lower academic performance. These findings underscore the need for targeted information literacy training programs to equip students with the

necessary research and citation skills.

Another significant finding from the study is that there was no notable gender difference in computer literacy levels among distance education students. This result suggests that both male and female students have had equal opportunities to learn and use computers, reflecting progress in gender equality within technology and education. Nambiar (2020) and Tsai et al. (2021) noted that when there is no significant gender gap in computer literacy, it may indicate equal access to technology infrastructure and educational resources. However, since the overall computer literacy level was low for both genders, the findings imply that distance education students, regardless of gender, have had limited exposure to digital literacy training. This contradicts earlier studies by Tsai et al. (2021) and Kumi-Yeboah (2018), which found that male students generally demonstrated higher computer literacy levels compared to female students. Similarly, Simonson et al. (2019) noted that male students often had more positive attitudes towards computers and exhibited higher levels of proficiency. The current study, however, challenges these findings and suggests that gender-focused interventions may not be necessary. Instead, policymakers should focus on broader digital literacy initiatives that target all students, regardless of gender, while addressing other factors such as socioeconomic status and access to technology.

Lastly, the study revealed significant differences in computer literacy levels based on students' place of residence (urban vs. rural). It was found that students from urban areas had higher levels of computer literacy compared to their rural counterparts. This disparity can be attributed to the fact that urban areas typically have better access to technological infrastructure, such as high-speed internet, computer labs, and digital learning resources. In contrast, rural areas face several challenges, including limited internet connectivity, lack of technological resources, and inadequate exposure to digital tools. The findings are consistent with prior research, which has shown that students from rural backgrounds often struggle with digital literacy due to infrastructural and socio-economic barriers. Addressing this urban-rural gap requires targeted policy interventions, investment in rural digital infrastructure, and training programs to enhance computer literacy among rural students.

Conclusions

The study highlights critical gaps in computer literacy among distance education students, particularly in digital communication, software applications, data security, and information literacy. The concept of computer literacy in distance education continues to be an integral area of research due to the importance of digital literacy in the general academic performance of distance learners. Although much attention has been placed on building fast, resilient and reliable technological infrastructure to support distance learning, one key stakeholder in the distance learning value chain is the student. Therefore, irrespective of the technological infrastructure, if students are bereft of the needed skills to manoeuvre and use the infrastructure, its intended purpose will not be achieved. Therefore, while researching and investing in how to expand and make distance education more accessible, much of such investment should be directed at enhancing students' level of computer literacy. The conclusion derived from the findings of this study was that there is a low level of computer literacy among distance education students. Moreover, while there was no significant difference based on gender, it was concluded that there is a significant difference in the level of computer literacy among distance education students based on area of residence.

Recommendations

It is therefore recommended that a multifaceted approach be applied to enhance digital communication skills and software application skills in distance learning. This includes providing training and support for both students and educators, integrating digital literacy into the curriculum, and fostering a supportive online learning environment that encourages collaboration and communication. Educators of distance learning should also foster a supportive learning environment that encourages experimentation and skill development. Moreover, to mitigate these effects, it's crucial for institutions and individuals involved in distance learning to invest in training and resources to enhance their understanding of data security and privacy best practices. This includes implementing robust security measures, staying informed about relevant regulations, and fostering a culture of privacy and security awareness among all stakeholders.

Furthermore, practical suggestions for students with low computer literacy levels include employing interactive and visual learning techniques, giving plenty of practice and feedback opportunities, and emphasizing fundamental skills like keyboarding, mouse navigation, basic software usage, and internet browsing. Again, to assess and determine what is

appropriate in their situation, the administrators should get in touch with other distance education universities worldwide that offer a comparable curriculum and present it to the university management. Administrators should keep an eye on the training's development, look for any irregularities, and periodically report on the goals met and the impact of the instruction on distance education students' test scores.

Limitations and suggestions for further studies

The study has certain shortcomings. There's a chance that the computer literacy indices utilised in this study differed from what the chosen participants were familiar with. Thus, the majority of the computer literacy indices that students might employ for learning should receive more attention in future studies. Furthermore, a cross-sectional design was used to collect the data rather than a longitudinal one, which may have limited the results' capacity to be applied broadly. Once more, there were more trustworthy methods to gauge student involvement than using self-report surveys.

Acknowledgements

The authors would like to thank the University of Cape Coast's undergraduate distance education level 400 or final-year students who participated in this study by answering the questionnaire.

Funding statement

No specific grant was given for this research by public, private, or nonprofit funding organisations.

References

Abrosimova, G. A. (2020). Digital literacy and digital skills in university study. International Journal of Higher Education, 9(8), 52-58. https://doi.org/10.5430/ijhe.v9n8p52.

Adarkwah, M. A. (2021). "I'm not against online teaching, but what about us?": ICT in Ghana post Covid-19. Education and Information Technologies, 26(2), 1665-1685. https://doi.org/10.1007/s10639-020-10331-z.

Andoh, R. P. K., Appiah, R., & Agyei, P. M. (2020). Postgraduate distance education in University of Cape Coast, Ghana: Students' perspectives. International Review of Research in Open and Distributed Learning, 21(2), 118-135. https://doi.org/10.19173/irrodl.v21i2.4589.

Avcı, Ü., & Oruç, O. (2020). Computer literacy course with distance education: students' views on the procedure, content and benefits. Instructional Technology and Lifelong Learning,1(2), 138-156. https://dergipark.org.tr/tr/pub/itall.

Barfi, K. A., Imoro, O., Arkorful, V. & Armah, J. K. (2023). Acceptance of e-library and support services for distance education students: Modelling their initial perspectives. Information Development, 1–13. https://doi.org/10.1177/02666669221150426.

Bertiz, Y., & Karoglu, A. K. (2020). Distance education students' cognitive flexibility levels and distance education motivations. International Journal of Research in Education and Science, 6(4), 638-648. https://doi.org/10.46328/ijres.v6i4.1022.

Bhebhe, S., & Maphosa, C. (2016). Examining teachers' computer literacy and utilisation of ICTs in teaching and learning at primary school level. Journal of Communication, 7(2), 231-240. http://dx.doi.org/10.1080/0976691X.2016.11884902.

Burns, M. (2023). Distance education for teacher training: Modes, models, and methods. Education Development Center, Incorporation. https://www.edc.org/sites/default/files/edc-distance-edu-book-CH20.pdf.

Castro, M. D. B., & Tumibay, G. M. (2021). A literature review: efficacy of online learning courses for higher education institution using meta-analysis. Education and Information Technologies, 26(2), 1367-1385. https://link.springer.com/article/10.1007/s10639-019-10027-z.

Chiang, L. C. (2002). Development and application of the indicators for assessing learning management system of Web-based instruction: A case study of the institute for information industry's good2u (Unpublished master's thesis). National Taiwan Normal University, Taipei, Taiwan.

Chou, S. W., Sun, S. Y., & Ju, S. M. (2020). Application of distance learning: An exploratory study of teachers and students in vocational education. Chung Hua Management Review, 3(1), 123-134.

Clark, J. T. (2020). Distance education. In clinical engineering handbook (pp. 410-415). Elsevier Academic Press.

DiSessa, A. A. (2018). Computational literacy and "the big picture" concerning computers in mathematics education. Mathematical thinking and learning, 20(1), 3-31. http://dx.doi.org/10.1080/10986065.2018.1403544.

Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching:

Opportunities and challenges in emergency situations. Societies, 10(4), 86. http://dx.doi.org/10.3390/soc10040086.

Fidalgo, P., Thormann, J., Kulyk, O., & Lencastre, J. A. (2020). Students' perceptions on distance education: A multinational study. International Journal of Educational Technology in Higher Education, 17, 1-18. http://dx.doi.org/10.1186/s41239-020-00194-2.

Forson, I. K., & Vuopala, E. (2019). Online learning readiness: perspective of students enrolled in distance education in Ghana. The Online Journal of Distance Education and E-learning, 7(4), 277-294. https://www.tojdel.net/journals/tojdel/articles/v07i04/v07i04-03.pdf.

Gao, L. X., & Zhang, L. J. (2020). Teacher learning in difficult times: Examining foreign language teachers' cognitions about online teaching to tide over COVID-19. Frontiers in Psychology, 11, 549653. http://dx.doi.org/10.3389/fpsyg.2020.549653.

Greenhow, C., Lewin, C., & Willet, K. B. S. (2021). The educational response to COVID-19 across two countries: a critical examination of initial digital pedagogy adoption. Technology, Pedagogy and Education, 30(1), 7-25. http://dx.doi.org/10.1080/1475939X.2020.1866654.

Kara, M. (2022). Revisiting online learner engagement: Exploring the role of learner characteristics in an emergency period. Journal of Research on Technology in Education, 54(1), S236-S252. https://doi.org/10.1080/15391523.2021.1891997

Kumi-Yeboah A. (2018). Designing a cross-cultural collaborative online learning framework for online instructors. Online Learning Journal, 22(4), 181-201. http://dx.doi.org/10.24059/olj.v22i4.1520.

Kumi-Yeboah, A., Sallar, A.W., Kiramba, L.K., & Kim., Y. (2020). Exploring the use of digital

technologies from the perspective of diverse learners in online learning environments. Online

Learning, 24(4), 42-63. https://doi.org/10.24059/olj.v24i4.2323.

Kumi-Yeboah A., Dogbey J. K., & Yuan G. (2017). Online collaborative learning activities: The perceptions of culturally diverse graduate students. Online Learning, 21(4), 5-28. https://doi.org/10.24059/olj.v21i4.1277.

Landrum, B. (2020). Examining students' confidence to learn online, self-regulation skills and perceptions of satisfaction and usefulness of online classes, Online Learning, 24(3), 128-146. https://doi.org/10.24059/olj.v24i3.2066.

Mahlangu, V. P. (2018). The good, the bad, and the ugly of distance learning in higher education. Trends in E-learning. InTech. https://doi.org/10.5772/intechopen.75702.

Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of readiness for online learning: Importance and confidence. Online Learning, 24(2), 38-58. https://doi.org/10.24059/olj.v24i2.2053.

Nambiar, D. (2020). The impact of online learning during COVID-19: students' and teachers' perspective. The International Journal of Indian Psychology, 8(2), 783-793. http://dx.doi.org/10.25215/0802.094.

Palvia S., Aeron P., Gupta P., Mahapatra D., Parida R., Rosner R., Sindhi S. (2018). Online education: Worldwide status, challenges, trends, and implications. Journal of Global Information and Technology Management, 21(4), 233–241. http://dx.doi.org/10.1080/1097198X.2018.1542262.

Qua-Enoo, A. A., Bervell, B., Nyagorme, P., Arkorful, V., & Edumadze, J. K. (2021). Information technology integration perception on Ghanaian distance higher education: A comparative analysis. International Journal of Learning, Teaching and Educational Research, 20(2), 304-329. http://dx.doi.org/10.26803/ijlter.20.2.17.

Quaicoe, J. S., & Pata, K. (2020). Teachers' digital literacy and digital activity as digital divide components among basic schools in Ghana. Education and Information Technologies, 25(5), 4077-4095. https://doi.org/10.1007/s10639-020-10158-8.

Seaman, J., Allen, I., & Seaman, J. (2018). Grade increase: Tracking distance education in the

United States. Pearson. http://onlinelearningsurvey.com/reports/gradeincrease.pdf.

Segbenya, M., Bervell, B., Minadzi, V. M., & Somuah, B. A. (2022). Modelling the perspectives of distance education students towards online learning during COVID-19 pandemic. Smart Learning Environments, 9(1), 13. https://doi.org/10.1186/s40561-022-00193-y

Sever, S., & Çatı, K. (2021). The mediating role of attitude towards distance education in the effect of digital literacy level on satisfaction with distance education. Yükseköğretim ve Bilim Dergisi, 11(3), 559-574. https://dx.doi.org/10.5961/higheredusci.979236.

Shin, M., & Hickey, K. (2021). Needs a little TLC: Examining college students' emergency remote teaching and learning experiences during COVID-19. Journal of Further and Higher Education, 45(7), 973-986. http://dx.doi.org/10.1080/0309877X.2020.1847261.

Simonson, M., Zvacek, S. M., & Smaldino, S. (2019). Teaching and learning at a distance: Foundations of distance education (7th ed.) Information Age Publishing 50-350.

Simpson, O. (2018). Supporting students in online, open and distance learning. Routledge.

Stopar, K., & Bartol, T. (2019). Digital competencies, computer skills and information literacy in secondary education: mapping and visualization of trends and concepts. Scientometrics, 118(2), 479-498. http://dx.doi.org/10.1007/s11192-018-2990-5.

Tsai, M. J., Liang, J. C., & Hsu, C. Y. (2021). The computational thinking scale for computer literacy education. Journal of Educational Computing Research, 59(4), 579-602. http://dx.doi.org/10.1177/0735633120972356.

Ümmühan, A.., & Orçun, O. (2020). Computer literacy course with distance education: students' views on the procedure, content and benefits. Instructional Technology and Lifelong Learning, 1(2), 138-156. https://files.eric.ed.gov/fulltext/ED608942.pdf.

Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. Learning, Media and Technology, 45(2), 107-114. http://dx.doi.org/10.1080/17439884.2020.1761641.

Yeşilyurt, E., & Vezne, R. (2023). Digital literacy, technological literacy, and internet literacy as predictors of attitude toward applying computer-supported education. Education and Information Technologies, 28(8), 9885-9911. https://doi.org/10.1007/s10639-022-11311-1.

Zandi, B., & Sarmadi, M. (2016). Investigating the effect of distance education system on the computer literacy of Ma students in Tehran University. The Online Journal of Distance Education and e-Learning, 4(1), 1-28. https://www.tojdel.net/journals/tojdel/articles/v04i01/v04i01_03.pdf.

Corresponding Author
Simon-Peter Kafui Aheto
saheto@ug.edu.gh