LECTURERS' ICT SKILLS IN KNOWLEDGE SHARING: A FOCUS ON SCIENCE EDUCATORS IN FEDERAL COLLEGE OF EDUCATION, OBUDU, CROSS RIVER STATE, NIGERIA.

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Abstract

The study examined the influence of lecturers' ICT skills in knowledge sharing by Science educators in Federal College of Education, Obudu, Cross River State. Five (5) aim and objectives guided the study, and five (5) research questions were raised for the study. Descriptive survey research design was adopted for the study. The population of the study consisted of all the twenty six (26) Science Education Lecturers (educators) who lecture in the departments of Biology, Chemistry and Physics respectively. A simple random sampling technique was used to select a sample size of eighteen (18) science educators consisting of eight (8) Biology lecturers, five (5) Chemistry lecturers and five (5) Physics lecturers (respondents). A researcher self-made 4-point Likert scale instrument titled "Lecturers' ICT skills and Knowledge Sharing Questionnaire (LICTSKSQ)" was used for data collection which was validated by the experts in the field of measurement and evaluation. Data obtained were analyzed using frequency counts and mean scores. Findings of the study showed possession of some ICT skills such as social media utilization skills, web navigational skills, among others. It also revealed the sources through which science educators in Federal College of Education, Obudu acquire their ICT skills. These sources include personal reading/research and attending conferences/seminars, among others. The study revealed that the adoption of lectures, use of meetings, presentation/delivering of papers at conferences, are the top-most patterns adopted by science educators for knowledge sharing. Furthermore, it was revealed that efficiency in communication, access to wider population, and proper understanding of knowledge shared are among the influence of science educators' ICT skills on their knowledge sharing practices. The study also revealed that science educators are faced with challenges in respect of the acquisition of ICT skills and knowledge sharing, which includes, but not limited to inadequate ICT skills on the side of the science educators, absence of quality ICT training programmes, high cost of ICT gadgets, etc. Based on the revealed influence of ICT skills and the challenges facing the application of these skills for knowledge sharing, the study recommended among others that ICT facilities should be provided and its functionality ensured so as to improve science educators' access to it within the College.

Keywords: *ICT, Skills, Knowledge-Sharing, Influence, Science Educators.*

Introduction

The chunk of academic work revolves round the process and practices of knowledge sharing within the higher institutions of learning and extends to other colleges and universities both home and abroad. In this case, the science educators (lecturers) are in one end sharing the knowledge, whereas the learners are on the other end receiving the knowledge. Knowledge sharing manifests in diverse ways such as the lecturers to the learners, the

teachers to the pupils, the masters to the apprentices, the parents to the children, the presenters to the audience, and the superiors to the sub-ordinates. Whichever way it manifests, the focus is that knowledge is being shared from one end to another. It is imperative to understand that knowledge sharing does not only come from up to down, but can as well be from down to up. This implies that in every human, there is an iota of knowledge which could be shared for the benefit of the receivers (decoders).

According to Nnadozie (2016) knowledge is a primary component of people's intellectual asset, which is made up of skills, experiences, ideas, intellect, expertise and intuition, which become evident when value has been added to information through processing. In a more detailed ancient definition, Leonard and Sensiper (as cited in Onuoha, Akidi & Chukwuemeka, 2019) described knowledge as value-added information that is relevant, actionable and based, to a large extent, on experience. Knowledge could also be referred to a fluid mix of framed experiences, values, contextual information and expert insight that provide a framework for evaluating and incorporating new experiences and information. Knowledge originates and is applied in the mind of the knowers. In the organizational setting like colleges of education, it is often embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.

From the above definitions, one could believe that action is based on knowledge shared and received. This means that the process of sharing this knowledge to another goes a long way in determining the action of the persons. To this end, knowledge sharing could be defined as the ability of organizations and individuals to share knowledge with each other or among one another. Knowledge sharing occurs when people who share a common purpose and experience similar problems come together to exchange ideas and information (MacNeil, 2023). The process of knowledge sharing among individuals involve the conversion of the knowledge held by an individual into a form that can be understood, absorbed and used by other individuals (Ipe, 2023). It is primarily a mechanism by which knowledge is transferred from one individual to another.

Knowledge sharing involves patterns and methods. The pattern and method to be adopted largely depends on the experiences and skills of sharers as well as the environment, the receivers/audience, among other factors. These methods could be through personal conversation, teaching in the classroom, preaching in the religious settings, presenting papers in conferences and seminars, undertaking radio/television programme, parents at home, and lots more. However, the focus of this study is on methods applied in the academic setting. The effectiveness of the method/pattern adopted in knowledge sharing could be anchored on issue of time and energy exerted in the process. Some believe that when one has not spent much energy, he/she is in the best place to share knowledge effectively, some would attest to the fact that the comfort of the environment determines the influence of knowledge sharing practices, which could be enhanced by application of information and communication technologies and skills.

Consequently, science educators are some of the professionals that have tested different technologies in the course of its dynamic changes, not only in the practicing profession but also in the teaching profession. This is so because, Nnadozie (2016) holds that science education was founded, and still thrives, on inculcating into man, the ability to make innovative ideas. Hence, the technology for the creation, organization, preservation, management and dissemination of this creative idea has been of interest in the science education as well as practice of lecture delivering. Every generation of science educators has had to respond to the need to fashion basic technological tools to play their role. The response to this could be seen in the acquisition of technological skills (ICT-related) as well as its application in the knowledge sharing practices.

Although ICTs emerged in the 20th Century, the popularity of this phenomenon in science education simply underscores its importance both in the science educators and their students. ICTs have influence beyond science education and other disciplines concerned with information sharing, and have become central to the sharing of knowledge assets in other organizations, agencies and departments. Besides, people engaged in different economic, administrative, political, entrepreneurial, and academic enterprises adopt information technologies to achieve their respective purposes, science educators, inclusive. This leaves no doubt that ICTs and possession of ICT skills are not only crucial to knowledge sharing, but also contribute immensely to the

advancement of human society. This research, therefore, explores the influence of ICT skills in knowledge sharing with particular reference to science educators in Federal College of Education, Obudu.

Statement of the problem

The world today is moving digitally as all facets of life have been digitalized to suit the current trends of happenings in the digital era. Incorporating Information and Communication Technology (ICT) in the field of education has been seen as one of the fundamental elements of the changing world. ICTs have metamorphosed into diverse forms which had helped and/or helping not only in the field of education but economics, business, corporate organization etc. The integration of Information and Communication Technologies (ICTs) in the education setting such as lecturing, research, data gathering, message dissemination and effective communications has brought a huge success in the citadel of learning in this recent time. The effective utilization of ICT skills by college of education lecturers in Federal College of Education, Obudu has improved and/or enhanced academic performance of students tremendously in this digital age. The Federal Government of Nigeria has taken a proactive step by renovating and equipping the federal colleges of education with the necessary ICT tools and facilities to enable lecturers to make meaningful impacts via the use of ICT skills acquired.

However, the effective utilization of these ICT skills in the colleges of educations for knowledge sharing, research writing, information dissemination and effective communication to the students depends to a large extent on the skills and knowledge acquired by the lecturers in Colleges of Education. To what extent do these lecturers utilized these ICT skills for knowledge sharing in the higher institutions of learning? To what extent can these lecturers surf the net for effective knowledge sharing? These and many others form the bedrock for this research study.

Purpose of the study:

The general purpose of this study is to examine the influence of Science Education lecturers' ICT skills in knowledge sharing: a focus on science educators in Federal College of Education, Obudu, Cross River State, Nigeria.

Specifically, the study intends to:

1. identify the ICT skills possessed by science educators (lecturers) in Federal College of Education, Obudu.
2. ascertain the sources of ICT skills of science educators (lecturers) in Federal College of Education, Obudu.
3. find out various methods/patterns adopted by science educators (lecturers) for knowledge sharing in Federal College of Education, Obudu.
4. determine the influence of science educators' (lecturers') ICT skills in their knowledge sharing practices in Federal College of Education, Obudu.
5. uncover the factors influencing knowledge sharing by science educators (lecturers) in Federal College of Education, Obudu.

Research questions:

1. To what extent do federal college of education Science Education lecturers' identification of ICT skills influence knowledge sharing in FCE, Obudu?

2. To what extent do Science Education lecturers' ICT skills sources influence their knowledge sharing in FCE, Obudu?

3. To what extent do methods/patterns employed by Science Education lecturers improve their ICT skills in information sharing in FCE, Obudu?

4. To what extent do Science lecturers' ICT skills in knowledge sharing improve their research outcomes in FCE, Obudu?

5. What are the major factors that enhance Science Education lecturers' ICT skills and knowledge sharing in FCE, Obudu?

Review of Related Literature

Knowledge sharing has been defined as the action of individuals in making knowledge available to others within the organization (Ipe, 2023). Similarly, Bartol and Srivastava (2022) viewed knowledge sharing as the sharing of organizationally relevant information, ideas, suggestions, and expertise with one another. Lee (2021), on the other hand, gave a broader definition of knowledge sharing, indicating it as involving activities of transferring or disseminating knowledge from one person, group or organization to another. In summary, all these definitions agree that knowledge sharing is a mechanism to disseminate information and knowledge from one individual, group, or organization to another.

Even though most studies defined knowledge sharing at the individual level as a single dimension construct, there are also those who proposed a two dimensional perspective. For example, Van den Hooff and de Ridder (2014) defined knowledge sharing as the process where individuals mutually exchange their knowledge and jointly create new knowledge. This definition implies that knowledge sharing process consists of 'donating' and 'collecting'. According to the authors (Van den Hooff & de Ridder 2014), knowledge

'donating' means communicating to others what one's personal intellectual capital is, while knowledge 'collecting' means consulting colleagues in order to get them to share their intellectual capital. Similarly, Renzl (2018) defined knowledge sharing as a reciprocal process of knowledge exchange, and thus entails contributing, as well as accumulating knowledge from the mass. Srinivas (2016) saw knowledge sharing as one of the most important pillars of knowledge management. To him, knowledge sharing is the life cycle, which starts with the production of knowledge, organization and culminates in the exchange of knowledge and its use. Knowledge sharing among individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals. The use of the term sharing implies that this process of presenting individual knowledge in a form that can be used by others involves some conscious action on the part of the individual who possesses the knowledge.

To Yi (2019), knowledge sharing exists in four dimensions namely: written contributions, personal interactions, organizational communication, and community interactions. Lichtenthaler and Ernst (2016) believed that knowledge sharing involve daily activities of universities and individuals, who engage in knowledge sharing practices to attain greater insights and understanding about concepts or practical applications and, in so doing, enhance their levels of learning and expertise. To them, knowledge sharing can be considered a valuable means by which academic staff can learn from one another and develop intellectually. Researches have shown that knowledge sharing is carried out through the processes of exposition, analysis, synthesis and reflection among individuals. It leads to enhanced understanding and skills development, promotes the creation of new ideas, and enhances academic performance. A study of knowledge sharing behaviours of academics at a university in Nigeria has shownthat knowledge sharing is crucial for the success of organizations and institutions including universities (Elogie & Asemota, 2013). Elogie and Asemota (2013) found out that attitude, social networks, perceived behaviour control, knowledge self-efficacy and enjoyment in helping others, positively influenced knowledge sharing behaviour.

Enakrire and Uloma (2012) conducted a study on knowledge sharing amongst academics on the influence of tacit knowledge for teaching and learning processes and found the need for faculties and departments to organize staff/lecturers' training programmes to boost lecturers' tacit knowledge. Fullwood *et al.* (2013) in their study found that academics engage in knowledge sharing when carrying out research, and teaching. The study argued that in general, academics had positive attitudes and intentions towards knowledge sharing and they had a high level of expectation of some personal benefits or rewards as an outcome of their knowledge sharing. Among the benefits, as revealed in the study of Fullwood *et al.* (2013) is the benefit of improving and extending their relationships with colleagues, and to offer opportunities for internal promotion and career development in other universities. Furthermore, the study of Cheng *et al.* (2019) found that academics are motivated to share if they perceive the incentives and rewards to benefit them even if there is no immediate reward or pay-off. Mogotsi *et al.* (2021) investigated the relationship between demographic variables (gender, age, organizational tenure and professional tenure) and knowledge sharing behaviour in the context of the public service sector in Botswana. The study concluded that gender, age, and professional tenure were not related to knowledge sharing behaviour, whilst organizational tenure correlated negatively with knowledge sharing behaviour. Their study also concluded that demographic variables such as race, age, gender do not appear to play any significant role in relation to knowledge sharing behaviour.

Researches and most literature show that the way knowledge is shared has a deep impact on its meaning and that knowledge is transmitted explicitly or internalized through a learning process, whether people trust each other, are motivated, or share the same mental models; all these factors determine the mechanisms, and hence the influence, of knowledge sharing. To this end, it is right to assert that knowledge sharing is crucial because it provides a link between the individuals and the organization by moving knowledge that resides with individuals to the organizational level, where it is converted into economic and competitive value for the organization. Osunade *et al.* (2017) studied knowledge sharing amongst academics and found out that technology and human resources are central to knowledge sharing. This is where the ICT and its skills come in. ICT, as part of the technology, is simply an acronym for Information and Communications Technology. It captures the various electro-mechanical devices used in information handling (Nnadozie 2016). ICTs refer to the aggregate of computers and their accessories, telecommunications equipment, multimedia, and all other associated technologies applied in information organization, management and dissemination. However, Goswami (2015) noted the expansive nature of ICT and described it as an overarching and generic term for the various digital technologies used for manipulating information.

Consequently, the field of education has been influenced by ICTs, which have undoubtedly affected teaching, learning, and research (Yusuf 2015) as well as the overall processes of knowledge transfer and receipt. ICTs have the potentials to innovate, accelerate, enrich, and deepen skills, to motivate and engage educators and their students or any other category of persons that engage in knowledge sharing (Yusuf 2005). Jhurree (2015) stated that much has been said and reported about the influence of technology, especially computer-enabled devices in communication practices. These computers and applications of technology became more pervasive in society which led to a concern about the need for computing and ICT skills in everyday life.

Amua-Sekyi and Asare (2016) conducted a survey on the ICT literacy among lectures and found out the possession of Internet accessing skills, word processing skills, email sending skills, presentation skills, databased searching skills, among other skills. According to Amua-Sekyi and Asare (2016), surfing the Internet for information will make the educators' job easy and engender the establishment of connections with global education, word processing skills and ability to communicate through emails give the educators the capability to easily create and produce documents relevant to their teaching requirements, as well as offer high versatility and flexibility, and lecturers can use it to support any kind of directed instruction. The study further revealed that ICT skills is of immense influence to the science educators/lecturers as it enable them to save time in creating or modifying materials to be used in teaching, create documents that are more appealing to students, among other numerous benefits.

On how science educators develop skills to enable them use the ICTs for knowledge sharing, Archibong, Ogbiji and Anijaobi-Idem (2020) study on the ICT competence among academic staff in universities in Cross Rivers State, Nigeria found that 268 (89.3%) of academic staff funded any form of ICT development training they have undertaken, while only 32(10.7%) academic staff have received assistance from the University in ICT–related development training. Furthermore, the study by the authors revealed that majority (53.3%) rated their ICT competence as low which according to the respondents is based on inadequate ICT facilities, excess work load and funding. Recommendations made to include funding of ICT training of academic staff by the university management and making ICT training mandatory for all academic staff. Hepp *et al.* (2014) claimed in their paper that ICTs have been utilized in knowledge sharing ever since their inception, but they have not always been massively present in the process of teaching in most educational institutions in Nigeria. Furthermore, it is crucial to understand that the chunk of the knowledge sharing activities of science educators is teaching. This is means that educating the students is one major means through which science educators share their knowledge. ICT skill is therefore necessary for science educators because higher education students are nowadays the digital natives (Prensky, 2021). The behaviour of these students is different compared to previous generations concerning the ways of learning (Georgas, 2013). Students, as digital natives are characterized by their digital fluency and desire to have everything on their phone or gadgets. They spend a great amount of time online and many are frequently connected in social media.

Lekka and Pange (2015) are of the view that the social media are widely used for communication purposes among the academic community and also for teaching and learning. These media involve certain digital tools, such as Google, Facebook, Messenger, Instagram, YouTube, Edmodo and so on. Most of the science education lecturers in some universities are unfamiliar with some basic ICT tools, like email, Internet, video conferencing, word processing, etc. It is however pivotal to assert that the Internet and other ICT gadgets have influenced the teaching profession in all its dimensions (Nnadozie 2016). Among the areas they have influenced include the way information is stored, retrieved and disseminated. ICT has made it possible that information and knowledge can be packaged, repackaged and transferred to suit the way information is consumed by various people. Creating videos is one of the ways in which science educators through ICT can package information to meet their different ways in which their students consume information and also the information needs of distant students (Palmer, as cited in Gibbs, 2015). Palmer further observes that the availability of Internet connectivity and technological tools like digital camera and smart phone has made Video (streaming) possible. Video streaming has enabled higher education institutions overseas to implement globalization strategy of reaching out to wider students without regional barriers. The author observes that the use of video streaming for knowledge sharing in higher institutions is more cost effective, time effective and sustainable method of teaching and learning.

A survey conducted by Gibbs (2015) on lecturers of research methods in institutions of higher learning in United Kingdom (UK), revealed that video use was common. Among Science education professionals, video offers itself as a way of packaging information to meet the information consumption styles of various students. Some schools do not have them provided for their teachers and some teachers may not be economically buoyant to buy one for themselves. At the tertiary-level of education, Okhiria (as cited in Ajegbelen, 2016) noted that National Universities Commission (NUC) in Nigeria has prescribed that there should be at least one computer to every four students and one PC to every two lecturers below the grade of lecturer I, one PC per senior lecturer and one notebook per reader/ professor. NUC has gone further to establish e-learning platforms fitted with twenty smart boards in twelve Federal universities for the promotion of the use of ICT in teaching and learning. Majority of the Nigerian universities have not achieved this recommended system ratio for their faculties, though some have made giant or notable strides in campus wide area networking and e-learning course deliveries

A number of challenges have been observed to militate against the application of ICT in knowledge sharing. According to Osakwe (2022), acquisition, deployment and management of information technology resources and services for teaching depend on electricity. Studies have shown that poorly maintained equipment and poor network infrastructure are prominent obstacles to the integration of ICT tools in classroom knowledge sharing practices. A number of science educators today have never used computers in their lives and they are

terribly shy when they are confronted with this new technology and the terminology associated with using them. Sentlowitz (as cited in Ajegbelen, 2016) observed that inadequate technology infrastructure, lack or inadequate power supply and unsteady Internet access, lack of training, funds, skilled and experienced lecturers in multimedia creation and knowledge of video creation tools as well as lack of support from curriculum decision makers can create a big huddle in teaching video creation. Ajegbelen (2016) submits that low digital fluency of faculty and inappropriate technological experience are some of the challenges facing adoption of ICT for knowledge sharing. He explains that many science education lecturers in higher institutions do not come from technological background, thus there is always a generational gap between the technological capability of the lecturers and that of their students. Secondly, the lecturers' inadequate technological skill on how to create and use the new technology can be complicated and time consuming. But Brynjolfesson and Mcafee (2014) maintained that if science educators are to provide students with the skills needed to survive in the 'Second Machine Age', then it is imperative they understand the technology at deeper level and its application in knowledge sharing.

Berge and Mulienberg (2021) suggested that technology and pedagogical changes are not the reasons that faculty members are resistant to engage in online instruction; the major problems are associated with changes in faculty role, organizational function, and administrative structure. In contrast, Shelton and Saltsman (2015) underscored the need for faculty to obtain that technological and pedagogical "know-how." The authors concluded that most faculty participants in their study were unprepared for teaching in a virtual environment. The authors divided faculty's reported barriers to teaching online into seven areas: faculty buy-in, policies addressing faculty concerns, faculty selection, faculty compensation, faculty workload, faculty support, and faculty satisfaction. Out of the seven areas, Shelton and Saltman reported that the issues most pressing for faculty were compensation, faculty workload, and faculty selection.

Methodology

The study adopted a descriptive survey research design. The population of the study comprised all the twenty-six (26) science educators (lecturers) and the simple random sampling technique was used to select a sample size of eighteen (18) science educators (lecturers) in the departments of Biology, Chemistry and Physics in the Federal College of Education, Obudu, Cross River State. This consists of eight (8) Biology lecturers (5) chemistry lecturers and five (5) physics lecturers who lecture in the college. The study was carried out in Obudu

Local Government Area of Cross River State. A 4- point Likert scales researcher-made instrument titled:

"Lecturers' ICT Skills and Knowledge Sharing Questionnaires (LICTSKSQ)".

(LICTSKSQ) was used to generate raw data for the study. The researchers personally distributed copies of the questionnaire to the science educators (lecturers) in the College and collected on-the-spot. This strategy accounted for the return of all copies, which gave a response rate of 100%. Data collected were analyzed using descriptive statistics of frequency counts and mean score. A four point Likert scale method involving Strongly

Agree (SA); Agree (A); Disagree (D); and Strongly Disagree (SD), was used to determine the degree of agreement or otherwise in each of the item statements. The criterion mean of 2.5 was used, which indicated the level of agreement or disagreement. In this, any mean score less than 2.5 was considered disagreed, whereas items with mean sores 2.5 and above were considered agreed. Presentation of results was done through the use of frequency tables.

Presentation of Result/Discussion of Findings Research Question one:

To what extent do federal college of education Science Education lecturers' identification of ICT skills influence knowledge sharing in FCE, Obudu?

Table 1: Mean Responses of Science Education lecturers' (Educators') on ICT Skills Possessed (N = 18)

S/No	Item Statement	SA	A	D	SD	Mean	Decision
1	Word processing skills	5	9	3	1	3.00	Agreed
2	Videoconferencing skills	1	5	7	5	2.11	Disagreed
3	Electronic presentation skills	6	6	4	2	2.89	Agreed
4	E-mail management skills	0	18	0	0	3.00	Agreed
5	Web navigation skills	9	7	2	0	3.39	Agreed
6	Social media utilization skills	8	10	0	0	3.44	Agreed
7	Software manipulation and use skills	1	4	7	6	2.00	Disagreed
8	File Management & Windows Explorer Skills	3	12	2	1	2.94	Agreed
9	WebCT or Blackboard Teaching Skills	1	5	8	4	2.17	Disagreed
10	AI application skills	2	8	7	3	3.44	Agreed
	Grand Mean					**2.69**	**Agreed**

Source: ***Researchers' Field Survey, 2024*** **Criterion Mean = 2.50**

Table 1 presents data from responses by the Science educators (lecturers) in FCE, Obudu on the ICT skills they possessed. There are ten (10) item statements covering responses by Science educators on ICT skills possessed by Science educators in FCE, Obudu. Although, ICT skills are not limited to the ten (10) contained in the Table, the ten (10) were considered to be relevant for knowledge sharing. The result reveals a total agreement by majority of the respondents on the possession of numerous ICT skills as the grand mean equals 2.69. This acceptance is as a result of the grand mean score being higher than the criterion mark of 2.5 set for the study. A further breakdown of the result shows that majority of the respondents, agreed on the possession of ICT skills such as: Social media utilization skills (with a of 3.44); web navigation skills (with a of 3.39); email management skills (with a of 3.00); word processing skills (with a of 3.00); file management & windows explorer skills (with a of 2.94); and electronic presentation skills (with a of 2.89) and AI application skills (with a of3.44). Other respondents with mean scores of 2.00, 2.11, and 2.17 disagreed with the possession of software manipulation and use skills, videoconferencing skills, and WebCT or blackboard teaching skills, respectively. The report which indicated the possession of seven (7) out of ten (10) ICT skills investigated by this study, as well as a grand mean above the criterion mean, indicates that Science educators in FCE, Obudu possess reasonable number of ICT skills for knowledge sharing. This result is in agreement with the work of Sekyi and Asare (2016) which revealed the possession of number of skills, such as: Internet accessing skills, word processing skills, email sending skills, presentation skills, and database searching skills, among other skills. However, the absence or low possession of ICT skills such as software manipulation and use skills, videoconference skills, and WebCT or blackboard teaching skills could impede the effective transfer of knowledge through lecturing or software communication.

Research Question Two:
To what extent do Science Education lecturers' ICT skills' sources influence their knowledge sharing in FCE, Obudu?

Table 2: Mean Responses of Science Education lecturers' (Educators) on Sources of ICT Skills (N = 18)

S/No	Item Statement	SA	A	D	SD	Mean	Decision
11	Visiting Internet/cyber cafes	8	6	3	1	3.17	Agreed
12	Through online tutorials	1	2	11	4	2.00	Disagreed
13	Hiring ICT specialists	4	10	4	0	3.00	Agreed
14	Personal reading/research	8	7	3	0	3.28	Agreed
15	From colleagues	3	11	3	1	2.89	Agreed
16	Self-learning and/or everyday practice	4	8	4	2	2.78	Agreed

17	Visiting digital libraries	1	14	1	2	2.78	Agreed				
18	Registering for computer lessons		1	2	10	5	1.94	Disagreed			
19	Attending seminars/conferences		8	7	3	0	3.28	Agreed			
20	Acquiring degrees/certificates in ICT-related courses				1	3	8	6	1.94	Disagreed	
	Grand Mean								**2.71**	**Agreed**	

Source: ***Researchers' Field Survey, 2024*** **Criterion Mean = 2.50**

Table 2 presents data from responses by the Science educators in FCE, Obudu on sources of ICT skills. The Table is made up of ten (10) item statements showing perceived sources of ICT skills and covering responses by Science educators on their sources of ICT skills. The result indicates a total agreement by majority of the respondents on sources of ICT. This agreement is based on the fact that the study scored a grand mean above the criterion mean which is 2.71. A further analysis of data per item statement shows that the majority of the respondents that constitutes mean scores and standard deviation of 3.28, 3.28, 3.17, 3.00, 2.89, 2.78, and 2.78 agreed with the acquisition of ICT skills through personal reading/research, attending seminars/conferences, visiting Internet/cyber cafes, hiring ICT specialists, from colleagues, visiting digital libraries, and self-learning and/or everyday practice, respectively. Furthermore, majority of the Science educators in FCE, Obudu disagreed with sources such as: registering for computer lessons (with a of 1.94), acquiring degrees/certificates in ICT-related courses (with a of 1.94), and through online tutorials (with a of 2.00).

It could be seen from the result of this present study that Science educators in FCE, Obudu put in much personal efforts in the quest to acquire ICT skills. These personal efforts range but not limited to personal reading/research, attending seminars and conferences to hiring ICT specialists, among other numerous personal efforts. This finding agrees with the work of Archibong *et al.* (2020) which found that 268(89.3%) of academic staff funded any form of ICT development training they have undertaken, while only 32(10.7%) academic staff have received assistance from the College in ICT–related development training. This is because majority of the sources of ICT skills acquisition by Science educators are personally motivated.

Research Question Three:

To what extent do methods/patterns employed by Science Education lecturers (Educators) improve their ICT skills in information sharing in FCE, Obudu?

Table 3: Mean Responses of Science Education lecturers' (Educators) on Methods/ Patterns Adopted for Knowledge Sharing (N = 18)

S/No	Item Statement	SA	A	D	SD	Mean	Decision
21	Sending e-mails and private messages	1	17	0	0	3.06	Agreed
22	Use of goggle form	5	7	4	2	3.41	Agreed
23	Use of audio/video clips and recordings	3	4	5	6	2.22	Disagreed
24	Through lectures	8	10	0	0	3.44	Agreed
25	Use of meetings and other gatherings	7	11	0	0	3.39	Agreed
26	Use of radio/television programmes	2	5	9	2	2.39	Disagreed
27	Personal interactions	6	12	0	0	3.33	Agreed
28	Video/audio conferencing	2	3	11	2	2.28	Disagreed

29	Use of Facebook timeline messages and other social media platforms	6	12	0	0	3.33	Agreed
30	Delivering/presenting papers at conferences	5	13	0	0	3.28	Agreed
	Grand Mean					**2.97**	**Agreed**

Source: ***Researchers' Field Survey, 2024*** **Criterion Mean = 2.50**

Table 3 presents data from responses by Science educators in FCE, Obudu on the methods/patterns adopted by them for knowledge sharing. There are ten (10) item statements covering responses by Science educators on methods/patterns adopted for knowledge sharing. The result reveals a total agreement by majority of the respondents on the adoption of different and numerous methods/patterns for knowledge sharing with a grand mean () of 2.97. This agreement is as a result of the grand mean score being higher than the criterion mean of 2.5 set for the study. A further breakdown of the result shows that the respondents agreed with the methods/patterns such as: through lectures (with a of 3.44); use of meetings and other gatherings (with a of 3.39); personal interactions (with a of 3.33); use of Facebook timeline messages and other social media platforms (with a of 3.33); delivering/presenting papers at conferences (with a of 3.28); and sending e-mails and private messages (with a of 3.06) and use of goggle form (with a of 3.41). However, other respondents disagreed with methods/patterns such as: use of audio/video clips and recordings (with a of 2.22); video/audio conferencing (with a of 2.28); and use of radio/television programmes (with a of 2.39) .

Consequently, the acceptance of seven (7) out of nine (10) methods being investigated, is a strong indication that the methods/patterns adopted by Science educators for knowledge sharing is not only limited to one pattern. The acceptance of methods/patterns such as use of Facebook timeline messages and other social media platforms, use of e-mails and private messages, among other method/patterns shows the adoption of ICTenabled platforms for knowledge sharing by Science educator in FCE, Obudu. Similarly, the rejection of methods/patterns involving the use of radio/television programmes, audio/video clips and recordings and video/audio conferencing could be attributed to the absence or low possession of videoconferencing skills as presented in item statement 2 in Table 1. This is a strong indication that knowledge sharing skills has something to do with method/patterns adopted for knowledge sharing by Science educators in FCE, Obudu. This is in tandem with the study of Fullwood *et al.* (2013) which revealed that academics engage in knowledge sharing when carrying out research, and teaching. The study argued that in general academics had positive attitudes and intentions towards knowledge sharing and they had a high level of expectation of some personal benefits or rewards as an outcome of their knowledge sharing.

Research Question Four:

To what extent do Science Education lecturers' ICT skills in knowledge sharing improve their research outcomes in FCE, Obudu?

Table 4: Mean Responses of Science Education Lecturers (lecturers) on Influence of Science Educators' ICT Skills on their Knowledge Sharing Practices (N = 18)

S/No	Item Statement	SA	A	D	SD	Mean	Decision
31	Guides against misunderstanding/misinterpretation	9	9	0	0	3.50	Agreed
32	Saving of time	5	13	0	0	3.28	Agreed
33	Promotes proper understanding of knowledge shared	9	9	0	0	3.50	Agreed
34	Reduces stress	9	9	0	0	3.50	Agreed
35	Saving of energy	9	9	0	0	3.50	Agreed

36	Improve attention and understanding	6	12	0	0	3.20	Agreed
37	Ensures effective utilization of knowledge	9	9	0	0	3.50	Agreed
38	Access to wider population	10	8	0	0	3.56	Agreed
39	Makes for easy referral of knowledge passed/shared	4	14	0	0	3.22	Agreed
40	Brings about efficiency in communication	14	4	0	0	3.78	Agreed
	Grand Mean					**3.48**	**Agreed**

Source: ***Researchers' Field Survey, 2024*** **Criterion Mean = 2.50**

Table 4 above presents data from responses by Science educators in FCE, Obudu on the influence Science educators' ICT skills on their knowledge sharing practices. The study reveals the presence of ten (10) item statements bothering on the perceived effects of ICT skills of individuals on their knowledge sharing practices. Result gotten from the study on this reveals a total agreement by majority of the respondents on the effects of ICT skills on knowledge sharing practices with a grand mean of 3.48. This agreement is as a result of the grand mean score being higher than the criterion mean of 2.50 set for the study. A further breakdown of the result shows that the respondents agreed with the effects such as: brings about efficiency in communication (with a of 3.78); access to wider population (with a of 3.56); saves energy (with a of 3.50); promotes proper understanding of knowledge shared (with a of 3.50); reduces stress (with a of 3.50); ensures effective utilization of knowledge (with a of 3.50) and improve attention and understanding (with a of 3.20); guides against misunderstanding/misinterpretation (with a of 3.50); saves time (with a of 3.28); and makes for easy referral of knowledge passed/shared (with a of 3.28).

Consequently, the agreement of all the item statements in Table 4 as well as the scoring of 3.48 as grand mean is a strong indication that Science educator's ICT skills play a great significant and positive role in their knowledge sharing practices. These effects which range from efficiency in communication to easy referral of knowledge passed/shared are very vital in ensuring smooth and effective knowledge sharing among LIS educators. The finding agrees with the report of Sekyi and Asare (2016), which revealed that ICT skills are of immense influence to the Science educators/lecturers as it enables them to save time in creating or modifying materials to be used in teaching, create documents that are more appealing to students, among other numerous benefits.

Research Question Five: What are the major factors that enhance Science Education lecturers' (educators') ICT skills and knowledge sharing in FCE, Obudu?

Table 5: Mean Responses of Science Educators on Factors Influencing Acquisition of ICT Skills for Knowledge Sharing (N = 18)

S/No	Item Statement	SA	A	D	SD	Mean	Decision
41	High cost of most ICT gadgets	4	10	4	0	3.00	Agreed
42	Atmospheric and weather conditions hinder effectiveness of some ICTs	9	9	0	0	3.50	Agreed
43	High cost of acquiring ICT skills	9	9	0	0	2.50	Agreed
44	In adequate ICT skills	4	10	4	0	3.00	Agreed
45	Inadequate time to engage in ICT trainings	4	10	4	0	3.00	Agreed
46	Issue of ICT-knowledge at the receiving end being insufficient	9	9	0	0	3.50	Agreed
47	The issue of technological obsolescence	9	4	5	0	3.22	Agreed
48	Most of the ICTs require much technical-know-how	5	13	0	0	3.28	Agreed
49	Absence of quality ICT training programmes	4	14	0	0	3.22	Agreed
50	Inadequate ICT skills on the side of the educators	9	9	0	0	3.50	Agreed
	Grand Mean					**3.19**	**Agreed**

Source: ***Researchers' Field Survey, 2024*** **Criterion Mean = 2.50**

Table 5 presents data from responses by Science educators in FCE, Obudu on factors influencing use of CT for knowledge sharing. There are ten (10) item statements covering responses on the factors influencing the use of ICT for knowledge sharing. The result reveals a total agreement response by majority of the respondents on the factors that influences use of ICT in knowledge sharing. This agreement response was as a result of the study having a grand mean score of 3.19, which is above the criterion mean set for the study. Responses to specific item statements indicate agreement with all the item statements by majority of the respondents as each of the item statements obtained mean scores above the criterion mean of 2.50. These factors, and their mean scores and standard deviation include: inadequate ICT skills on the side of the educators (with a of 3.50); issues of ICT knowledge at the receiving end being insufficient (with a of 3.50); atmospheric and weather conditions hinder effectiveness of some ICTs (with a of 3.50); most of the ICTs require much technical-know-how (with a of 3.28); the issue of technological obsolescence (with a of 3.22); absence of quality ICT training programmes (with a of 3.22); inadequate time to engage in ICT trainings (with a of 3.00); high cost of most ICT gadgets (with a of 3.00); and high cost of acquiring ICT skills (with a of 2.50) and inadequate ICT skills (with a of 3.00).

It could be deduced from the responses and findings of the study that availability and functionality of ICT gadgets (see item statements 39, 44, and 45), the atmosphere/environment of ICT application (see item statement 46) as well as the receivers of this knowledge (see item statement 43), greatly influence the acquisition of ICT skills for knowledge sharing by Science educators. These educators seem to be discouraged in their quest for ICT skills when considering the high cost of acquiring the training, high cost of the ICT gadgets, the state of the environment where these gadgets could be deployed for use, and the knowledge and reception of the users of this knowledge if ICTs where used for the transmission of knowledge. The findings of these factors, among other factors agree with the work of Sentlowitz (2019), which revealed that inadequate technology infrastructure, lack or inadequate power supply and unsteady internet access, lack of training, funds, skilled and experienced lecturers, as factors inhibiting acquisition of ICT skills for knowledge sharing.

Summary and Conclusion

From the findings of this study, it was concluded that ICT skills play a critical role in Science knowledge sharing practices. The study has shown the different sources of ICT skills of Science educators. Most of these sources are personally motivated and self-funded. However, the highly used method or pattern adopted for knowledge sharing by Science education lecturers (educators) include lectures and presentation of papers at conferences and seminars, among other patterns. If these educators possess low ICT skills, it invariably shows that their knowledge sharing practices will not be effective. This study however concludes that ICT skills of the lecturers are essential for knowledge sharing practices in the 21st century. Although these educators are faced with numerous challenges in an attempt to acquire ICT skills, adequate measures should be taken to overcome these challenges faced by the Science educators.

Recommendations:

Based on the findings of this study, the researchers made the following recommendations:

1. ICT facilities should be provided and its functionality ensured so as to improve science educator's access to it within the College of education.
2. On the other hand, College management should see it as a necessity and intensify efforts to fund the ICT training of Science educators.
3. Furthermore, provision should be made for continuous retraining of Science educators on ICT since development in technology is dynamic and the educators need to keep abreast with current trends.
4. College management should make training in ICT mandatory for all Science educators as this will propel the uninterested or unwilling ones to undertake the training.

5. ICT facilities should be provided and its functionality ensured so as to improve academic staff access to it within the campuses. It is suggested that LIS educators should have a rethink towards ICT training and skills acquisition and make time to improve their competences irrespective of their workload.

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