Information Communication Technologies and Implementation of Education for Sustainable Development in Higher Education in Uganda: A case of Busitema University

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Abstract

Information and Communications Technologies (ICTs) play an important role in Education for Sustainable Development (ESD), one of the multiple approaches advanced in the last two decades to address the global sustainability crisis. The role of higher education, especially as a main driver of change, in ameliorating the immense sustainability challenges is widely acknowledged. Educators in higher education institutions must strategically engage in profound transformative programmatic, pedagogical and organisational shifts in order to play this role. ICTs are important in enabling educators to make the necessary modifications to effectively promote themes, skills, knowledge, values and attitudes in learners that will foster sustainable development. This study adopted a concurrent mixed strategy to investigate the use of ICT in the implementation of ESD practices by academic staff of Busitema University in Uganda. It sought to find out the dominant ICT activities that staff used for implementing particular ESD practices. The sample consisted of 134 academic staff and students selected using simple random and purposive sampling. The study employed a questionnaire, interview and focus group guides as primary data collection instruments. The results point to a low level of ICT use, with the dominant ICT activities being of communication and sharing

information, information creation and management, which did not add much value to the educational experiences of the learners in ESD. The study recommends staff training in ICT skills to address the challenge that comes with the use of new digital technologies, addressing the issues of access to ICTs and internet infrastructure.

Keywords: *Information and Communications Technologies (ICTs); Sustainable development; Education for Sustainable Development (ESD); Higher education*

Introduction

The world grapples with immense sustainability challenges of social, economic and environmental dimensions. Scientists have blamed the crisis largely on unsustainable patterns of consumption and production; and lack of sustainable basic education (Li et al., 2019). Many approaches have been suggested for addressing the global crisis. At the centre of the approaches is the need for a shift of consciousness through education, termed Education for Sustainable Development (ESD), which has been advanced in the last two decades. All forms and all levels of education have important roles. However, the role of higher education, especially as main drivers of change in addressing the immense sustainability challenges plaguing the world, is widely acknowledged. Educators in higher education institutions must strategically engage in profound transformative programmatic, pedagogical and organisational shifts in order to play this role. Thus, ESD requires that educators modify existing pedagogical methods to maximise their effectiveness in promoting critical consciousness, and they can achieve this by making use of ICT (Makrakis, 2014). ICTs have become a major driving force shaping educational change and have an important role in achieving the UN's Agenda 2030.

According to Adarkwah (2021), ICTs are a means to achieve SDG 4 and a platform for communication of the SDGS. They are important in enabling educators to make the necessary modifications to effectively promote themes, skills, knowledge, values and attitudes in learners that will foster sustainable development. There is agreement that ICTs, especially digital ones, are essential in facilitating practices of ESD and enabling education to exploit its transformative potential for sustainable development. When combined with existing pedagogies and social contexts, ICTs, especially digital technologies, can constitute strong drivers of transformation of learners' behaviours for sustainability. Thus, planning with technologies is an essential part of a whole system approach to the integration of ESD into practices of higher education institutions (Moodly & Adu, 2017).

Literature Review

Both old and new technologies are essential to the implementation of ESD. Research reveals that educators use ICTs as an innovative interactive tool to achieve different goals of ESD. ICTs provide great interactive tools for the benefit of ESD (Madani et al., 2017). Thus, the use of technology in ESD provides innovative approaches to teaching and learning sustainability, which interests the learners in the practice (Li et al., 2019). It also increases access to information and promotes new ways of interaction, thus acting as drivers of new pedagogical approaches (Meenashki, 2013). Meenashki further reveals that educators believed ICTs could be used to enhance learning and achievement among learners. ICTs are also used to support other pedagogical approaches for sustainability education. Waluyo (2019) reports the facilitative role of ICTs as a pedagogical support during teaching and learning and in helping to improve learners' achievement. He concluded that ICTs create an

opportunity to use a variety of pedagogical approaches and support facilitative, collaborative and interactive approaches that lead to transformative learning.

Similarly, Makrakis and Kostoulas-Makrakis (2012) report the use of ICTs as transformative tools in sustainability education. Sustainability scholars agree with the transformative role of ICTs. Makrakis (2014), for instance, explains that ICTs enable the construction of meaningful learning environments for sustainability by promoting processes that engage and challenge learners to explore, experience, discover, construct and reflect on sustainability themes, ideas and values. ICTs have also been used to help learners engage in problem-based learning. Li et al. (2019) assert that project-based learning and problem-solving strategies that are so much encouraged in the teaching and learning of ESD benefit greatly from the use of ICTs. The authors also found that academic staff used ICTs to connect classroom teaching to learners' interests, experiences and background, thus making them learn in more relevant ways. Researchers also link ICTs directly to skills and competence development. For instance, ICTs can be used to provide the much needed 21st century skills that can best enable learners to compete in a society driven by knowledge and information (Haji et al., 2017). Thus, they can promote (ESD) competences such as problem-solving, group decision-making and communication (Hong, 2016).

Other scholars have, however, contradicted the above findings. For instance, findings by Opati (2013) of a study set in the Makerere University College of Education showed that ICTs were used more in lecture preparation, record management and socialisation than in the teaching and learning process. Li et al. (2019) reported that educators in Mongolia primary schools used ICTs for storage and dissemination because they lacked ICT skills. Many teachers did not consider ICT use to be central to the teaching and learning process and were reluctant to use them (Meenashki, 2013). They also felt that using ICTs required the adoption of learner-centred approaches which, to them, consumed much time and energy.

The low levels of ICT adoption by academic staff stem from several factors, which include lack of knowledge, inadequate skills, limited resources and accessibility. Messina and Tabone (2012) indeed found low scores on teachers' knowledge of technology and how to connect technology, pedagogy and context. Limited knowledge of technology definitely limits the application of ICTs to the teaching and learning process, as well as to research and community engagement. Academic staff require new skills and competences in order to use the newer digital technologies for communication, creating digital content and solving technical digital problems (Rana, 2018). Li et al. (2019) confirm that educators need capacity-building if they are to progress from the basic use of ICTs to making them part of pedagogy. Without capacity-building in information literacy, academic staff may not make sufficient use of ICTs for the promotion of ESD. This speaks for other countries. What about the study context?

Studies reveal that educators in higher education have used ICTs extensively but

mainly for general rather than ESD-specific purposes. Moodly and Adu (2014) warn that the general use of ICTs does not add value to the educational experience of learners. Educators need to identify and use technology that adds value. Some of the findings are based on literature reviews and not empirical data. Moreover, most of the studies reviewed were conducted in developed and high-resource-based countries which are well-endowed with ICT resources, where staff and students possess high skills in technology use. The studies do not depict how academic staff in developing countries, whose institutions are challenged by inadequate ICT resources, make use of ICTs for ESD purposes. There is hardly any literature on how academic staff in Ugandan universities,

including Busitema, use ICTs in ESD practices. The mission of Busitema University, the context of the study, is to "provide high standard training, engage in quality research and outreach for societal transformation and sustainable development" (Busitema University, 2014). The mission sets the university on the path of ESD. This study was, therefore, important in investigating how academic staff of the university are using ICTs to fulfil part of the mission of the university.

Purpose/Objectives

The purpose of this study was to investigate the use of ICTs for the implementation of ESD by academic staff in Busitema University. The specific objectives were to:

1. Investigate the extent to which academic staff use different ICT activities to implement ESD practices in Busitema University.
2. Establish the challenges encountered by academic staff in using ICTs to implement ESD practices in Busitema University.

Conceptualising Key Terms

ICT stands for information and communications technology, and represents a variety of technological tools and resources used to communicate, and to create, disseminate, store and manage information (Meenaskshi, 2013). Luyombya (2012) explains that ICTs are instruments, devices or applications used in facilitating the communication, creation, processing, use or dissemination, storage, retrieval and transmission of information by electronic means. Estable (2011) and Makrakis and Koustoulas-Makrakis (2012) consider ICTs as both old and new technologies used in processing and communicating information. This study understands ICTs to mean old technologies and new digital devices and applications used to communicate, create process, disseminate, store, retrieve and manage information electronically.

Ferrari (2012) explains ICT use in terms of competences for the key ICT activities of information management, collaboration, communication and sharing, creation of content and knowledge, ethics and responsibility, evaluation and problem-solving and technical operations. This study considers ICT use to mean the employment of different technologies to facilitate the activities outlined by Ferrari (2012) for the implementation of ESD. Specifically, ICT use considers using ICT tools to promote activities such as problem-solving, information management, collaboration, communication and sharing, the creation of content and knowledge in the implementation of ESD.

The widely agreed upon definition of the term sustainable development is the one provided by the WCED report, commonly known as *Our Common Future*. The report defines sustainable development as "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p.43). The definition underscores the importance of understanding the intricate relationship between development and the environment (UNESCO, 2018); the relationship between a healthy economy and healthy environment; the principles of intergenerational and intra-generational equity; the significance of poverty eradication; and the limitations set by the carrying capacity of the environment (Arpita et al., 2018). The vision for sustainable development is currently enshrined in the SDGs that address a wide range of complex social, ecological and economic issues, which include poverty reduction, food security, climate change mitigation, quality education and the promotion of sustainable consumption (Albareda-Tiana et al., 2019).

The concept of ESD has a variety of meanings because of its ever-changing nature (Arpita et al., 2018; Nomura & Abe, 2010; Yiu, 2015). Most scholars agree that ESD is a means of achieving

Sustainable Development Goals (SDGs). Dannenberg and Gapentin (2016) posit that ESD is education that develops sustainability competences by incorporating issues of sustainable development into different aspects of education. It is thus "a process of integrating the principles and practices of sustainable development into all aspects of education and learning, to encourage changes in knowledge, values and attitudes with the vision of enabling a more sustainable and just society for all" (UNESCO, 2014, p. 5). Muller et al. (2021) define ESD as an educational programme that empowers people to think about the impact of their actions and make responsible decisions for a better future. According to UNESCO (2018), ESD provides a new vision of education that addresses the connections between complex sustainability issues, giving learners the opportunity to connect with nature. Similarly, according to Kedzierska et al. (2013), ESD is a strategy used for achieving the goal of sustainable development. Drawing upon the several understandings of ESD, this study considers ESD as an educational approach and strategy through which learners acquire knowledge and values, and develop skills and attitudes that will enable them to work and live in a way that safeguards the environment and the socio-economic wellbeing of society. Implementation of ESD in this study is denoted by different ESD practices, and these are incorporation of ESD into curriculum development, teaching and learning for ESD, ESD research, outreach for sustainable development, and sustainability in campus operations such as student sustainability clubs, waste reduction practices, water and energy conservation practices, sustainable landscaping and sustainability audits.

Methodology

This study adopted a parallel convergence mixed methods strategy that combines both quantitative and qualitative research approaches for full investigation of the research objectives. The study concerned itself with the exploration, interpretation, explanation and description of the use of ICTs in implementing ESD practices by academic staff in faculties of Busitema University. The target population of the study consisted of all full-time academic staff and undergraduate students in the faculties of Busitema University. By targeting full-time staff, the researcher wanted to capture respondents who were knowledgeable about all programmes of the university. The participants were representative of the different categories of academic staff so as to enable the researcher to capture the experience of the different levels of academic staff with ESD implementation. The inclusion of students was to ensure that the information gathered from the focus groups was used to substantiate data collected from other sources. The students were representatives of different programmes so as to bring voices from their different programmes of study to enrich the study findings. The study sample consisted of 140 academic staff, 15 ESD key persons and 48 students chosen from different programmes in six faculties. The study employed stratified sampling technique to divide the target population into different homogeneous strata, simple random sampling to select respondents from each stratum to complete the questionnaires and purposive sampling to select participants for interviews.

Data in the study was collected using survey questionnaires, interviews and focus group discussions (FGDs) as the primary data collection methods. A questionnaire was administered to faculty members to establish the extent of ESD implementation in the faculty. Interviews were carried out among deans and deputy deans of faculties and key persons working with ESD in the faculty. Focus group discussions were conducted for final year student groups selected from different programmes in order to cover a wide range of opinions. Document analysis was the only

secondary data collection method used to cross-check and complement the information obtained from the other data collection methods.

The quantitative data was sorted, processed and analysed using the Statistical Package for Social Sciences (SPSS). Data was analysed at the univariate level using descriptive analysis. The descriptive statistics in the form of frequencies and percentages were used to summarise and describe responses. The qualitative data was analysed manually. This started with content analysis and thereafter patterned coding was done to identify emerging themes as suggested by Percy et al (2015). The two datasets were triangulated at the time of reporting the findings and discussion.

Findings of the Study

The extent of use of ICT activities by academic staff in ESD practices

The first objective of the study was to establish the extent to which academic staff used ICTs for implementing ESD practices. It specifically sought to find out the extent to which academic staff used ICTs for information management, collaboration, communication and sharing information, the creation of content and knowledge, ethics and responsibility, evaluation and problem-solving and technical operations. The ESD practices were curriculum development and implementation, research and scholarship, outreach, and campus operations. Campus operation practices included student programmes, energy conservation and water conservation practices. Others were recycling of solid waste, sustainable landscaping, waste reduction and sustainability audits. Data was collected through both quantitative and qualitative methods. The survey section on the use of ICTs required respondents to indicate the ICT activities that they had commonly adopted for implementing various ESD practices. The scores for each ICT activity were summed up for each ESD practice. The results in percentages are presented in Table 1.

Table 1: The extent of using ICT activities for ESD practices

	ICT ACTIVITIES (%)						
ESD Practices	IM	CO	CS	CCK	ER	EPS	TO
Curriculum Implementation	66.3	48.1	72.1	64.4	18.3	23.1	36.5
Teaching and Learning	55.8	43.3	75.0	69.2	26.9	36.5	34.6
Research and Scholarship	64.4	63.5	66.3	53.8	44.2	37.5	29.8
Outreach and service	57.7	57.7	73.1	28.8	20.2	31.7	29.8
Student Programmes	41.3	31.7	56.7	17.3	14.4	18.3	17.3
Energy Conservation	32.7	16.3	45.2	17.3	10.6	20.2	16.3
Water Conservation	32.7	19.2	40.4	17.3	4.8	21.2	25.0
Sustainable Landscaping	37.5	21.2	38.5	24.0	8.7	22.1	21.2
Recycling of solid waste	32.7	19.2	20.2	20.2	13.5	21.2	20.2
Waste reduction Practices	44.2	23.1	33.7	19.2	12.5	19.2	22.1
Sustainability Audit	29.8	15.4	24.0	15.4	14.4	13.5	12.5

Note: IM = Information Management; CO = Collaboration; CS = Communication and Sharing; CCK = Creation of Content and Knowledge; ER = Ethics and Responsibility; EPS = Evaluation and Problem-solving; TO = Technical Operations

An overview of the results in Table 1 shows that the most dominant ICT activity across ESD practices was communication and sharing, followed by information management and the creation of content and knowledge. The use of ICTs was low for activities such as collaboration, evaluation and problem-solving, as well as technical operations, and least for ensuring ethics and responsibility. This observation regarding the dominance of certain ICT activities cuts across all ESD practices.

The findings on practices that fall directly under the roles of academic staff were as follows: The main use of ICT for curriculum implementation was communication and sharing, with 72.3% scores. This was followed by 66.3% for information management, and 64.4% for the creation of content and knowledge. About 48.1% respondents indicated that they had used ICTs for collaboration during curriculum implementation, while 36.5 had used it for technical operations, and 23.1% for evaluation and problem-solving. The lowest score of ICT use for curriculum implementation was in ethics and responsibility. Similar to curriculum implementation, communication and sharing emerged as the most frequently used ICT activity during teaching and learning, with 75.0% scores. This was followed by the creation of content and knowledge (69.2%), information management (55.8%) and collaboration (48.1%). Lower scores were observed for ICT use in the activities of evaluation and problem-solving (36.5%) as well as technical operations (34.6%), and the lowest being ethics and responsibility, with a score of only 26.9%. Analysis of the extent of using ICT activities for research and scholarship shows high scores for ICT use for communication and sharing (66.3%), followed closely by information management, collaboration, the creation of content and knowledge, ethics and responsibility, and evaluation and problem-solving, and the least used ICT activity was technical operations, with only 29.8% scores. Communication and sharing still had the highest score of 73.1% for ICT use in outreach and service, like in the other core ESD practices (see Table 1). ICT activities for information management and collaboration in outreach and service practices were each rated at 57.7%. This was followed by evaluation and problem-solving at 31.7%, technical operations at 29.8%, the creation of content and knowledge at 28.1%, and ethics and responsibility at 20.2%.

Regarding the other ESD practices which fall in the category of campus operations, the scores for all ICT activities were below 50%. These practices do not fall directly under the roles of academic staff; they are mainly practices falling under the Estates Department. The results could mean that the staff had little information about those practices. This is indicative of the fact that academic staff are more engaged in practices of curriculum development and implementation, teaching and learning, research and scholarship as well as outreach and service and less in student environmental sustainability and operational practices such as waste management, energy and water conservation practices.

A triangulation of the above findings on ICT use for SD implementation with the qualitative ones revealed that the findings using the two methods were in agreement. Asked to comment on how they and other members of staff had used ICTs to facilitate curriculum implementation, research and outreach in the area of ESD, the majority of the interview participants intimated that ICTs were mainly used for communication, information-sharing and collaboration. There was limited use of ICTs for interactive teaching and learning. ICTs were mainly used for general communication, information-sharing, managing information and the creation of content. The following statements from participants attest to this:

> I have not known many staff using ICT for teaching and learning. We use ICT for information-sharing.
>
> They use ICT for making notes, information transfer and to update themselves.

> Apparently, the only thing I can say is sharing information, not really notes. Very few staff use ICT activities. ICT facilities and internet are very limited so it is difficult to use ICT for teaching and learning.

The voices of students from the FGDs confirmed that there was limited use of ICTs in the university and reaffirmed that ICT use was mainly for information-sharing and communication. There was little use of ICTs for teaching and learning. The students observed that even university management had not fully embraced the use of ICTs because offices like that of the Academic Registrar had problems handling students' results online. From FDG 2, one participant explained, "ICTs are not fully used; the system for online registration and accessing of results are not working." Another participant added, "We have not yet embraced ICT fully even for information management because we are still submitting our projects in hardcopy only." A participant from FDG3 similarly explained that not all courses accepted online submission of students' project work and coursework.

Two faculties had, however, embraced ICTs as an interactive pedagogical tool to facilitate teaching and learning. The study found that faculties that were well-endowed with ICT facilities were involved in using ICTs for e-learning and other interactive innovative teaching and learning for ESD. A participant explained that they had the facilities and had done innovations in ICT:

> We have ICT, we have e-learning centre in the library. You are aware that the faculty has done a lot of innovations in ICT. You could have heard of the learning board made by one of our staff.

Other participants explained how the problem-based approach, one of the ESD-relevant pedagogical approaches, was well supported by the use of ICTs. The approach makes use of the different ICT activities of communication, creation of knowledge and sharing information. In the statement below, one participant underscores the importance of ICTs and explains how his faculty had embraced the use of ICTs because the problem-based approach required extensive use of ICTs:

> You know the problem-based learning approach and learner-centeredness has that advantage. That has made our students here explore a lot using ICT-based resources. Most of our resources are online, the library has only a few. The staff all have internet access and a computer or laptop. They use interactive whiteboard and all our classrooms have projectors.

The participant, however, observed that the faculty had not yet adopted some high-level and complex ICT systems that were much needed for teaching and learning, such as simulation systems for computerised models owing to inadequate resources. He also thought the staff needed more training in complex ICT issues and usage.

Some faculties were using ICTs to embrace online learning platforms and open distance learning (ODL). These were, however, still in infant stages. A participant stated that their faculty was exploring setting up online learning platforms and that work had begun on it. A participant from another faculty explained:

> We have e-learning programmes and we share ideas on a topic with students on the internet before the lecture room interaction. The process of turning our programmes to open distance learning has also started.

Other faculties had made use of online Google groups and social media, as exemplified by the statement: "Actually, what we do for every class is open up a communication network for staff and students, a Google email group, where we post materials for students before the lecture." Other participants who thought that academics were making considerable use of ICTs for teaching and

learning based their arguments on the use of ICTs for lecture and project presentations. A deep analysis of their explanations, however, pointed to ICT use for information-sharing and communication.

Data from interviews also corroborated the quantitative results related to ICT use for research, outreach and community engagement. One participant explained how they encouraged students to use ICT for research:

> The research projects for the students. We encourage them to give presentations; whether that is ICT or computer they do presentation. We encourage them to type their work and if they can send it on email the better so that we have a permanent record of the work because papers can be lost.

The participants confirmed that they used ICTs for community engagement but it was still at the level of communication, sharing of information and collaboration. Describing how his faculty had made use of social media for community engagement, a participant opined:

> Students and teachers have exploited social media. There is a WhatsApp group linking the faculty and the community during our mandatory outreach programmes, COBERS. Members of the rural communities can give us feedback on our students. For example, when a student does not report or disappears, the community can immediately report through the forum.

The survey, interview and FGD results all point to the limited use of ICTs and mainly for communication, sharing and information management. Apart from a few faculties that seemed to be doing fairly well in ICT use, the rest were struggling. There was little use of ICTs for core academic business, such as curriculum implementation, teaching and learning, research and outreach. Although most participants said that the staff and students used ICTs for communication and sharing and information management, it was clear that the use of ICTs was not specifically tailored to the pursuit of ESD goals in teaching, research and outreach, or even in operations.

Challenges encountered by academic staff in using ICTs for implementing ESD practices

The second objective of the study was to investigate the obstacles that impacted on the level of ICT use by academic staff in the university. Data for this objective was gathered qualitatively through interviews and FGDs. Most participants attributed the low level of ICT use to challenges caused by inadequate ICT equipment, facilities and poor internet infrastructure with limited connectivity. As a result, they argued that even if one wanted to make use of ICT, one found it difficult, as depicted in the statement: "Very few staff use ICT activities. ICT facilities and internet are very limited, so it is difficult to use ICT for teaching and learning." Another participant lamented about how the challenges of facilities and internet connectivity had crippled some of the teaching and learning activities in some of their programmes thus: "ICT use is dictated by the facilities."

The shortage of computers in relation to the big student enrolment in some faculties is another hindrance. The following statement draws attention to the deplorable situation in one faculty: "We have close to 2,000 students but, unfortunately, we have only 23 computers." Another participant emphasised the shortage of ICT equipment in the following statement: "The fact is that these gadgets are limited; one projector is used in a whole faculty. There are limited resources." The students in the FGDs also confirmed the challenges related to inadequate ICTs and internet access that had been raised by the interview participants. Stressing the hindrance to the use of ICTs, one participant from FDG 1 asserted, "We would want to make use of ICT for research but that is not possible. Some of us do not have personal computers and yet there are very few in the library."

Academics were equally unhappy with inadequate internet facilities and poor connectivity, which they considered a big hindrance to the use of ICTs for ESD purposes. The participants explained how they had to rely on personal devices and smart phones to access the internet, making it expensive for interactive teaching and learning. They complained about limited access, slow speeds and inadequate internet infrastructure. This is borne out by the following voices:

> Of course, you know all good things come with a cost. In some universities, internet is concentrated in a particular place where students can access it. Everybody goes there with their laptop or phone to access internet. For us here it is not possible. You buy your own. If you wanted to use Skype, can you do it?

> The issues of internet are just the same; students and staff are complaining. It is hindering the research component; it is hindering coursework because what is basically stocked in the library does not cover much. We have a big student population and the library cannot accommodate all of them but the internet is too slow; one thing takes a whole day to download.

> Internet is a big problem because we don't have the cyber. For heads of departments we had to buy modems for use in coordination. For students it is difficult; the search takes a long time although they have reported some improvement this semester.

One participant explained how their attempt to use Moodle failed because of unreliable internet service:

> We have tried interactive learning using Moodle but because of the nature of the faculty and equipment, it has not been successful. We are still struggling because using the Moodle platform required training and available internet.

The students in the FGDs also confirmed challenges related to internet access. The participants explained that the limited internet connectivity hindered the research and coursework components of their study programmes because the internet bandwidth was not enough. The internet problems were elaborated on further in comments such as:

> There are online resources but you can only access them in the library. You know that our library does not have enough space for all of us. Elsewhere on the campus there is poor internet connection.

Academic staff also mentioned inadequate knowledge of new digital technologies and inadequate skills to use them as a hindrance to the use of ICTs:

> The challenge I see is that a big number of people, staff and students do not have good computer skills. We also lack knowledge of new digital technologies. You cannot use what you do not know. This makes using ICT for teaching and learning, outreach or research a challenge.

The methods of assessment were deemed as a hindrance to the use of ICTs in ESD implementation. The participants revealed that they employed more of summative assessment methods than formative which, they argued, do not require interactive use of ICTs. Appropriate learner assessment in ESD relies heavily on formative assessment, creating room for learners to question and adjust their assumptions. The following quotation exemplifies the issue of inappropriate assessment hindering ESD implementation:

> Curriculum assessment methods should be ICT related not just knowledge. There has been an attempt to balance summative and formative assessment but I think we need to do more towards formative assessment.

Discussion

The findings of the study indicate a low level of ICT use by academic staff. The survey, interview and FGD results all point to the limited use of ICTs. There were a few faculties that seemed to be doing fairly well with regard to ICT use but, overall, ICTs were used for activities that required surface technological skills. The results show that across all ESD practices, academic staff majorly used ICTs for communication and sharing information, as well as for information management and creation. There was low use of ICT for activities such as collaboration, evaluation and problem-solving, ethics and responsibility and technical operations. There was more ICT use in practices that constitute the core of academic roles such as curriculum implementation, teaching and learning, and research and outreach. Among these practices, the low use of ICTs for community engagement is very noticeable. Academic staff had little information on ICT use in practices that did not fall under their jurisdiction; thus student programmes, programmed sustainability audits and resource or environmental conservation practices were hardly cited by staff in their use of ICTs. The study did not find any online platforms for ESD but the university was in the infant stages of developing online or e-learning and ODL programmes. This finding on the limited use of ICTs for improving learning experiences agrees with Rana and Rana's (2020) that teacher educators in a key university in Nepal made only limited use of ICTs for educational purposes.

The study findings show that the academic staff used ICTs for general purposes such as the preparation of lecture notes and tests, lecture presentation and web searches for research, but not to enhance students' learning. This could mean that the academic staff in Busitema University did not use ICTs as interactive tools for ESD and, therefore, the use of ICTs did not engage learners in developing key ESD competences. Such a general and surface use of ICTs does not develop cognitive, critical-thinking, problem-solving and systems thinking skills that are much required in building competences for sustainability. It does not improve the educational experiences of learners and cannot, therefore, effectively contribute to the quality of ESD (Moodly & Adu, 2014). This finding is similar to that of Muianga (2019), who reported that the emphasis on the use of ICTs to enhance student-centred learning in preparation for 21st century skills had not translated into a practice among academic staff of higher education institutions. Higher education teachers have continued to use traditional teaching methods and so ICTs play a secondary role in teaching and learning. Moodly and Adu (2014) equally revealed that the general use of ICTs did not add value to ESD. The duo concluded that for ICTs to contribute to educational experiences of learners, academics must focus on using technology that adds value to learners' experiences.

In the study findings, the limited use of ICT was attributed to a number of factors, among which was inadequate ICTs and poor internet infrastructure, limited access and inadequate ICT knowledge and skills. These findings resonate with those of other scholars, who have reported that the potential of ICTs to enhance teaching and learning is encumbered by many challenges. Rana and Rana report that the adoption of ICTs is encumbered by resource constraints, while Li et al. (2019) argue that the evolution of ICTs into pedagogical tools, coupled with the emergence of new technologies, created knowledge and skills gaps that posed a great challenge to academic staff in the use of ICTs. Rana (2018) found that school teachers had not adopted ICTs for pedagogical purposes or for engaging learners in deep and reflective thinking because of the kind of training they had received. They revealed that insufficient staff training, lack of ICT skills and inadequate implementation of ICT policy hindered ICT use among academic staff. A minimal level of ICT resources is needed (Rana,

2018) and teachers need professional development in ICT skills (Rana & Rana, 2020) for the effective use of ICT in teaching and learning.

Conclusion and Recommendations

The study findings reveal a low level of ICT use among academic staff. The use of ICTs is majorly for general and basic tasks and not as pedagogical tools or to support programmes in the implementation of ESD. Thus, academics do not use ICTs to promote experiential learning. They do not focus on tapping the potential of ICTs to add value to the educational experience of the learner. The limitations to ICTs use imply that academics in Busitema University are not effectively tapping into the power of ICTs to develop competencies for sustainable development. Thus, the transformation that should come with ESD is not happening. Having computers, using projectors and other technologies for doing basic things such as lecture presentation does not make them a transformative tool without purposefully targeting experiential and transformative learning.

We recommend that there is need for the implementers of ESD practices in higher education institutions to make more use of ICTs as pedagogical tools and affordances. They need to go beyond general use of ICTs and purposefully choose to make use of all types of ICTs and digital technologies to enhance the educational experiences of learners in order to develop ESD competences. This requires making careful decisions to ensure that ICT activities blend with pedagogy and programmes for the benefit of the teacher and learner. When ICTs are used this way, their dual purpose can release academic programmes from disciplinary restrictions, unleashing the interdisciplinary and multi-disciplinary nature of the ESD dialogue. Purposeful use of ICTs strengthens partnerships with stakeholders in the sustainability debate and takes the learning into real-life situations, enabling learners to have local and global encounters of sustainability. The transformation needed in ESD requires using ICTs in such ways that they can add value to ESD.

Universities such as Busitema that position themselves to educate for sustainable development need to address the challenges of and hindrances to the effective use of ICTs. The use of ICTs as a pedagogical tool in ESD should be enhanced through training of academic staff. Constant upgrading of skills is required to improve ICT skills and address the challenge that comes with new digital technologies. Institutions also need to address the issues of access to ICTs and the internet across faculties. Improving access to ICTs, making internet infrastructure available to all faculties, and upgrading computer laboratories, lecture rooms and libraries on each of the campuses will go a long way in supporting the use of technologies for ESD and other disciplines.

This investigation hinged on a case study of Busitema University, a public university in Uganda. Busitema operates on a multi-campus model, unlike many universities within Uganda. The picture of ICT use for ESD is likely to be different in other university contexts. A study of other universities, both public and private, is recommended for a broader investigation. Such a study is likely to provide more representative information that can be applied to a wider university context in Uganda and elsewhere in the world. Investigating ICT use in disciplines other than ESD would probably unveil substantial information, too. This study targeted academic staff only. It would be beneficial to the body of knowledge to investigate how other categories of staff are making use of ICTs.

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Declaration

We declare no conflict of interest.

Availability of data and material for data transparency

All data generated or analysed during this study are included in this published article. The original datasets are available from the corresponding author on reasonable request.

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