Sokoine University of Agriculture

MSc Dissertation

Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania

Zungu Remmy Makundi

May 2024

UTILIZATION OF ICT FACILITIES IN TEACHING AND LEARNING OF AGRICULTURAL SCIENCES AT SOKOINE UNIVERSITY OF AGRICULTURE, TANZANIA

Dissertation to be submitted to Sokoine University of Agriculture in fulfilment of the requirements for Master's Degree in Agricultural Extension

By

Zungu Remmy Makundi

Supervisors

Prof. Deogratias F. Rutatora
Dr. Joshua S. Kidudu

Department of Agricultural Extension and Community Development
College of Agriculture
Sokoine University of Agriculture, Morogoro, Tanzania

May 2024

EXTENDED ABSTRACT

This study examined utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania. The primary objective of this study was to assess the extent to which ICT facilities are utilized by members of academic staff in teaching and learning of agricultural sciences at Sokoine University of Agriculture. Specifically, the study inquired about the types of ICT facilities available at SUA for teaching and learning of agricultural sciences. The study also determined the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at the University. Moreover, the study described the factors that influence the use of ICT facilities in teaching and learning of agricultural sciences and lastly, the study inquired about the challenges that deter instructors from effective use of ICT facilities during teaching and learning of agricultural sciences. To achieve these objectives, a descriptive survey design incorporating a mixed approach of both quantitative and qualitative methods was employed. Data were collected using questionnaires, interview schedule and focus group discussion. The population of the study comprised of 65 instructors from the College of Agriculture (CoA), four Heads of Department and the Head of ICT services at the University. Both instructors and key informants were selected purposively and a list of instructors with a minimum of ten or more years in teaching from the CoA was used as a sampling frame. Subsequently, the collected data were entered into a computer, underwent cleaning, and were then subjected to analysis. The Statistical Package for Social Science (SPSS) version 20 computer software was used to analyze quantitative data and qualitative data were analyzed through content analysis. Binary logistic regression was used determine factors influencing instructors' use of ICT facilities in teaching and learning of agricultural sciences at the University. Other variables were analysed by using descriptive statistics. Firstly, the study findings revealed that, most of the ICT facilities were available at the university but were inadequate to

accommodate the number of instructors present at the respective departments in the CoA. The findings also revealed that, the extent of utilization was moderate with some of the ICT facilities being over utilized while others were underutilized. Additionally, the study findings revealed that institutional factors (e.g., availability and accessibility of ICT facilities, and technical support) and personal factors (e.g., instructor positive attitude, sex, age and teaching experience) play a significant role in influencing ICT utilization at the university. Finally, the study findings disclosed that inadequacy of ICT facilities and infrastructure, slow internet connectivity, unreliable power supply, lack of in-service training, problems of handling large classes, inadequacy of ICT manpower/ technical support, and lack administrative support as challenges that deter instructors from utilizing ICTs in teaching and learning process. The current study confirms with the Technology Acceptance Model (TAM) developed by Davis in 1978, as a framework to explain and predict how people adopt and use technology, particularly ICT. The study concluded that, although ICTs are very crucial in promoting teaching and learning of agricultural sciences at the University, the extent of utilization is still moderate due to various challenges such as shortage of ICT facilities and infrastructure at departmental level, unreliable power supply at the University, lack of in-service training, problems of handling large classes and inadequacy of skilled ICT manpower. Therefore, the university in keeping with its current strategic plan and ICT policy should develop a sound long term strategy that seeks to address these challenges while seeing to it that, it's properly financed and executed. In the short term the university should carry out holistic capacity needs assessment with the intent of addressing capacity gaps at individual, organizational and systemic levels while bringing to light the numbers and type of ICT facilities required; offer professional development programs/trainings that focus on enhancing instructors' technological proficiency; and guarantee that alternative sources of power such as generators and solar panels are installed across different departments to ensure reliable power supply at the university.

IKISIRI KUU

Utafiti huu ulichunguza matumizi ya vifaa vya TEHAMA katika ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu cha Sokoine cha Kilimo, Tanzania. Madhumuni ya kimsingi ya utafiti huu ni kutathmini ni kwa kiasi gani vifaa vya TEHAMA vinatumiwa na wafanyakazi wa taaluma katika ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu cha Sokoine cha Kilimo. Hasa, utafiti uliuliza kuhusu aina za vifaa vya TEHAMA vinavyopatikana SUA kwa ajili ya kufundishia na kujifunzia sayansi ya kilimo. Utafiti huo pia ulibainisha kiwango cha matumizi ya vifaa vya TEHAMA katika ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu. Aidha, utafiti huo ulieleza sababu zinazoathiri matumizi ya vifaa vya TEHAMA katika kufundishia na kujifunzia sayansi ya kilimo na mwisho, utafiti uliuliza changamoto zinazowakabili wakufunzi kutumia ipasavyo vifaa vya TEHAMA wakati wa ufundishaji na ujifunzaji wa sayansi ya kilimo. Ili kufikia malengo haya, muundo wa uchunguzi wa maelezo unaojumuisha mbinu mchanganyiko wa mbinu za upimaji na ubora ulitumika. Taarifa zilikusanywa kwa kutumia hojaji, ratiba ya usaili na majadiliano ya vikundi. Idadi ya watu katika utafiti huo ilijumuisha wakufunzi 65 kutoka Chuo cha Kilimo (CoA), Wakuu wa Idara wanne na Mkuu wa huduma za TEHAMA katika Chuo Kikuu. Wakufunzi na watoa habari wakuu walichaguliwa kimakusudi na orodha ya wakufunzi walio na angalau miaka kumi au zaidi katika ufundishaji kutoka katika Idara ya kilimo ilitumika kama sampuli za sampuli. Baadaye, taarifa iliyokusanywa iliingizwa kwenye kompyuta, ikasafishwa, na kisha ikafanyiwa uchambuzi. Programu ya kompyuta ya Kifurushi cha Takwimu kwa Sayansi ya Jamii (SPSS) toleo la 20 ilitumiwa kuchanganua data ya kiasi na data ya ubora ilichanganuliwa kupitia uchanganuzi wa maudhui. Urejeshaji wa uratibu wa njia mbili ulitumiwa kuamua mambo yanayoathiri wakufunzi kutumia vifaa vya TEHAMA katika ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu. Vigezo vingine vilichanganuliwa kwa kutumia takwimu za maelezo. Kwanza, matokeo ya utafiti yalibaini kuwa, vifaa vingi vya TEHAMA

vilipatikana chuoni lakini havitoshelezi idadi ya wakufunzi waliopo katika idara husika. Matokeo hayo pia yalibaini kuwa, kiwango cha matumizi kilikuwa cha wastani huku baadhi ya vifaa vya TEHAMA vikitumika kupita kiasi huku vingine vikitumika kwa kiwango cha chini. Aidha, matokeo ya utafiti yalibaini kuwa mambo ya kitaasisi kama vile upatikanaji na ufikiaji wa vifaa vya TEHAMA, na usaidizi wa kiufundi pamoja na mambo binafsi kama vile mtazamo chanya wa mwalimu, jinsia, umri na uzoefu wa kufundisha vina mchango mkubwa katika kushawishi matumizi ya TEHAMA katika kufundishia yasansi ya Kilimo chuoni. Hatimaye, matokeo ya utafiti yalibaini kuwa upungufu wa vifaa na miundombinu ya TEHAMA, kasi ya uunganisho wa intaneti, usambazaji wa umeme usioaminika, ukosefu wa mafunzo ya kazini, matatizo ya kushughulikia madarasa makubwa, upungufu wa wafanyakazi wa TEHAMA/msaada wa kiufundi, na ukosefu wa usaidizi wa kiutawala kama changamoto zinazowakabili na kuzuia wakufunzi kutumia TEHAMA katika mchakato wa ufundishaji na ujifunzaji. Utafiti wa sasa unathibitisha na Muundo wa Kukubalika kwa Teknolojia (TAM) uliotengenezwa na Davis mwaka wa 1978, kama mfumo wa kueleza na kutabiri jinsi watu wanavyotumia na kutumia teknolojia, hasa TEHAMA. Utafiti ulihitimisha kuwa, ingawa TEHAMA ni muhimu sana katika kukuza ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu, kiwango cha matumizi bado ni cha wastani kutokana na sababu mbalimbali kama vile uhaba wa vifaa vya TEHAMA na miundombinu katika ngazi ya idara, usambazaji wa umeme usio na uhakika, ukosefu wa mafunzo ya kazini, matatizo ya kushughulikia madarasa makubwa na upungufu wa wafanyakazi wa TEHAMA. Hivyo basi, uongozi wa chuo kwa kuzingatia mpango mkakati wake wa sasa na sera ya TEHAMA inapaswa kuunda mkakati mzuri wa muda mrefu ambao unatafuta kushughulikia changamoto hizi huku ikihakikisha kwamba, inafadhiliwa na kutekelezwa ipasavyo. Kwa muda mfupi chuo kinapaswa kufanya tathmini kamili ya mahitaji ya uwezo kwa nia ya kushughulikia mapungufu ya uwezo katika viwango vya mtu binafsi, shirika na kimfumo huku ikitoa idadi na aina ya vifaa vya TEHAMA vinavyohitajika; kutoa programu/mafunzo ya maendeleo

ya kitaaluma ambayo yanalenga katika kuimarisha ustadi wa kiteknolojia mpya wa waalimu; na kuhakikisha kwamba vyanzo mbadala vya nishati kama vile jenereta na paneli za miale ya jua vimewekwa katika idara mbalimbali ili kuhakikisha ugavi wa umeme unaotegemewa katika chuo kikuu.

DECLARATION

I **Zungu Remmy Makundi** do hereby declare to the senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____ _____

Zungu Remmy Makundi Date
(MSc Candidate)

The above declaration is confirmed by;

_____ _____

Prof Deogratias F. Rutatora Date
(Supervisor)

_____ _____

Dr Joshua S. Kidudu Date
(Co-supervisor)

LIST OF MANUSCRIPTS FOR PUBLICATIONS

Publications in Peer-reviewed Journals

1. Availability and Utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania
2. Factors Influencing Utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania

COPYRIGHT

ACKNOWLEDGEMENTS

I unquestionably cannot claim that the end product of this dissertation was only the result of my own efforts. I would like to express my deepest gratitude to all those who have supported me throughout the journey of completing this dissertation.

Firstly, I delightedly extend my heartfelt gratitude to God who made me alive, encouraged and realize the necessity of carrying out this study and hence end up with great success in the process of preparing this dissertation. Also, I am highly indebted to extend my sincere thanks to my supervisors **Prof. Deogratias F. Rutatora** and **Dr. Joshua S. Kidudu** for their supervision, tireless heart of reading, editing, giving constructive advices and suggestions to my work. Without them this dissertation would not be like the way it is. Moreover, I would like to thank my family and friends/colleagues for their constant encouragement and understanding during this challenging period. Their emotional support has been a source of strength, and I am truly blessed to have such a wonderful network of people in my life. Furthermore, I want to acknowledge the research participants who generously contributed their time and insights to this study. Without their cooperation, this research would not have been possible. Lastly, I would like to say that this dissertation is a reflection of the collective efforts of all those who have played a role in shaping my academic journey. Thank you for being an integral part of this significant milestone in my life. God bless you all.

DEDICATION

This dissertation is dedicated to my beloved parents Mr. Remmy Emmanuel Makundi and Mrs. Winfrida Samdala Kavishe together with my brother Giftdan Remmy Makundi and my sister Consolatha Kavishe for their support throughout my study period.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ICT	Information and communication technology
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
SUALISA	Sokoine University of Agriculture Laboratory for Interdisciplinary Statistical Analysis
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
URT	United Republic of Tanzania
UTLIP	University Teaching and Learning Improvement Programme

CHAPTER ONE

1.0 GENERAL INTRODUCTION

1.1 Background Information

Information and communication technology (ICT) has increasingly become an integral part of today's educational system throughout the world (Akuegwu *et al.,* 2011). This is mainly because information and communication technologies are at the heart of any educational system. ICT utilization has the potential to support many educational functions, such as teaching and learning, research and scholarship and management and administration. These technologies enhance the sharing of information; increase collaboration among students, academicians and administrators; enhance provision of distance education; and have resulted in new forms of pedagogy (SUA, 2014; 2022; Nweze, 2018; Onu and Ezhim, 2019).

Apagu and Wakili (2015) defined ICT as electronic or computerized devices, assisted by human and interactive materials that can be used for a wide range of teaching and learning as well as for personal use. ICT includes computer hardware and software, the network and several other devices (video, audio and photography camera) that convert information (text), images, sound, and motion into common digital form (Akuegwu *et al.,* 2011). ICT has a wider spectrum of applications with enormous relevance to universities' teaching and learning activities particularly in teaching of agricultural sciences. These facilities are now utilized in various educational aspects for enriching the quality of teaching and learning especially in the discipline of agricultural sciences. According to Yushau and Nannim (2020); Onu and Ezhim (2019), the availability and utilization of these facilities in higher learning institutions have proven to enhance teaching and learning, enabled self-paced learning, motivate and actively engage students, facilitate acquisition of in-depth knowledge and work-based competences in the learning environment as well as removing the time and space barriers for learning.

Given the importance of ICT in teaching and learning, most countries in the world have developed strategies to ensure ICT facilities are integrated in their educational system. For instance, in Malaysia, the National IT Council (NITC) was formed to ensure the integration of ICT into Malaysia education system and to reform the education and training system through lifelong learning via multiple ICT related media (Hoque *et al.,* 2012). Similarly, in Turkey through a Computer-Aided Education (CAE) Project computers were first introduced to Turkish educational institutions particularly in universities and colleges between 1984 and 1986 with the aim of improving the quality of education through utilizing ICT facilities (Noyi, 2013).

In Africa, despite the challenges that most of the African countries face in the process of teaching and learning, including teaching large classes, unavailability ICT facilities, inadequacies of teaching and learning environment, inadequate support system, and rapid changes in information and communication technology (ICT) (Nwike and Catherine, 2013); Governments of various African countries have relentlessly looked for strategies for addressing the above challenges while seeing to it that ICT facilities are adopted and put to full use in the teaching and learning environments. For example, in Nigeria, the Federal Government of Nigeria developed an ICT policy in 2001. This policy led to the establishment of the National Information Technology Development Agency (NITDA) with the aim of ensuring that ICT facilities are readily available and integrated into the education and training system (Ajayi, 2002; Yushau and Nannim, 2020).

The Government of the United Republic of Tanzania has, over the years, recognized the importance of promoting and supporting the use of ICT facilities in teaching and learning processes in its schools and universities like SUA and University of Dar es Salaam (UDSM) (URT, 2018). Given the importance of ICT facilities in teaching and learning processes, the Government of the United Republic of

Tanzania formulated a National ICT policy in 2003 and revised it in 2016 in keeping with the Tanzania Development Vision 2025. One of the policy statements of NICTP of 2016 was to ensure effective use of ICT in teaching and learning throughout the formal and non-formal education system (URT, 2016). The government has also facilitated the use of ICT in teaching and learning in universities, in line with the Higher Education Development Programme (SUACSP, 2021).

SUA is one of the public universities in Tanzania that has been offering agricultural science courses since 1965 when it was first established as an agricultural college offering diploma courses. In early 1980s, the University experienced an alarming rate of failures and repeaters hence, decided to launch a programme known as "University Teaching, Learning and Improvement Programme" (UTLIP) with the goal of trying to search for alternative forms of instruction which would provide students/learners and members of academic staff/instructors with more opportunities for interpersonal interactions and exchange of ideas. SUA also formulated an ICT Policy and guidelines in 2002 and later reviewed in 2014 to guide the identification, promotion and appropriate utilization of ICT at SUA by ensuring that ICT applications are integrated into the planning and implementation of university functions including teaching and learning. The policy is currently being reviewed with the aim of improving the quality of teaching, learning, research and outreach at the University using modern approaches enabled by ICT. This Policy aligns with the Corporate Strategic Plan (2021/22 – 2025/26), which advocates for the use of ICT to increase efficiency, cost effectiveness and competitiveness in teaching and learning process (SUA, 2021). On the other hand, a number of the UTLIP workshops conducted since 1986 to-date have revealed that too much emphasis is placed on teaching/lecturing and too little emphasis on learning (SUAUTLIP, 1986; 2005; 2017; 2020). Hence, in the final analysis learning is something that happens to the learner.

In realizing so, stakeholders at one of the UTLIP workshops unanimously agreed that it was an opportune time to look for strategies which can be used to improve teaching and learning within the present system by ensuring effective utilization of ICT facilities. Accordingly, the University administration responded positively by putting in place policies and strategies for redressing the situation (SUACSP, 2016; 2021; SUA, UTLIP, 2017; 2020; SUA, 2014).

Notwithstanding efforts made by the University and its partners to promote use of ICT in teaching and learning, subsequent UTLIP workshops have revealed that a number of academic members of staff have clung to their traditional practice of minimal or lack of ICT use (SUA-UTLIP 2020; 2017).This study, therefore, attempted to examine the degree of utilization of the available ICT facilities in teaching and learning of agricultural sciences at SUA.

1.2 General Problem Statement

SUA, since the time it was inaugurated in 1984, has been working hard to improve the teaching and learning environment by, among other things, emphasizing the use of various ICT facilities like e-resources, multimedia, projectors, print and the internet (SUACSP, 2016; 2021). Despite efforts made by the University in ensuring ICT facilities are available for teaching and learning, the extent of utilization is uncertain and the factors responsible are not clear or have not been established. Hence, this study strived to assess the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture.

1.3 Study Justification

This study intended to assess the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at SUA. The study would help the university administration, academics and other educational stakeholders to know the types of ICT facilities available at the university; the extent to which ICT facilities are used during

teaching and learning processes; and the factors that influence their utilization. The findings of this study would shed light on what needs to be done to encourage more members of academic staff to make use of ICT in teaching and learning for purposes of improving student performance and achievement; and overall student competencies. Additionally, this exploratory study would demonstrate areas for further research that other academics or researchers may be interested in.

1.4 Objectives

1.4.1 Overall objective

The overall objective of this study was to assess the extent to which ICT facilities are utilized by members of academic staff in teaching and learning of agricultural sciences at Sokoine University of Agriculture.

1.4.2 Specific objectives

The specific objectives of this study were to:

i. Identify the types of ICT facilities available at SUA for teaching and learning of agricultural sciences;
ii. Determine the extent of utilization of ICT facilities in teaching and learning of agricultural sciences;
iii. Describe the factors that influence the use of ICT facilities in teaching and learning of agricultural sciences; and
iv. Determine the challenges that deter instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences.

1.5 Research Questions

1. What ICT facilities are available for teaching and learning of agricultural sciences at Sokoine University of Agriculture?
2. What is the extent of utilization of ICT facilities in teaching and learning of agricultural sciences?

3. What are the factors that influence or encourage the use of ICT facilities in teaching and learning process?
4. What are the challenges facing instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences?

1.6 Operational Definition of key Terms

1.6.1 Utilization

Refers to the actual usage of the instructional facilities, equipment and supplies by the instructors in teaching and learning process

1.6.2 ICT facilities

Blurton (1999) defines ICT as a "diverse set of technologies, tools, and resources used to communicate, create, disseminate, store, and manage information." ICT comprises old and new tools/technologies ranging from radio, TV and chalk or green board, to new ones such as electronic or computerized devices, internet and wireless technology. ICT exists in multiple forms like audio, video, audio-visual, and texts.

1.6.3 Teaching

Is the process of engaging students in learning or active construction of knowledge. It requires the instructor not only knowledge of subject matter, but also knowledge of how students learn and how to transform them into active learners. It's the ability to make a positive impact on a student's life and academic career, including the capacity to teach important skill sets, introduce new concepts and manage any classroom concerns.

1.6.4 Learning

Learning is the process of acquiring knowledge, skills, values, competence or virtue. It is often described as a relatively permanent change in behavior resulting from insight, practice or experience (Rutatora in UTLIP, 2008).

1.6.5 Agricultural science

Is a broad multidisciplinary field of biology that encompasses the natural, economic and social science disciplines that are used in the practice and understanding of the agricultural industry (including crops, livestock, forestry and bee keeping).

1.7 Limitation of the Study

One of the limitations of this study was that, the study concentrated only on instructors from the College of Agriculture (CoA) with ten or more years of teaching at the University. Therefore, it was segregative in nature. Thus, the study findings were based on instructors with ten or more years of teaching at the University. This means that the study never focused on CoA faculty with less than ten years of teaching as well as other instructors from colleges outside agriculture some of whom happen to teach courses in the CoA. This limitation could affect the extent to which the results could be generalized. Another limitation was the existence of apathy and neglect. Some respondents declined from filling the instrument while a few failed to return the instrument.

1.8 Summary of the Theme of Each Chapter

This section presents the summary of main theme of each chapter. The first chapter presents the general introduction of the study. Chapter two presents the first paper which is about availability and utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania. Chapter three presents the second paper which is about factors influencing utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania. Chapter four presents general discussion and chapter five presents the general conclusion and recommendations of the study.

References

Akuegwu, B. A., Ntukidem, E. P., Ntukidem, P. J., & Jaja, G. (2011). Information and Communications Technology (ICT) Facilities' Utilization for Quality Instructional Service Delivery among University Lecturers in Nigeria. *Review of Higher education in Africa* 3(1), ISSN 1916-7881

Bukoye, R.O. (2019). Utilization of Instruction Materials as Tools for Effective Academic Performance of Students: Implications for Counseling. *In Multidisciplinary Digital Publishing Institute Proceedings* 2(21).

Chirwa, M. (2018). Access and use of internet in teaching and learning at two selected teachers' colleges in Tanzania. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 14(2): 4-16.

Dahiru, D. A., Akinpade, B. O., & Aluko, O. O. (2021). Assessment of the Availability and Usage of Instructional Facilities for Effective Teaching and Learning of Agricultural Science in Nigerian Air Force Secondary Schools. *International Journal of Research and Scientific Innovation (IJRSI)* 8(2), ISSN 2321–2705

Dungeri, R. (2019).Availability and Utilization of instructional materials for teaching and learning of Agricultural science. in Kwande local Government area of Benue state Nigeria

Enakrire, R. T. & Ocholla, D. N. (2017). Information and communication technologies for knowledge management in academic libraries in Nigeria and South Africa. *South African Journal of Information Management* 19(1): 1-9.

Hoque, K. E., Abdul-Razak, A. Z., & Zohora, M. F. (2012). ICT Utilization among School Teachers and Principals in Malaysia. *International Journal of Academic Research in Progressive Education and Development* 1(4): 2226-6348

Jiriko, R. K., Olorunaiye, E. S., Nwafulugo, F., & Omengala, A. (2015). Availability and utilization of instructional materials for the teaching of agricultural science in secondary

schools in Kaduna South and Chikun Local Government Areas of Kaduna State. *Journal of Educational Research and Reviews* 3(1): 6-11, ISSN: 2384-7301

Noyi, S. (2013). Applicability of information and communication technologies in enriching curriculum implementation in selected teachers colleges in Tanzania. A Dissertation Submitted in Partial Fulfillment of the Requirements for Award of the Degree of Master of Science in Development Policy (MSc-DP) of Mzumbe University

Nweze, A. C. (2018). Utilization of ICT facilities for quality teaching and learning in the 21st century: An overview of public secondary schools in Rivers State. *African Journal of Educational Research and Development (AJERD)*, 11(2)

Nwike, C. M. & Catherine, O. (2013). Effects of use of instructional materials on students' cognitive achievement in science. *Journal of Educational and Social Research* 3(5): 103-107.

Olatunde-Aiyedun, T. G., Olamoyegun, S. O., & Ogunode, N. J. (2022). Assessment of Science Resources in Higher Education. *Central Asian Journal of Theoretical and Applied Sciences* 3(7): ISSN: 2660-5317

Onu, F. M. & Ezhim, I. A. (2019). Utilization of ICT Facilities for Enhancing Instructional Delivery of Agricultural Science in Nigerian Secondary Schools. Library Philosophy and Practice (e-journal). 2646. https://digitalco mmons.unl.e du/libphilprac/2646

Soetan, A. K., Olanrewaju, O. O., Onojah, A. O., Abdulrahman, M. R., & Onojah, A. A. (2021). Assessment of instructional resources for teaching agricultural science in secondary schools in Oyo State. *The Online Journal of Distance Education and e-Learning* 9(3).

SUA, (2014). Information and Communication Technology Policy (2nd Ed). Approved by SUA 133rd Meeting of the Council

SUACSP, (2016). Sokoine University of Agriculture five years Corporate Strategic Plan 2021/22 – 2025/26

SUACSP, (2021). Sokoine University of Agriculture Five years Corporate Strategic Plan 2016 – 2021.

SUAUTLIP, (2008). The University teaching learning Improvement programme training course report. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau

SUAUTLIP, (2013). The third session of the university teaching learning Improvement programme training course. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau

SUAUTLIP, (2017). The University teaching learning Improvement programme training course report. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau

Suleiman, M. M., Yahya, A. T., & Tukur, M. (2020). Effective utilization of ICT tools in higher education. *Journal of Xidian University,* 2(5): 1001-2400

URT, (2018). Education Sector Development Plan (2016/17 – 2020/21) Review Report for Mainland. United Republic of Tanzania, Dar es Salaam, Tanzania.

Yushau, B., & Nannim, F. A. (2020). Investigation into the Utilization of ICT Facilities for Teaching Purposes among University Lecturers: Influence of Gender, Age, Qualification and Years of Teaching Experience. *Pedagogical Research* 5(2): 2468-4929

Zhao, Y. & Cziko, G. A. (2001). Teacher adoption of technology: A perceptual control theory perspective. *Journal of Technology and Teacher Education*, 9(1), 5-30.

CHAPTER TWO

PAPER ONE

East African Journal of Education and Social Sciences
EAJESS November –December 2023, Vol. 4, No. 6, pp. 68-79
ISSN: 2714-2132 (Online), 2714-2183 (Print). Published by G-Card
DOI: https://doi.org/10.46606/eajess2023v04i06.0335.

Availability and Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania

***Zungu R. Makundi**
ORCiD: https://orcid.org/0009-0008-3074-7291
Department of Agricultural Extension and Community Development,
Sokoine University of Agriculture, Tanzania
Email: zungumakundi@gmail.com

Prof. Deogratias F. Rutatora
ORCiD: https://orcid.org/0009-0007-9406-3684
Department of Agricultural Extension and Community Development,
Sokoine University of Agriculture, Tanzania
Email: rutatora@sua.ac.tz

Dr. Joshua S. Kidudu
ORCiD: https://orcid.org/0000-0002-3653-1749
Department of Agricultural Extension and Community Development,
Sokoine University of Agriculture, Tanzania
Email: kidudu@sua.ac.tz
***Corresponding Author:** zungumakundi@gmail.com

Status: The materials contained in this chapter have been published in
East African Journal of Education and Social Sciences (EAJESS)

Abstract
This study examined the availability and utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture (SUA). The study adopted a descriptive survey design and the population of the study comprised of 65 instructors from the College of Agriculture (CoA), four Heads of Department and the Head of ICT services at the university. A list of instructors with a minimum of ten or more years in teaching from the CoA was used to develop a sampling frame and all research respondents were purposively selected. The interview schedule and questionnaire with a reliability of 0.89 were employed as means of data collection. Quantitative data was analyzed descriptively while qualitative data were analyzed based on themes. The study revealed that most of the ICT facilities were available at the university but were inadequate to accommodate the number of instructors present at the respective departments. The study further revealed that the extent of utilization was moderate with some of the ICT facilities being over utilized while others were underutilized. Based on the findings of the study, it is recommended that the university administration should improve the ICT infrastructure at the departmental level, offer professional development programs that focus on enhancing instructors' technological proficiency and advocate for sufficient resource allocation at both the university and departmental levels to meet the growing demand of ICT use by instructors and students.
Keywords: Availability; utilization; ICT facilities; teaching and learning; instruction; agricultural sciences.

How to Cite: Makundi, Z. R., Rutatora, D. F. and Kidudu, J. S. (2023). Availability and Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania**.** East African Journal of Education and Social Sciences 4(6), 67-78.Doi: https://doi.org/10.46606/eajess2023v04i6.0335.

2.0 INTRODUCTION

In an increased globalized world, advancement of Information and Communication Technology (ICT) has brought significant changes within the global education system. This development has given rise to a lot of investment in various kinds of ICT facilities for teaching and learning (Yushau & Nanim, 2020). The presence and utilization of these facilities in universities has proven to be useful and influential by improving quality teaching and learning (Suleiman *et al.,* 2020) and enhanced instructional delivery (Nweze, 2018; Apagu and Wakili, 2015), removing time and space barriers for learning (Yushau and Nanim, 2020; Onu and Ezhim, 2019) and supporting collaboration and communication between students and their instructors. Furthermore, studies have shown that use of ICT offers powerful learning environments and transforms the teaching and learning process so that students can deal with knowledge in an active, self-directed and constructive ways (Agbo, 2015).

According to Chirwa (2018b), ICT as a diverse set of technologies, tools and resources is used to communicate, create, disseminate, store and manage information. ICT comprises old and new tools/ technologies ranging from radio, TV and chalk or green board, to new facilities such as electronic or computerized devices and internet and wireless technology which exist in multiple forms like audio, video, audio-visual and texts (Olatunde-Aiyedun *et al.,* 2022). ICT can also be defined as electronic or computerized devices, assisted by human and interactive materials that can be used for a wide range of teaching and learning (Apagu & Wakili, 2015). ICT in education therefore, involves the adoption and utilization of contemporary technological facilities to enhance information flow within the educational system.

ICTs are now being used in various education systems for enriching the quality of teaching and learning. As the rate of ICT utilization increases, the

transformation introduced by ICTs in the education process continue to broaden. This sustains the motivation and knowledge of both academics and students in higher learning institutions, fostering their commitment to integrate ICT facilities in teaching and learning process (Suleiman *et al.,* 2020). According to Hamilton-Ekeke and Mbachu (2015) and Toyo (2017), the introduction of ICTs into universities has changed the way education is conducted and has paved the way for a new pedagogical approach, where students are expected to play more active role than before. Students are now getting more involved in the learning process by being active participants in knowledge creation and not mere recipients of knowledge.

Agricultural sciences remain a critical component for national economies and the teaching and learning of agricultural science courses in universities and colleges is essential in preparing future generations to tackle agricultural challenges (Onu & Ezhim, 2019). In recent years, there has been an increasing focus on integration of ICT facilities in teaching and learning of agricultural sciences to enhance the quality of education and to prepare students for the emerging demands of the agricultural industry. Given the importance of ICT in teaching and learning, most countries have developed strategies to ensure that ICT facilities are available and are integrated in educational systems. In Nigeria, for instance, the Federal Government developed an ICT policy in 2001. This policy led to the establishment of the National Information Technology Development Agency (NITDA) with the aim of ensuring that ICT facilities are readily available and are integrated in education (Yushau & Nannim, 2020). Similarly, in Rwanda, the government has been working hard to ensure the utilization of ICTs in education institutions through engagement of pre-service and in-service training of instructors (Noyi, 2013).

In Tanzania, the Government has, over the years, recognized the importance of promoting and supporting the use of ICT facilities in teaching and learning processes (URT, 2018). The Government recognizes that effective use of teaching and learning facilities is essential to enhance students' performance and achievement. Given the importance of ICT facilities in teaching and learning processes, the Government formulated a National ICT policy (NICTP) in 2003 and revised it in 2016 in keeping with the Tanzania Development Vision 2025. One of the policy statements of the NICTP was to ensure effective use of ICT in teaching and learning throughout the formal and non-formal education system (URT, 2016). The government has also facilitated the use of ICT in teaching and learning in universities, in line with the Higher Education Development Program (SUACSP, 2021). Furthermore, on 2023 Workers' day, the President of the United Republic of Tanzania Hon. Dr. Samia Suluhu Hassan, while addressing the workers proposed that the government should reform the E-learning program by having teachers/instructors educated on how to use ICT facilities effectively.

SUA is one of public universities in Tanzania that has been offering agricultural sciences courses since 1965. In the early 1980s, the university faced a high rate of dropouts and repeaters, leading to the launch of the University Teaching, Learning and Improvement Program (UTLIP) which aimed to establish alternative forms of instruction that would enable more interpersonal interactions and exchange of ideas between students and instructors. In 2012, SUA adopted Moodle as the free and open-source software for learning management system, but only for ICT courses. In 2002, the University further formulated an ICT policy to promote appropriate utilization of ICT in teaching and learning. This policy was reviewed in 2014 and 2022 to align with the University's Corporate Strategic

Plan and to improve the quality of teaching, learning, research and outreach using modern ICT facilities (SUA, 2014; SUACSP, 2016, 2021). Despite efforts made, UTLIP workshops conducted since 1986 revealed that too much emphasis is placed on teaching/lecturing and too little emphasis on learning (SUA-UTLIP, 2013; 2017).

It is clear that if ICTs are used effectively to enhance teaching and learning in higher education institutions, they can be a useful tool, especially for enhancing the quality of instruction (Chirwa, 2018a). The incorporation of ICT in teaching and learning has the potential to revolutionize education by making it more engaging, interactive and effective. The teaching of agricultural sciences, in particular, has been greatly impacted by the integration of ICT facilities, as it provides students with access to a wide range of resources and tools to enhance their learning experience (Yushau & Nanim, 2020; Onu & Ezhim, 2019). A lot of efforts have been made by SUA to ensure ICT facilities are available and are properly utilized by members of academic staff to ensure effective teaching and learning at the university (SUA-UTLIP, 2013; 2017). Despite a number of initiatives made and evident benefits of ICT in teaching and learning of agriculture sciences, the actual utilization of these facilities is still uncertain, particularly during the teaching and learning processes. In principle, there is no readily accessible information about the availability and utilization of ICT facilities at the University, particularly for educational/ academic purposes.

On the other hand, several studies on availability and utilization of ICTs in higher education institutions have found that ICT facilities are limited in most of education institutions (Onu & Ezhim, 2019; Fidelis & Onyango, 2021). Other studies proclaim that ICT facilities are available but they are not properly utilized by members of academic staff during teaching and learning processes (Kiboss & Kosewe, 2017; Okorieocha *et al.,* 2019).

As such, there is a need for increased investment in ICT facilities to ensure their availability. Accordingly, it was argued that there is also a need for instructor training to enhance the utilization of ICT facilities so as to improve the quality of education in agricultural sciences and prepare students for emerging demands in the agricultural industry. This study, therefore, attempted to establish the availability and extent of utilization of ICT facilities by members of academic staff in teaching and learning of agricultural sciences at Sokoine University of Agriculture.

2.1 LITERATURE REVIEW

This section presents the review of relevant literature pertaining to availability and utilization of ICT facilities in the teaching of agricultural sciences.

2.1.1 Types of ICT Instructional Facilities for use in Teaching and Learning of Agricultural Sciences

There are various types of ICT facilities that can be used in the teaching-learning processes in higher education institutions. Several studies have identified various ICT facilities which are now being integrated in teaching and learning processes. For instance, Toyo (2017) designed a study to investigate the ICT adoption on the educational growth at colleges of education in Nigeria. The study revealed that majority of the ICT facilities were the internet, television, photocopying machines, computers, flash drives, printers, intercom, scanners and CD-ROMs. Similarly, a study done by Nweze (2018) on utilization of ICT for quality teaching and learning in the 21st century outlined multimedia, e-learning, personal computer, projectors and television as ICT facilities available for teaching and learning processes.

In Tanzania, Ngalawa *et al*., (2012) conducted a study on the use of ICT tools in Higher Learning Institutions in Tanzania. The study revealed that desktop computers, laptops, computer laboratories, internet facilities, email platforms and projectors were

available in the surveyed universities. This implies that majority of universities surveyed had ICT tools, which are essential for teaching and learning processes. Similarly, Mwanga *et al*., (2022) conducted a study on extensiveness of utilization of computers for improving teaching and learning in teacher colleges in Kilimanjaro Region. The study found that teacher colleges had computers, computer laboratories and computer software as ICT facilities used for teaching and learning process.

2.1.2 Extent of Utilization of ICT facilities in Teaching and Learning of Agricultural Sciences

Utilization of ICT facilities has always been accompanied with mixed reactions on the part of the users across various educational institutions. While some studies indicate the extent of utilization of ICTs to be high, other studies proclaim it to be low. For example, Yushau and Nannim's (2020) study about utilization of ICT facilities for teaching purposes among university lecturers in Nigerian universities. The study revealed that educators had the knowledge of using ICT facilities in teaching; however, they rarely used the facilities in teaching and learning processes. This study is similar to the one done by Olatunde-Aiyedun, *et al.* (2022) which revealed that science resources especially ICT facilities were not effectively utilized by academic staff in universities due to low level of ICT literacy among the instructors.

Rahman (2016) investigated the use of ICTs in the teaching of agricultural education at in the University of Gezira, Sudan. The study revealed that the majority of instructors utilized ICT facilities irregularly. This phenomenon was attributed to lack of ICT facilities in majority of the classrooms, which made instructors to rely on traditional methods of teaching including the use of black/green boards. Furthermore, Hamilton-Ekeke and Mbachu (2015) conducted a study on the place of ICT in teaching and learning in Nigerian tertiary institutions. The

study revealed that basic ICT facilities like computers, printers and internet connection were not available. On the other hand, Noyi (2013) conducted a study on applicability of ICTs in enriching curriculum implementation in selected teachers' colleges in Tanzania. The study revealed that instructors in the surveyed colleges utilized the ICT facilities in teaching and learning process to a greater extent. This was attributed to the availability of these facilities in the surveyed colleges and the willingness of instructors to use the ICT facilities in teaching and learning processes.

2.1.3 Theoretical Framework

This study adopted the Technology Acceptance Model (TAM) introduced by Davis (1989) as a framework to explain and predict how people adopt and use technology, particularly ICT. TAM is widely recognized and frequently applied in studies related to user acceptance and usage of ICT. TAM replaces certain attitude measures from the Theory of Reasoned Action (TRA) with two key factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which users believe that a specific technology or ICT system will enhance their job performance and efficiency. Perceived ease of use, on the other hand, refers to users' perception of the effortlessness associated with utilizing the technology. Both perceived usefulness and perceived ease of use are influenced by external factors, including individual differences (such as age, sex, teaching experience, education level and technology self-efficacy) and facilitating conditions (such as the availability and accessibility of ICT facilities, preparation time and administrative support).

The TAM suggests that instructors' use of ICT in teaching may be predicted by their perceived ease of use and perceived usefulness. Instructors' perceived ease of use (e.g. instructors readiness, confidence, positive attitude toward the technology) and perceived usefulness (e.g.

increased attention by the students as well as students becoming more engaged in learning) may be influenced by their individual differences (age, sex, teaching experience, education level, technology self-efficacy), facilitating conditions i.e. availability and accessibility of ICT facilities like computers, projectors, internet access etc., time to prepare necessary materials, administrative support like regular trainings and provision of funds. Both perceived use and perceived ease of use influence the actual use/utilization of the ICT facilities. These variables are demonstrated on the framework below

2.2 Methodology

This study employed a mixed - method research approach. The mixed approach involves the collection and analysis of both qualitative and quantitative data within a single study. The researchers used this approach to obtain both quantifiable and non-quantifiable information associated with the problem under investigation.

2.2.1 Research Design

The study adopted a descriptive survey research design. According to Nworgu (2006), descriptive survey research design is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. The descriptive survey method was used as the appropriate design for this study because the study was directed towards instructors, their opinions, attitude and behaviors toward using ICTs in the teaching and learning of agricultural sciences.

2.2.2 Population and Sampling

This study was conducted at SUA, one of the key public universities in Tanzania. SUA is located in Morogoro Municipality. The University is best known in the country for offering various degree programs in agricultural and allied sciences since its establishment as a College in 1965. The University has five campuses in different regions and seven academic units

(SUACSP, 2021). This study was conducted in the College of Agriculture (CoA) at the Edward Moringe Campus, involving four departments: Department of Agricultural Extension and Community Development, Department of Crop Science and Horticulture, Department of Soil Science and Geological Sciences and Department of Animal, Aquaculture and Range Sciences.

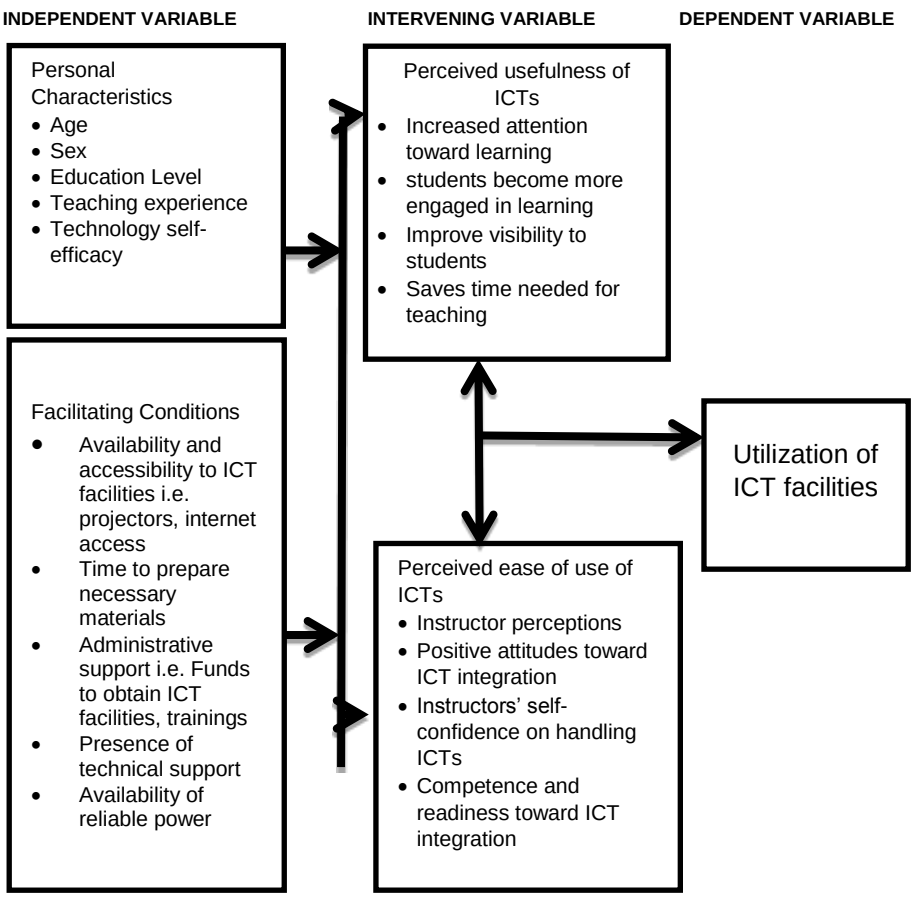


Figure 2.1: Theoretical Framework (Adapted from Venkatesh and Davis (2000)

The population of the study comprised 65 instructors from the College of Agriculture with a minimum of ten years of teaching experience at the university, four Heads of Department and a Head of ICT services at the university from randomly selected departments. A select number of students was only involved for corroboration of the findings. Purposive sampling was used to select the research participants to participate in the study.

2.2.3 Research Instruments

The instruments involved in this study were questionnaire, interview schedule and focus group discussion guide (FGD). Data from instructors were collected using self-administered semi structured questionnaires. A total of 65 questionnaire sheets were administered to agricultural science instructors with 53 questionnaires recovered and used for the analysis. This indicates that the response rate was 81.54%. Data from the Heads of Department and the Head of ICT services were collected using the semi structured interview schedule. The FGD guide was developed to guide the researchers in following up the questions on the availability and utilization of ICT facilities at the university. The FGD guide was developed to find out from the group of 10 students from the four randomly selected departments regarding what ICT facilities were available at the University and how often the instructors utilized the ICT facilities in delivering their respective courses.

2.2.4 Validity and Reliability

The instruments were given to experts from SUALISA to critically examine the face and content validity. The experts were given a copy of the instrument and asked to comment on its contents and recast statements that appeared to be incorrect. The comments and suggestions from the experts were incorporated into the final instrument. To establish the reliability of instrument, several copies of the questionnaire were administered to agricultural science instructors from the Department of Human Nutrition

and Consumer Studies for pre-testing. Cronbach's Alpha statistical technique was used to determine the internal consistency of the instrument, and it yielded the coefficient of 0.89. This indicated that the instrument was reliable and capable of yielding the desired results for the study.

2.2.5 Statistical Treatment of Data

Quantitative data were analyzed through descriptive statistics. Since the questionnaires were prepared having five-point Likert scale range from Very High Extent (=5) to Very Low Extent (=1), mean and standard deviation were used to determine the average of responses. Within the five-point ranges, three trisecting scores were used to make the analysis clear as suggested by Creswell and Creswell (2018); these scores were 2.49, 3.49 and 4.49. Thus, the extent of instructors' use of ICTs in teaching and learning of agricultural sciences were analyzed based on the responses of the respondents. The Remark was reached upon the mean value, whereby a mean value from ≤1.49 were to a Very Low Extent, 1.5 to 2.49 were Low Extent, from 2.5 to 3.49 were Moderate, from 3.50 to 4.49 were High Extent and from 4.50 to 5.00 were Very High Extent. Qualitative data were analyzed using content analysis. Constant comparison analysis was applied where by words were systematically reduced to codes inductively, and then themes were developed from the codes.

2.3 Results and Discussion

This section presents findings and the discussion of the findings by the use of literature.

2.3.1 Demographic Information of Participants

Study findings in Table 2.1 present details about the participants' demographic characteristics. The table shows the frequency and percentage of participants in different categories, including sex, age, teaching experience and academic rank. In regard to sex, the majority of respondents (67.9%) were males. The table

also shows that 41.5% of the participants fell within the 40-49 age range. With regard to teaching experience, a bigger portion of respondents (45.3%) had been teaching at the university for 10-15 years. In terms of academic rank, a bigger portion of respondents (41.5%) were lecturers.

Table 2.1: Demographic Information of participants

Category	**Item**	**Frequency**	**Percent %**
Sex of Respondents	Male	36	67.9
	Female	17	32.1
	Total	**53**	**100.0**
Age of Respondents	30-39	10	18.9
	40-49	22	41.5
	50 and above	21	39.6
	Total	**53**	**100.0**
Teaching Experience(years)	10-15	24	45.3
	15-20	11	20.8
	20-25	6	11.3
	More than 25	12	22.6
	Total	**53**	**100.0**
Academic Rank	Assistant Lecturer	6	11.3
	Lecturer	22	41.5
	Senior Lecturer	11	20.8
	Associate Professor	5	9.4
	Professor	9	17.0
	Total	**53**	**100.0**

2.3.2 Research question 1: What ICT facilities are available for the teaching and learning of agricultural sciences at SUA?

This research question sought to establish the availability of ICT facilities for the teaching and learning of the agricultural sciences at SUA.

Table 2.2: Availability of ICT Facilities for Teaching and Learning of Agricultural Sciences

S/N	ICT Facilities	Available		Not Available	
		Frequency	Percent %	Frequency	Percent %
1	Desktop Computer	35	66.0	18	34.0
2	Laptops	25	47.2	28	52.8
3	Projectors (Overhead, LCD)	52	98.1	1	1.9
4	Print materials (handouts, text books, posters, brochures)	51	96.2	2	3.8
5	Boards (whiteboard, green boards and blackboard)	50	94.3	3	5.7
6	Department computer laboratory	3	5.7	50	94.3
7	Video conferencing media	4	7.5	49	92.5
8	Internet services (WIFI, cable connection)	50	94.3	3	5.7
9	Printer and photocopy machines	49	92.5	4	7.5
10	Scanner	40	75.5	13	24.5
11	Emailing platforms (Gmail, Yahoo)	52	98.1	1	1.9
12	Zoom and Moodle platforms	27	50.9	26	49.1
13	Microsoft Office (Ms. Word, Ms. PowerPoint, Ms. Excel etc.)	50	94.3	3	5.7
14	Television Sets	17	32.1	36	67.9
15	Public Address System (PAS) (microphones, amplifiers, speakers)	33	62.3	20	37.7

The results in Table 2.2 indicate that the majority of the ICT facilities were available (i.e.>50%) at the university for teaching and learning purposes. The available ICT Facilities include desktops computers (66%), projectors (98.1%), print materials (96.2%), boards (94.3%), internet services (94.3%), printer and photocopy machines (92.5%), scanners (75.5%), emailing platforms (98.1%), Microsoft office software (94.3%) and PAS (62.3%). The findings are in line with TAM as it is seen that the university administration perceived these facilities as useful in teaching and learning process. The findings are also in line with the existing literature on ICT integration in higher education institutions. For instance, studies conducted by Mchalo *et al.* (2021); Noyi (2013) and Mandari (2018) in various educational institutions in Tanzania found that computers, photocopy machines, scanners, printers and Internet facilities were readily available. These findings also align with the findings of Toyo (2017) and Okorieocha *et al.* (2019) who designed studies to investigate ICT adoption on the educational growth of colleges in Nigeria and found that computers, photocopy machines, scanners, printers and Internet facilities were available.

On the other hand, Laptops (47.2%) were found to be slightly available (<50%). However, when instructors were asked about what type of ICT facilities they mostly used in teaching and learning processes, 48 (90.6%) said they used their personal laptops. This indicates that, laptops were available but they are privately owned by instructors and not provided by the university. This demonstrates instructors' readiness to adopt and change to new teaching technologies in order to enhance the teaching and learning process (Omondi & Jain, 2018).

Interviews with key informants shed light on the availability of ICT facilities for the teaching and learning of agricultural sciences at the university. For instance, the interview with one

of the Heads of Department, revealed the following:

> *At Department level, there are computers, printers, photocopy machines and scanners as well as projectors (LCD and OHP) used for teaching undergraduate and master's students. Individual instructors have their own LCD projectors and laptops. Due to the outbreak of COVID-19, the Department adopted teaching using the Zoom platform, especially for post-graduate students. For undergraduate students, few instructors have been using Zoom facility following the large number of students in the respective classrooms. Additionally, there is an e-learning platform at the university known as Moodle, where instructors have been directed to upload their teaching notes so that students can easily access the notes (Head of Department, 12th April 2023).*

Another respondent echoed that:

> *We have desktop computers, projectors, laptops and print materials that are used for teaching and learning purposes. In some Departments we have installed smart boards and, in both Campuses namely, Edward Moringe and Solomon Mahlangu, we have established and equipped computer laboratories; and ensured there are video conferencing centers, internet services both cable connection and Wi-Fi installed; as well as zoom and Moodle platforms and television sets to support e-learning. Additionally, there are*

audio facilities including several microphones, installed PA systems and mobile PA systems (*HOD ICT services, 14thApril 2023*).

Observations made during the study also indicated that desktop computers, laptops, projectors (both LCD and OHP), printers, photocopy machines, scanners and internet facilities were available at the university although their degree of use differs.

On the other hand, when instructors were asked if the available ICT facilities are adequate to accommodate the number of academic staff present at their respective departments, 49 (92.5%) of the instructors responded by saying they are inadequate while only 4(7.5%) instructors said the facilities are adequate. These findings indicate that while ICT facilities were found to be available, they were inadequate to meet the needs and demands of the instructors. This can potentially be due to higher number of instructors in these departments compared to the number of ICT facilities at their disposal. Inadequacies of ICT fascilities in certain departments is mostly due to shortage of funds (Nweze, 2018).

2.3.3 Research question 2: To what extent are the ICT facilities utilized in the teaching and learning of agricultural sciences at SUA?

Table 2.3: Extent of Utilization of ICT Facilities

S/N	ICT Facilities	Mean	Std. Deviation	Remark
1	Desktop computer	1.72	1.265	LE
2	Laptops	4.72	0.822	VHE
3	Projectors (Overhead, LCD)	4.64	0.71	VHE
4	Print materials (handouts, text books posters, brochures)	4.02	0.92	HE
5	Boards (whiteboard, green boards and blackboard)	3.64	1.094	HE
6	Department computer laboratory	1.43	0.951	VLE
7	Video conferencing media	1.28	0.601	VLE
8	Printer and photocopy machines	3.47	1.187	ME
9	Scanner	2.92	1.342	ME
10	Internet Facilities(WIFI, cable connection)	4.34	0.999	HE
11	Emailing platforms (Gmail, Yahoo)	4.08	1.158	HE
12	Zoom and Moodle platforms	2.38	1.18	LE
13	Microsoft Office (Ms. Word, Ms. PowerPoint, Ms. Excel etc.)	4.62	0.765	VHE
14	Television Sets	1.51	1.067	LE
15	Public Address System (PAS) (microphones, amplifiers, speakers)	3.02	1.587	ME
	Grand Mean	**3.182**		

Note: VHE=Very High Extent (5), HE=High Extent (4), ME=Moderate Extent (3), LE= Low Extent (2), VLE= Very Low Extent (1).

Data presented in Table 2.3 shows the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at the university. Looking at the mean scores, laptops (4.7), projectors (4.64) and Microsoft Office (4.62) were the most utilized ICT facilities, with mean scores indicating a very high extent of utilization. Internet facilities (4.34), emailing platforms (4.08), print materials (4.0) and boards (3.64) were also utilized. These results suggest that instructors at the university have embraced the use of ICT in their teaching and learning activities. This aligns with the increasing recognition of the role of ICT in enhancing teaching and learning outcomes in the university (Omondi and Jain, 2018; Onu and Ezhim, 2019).

This is mainly because use of these facilities enhances students learning and understanding, improves visibility to students as well as saving time needed for teaching as indicated on the TAM. The findings are in line with the existing literature on ICT integration in higher education institutions. For instance, a study conducted in Kenyan universities found that laptops were widely used by both students and instructors for various educational activities (Chepkoech & Misigo, 2016). Another study in Tanzanian universities highlighted the increasing use of projectors to enhance classroom presentations and facilitate interactive learning (Mshenga & Kitta, 2018). These findings are also in keeping with the findings of Toyo (2017); Okorieocha *et al.,* (2019) and Noyi (2013) who reported computers, projectors, email platforms and Microsoft office software were highly utilized in various teaching and technical colleges. The reliance on print materials, internet facilities, and emailing platforms is in line with the growing adoption of digital resources and online communication tools in universities (Kayode *et al.,* 2017).

On the other hand, printer and photocopy machines (3.47), scanner (2.92), and PAS facilities (3.02) were moderately

utilized, with mean scores indicating that these facilities are utilized at an average level compared to other ICT facilities. The printer and photocopy machines as well as scanners were moderately utilized since these facilities are mostly fixed in instructors offices as highlighted by Mandari (2018). The moderate utilization of PAS is directly linked to ability/skills on setting these facilities since some instructors face difficulties in fixing them (Kiboss and Kosewe, 2017).

The moderate utilization of PAS facilities was also supported by students during FGD as some of the student-respondents stated that:

While the number of students in our classes is large, some instructors do not always use Public Address System facilities to ensure effective communication or make sure they are heard when they are teaching. This is mostly due to the fact that some of them face difficulties in setting the speakers especially when the technical support is not available (FGD with students on 16th April, 2023).

Accordingly, desktop computers (1.7), Zoom and Moodle platforms (2.38), video conferencing media (1.28), television sets (1.51), and department computer laboratory (1.43) were the least utilized ICT facilities, with mean scores indicating a very low extent of utilization. This is because these facilities are not readily available (Nweze, 2018; Rahman, 2016; Apagu and Wakili, 2015; Cheserek *et al.,* 2019).

The low utilization of desktop computers in teaching and learning process may reflect a shift towards more portable and versatile devices (Chirwa, 2018b; Mchalo et al., 2021). However, observations made by the researcher revealed that desktop computers were fixed in instructor's offices. Zoom and Moodle platforms were also found to be less utilized. This is attributed to lack of familiarity with the technology or low level of ICT literacy among the instructors since zoom and

Moodle platforms are still new teaching technologies (Olatunde-Aiyedun*et al.* 2022; Bao, 2020).

The Overall mean score of 3.182 indicates that the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at the university is moderate. This demonstrates the fact that despite availability of most of the ICT facilities at the University, utilization of these facilities in teaching and learning of agricultural sciences is still moderate with some facilities being highly utilized and others being underutilized.

2.4 Conclusion and Recommendations

2.4.1 Conclusion

Overall, the study reveals that multiple ICT facilities are available for enhancing teaching and learning of agricultural sciences at the university. However, these facilities are inadequate to accommodate the number of academic staff present. As such, instructors do not effectively make use of ICT resources to enhance the teaching and learning processes. The extent of utilization of ICT facilities in the teaching and learning of agricultural sciences was also moderate with some ICT facilities being over utilized and others underutilized. The moderate utilization of ICT facilities suggests a missed opportunity for fully integrating technology into the teaching and learning process.

2.4.2 Recommendations

Based on the major findings of the study the following recommendations are drawn:

A comprehensive capacity needs assessment should be carried out to determine the specific requirements of each department in terms of ICT facilities and capacity or competencies to use them. This assessment should consider factors such as the number of instructors, the nature of courses taught, the desired pedagogical approaches and staff competencies. The findings will inform resource allocation and help prioritize the areas that require immediate attention.

The university administration should see the necessity of addressing the inadequacy of ICT facilities by investing in infrastructure upgrades and expansion. This includes providing new updated laptops to instructors, increasing the number of projectors and providing necessary software and hardware to support instructors' needs.

The university administration through UTLIP workshops should offer professional development programs that focus on enhancing instructors' technological proficiency, pedagogical integration of ICT tools and troubleshooting common technical issues. This will include putting in line a knowledgeable coordinator together with supporting staff to carry out the UTLIP workshops. There is a need to ensure that the university administration recognizes the importance of ICT facilities in the teaching and learning processes. There is also a need to advocate for sufficient resource allocation at both the university and departmental levels to meet the growing demands of instructors and students.

Finally, the University should ensure that there is a dedicated technical support system within each department to assist instructors with any ICT-related challenges. This includes a team of technicians who can provide timely assistance and address technical issues promptly. Regular maintenance and upgrades of ICT infrastructure should also be part of the support system.

References

Agbo, I. S., (2015). Factors Influencing the Use of Information and Communication Technology (ICT) in Teaching and Learning Computer Studies in Ohaukwu Local Government Area of Ebonyi State-Nigeria. Journal of Education and Practice, 6(7), ISSN 2222-1735: 71-86.

Apagu, V.V & Wakili, B.A (2015). Availability and Utilization of ICT Facilities for Teaching and Learning of Vocational and Technical Education in Yobe State

Technical Colleges. American Journal of Engineering Research (AJER).4(2), pp-113-118, e-ISSN : 2320-0847 p-ISSN : 2320-0936

Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. Human Behavior and Emerging Technologies, 2(2), 113-115.https://doi.org/10.1002/hbe2.191.

Chepkoech, R. C., & Misigo, B. E. (2016).Laptop use by faculty in higher education institutions in Kenya. International Journal of Educational Technology in Higher Education, 13(1), 1-17.

Cheserek, W. K., Onyango, R. O., & Nandi, C. K. (2019).Factors influencing adoption and use of ICT in teaching and learning in Public Secondary Schools in Baringo County, Kenya. International Journal of Science and Research, 8(2), 908-916.

Chirwa, M. (2018a). Understanding the role of information and communication technology (ICT) in agricultural education and training: The case of Lilongwe University of Agriculture and Natural Resources (LUANAR), Malawi. Journal of Agriculture and Rural Development in the Tropics and Subtropics, 119(1), 55-68.

Chirwa, M. (2018b).Access and use of internet in teaching and learning at two selected teachers' colleges in Tanzania.International journal of education and development using ICT, 14(2).

Creswell, J. W., and Creswell, J. D. (2018). Research Designs: Qualitative, Quantitative and Mixed Methods Approaches. 5th Edition. Los Angeles: SAGE Publication, Inc.

Fidelis, F., & Onyango, D.O. (2021).Availability of ICT Facilities and Teachers' Competence in the Use of ICT among Public Secondary Schools in Ngara District, Tanzania. East African Journal of Education and Social Sciences (EAJESS) 2(2)34-40

Hamilton-Ekeke and Mbachu (2015).The Place of Information, Communication and Technology (ICT) in Teaching and Learning in Nigerian Tertiary Institutions. American Journal of Educational Research, 3(3), 340-347.

Kayode, F., Mtebe, J. S., and Kissaka, M. M. (2017). Use of technology for teaching and learning in Tanzanian higher education: Evidence from undergraduate students. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 13(2), 18-33.

Kiboss, J. K., and Kosewe, O. N. (2017).Availability and utilization of ICT facilities in teaching and learning of agricultural sciences in Kenyan universities.International Journal of Education and Research, 5(5), 105-118.

Mandari, K.V. (2018).Availability of Information and Communication Technology (ICT) Tools Used for Managing Students' Academic Records in Tanzania: The Case of Secondary Schools in Arusha City Council. International Journal of Science and Research (IJSR), 7(12).ISSN: 2319-7064

Mchalo, H.D., Koda, G., and Mandila, T. (2021).Teachers' Use of Computers in Teaching and Learning in Public Secondary Schools in Arusha City Council, Tanzania. International journal of innovative research & development, 10(11) 37-46; ISSN 2278 – 0211 (Online)

Mshenga, P. M., and Kitta, S. (2018). Use of multimedia technology for teaching and learning in higher learning institutions in Tanzania: A case study of Mzumbe University. Journal of Education and Practice, 9(5), 16-23.

Ngeze, V. L. (2017). ICT Integration in Teaching and Learning in Secondary Schools in Tanzania: Readiness and Way Forward. International Journal of Information and Education Technology, 7(6), 424 -427.

Nworgu, B. G. (2006). *Educational research basic issues and methodology*. Nsukka: University

Noyi, S. (2013).Applicability of Information and Communication Technologies in enriching curriculum implementation in selected teachers colleges in Tanzania.A Dissertation Submitted in Partial Fulfillment of the Requirements for Award of the Degree of Master of Science in Development Policy (MSc-DP) of Mzumbe University.

Nweze, C.A.,(2018).Utilization of ICT facilities for quality teaching and learning in the 21st century: An overview of public secondary schools in Rivers State.African Journal of Educational Research and Development (AJERD), 11(2), 215-229.

Okorieocha, C. N., Okparaeke, G. M. and Nwogu, P. O. (2019). Availability and Utilization of Information and Communication Technology to Enhance Technical Education Programme in Technical Colleges: An Implication for National Development. Rivers State University Journal of Education (RSUJOE), ISSN: 2735-9840, 22 (1&2):84-98.

Olatunde-Aiyedun, T. G., Olamoyegun, S. O., and Ogunode, N. J. (2022). Assessment of Science Resources in Higher Education. Central Asian journal of theoretical and applied sciences.3(7): ISSN: 2660-5317.

Omondi, F. M., and Jain, P. (2018). Adoption of e-learning in Kenya and Tanzania: A comparative analysis. In Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance,582-589.

Onu, F. M., and Ezhim, I. A. (2019).Utilization of ICT facilities for enhancing instructional delivery of Agricultural Science in Nigeria secondary schools. Library Philosophy and Practice (e-journal), 2646.https://digitalcommons.unl.edu/libphilprac/2646.

Rahman, A. M. A., (2016).Use of ICTs in Agricultural Higher Education: A Case Study of the Faculty of Agricultural Sciences, University Of Gezira, Sudan. International Journal of Agricultural Extension, 04 (03),181-184.

SUA, (2014). Information and Communication Technology Policy (2nd Ed). Approved by SUA 133rd Meeting of the Council.

SUACSP, (2016). Sokoine University of Agriculture five years Corporate Strategic Plan 2021/22 – 2025/26.

SUACSP, (2021). Sokoine University of Agriculture Five years Corporate Strategic Plan 2016 – 2021.

SUAUTLIP, (2013).The third session of the university teaching learning Improvement programme training course. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau

SUAUTLIP, (2017).The University teaching learning Improvement programme training course report. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau

Suleiman, M. M., Yahya, A. T., and Tukur, M. (2020). Effective utilization of ICT tools in higher education. Journal of Xidian University, 14(9), 588-594 ISSN:1001-2400. https://doi.org/10.37896/jxu14.9/061.

Toyo, O. D. (2017). Information and Communication Technology (ICT) Adoption and the Educational Growth of Colleges of Education in Agbor and Warri, Delta State, Nigeria Constraints of ICT adoption. International Journal of Education and Evaluation, 3(7), 19-32..

URT (2016). National Information and Communications Technology Policy. Ministry Of Works, Transport and Communication.

United Republic Of Tanzania, Dar es Salaam, Tanzania.

URT (2018). Education Sector Development Plan (2016/17 – 2020/21) Review Report for Mainland.United Republic of Tanzania, Dar es Salaam, Tanzania.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186-204.

Yushau, B., and Nannim, F. A. (2020). Investigation into the Utilization of ICT Facilities for Teaching Purposes among University Lecturers: Influence of Gender, Age, Qualification and Years of Teaching Experience. Pedagogical Research, 5(2), em0054. e-ISSN: 2468-492

CHAPTER THREE

PAPER TWO

Factors Influencing Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania

[1]Makundi, Z. R.*, [1]Rutatora, D. F. and [1]Kidudu S. J.

[1]Department of Agricultural Extension and Community Development, Sokoine University of Agriculture

P.O. Box 3011, Chuo Kikuu, Morogoro, Tanzania
Corresponding author, Email: *zungumakundi@gmail.com

Status: The materials contained in this chapter have been published in International Journal of Research and Innovation in Social Sciences (IJRISS)

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Factors Influencing Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences. (A Case Study of Sokoine University of Agriculture, Tanzania)

[1]Zungu R. Makundi*, [1]Prof. Deogratias F. Rutatora and [1]Dr. Joshua S. Kidudu (PhD)

Department of Agricultural Extension and Community Development, Sokoine University of Agriculture

P.O. Box 3011, Chuo Kikuu, Morogoro, Tanzania

***Corresponding Author**

DOI: https://dx.doi.org/10.47772/IJRISS.2024.802160

Received: 04 February 2024; Accepted: 21 February 2024; Published: 24 March 2024

ABSTRACT

This study investigated the factors influencing utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture (SUA), Tanzania. A descriptive survey design was adopted in this study; and a mixed research approach was employed whereby, a questionnaire with a reliability of 0.83 and interview schedule checklist were used for data collection. Data were collected from the College of Agriculture (CoA) at SUA involving a sample population of 65 instructors, 4 Heads of Department and the Head of ICT services who were all purposively selected. Data were analysed using descriptive statistics, content analysis and binary logistic model. The findings revealed that institutional factors such as the availability and accessibility of ICT facilities, and technical support influence instructors toward using ICTs in teaching and learning processes. The findings also revealed that, personal factors such as instructors' positive attitude, sex, age and teaching experience play significant roles in influencing ICT utilization at the university. The study findings also point out that inadequacy of ICT facilities, slow internet connectivity, unreliable power supply, inadequate ICT infrastructures, lack of in-service training, problems of handling large classes, inadequacy of ICT manpower/ technical support, and lack administrative support i.e. provision of funds as challenges that deter instructors from utilizing ICTs. Among other things, it was recommended that, the university should strive to address the existing challenges by at least ensuring alternative source of power is installed, ensuring regular training of instructors is organized and adequate ICT infrastructures are available at the university.

Key words: ICT facilities, institutional and personal factors, Challenges

INTRODUCTION

Information and communication technology (ICT) has increasingly become an integral part of today's educational system throughout the world (Aidoo, *et al*., 2022). This is mainly because information and communication technologies are at the very heart of any educational system. ICT utilization has the potential to support many educational functions, such as teaching and learning, research and scholarship as well as management and administration (Yashau & Nanim, 2020; Al-Mamary, 2020). These technologies enhance the sharing of information; increase collaboration among students, academicians and administrators; enhance provision of distance education; and have resulted in new forms of pedagogy (SUA, 2014; Makundi *et al*., 2023; Onu & Ezhim, 2019).

The term "Information and communication technologies" (ICTs) refers to a diverse array of technological

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

tools and resources utilized for creation, communication, dissemination, storage, and management of information (Yashau and Nanim, 2020; Apagu and Wakili, 2015; Haliso, 2011). ICTs encompass a wide range of rapidly evolving technologies, including telecommunication technologies such as telephone, television and radio, computer-mediated conferencing, and video conferencing. They also encompass digital technologies like computers, information networks such as the internet, as well as software applications (Olatunde-Aiyedun *et al.*, 2022).

The impact of ICTs in the field of education has been widely recognized. The integration of information and communication technology in education has revolutionized teaching and learning across various disciplines, including agricultural sciences. ICT facilities such as computers, internet connectivity, multimedia tools, and educational software offer numerous opportunities to enhance the delivery of agricultural education (Onu & Ezhim, 2019). The utilization of information and communication technologies in educational settings specifically in the field of agricultural sciences, not only creates a dynamic learning environment but also revolutionizes the learning and teaching process, encouraging students to actively engage with knowledge in a self-directed and constructive manner (Agbo, 2015; Yashau & Nanim, 2020; SUA, 2014).

Recognizing the influence of ICT on both professional environments and everyday life, educational institutions are striving to restructure their curricula and classroom facilities to bridge the existing technology gap in teaching and learning. Due to the disruption caused by the COVID-19 pandemic, numerous education institutions across the globe transitioned to remote instruction delivery and learning, replacing traditional in-person classroom gatherings (Aidoo, *et al.*, 2022). The impact of this disruption appears to have significant consequences for teaching methods, particularly in terms of communication between instructors and students. As a result, there is a need for alternative approaches to teaching and learning, as highlighted by Yashau & Nanim (2020); and Al-Mamary, (2020). These alternative methods necessitated a swift shift towards digitalization and the utilization of available information and communication technology resources in educational institutions including universities (McFarlane, 2019).

Utilization of information and communication technologies holds significant potential as a valuable instrument in expanding educational possibilities and facilitating remote learning (Chirwa, 2018; Aidoo, *et al.*, 2022). For more than two decades, the Governments across the globe have placed significant emphasis on incorporating information and communication technologies into educational institutions through various initiatives. For instance, in Malaysia, the National IT Council (NITC) was formed to ensure the integration of ICT into Malaysia education system and to reform the education and training system through lifelong learning via multiple ICT related media (Al-Mamary, 2020; Hoque *et. al.*, 2012; Aldheleai *et al.*, 2019). In Tanzania, the Government of the United Republic of Tanzania since early 2000's has been introducing various schemes to assist the wider adoption of ICT in every field including education (URT, 2018). In recognizing the importance of ICTs in education institutions like schools, colleges and universities, the government has put up policy frameworks including the National ICT policy of 2003 which was revised in 2016 in keeping with the Tanzania Development Vision 2025. One of the policy statements of NICTP of 2016 was to ensure effective use of ICT in teaching and learning throughout the formal and non-formal education system (URT, 2016).

The Government of the United Republic of Tanzania recognizes that, effective use of teaching and learning facilities including ICT facilities are essential for the purposes of enhancing students' performance and achievement including transfer of learning. Along this initiative, the Government through the Ministry of Education and Vocational Training (MoEVT) in partnership with the Sweden International Development Cooperation Agency (SIDA) also emphasized ICT development and deployment in teacher education colleges (TCs) starting from 2005 onwards. The main goal of this initiative was to improve the quality of pre-service and in-service teacher education by using ICTs (MoEVT 2007; Chirwa, 2018; Mwalongo, 2011 and Swarts & Wachira, 2010). Other policies introduced by the government of Tanzania in favor of ICT are Science Technology and Innovations (STI) Policy of 1996 and the National Research and Development

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Policy of 2010 (Malero *et al.*, 2015).

Sokoine University of Agriculture (SUA) is one of the public universities in Tanzania that has been offering agricultural science courses since 1965 when it was first established as an agricultural college offering diploma courses. In early 1980s, the University experienced an alarming rate of failures and repeaters hence, decided to launch a programme known as "University Teaching, Learning and Improvement Programme" (UTLIP) with the goal of trying to look for alternative forms of instruction which would provide students/learners and members of academic staff/instructors with more opportunities for interpersonal interactions and exchange of ideas (SUACSP, 2016; 2021; SUA, UTLIP, 2013; 2017). Accordingly, SUA formulated an ICT Policy and guidelines in 2002 and later reviewed in 2014 and 2023 to guide the identification, promotion and appropriate utilization of ICT at SUA by ensuring that ICT applications are integrated into the planning and implementation of university functions including teaching and learning. This Policy aligns with the Corporate Strategic Plan (2021/22 – 2025/26), which advocates for the use of ICT to increase efficiency, cost effectiveness and competitiveness in teaching and learning process (SUA, 2021).

It is an established fact that the application of ICTs has significantly altered the way and manner we do things in all aspects of life (Makundi *et al.*, 2023). In the field of education in particular, the use of ICTs has ushered in a new era of educational techniques/approaches, drastically altering traditional methods of information transmission and usage patterns in the field while also providing instructors and students with modern learning opportunities (Wokocha *et al.*, 2018; Al-Mamary, 2020). Numerous efforts have been made to promote ICT integration in higher learning institutions including colleges and universities, one of which is Sida-MoEVT project by the government and UTLIP workshops by the Sokoine University of Agriculture (SUA) (SUACSP, 2016; 2021; Chirwa, 2018; Swarts & Wachira, 2010). Despite efforts made, ICT facilities are not fully utilized and it is unclear what factors deter instructors from using ICT facilities at the university, specifically during teaching and learning process. This paper, therefore, explores factors that influence the utilization of ICT facilities in teaching and learning agricultural sciences at Sokoine University of Agriculture. Specifically, the study intended to;

1. Describe the factors that influence the use of ICT facilities in teaching and learning of agricultural sciences; and
2. Determine the challenges that deter instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences.

Research Questions

The following research questions were raised to guide this study:

1. What are the factors that influence instructors to use of ICT facilities in teaching and learning of agricultural sciences?
2. What are the challenges facing instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences?

Theoretical Framework

Theoretically, many models have been used to explain technology acceptance among individuals specifically in teaching and learning process. However, this study adopted the Technology Acceptance Model (TAM). The Technology Acceptance Model propounded by Davis in 1989 is considered as a useful theoretical framework for this study because of its successes in predicting and explaining how people come to accept and use a given technology or ICT. Venkatesh (2000) asserts that TAM is the most widely applied model of user's acceptance and usage of ICT. TAM is said to replace many of the Theory of Reasoned

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Action (TRA)'s attitude measures with the two technology acceptance measures –ease of use and usefulness. As alluded to earlier, TAM was developed from the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1980). The TAM argues that when users are presented with new technology, a number of motivating factors influence their decisions about how and when they will implement and/or use the technology, primarily perceived usefulness (PU) and perceived ease of use (PEU) (Davis, 1989). The Perceived usefulness refers to the degree to which user believes that using a particular technology or ICT facility would enhance his or her job performance and output efficiency. The perceived ease of use refers to the degree to which user believes that using a particular technology/ICT will be free of effort (Davis, 1989). The perceived ease of use and perceived usefulness are triggered by external variables which can be Individual differences and facilitating conditions. Both perceived use and perceived ease of use influence actual use of the technology by the users.

In application of the TAM to the use of ICT in teaching, the model suggests that instructors' use of ICT in teaching may be predicted by their perceived ease of use and perceived usefulness of ICT facilities. Instructors' perceived ease of use (e.g. confidence, positive attitude toward the technology) and perceived usefulness (e.g. increased attention by the students; students becoming more engaged in learning) of ICT facilities may be influenced by their individual differences (age, sex, teaching experience, education level (rank), technology self-efficacy); facilitating conditions i.e. availability and accessibility of ICT facilities like computers, projectors, internet access etc., time to prepare necessary materials, administrative support like regular trainings, provision of funds. Both perceived use and perceived ease of use influence actual use of the ICT facilities by the instructors in teaching and learning process.

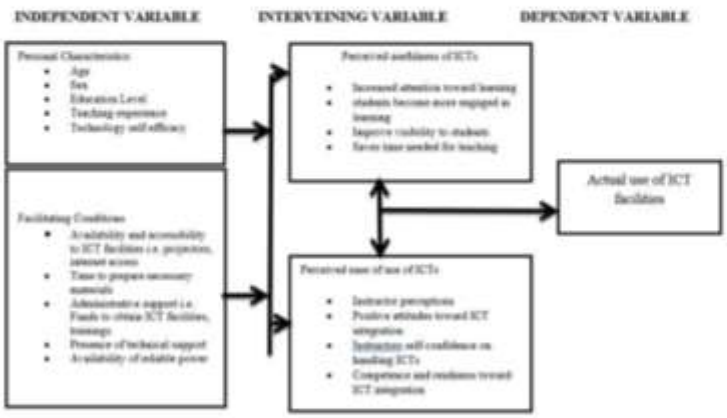


Figure 1: Theoretical Framework (Adapted from Venkatesh and Davis (2000)

METHODOLOGY

This study adopted a descriptive survey research design. The study was conducted at Sokoine University of Agriculture (SUA) located in Morogoro Municipality, Tanzania. The University is best known in the country for offering various degree programmes in agricultural and allied sciences. The University has five campuses in different regions and seven academic units (SUACSP, 2021). This study was conducted at Edward Moringe Campus within the College of Agriculture (CoA) in Morogoro region involving four departments namely; Department of Agricultural Extension and Community Development; Department of

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Crop Science and Horticulture; Department of Soil Science and Geological Sciences; and, Department of Animal, Aquaculture and Range Sciences.

The population of this study comprised of 65 instructors from the College of Agriculture, with a minimum of ten or more years in teaching at the university, the Head of ICT services at the university and 4 heads of department. Both instructors and key informants were purposively selected and a list of instructors with a minimum of ten or more years in teaching from the CoA was used as a sampling frame. The instruments involved in this study were questionnaires, and interview schedule. Data from instructors were collected using self-administered semi structured questionnaires. A total of 65 questionnaires were administered to agricultural science instructors with 53 questionnaires recovered and used for the analysis. This indicates that the response rate was 81.54%. Data from the heads of departments and the head of ICT services were collected using semi structured interview schedule. The instruments were validated by experts from the Sokoine University of Agriculture Laboratory for Interdisciplinary Statistical Analysis (SUALISA). To establish the reliability of instrument, drafts of the questionnaires were purposively given to agricultural science instructors from the department of Human Nutrition and Consumer Studies for pre-testing. Cronbach's Alpha statistical technique was used to determine the internal consistency of the instrument, and it yielded a coefficient of 0.83. This indicated that the instrument was reliable and capable of yielding the desired results for the study.

Qualitative data were analyzed using content analysis. Quantitative data were analysed using Statistical Package for Social Science (version 20) software whereby descriptive statistics such as frequency, percentages, mean and standard deviation were used to make analysis. Since the questionnaire was prepared having five-point Likert scale range from Strongly Agree (=5) to Strongly Disagree (=1), three trisecting scores were used to make the analysis clear as suggested by Creswell and Creswell (2018). These scores were 2.49, 3.49 and 4.49. The remark was reached upon the mean value, whereby a mean value from ≤1.49 was strongly disagree, 1.5 to 2.49 was disagree, from 2.5 to 3.49 was neutral, from 3.50 to 4.49 was agree, and from 4.50 to 5.00 was strongly agree. A binary logistic regression model was used to determine factors influencing utilization of ICT facilities by instructors at the university. The binary logistic model and its interpretation are shown below

$$\log\frac{P}{1-P} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \cdots\cdots\cdots + \beta_n X_n + \varepsilon \quad \text{(i)}$$

Whereby, P is the probability of an instructor always use ICT facilities, P-1 is the probability that an instructor uses ICT facilities otherwise, β_0= Y-intercept, β= Regression coefficient, ε=Error term, $X_1 \ldots X_n$= Independent variables (X_1 =availability of ICTs, X_2 = accessibility of ICTs, X_3 =reliable power, X_4 =time to plan for teaching materials, X_5 =number of students, X_6 =technical support, X_7 = provision of funds, X_8 = instructor attitude, X_9 = Instructors self − confidence, X_{10} = competence and readiness,X_{11} = Instructor's teaching style, X_{12} = Sex, X_{13} =age, X_{14} =teaching experience

Table 1: Description of the variables

Variable	Descriptions
Dependent variable	
Utilization of ICT facilities	1 if an instructor always uses ICTs, 0- otherwise
Independent variables	
Availability of ICT facility	1 if ICTs are available, 0-otherwise
Accessibility of ICT facilities.	1 if ICTs are accessible, 0-otherwise
Availability of reliable power	1 if power is available, 0-otherwise

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Enough time to plan for teaching materials	1 if time is available, 0-otherwise
Large number of students	1 if the number is large, 0-otherwise
Provision of funds	1 if funds are available, 0-otherwise
Technical support	1 if technical support is provided, 0-otherwise
Instructor's attitude	1 if an instructor has positive attitude, 0-otherwise
Instructors' self-confidence	1 if an instructor has self-confidence, 0-otherwise
Competence and readiness	1 if an instructor is competent, 0-otherwise
Instructor's teaching style	1 if an instructor uses student-centred, 0-otherwise
Sex of Respondents	1 if an instructor is male, 0-otherwise
Age of Respondents	1 if an instructor is aged, 0-otherwise
Teaching Experience	1 if an instructor has 10 years of teaching, 0-otherwise

FINDINGS AND DISCUSSION

Demographic Information of participants

Table 2 provides information on the demographic characteristics of participants in a study. In terms of gender, the majority of respondents 67.9% were male and nearly 81% were aged between 40 and50 years. Regarding the teaching experience, majority of the respondents 66% had 10-20 years of teaching at the university. When considering academic rank, majority of the respondents 62% were lecturers (i.e., Ph.D. holders).

Table 2: Demographic Information of participants

Category	Items	Frequency	Percent %
	Male	36	67.9
Sex of Respondents	Female	17	32.1
	30-39	10	18.9
Age of Respondents	40-49	22	41.5
	50 and above	21	39.6
	10-15	24	45.3
	15-20	11	20.8
Teaching Experience(years)	20-25	6	11.3
	More than 25	12	22.6
	Assistant Lecturer	6	11.3
	Lecturer	22	41.5
Academic Rank	Senior Lecturer	11	20.8
	Associate Professor	5	9.4
	Professor	9	17.0
	Total	**53**	**100.0**

Source: Field survey, (2023)

Research Question One: What are the factors that influence instructors to use of ICT facilities in teaching and learning of agricultural sciences?

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

Table 3: Responses on the factors that influence the use of ICT facilities in teaching and learning of agricultural sciences at the university

Variables	B	S.E.	Wald	df	Sig.	Exp (B)
Institutional factors						
Availability of ICT facility	1.327	1.151	1.329	1	0.049**	3.769
Accessibility of ICT facilities.	1.712	1.473	1.351	1	0.014**	5.540
Availability of reliable power	-0.343	0.801	0.183	1	0.669	0.710
Enough time to plan for teaching materials	-1.471	0.841	3.059	1	0.080	0.230
Large number of students	4.785	2.545	3.534	1	0.060	1.197
Provision of funds	-1.327	1.151	1.329	1	0.249	0.265
Technical support	5.026	2.606	3.721	1	0.050**	1.523
Personal factors						
Instructor's attitude	3.624	1.825	3.943	1	0.047**	3.748
Instructor perceptions	2.026	2.524	0.644	1	0.422	7.586
Instructors' self-confidence and knowledge	-5.019	2.757	3.314	1	0.069	0.007
Competence and readiness	2.563	2.465	1.082	1	0.298	1.297
Instructor's teaching style	4.785	2.545	3.534	1	0.060	1.197
Sex	4.551	2.290	3.950	1	0.047**	9.472
Age	-5.325	2.571	4.290	1	0.038**	0.005
Teaching Experience	5.106	1.938	6.940	1	0.008***	1.659
Constant	5.700	11.631	2.869	1	0.021	2.988

Summary of the model fit: Nagelkerke R2=0.739, Cox & Snell R2=0.549, -2 Log likelihood=29.782[8]

Table 3 presents the results of a statistical analysis on the factors influencing instructors toward utilizing ICT facilities. Each variable in the table represents a specific factor, and the associated statistics provide information about the strength and significance of the relationship between each factor and the utilization of ICTs. The factors are categorized into institutional and personal factors. All the factors confirm with the Technology Acceptance Model (TAM) developed by Davis in 1978, as a framework to explain and predict how people adopt and use technology, particularly ICT. Starting with institutional factors, availability of ICTs had a positive coefficient (1.327) and statistically significant (0.049) with the odds ratio of 3.769. This indicates that, an increase in the availability of ICT facilities is associated with a 3.769 times higher likelihood of utilizing ICTs. This implies that, instructors are more likely to utilize ICT facilities if the facilities are readily available. These findings are consistent with the findings of Gikundi (2016) and Al-Mamary (2020) who reported that, availability of ICT facilities significantly influences utilization of ICTs since instructors can only utilize ICT facilities if the ICTs are available. However, these findings are in contrast to the findings of Kiboss and Kosewe, (2017); and Okorieocha et al., (2019) who found that availability of ICT facilities does not guarantee instructors' effective use of ICT.

Accessibility of ICT facilities was also statistically significant (0.014) with a positive coefficient (1.712) and

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

the odds ratio above 1(5.540). This implies that; an increase in the accessibility of ICT facilities is associated with a 5.540 times higher likelihood of utilizing ICTs. Therefore, the more ICTs are accessible to the instructors underpinned by instructors' ability to use these facilities, the more instructors utilize ICTs in teaching and learning process. These findings are consistent with the findings of Al-Mamary (2020) and Buabeng-Andoh (2012) who reported that accessibility of ICT facilities to instructors enhances chances of utilization. Moreover, technical support was found to have a significance of 0.05 and a positive coefficient of 5.026 suggesting that the availability of technical support is associated with a higher likelihood of utilizing ICTs. This indicates that, presence of technical support/ ICT systems personnel/experts influence instructors towards utilizing ICT facilities. The findings are in line with the findings of Al-Mamary (2020); Gikundi (2016); Singh and Muniandi (2012) and Aidoo *et al*., (2022) who reported that if technical support is available and accessible, then the likelihood of utilizing ICT is high.

On the other hand, personal factors such as instructor's positive attitude toward ICTs was found to have a positive coefficient (3.624) and the odds ratio above 1(3.748). This implies that, the instructor's attitude has a positive and significant impact on the utilization of ICTs. This indicates that if an instructor has a positive attitude on a particular ICT facility, then the chances of incorporating such facility in teaching and learning process is higher. The finding is similar to the studies done by Agbo (2015); Alabi (2016) and Scott (2016) who found instructor's positive attitude toward technology influences utilization of various ICTs. In addition to that, the coefficient for instructors' sex was positive (4.551) and statistically significant (0.047) with odds ratio of (9.472) respectively. This connotes that, instructors who are male are more likely to utilize ICTs more than female instructors. This is mainly because, looking at the population of instructors at the university, male instructors had higher population compared to the female instructors. That is, male instructors appeared to utilize ICT facilities more often than female instructors not only because their population at the university being higher compared to that of female instructors but also male instructors had more opportunities for attending UTLIP seminars and courses (SUAUTLIP, 2017). These findings are in line with the findings of Alabi (2016); Mahdi and Al-Dera (2013) and Murphey *et al.* (2012) who reported male instructors were likely to use ICTs than female instructors since male instructors were found to have knowledge and skills to operate various ICTs than female instructors. Similarly, these findings are inconsistence with the findings of Yashau and Nanim (2020) and Olafare *et al*., (2018) that showed that there is no difference in the level of ICT utilization based on the gender of instructors.

Age of respondents was found to have a negative coefficient (-5.325) and statistically significant (0.038) with odds ratio of 0.005. The negative sign indicates that, as one grows in terms of age the likelihood of utilizing ICTs decreases. This means that, instructors who are at youth age are more likely to utilize ICTs in teaching process compared to elderly instructors. This finding is consistent with the findings reported by Alabi (2016) who reported that, as instructors become older in age they could maintain technologies that they are accustomed too many years ago thereby negatively influencing adoption of contemporary ICTs. These findings are also similar to Rogers (2003) who reported that the younger people are technologically-enthusiast individuals; therefore, they are more positively disposed to the use of various ICTs. However, this result is inconsistent with the findings of Yashau and Nanim (2020) who reported that lecturers who are older in age had higher mean ratings on level of utilization of ICT facilities.

Finally, teaching experience had a positive coefficient (5.106) and statistically significant (0.008) with the odds ratio of 1.659 respectively. This indicates that, the more experienced an instructor is the more likely he/she utilizes ICTs. This may be due to the fact that, as an instructor gains experience in teaching the more exposure to different ICT facilities. This is because the more experience an instructor has in teaching, the more he/she has access to various ICT resources/facilities. These findings are consistent with the findings of Olafare *et al*., (2018); Alabi (2016); Yashau and Nanim (2020) who also reported that, ICT resources were more frequently used in the classroom by individuals with more years of teaching experience than by those with fewer years in teaching. However, these results are in contrast with the study of Mahdi and Al-Dera

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

(2013) who reported that, there is no significant difference on ICT use based on years of teaching. The findings are also in contrast with the findings of Tezci, (2009) who reported that instructors with fewer years in teaching utilized ICTs more than those with more years of teaching experience.

Research Question Two: What are the challenges facing instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences?

Table 4: Responses on the challenges that deter instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences. (N=53)

Challenges/Constraints towards ICT utilization	Mean	SD	Remark
Lack of interest/ negative attitude of instructors toward using ICT during classroom instruction delivery	2.09	1.148	D
Insufficient time to master new software or integrate ICT during a classroom instruction delivery	2.75	1.207	N
Lack of instructor's collaboration and instructional support on how to use ICTs, as well as a lack of experience among cooperating instructors	2.83	1.205	N
Lack of specific knowledge and skills about new technologies and how to combine it with the existing instructional content/ knowledge to support student learning	3.13	1.161	N
Lack of in-service training on the use of ICT facilities	3.79	1.246	A
Problems of handling large classes and large number of students to accommodate the existing technologies	3.70	1.449	A
Lack of self-confidence in using ICTs for teaching	1.96	1.224	D
Instructor's resistance to change, hence unable to effectively use ICTs during teaching and learning process	1.98	1.217	D
Inadequacy of ICT facilities and infrastructures projectors, laptops etc. to support the full application of ICT in teaching and learning process	4.36	1.021	A
Slow internet connectivity	4.26	.880	A
Inadequacy of ICT manpower/ technical support at the college	3.75	1.054	A
Unreliable power supply at the University	4.38	.860	A
Most of the available ICT facilities are nonfunctional	3.70	1.219	D
Lack of reward or incentive for using ICT in teaching and learning	1.96	1.224	D
Lack of appropriate administrative support for the effective use of ICT	3.81	.962	A

Note: A-Agree, N-Neutral, D-Disagree Source: Field survey, (2023)

Table 4 indicates responses on the challenges faced by agricultural science instructors towards utilizing ICT facilities in teaching and learning of agricultural sciences at the university. Such constraints include inadequacy of ICT facilities and infrastructures (4.36), slow internet connectivity (4.26), unreliable power supply (4.38), lack of in-service training (3.79), problems of handling large classes (3.70), inadequacy of ICT manpower/ technical support (3.75), and lack administrative support i.e. provision of funds (3.8).

Inadequacy of ICT facilities and infrastructure (Mean=4.36) signifies that there is shortage of necessary ICT facilities and ICT infrastructure at the university. ICT facilities such as desktop computers, laptops, projectors, and other related equipment, are insufficient to meet the demands of agricultural science instructors present at their respective departments in the CoA (Makundi *et al.*, 2023). Similarly, insufficient computer labs, multimedia classrooms, or other necessary infrastructure may impede instructors' ability to

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

incorporate ICT effectively into their teaching practices. This was supported by one of the key informants who revealed that:

"Some of the laptops we are using during teaching and learning sessions are old and outdated since some instructors still use the same laptops that they used years ago when they were undertaking their degree programmes/ studying. These laptops are slow and sometimes may even get stuck on the middle of teaching process hence making teaching and learning difficult. Given this scenario, some instructors have opted for conventional teaching methods like lecture and use of overhead projectors (One of the Head of Department, 14th April 2023)."

These findings are supported by Aldheleai, *et al.,* (2019) who conducted a study on what hinders the use of ICT among academic staff in Yemen's public universities, and Obiri-Yeboah, *et al.,* (2013) at Kwame Nkrumah University, Ghana who revealed that lack of appropriate ICT resources/facilities and infrastructure can be barriers to integration of ICT in teaching and learning.

Slow internet connectivity (Mean=4.26), implies that the internet speed experienced by agricultural science instructors is not sufficient for conducting effectively their teaching activities. Slow internet connectivity can hinder their ability to access online resources, communicate with students, or utilize web-based tools effectively. These results are in line with Emmanuel's (2020) study which revealed that instructors had difficulties in integrating ICT into teaching and learning process because of low internet speed. This is also consistent to the findings by Kunda *et al.,* (2018) that lack of adequate Internet bandwidth is among the major barrier for assimilating ICTs in teaching and learning among Zambian university lecturers.

Unreliable power supply (Mean=4.38), including issues related with the consistency and stability of electricity supply at the university implies that there is frequent power outage or disruptions that hinder the use of ICT tools in teaching and learning process. Unreliable power supply at SUA is a critical problem experienced in both even and odd semesters necessitating the use of generators which are not readily accessible in all classrooms. Interview with the key informants also revealed that:

"Most of the ICT facilities require electricity to operate, however problems with frequent power outages hinder us of from utilizing the facilities efficiently as a result we are forced to use the traditional methods of teaching (One of the Head of Department, 12th April 2023)."

The findings are in line with Apagu and Wakili (2015); Aldheleai *et al.*,(2019) and Haliso (2011) who revealed that unreliable power supply is one of the challenges that hinders instructors from using ICTs.

Lack of in-service training (Mean=3.79) suggests that there is a notable deficiency in the provision of in-service training among the instructors at the university. With the rapid growth of technology, the university has been providing trainings through the UTLIP workshops. However, instructors still lack some necessary skills or competencies on how to operate contemporary teaching technologies. Interview with key informants also revealed that;

"Technology in teaching and learning keeps on changing day by day depending on advances in science and technology. For instance, we now are experiencing emergence of zoom and Moodle platforms as new teaching technologies and instructors are required to upload their teaching notes via these platforms. However, most of the instructors do not possess the necessary skills and knowledge to operate these technologies since the university does not conduct regular trainings on how to operate and manage these facilities (Head of ICT services, 14th April 2023)."

These findings are supported by Emmanuel (2020); Mtega *et al.,* (2012) and Mtebe and Raisamo (2014) who revealed that lack of training among lecturers is one of the factors/challenge hindering ICT integration

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

in higher education institutions in Tanzania.

Problems of handling large classes (Mean=3.70) is one of the major challenges that deters instructors from incorporating ICTs into their teaching activities. This is mainly because over the years, SUA has been experiencing an increased undergraduate and graduate students' enrollment in keeping with its strategic plan. For instance, the number of students' enrollment has grown from about 500 in 1988, 7,299 in 2016 to 14,581 students in 2021 (SUACSP, 2021). This trend has made agricultural science instructors at SUA to struggle with managing large class sizes of over 200 students. Large classes are indeed challenging and have been found to be a bottleneck when it comes to providing individualized attention to students and in particular those with special needs. . These findings are in line with Ojo and Adu (2018) who reported that, the size of classroom and ability of instructors to manage larger student population can affect instructor's use of ICTs during teaching and learning process. Interview schedule with key informants further supports these findings as one of the key informants reported that;

"One of the major challenges that we ax instructors face nowadays is the presence of very large number of students in the lecture rooms compared to the type of ICT facilities we have. For instance, with the new venues and especially the multipurpose laboratories it is difficult for all the students to see what is projected in front of the lecture room by the instructor when using the LCD projector with one screen. Under these circumstances large enrollments have been found to promote student disengagement and feelings of alienation, which may in the process erode students' sense of responsibility and lead to behaviors that both reflect and promote lack of engagement. It is no secret that a number of times some students during teaching sessions are found busy surfing on their cellular phones and completely detached from the session. The situation is indeed alarming and in a way is comprising the quality of education being offered. It needs to be arrested by the University authorities. (One of the Heads of Department, 13th April 2023)."

Inadequacy of ICT manpower/technical support (Mean=3.75), implies that there is a shortage of personnel at SUA with ICT expertise and experience who could provide the necessary technical support to agricultural science instructors when and where need arises. As such, instructors face difficulties in troubleshooting technical issues when problems arise using ICTs during teaching sessions leaving instructors and students being frustrated. This is similar to the studies done by Al-Mamary (2020) in Yemen and Emmanuel (2020) in Tanzania who reported that lack of technical support/ insufficient ICT systems personnel can affect instructor's effective use of ICT facilities.

Lack of administrative support and in particular financial assistance (Mean=3.80), suggests that lack of financial support from the university administration to address the ICT-related needs of agricultural science instructors which deters them from using ICT facilities. It was reported that instructors at SUA face challenges in acquiring necessary ICT resources, upgrading existing infrastructure, or accessing training opportunities due to limited funding or shrinking university budget. For instance, one of the key informants revealed that;

"Some of the white boards in the lecture rooms are blur/dirty/dilapidated and there are no accessories such as alcohol-based sanitizers and clean microfiber cloth. Additionally, there are no marker pens to use on these boards as a result; instructors do not use these boards during teaching and learning process. This appears to be an inherent problem that calls for immediate attention. (One of the Head of Department, 14th April 2023)."

These findings appear to be in line with the study conducted by Kunda *et al.*, (2018) in Zambia; and Bett (2014) in Kenya who reported that poor support and limited financial resources were the barriers toward utilizing ICT facilities.

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

CONCLUSION AND RECOMMENDATIONS

The study concludes that there are various factors that influence ICT utilization in teaching and learning of agricultural sciences at SUA. These factors are hovered around institutional and personal factors as alluded to earlier. The findings of this study revealed institutional factors such as availability and accessibility of ICT facilities, and availability of technical support together with personal factors such as positive instructor attitudes, sex, age and teaching experience play significant roles in influencing ICT utilization at the university. The results of this study also show that inadequacy of ICT facilities and infrastructures, slow internet connectivity, unreliable power supply, lack of in-service training, problems of handling large classes, inadequacy of ICT manpower/ technical support, and lack administrative support i.e. financial assistance are the barriers toward integrating ICT facilities in teaching and learning of agricultural sciences at the university. Given the existence of a myriad of factors that deter instructors from utilizing ICTs in teaching and learning process, it appears the University has not put in place a coherent strategy for addressing both the institutional and personal factors. Therefore, the university in keeping with its current strategic plan and ICT policy should develop a sound long term strategy that seeks to address these challenges while seeing to it that, it's properly financed and executed. In the short term, it is recommended that the university should strive to implement the following strategies as proposed by various instructors. These strategies as reported by respondents are presented as follows:

1. The university, if it is to live up to its vision, should take an affirmative action and ensure that use of ICT in teaching and learning is at the centre stage in keeping with its strategic plan. This is essential given the university and Government's desire for increased student enrollments in line with the Tanzania Development Vision 2025 and the evidence of youth bulge in Tanzania.
2. The university administration should use part of the internally-generated revenue for purchasing ICT tools/facilities so as to overcome the challenge of inadequate ICT facilities in respective departments. For instance, the university should purchase and provide instructors with new updated moderu laptops since the ones they have are personal and outdated.
3. Alternative source of power such as generators and solar panels should be installed across different departments to ensure reliable power supply at the university.
4. In-service training to instructors and students on how to use various ICTs should be provided especially on zoom and Moodle platforms so that instructors can be aware on how to upload their teaching notes on these platforms so that students can easily access them wherever and whenever they need them.
5. The university should ensure that, sufficient ICT systems personnel/expertise are available at different departments to provide technical support to instructors on all ICT related problems. These experts should ensure obsolete /damaged ICT equipment are timely and properly repaired and/or replaced with new ones.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisors for their valuable contribution and support during the research and publication of this paper. Their guidance and assistance have been instrumental in shaping the outcome of this work.

REFERENCES

1. Agbo, I. S., (2015). Factors Influencing the Use of Information and Communication Technology (ICT) in Teaching and Learning Computer Studies in Ohaukwu Local Government Area of Ebonyi State-Nigeria. Journal of Education and Practice, 6(7), ISSN 2222-1735: 71-86

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

2. Aidoo, B. Macdonald, A. Gyampoh, A. Baah, K. & Tsyawo, J. (2022). Factors Influencing Teachers' Online Teaching Competence in Higher Education. Social Education Research, 3(1) 148-160.
3. Alabi, O.O., (2016). Adoption of Information and Communication Technologies (ICTs) by Agricultural Science and Extension Teachers in Abuja, Nigeria. Journal of Agricultural Education, 57(1), 137-149.
4. Aldheleai, Y. M., Baki, R., Tasir, Z., and Alrahmi, W., (2019). What hinders the use of ICT among academic staff at Yemen's public universities? International Journal of Humanities and Innovation (IJHI) 2 (1), 7-12
5. Bett, M.J., (2014). Use of Information and Communication Technologies in Higher Education in Kenya. Unpublished Master Thesis. Media Education Spring, Faculty of Education.
6. Buabeng-Andoh, C. (2012). Factors Influencing Teachers' Adoption and Integration of Information and Communication Technology into Teaching: A Review of the Literature. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 8(1), 136-155.
7. Creswell, J. W., and Creswell, J. D. (2018). Research Designs: Qualitative, Quantitative and Mixed Methods Approaches. 5th Edition. Los Angeles: SAGE Publication, Inc.
8. Emmanuel, A. (2020). Assessment of Factors Hindering Effective Use of ICT System at St. John's University in Tanzania. A Dissertation Submitted for Partial Fulfillment of the Requirements for the award of Masters of Information Technology in Project Management of the College of Business Education, Dar es Salaam
9. Gikundi, Z. (2016). Factors Influencing Integration of Information and Communication Technology in Learning and Teaching in Public Secondary Schools: A Case of Tigania West Sub County, Meru County, Kenya. A Research Project Presented In Partial Fulfillment Of The Requirements For The Award Of Master Of Arts Degree In Project Planning And Management Of The University Of Nairobi
10. Kiboss, J. K., and Kosewe, O. N. (2017). Availability and utilization of ICT facilities in teaching and learning of agricultural sciences in Kenyan universities. International Journal of Education and Research, 5(5), 105-118.
11. Kunda, D. Chembe, C., and Mukupa, G. (2018). Factors that influence Zambian higher education lecturer's attitude towards integrating ICTs in teaching and research. Journal of Technology and Science Education (JOTSE), 8(4): 360-384
12. Mahdi, H. S., & Al-Dera, A. S. A. (2013). The impact of teachers' age, gender and experience on the use of information and communication technology in EFL teaching. English Language Teaching, 6(6), 57-67. https://doi.org/10.5539/elt.v6n6p57
13. Malero, A. Ismail, A., and Manyilizu, M (2015). ICT Usage Readiness for Private and Public Secondary Schools in Tanzania, a Case of Dodoma Municipality. International Journal of Computer Applications,129(3), 29-32
14. Makundi, Z. R., Rutatora, D. F. and Kidudu, J. S. (2023). Availability and Utilization of ICT Facilities in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania. East African Journal of Education and Social Sciences 4(6), 67-78. Doi: https://doi.org/10.46606/eajess2023v04i6.0335.
15. McFarlane, A. E. (2019). Devices and desires: Competing visions of a good education in the digital age. British Journal of Educational Technology, 50(3), 1125-1136. https://doi.org/10.1111/bjet.12764
16. MoEVT 2007, Information and communication technology (ICT) policy for basic education, Ministry of Education and Vocational Training, United Republic of Tanzania, Dar es Salaam.
17. Mtebe, J. S., and Raisamo, R. (2014). Challenges and instructors' intention to adopt and use open educational resources in higher education in Tanzania. The International Review of Research in Open and Distance Learning, 15(1).
18. Mtega, W. P., Bernard, R., Msungu, A. C., and Sanare, R. (2012). Using mobile phones for teaching and learning purposes in higher learning institutions: The case of Sokoine University of Agriculture in Tanzania. In Proceedings and report of the 15th UbuntuNet alliance Annual Conference.
19. Murphrey, T.P., Arnold, S., Foster, B., & Degenhart, S. H. (2012). Verbal immediacy and audio/video

INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6196 | DOI: 10.47772/IJRISS |Volume VIII Issue II February 2024

technology use in online course delivery: What do university agricultural education students think. Journal of Agricultural Education 53(3):14-27.

20. Obiri-Yeboah. K. Kwarteng, K. O. and Kyere-Djan, R. (2013).Factors Affecting ICT Adoption in Tertiary Institutions in Ghana: A Case of Kwame Nkrumah University of Science and Technology. Information and Knowledge Management, 3(6), ISSN 2224-5758 (Paper) ISSN 2224-896X (Online)
21. Ojo, O., and Aju, E., (2018). The effectiveness of Information and Communication Technologies (ICTs) in teaching and learning in high schools in Eastern Cape Province. South African Journal of Education, 38, (2), 1-11
22. Okorieocha, C. N., Okpuraeke, G. M. and Nwogu, P. O. (2019). Availability and Utilization of Information and Communication Technology to Enhance Technical Education Programme in Technical Colleges: An Implication for National Development. Rivers State University Journal of Education (RSUJOE), ISSN: 2735-9840, 22 (1&2):84-98
23. Olatunde-Aiyedun, T. G., Olamoyegun, S. O., and Ogunode, N. J. (2022). Assessment of Science Resources in Higher Education. Central Asian journal of theoretical and applied sciences.3(7): ISSN: 2660-5317.
24. Olafare, F. O., Adeyanju, L. O., & Fakorede, S. O. A. (2018). Colleges of Education Lecturers Attitude Towards the Use of Information and Communication Technology in Nigeria. MOJES: Malaysian Online Journal of Educational Sciences, 5(4), 1-12. Retrieved from https://mojes.um.edu.my/index.php/MOJES/article/download/12515/8084
25. Scott, K. M. (2016). Change in university teachers' e-learning beliefs and practices: a longitudinal study. Studies in Higher Education, 41(3), 582-598. https://doi.org/10.1080/03075079.2014.942276
26. Singh,T. K. R., and Muniandi, K., (2012). Factors Affecting School Administrators' Choices in Adopting ICT Tools in Schools – The Case of Malaysian Schools. International Education Studies;5 (4), 21-30
27. SUA, (2014). Information and Communication Technology Policy (2nd Ed). Approved by SUA 133rd Meeting of the Council.
28. SUACSP, (2016). Sokoine University of Agriculture five years Corporate Strategic Plan 2021/22 – 2025/26.
29. SUACSP, (2021). Sokoine University of Agriculture Five years Corporate Strategic Plan 2016 – 2021.
30. SUAUTLIP, (2013). The third session of the university teaching learning Improvement programme training course. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau
31. SUAUTLIP, (2017). The University teaching learning Improvement programme training course report. Sokoine University of agriculture office of the deputy vice chancellor (Academic) quality assurance and promotion bureau
32. URT, (2018). Education Sector Development Plan (2016/17 – 2020/21) Review Report for Mainland. United Republic of Tanzania, Dar es Salaam, Tanzania.
33. URT (2016). National Information and Communications Technology Policy. Ministry Of Works, Transport and Communication. United Republic Of Tanzania, Dar es Salaam, Tanzania.
34. Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186-204.
35. Wokocha, K. D. Babalola, J. O. and Appah, C. N., (2018). Utilization of Information and Communication Technology Facilities for Administration of Public Secondary Schools in Rivers State. International Journal of Innovative Social & Science Education Research 6(2):126-133

CHAPTER FOUR

4.0 GENERAL DISCUSSION

4.1 Overview

This chapter provides a synthesis of the findings of the study based on the study objectives aimed at assessing the utilization of ICT facilities in teaching and learning of agricultural sciences at Sokoine University of Agriculture, Tanzania.

4.1.1 Types of ICT facilities available at SUA for teaching and learning of agricultural sciences

The specific objective number one intended to identify the types of ICT facilities available at SUA for teaching and learning of agricultural sciences. The purpose was to identify types of ICT facilities available and used in teaching and learning of agricultural sciences at the University. Out of the 15 ICT facilities, 11 were identified by instructors as ICT facilities available at the university. The ICT facilities that were available included; desktop computers, projectors (OHP and LCD), print materials, boards (whiteboard, green boards and blackboard), internet services, printer and photocopy machines, scanners, Emailing platforms, Microsoft Office software, and public address systems (PAS). This indicated that, majority of the ICT facilities (>50%) were available at the university and they were used in teaching and learning of agricultural sciences. This implies that the University is aware and understands the role played by these facilities in teaching and learning processes at the university. Although study findings indicate that laptops were slightly available (47.2%), the majority of instructors 48(90.6%) said they use their own personal laptops instead of university-owned laptops. This shows that laptops that are said to be available are privately owned by instructors and not provided by the university. In a way this shows pro-activeness and readiness of instructors to adopt and use new technologies in teaching and learning processes. On the other hand, when instructors were asked if the available ICT facilities are adequate to accommodate the number of academic staff present

at their respective departments, majority of the instructors (92.5%) responded by saying they are inadequate. This indicated that while ICT facilities were found to be available at the university level, they were inadequate at the departmental level to meet the needs and demands of the instructors present in respective departments.

4.1.2 Extent of utilization of ICT facilities in teaching and learning of agricultural sciences at SUA

This specific objective aimed at determining the extent to which the available ICT facilities are being utilized by members of academic staff in teaching and learning of agricultural sciences at the University. The study findings revealed that, ICT facilities such as laptops, projectors (OHP and LCD), Microsoft Office software, Internet facilities, emailing platforms, print materials and boards were the most utilized ICT facilities with mean scores indicating a high extent of utilization. This demonstrates how instructors have embraced use of ICT facilities in teaching and learning of agricultural sciences at the university. This is mainly because, use of these facilities facilitates delivery of lectures while enhancing students' learning and understanding by interacting with the materials through the senses of hearing and seeing. On the other hand, ICT facilities such as printer and photocopy machines, scanner, and the public address system (PAS) facilities were moderately utilized, with mean scores indicating that these facilities are utilized at an average level compared to other ICT facilities. Moreover, the study findings revealed that, desktop computers, Zoom and Moodle platforms, video conferencing media, television sets, and department computer laboratory were the least utilized ICT facilities, with mean scores indicating a very low extent of utilization. Low use of such ICT facilities as video conferencing media and television sets was mostly due to the fact that these facilities were not readily available at the University. On the other hand, low utilization of Zoom and Moodle platforms was attributed to lack of familiarity with the technology or low level of ICT literacy among the instructors since zoom and Moodle platforms are still new teaching technologies. However,

overall mean score was found to be 3.182. This indicated that, the extent of utilization of ICT facilities in teaching and learning of agricultural sciences at the university was moderate.

4.1.3 Factors influencing utilization of ICT facilities in teaching and learning of agricultural sciences at SUA

This specific objective aimed at assessing factors influencing instructors toward utilizing ICT facilities in teaching and learning of agricultural sciences at the University. It is clear that, incorporation of ICT in teaching and learning has the potential to revolutionize education by making it more engaging, interactive, and effective. However, instructors' use of ICTs in teaching and learning process can be triggered by number of factors. These factors can either be institutional or personal factors. From the study findings it was revealed that, institutional factors such as availability and accessibility of ICTs and technical support play a significant role in influencing instructors toward use of ICT facilities in teaching and learning process. This is due to the fact that, utilization of ICTs is directly linked to availability and accessibility of ICTs. Hence, instructors can only utilize ICTs if these facilities are found to be available and accessible to them. Also, the chances of utilizing ICT facilities are higher if there are adequate and competent ICT technicians to provide technical backstopping to instructors in case of troubleshooting or during maintenance of damaged ICT facilities as well as installation of relevant software needed for teaching and learning process. Apart from these reasons there might be a number of individual factors that influences instructors' use of ICTs in teaching and learning processes. From the study findings it's clear that, instructors' use of ICTs is influenced by attitude, sex, age and teaching experience. The instructor's positive attitude was found to have a positive and significant impact on the utilization of ICTs. This is mainly because, if an instructor has a positive attitude on a particular ICT facility, then the chance of incorporating such facility in teaching and learning process is higher. Also, the study findings revealed that male instructors were more likely to utilize ICTs more

than female instructors. This connotes that, looking at the population of instructors at the university, male instructors were found to be more in number compared to the female instructors. This is because large number of male instructors were recruited than female instructors. Also looking on the UTLIP workshop attendance, male instructors were favored in these workshops than female instructors making them to be more aware and competent in handling different ICTs compared to female instructors. Moreover, the study findings revealed that age of instructors had negative coefficient and was statistically significant associated with utilization of ICTs in teaching and learning process. The actual association was that as one grows in terms of age the like hood of utilizing ICTs decreases. This implicates that; instructors who are at youth age are more likely to utilize ICTs into their teachings compared to the elderly instructors. This is because, young instructors are more interested in digital devices and are active participants with the desire of ensuring they are interconnected. Moreover, the study findings revealed that instructors teaching experience influences the use of ICTs in teaching and learning process. This indicates that, the more experienced an instructor is the more likely he/she utilizes ICTs. This mostly due to the fact that, as an instructor gains experience in teaching with exposure to UTLIP and other related programmes emphasizing use of different ICT facilities the more he/she gains confidence in use such facilities.

4.1.4 Challenges facing instructors from effectively utilizing ICT facilities in teaching and learning of agricultural sciences at SUA

This specific objective aimed at determining the challenges that deter instructors from utilizing ICT facilities in teaching and learning processes. The study findings revealed inadequacy of ICT facilities and infrastructure, slow internet connectivity, unreliable power supply, lack of in-service training, problems of handling large classes, inadequacy of ICT manpower/ technical support, and lack of administrative support as challenges that hinder instructors from

effectively utilizing ICTs into their teaching activities. Given the existence of a myriad of challenges that deter instructors from utilizing ICTs in teaching and learning process, it appears that the University has not put in place a coherent strategy for addressing these challenges. To improve instructors' use of ICT facilities in teaching and learning process, the university in keeping with its current strategic plan and ICT policy should see the necessity of addressing these challenges through developing a long term strategy that is properly financed and executed.

CHAPTER FIVE

5.0 GENERAL CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

Based on the major findings of the study, the following conclusions are made;

i. Most of the ICT facilities were available at the university level but at the departmental level these facilities were inadequate to accommodate the number of academic staff present in their respective departments. As such, instructors do not effectively make use of ICT resources to enhance the teaching and learning processes.

ii. The extent of utilization of ICT facilities in teaching and learning of agricultural sciences was moderate. This implies that the available ICT facilities were utilized at an average level with some of the facilities being over utilized and others underutilized. The moderate utilization of ICT facilities by instructors suggests a missed opportunity for fully integrating technology into the teaching and learning process.

iii. Moreover, it was found that, utilization of ICT facilities goes hand to hand with availability and accessibility of ICTs underpinned by provision of technical support. Based on the study findings, ICTs can be utilized by instructors only if these facilities are available and easily accessible. Accordingly, instructors can utilize ICTs during their teaching activities if there are adequate and professionally competent ICT personnel to provide the necessary technical support to instructors whenever and wherever need arises. In addition, personal factors such as positive instructor attitudes, sex, age and teaching experience play significant roles in influencing ICT utilization at the university.

iv. The utilization of ICT facilities in teaching and learning of agricultural sciences at the University is hindered by a number of challenges such as inadequacy of ICT facilities and infrastructure, slow internet connectivity, unreliable

power supply, lack of in-service training, problems of handling large classes, inadequacy of ICT manpower/ technical support, and lack administrative support. Given the existence of a myriad of challenges that deter instructors from utilizing ICTs in teaching and learning process, it appears the University has not put in place a coherent strategy for addressing these challenges. The actual use of ICTs by instructors can be improved if these challenges are effectively addressed.

5.2 Recommendations

Based on the above conclusions, the following recommendations are made:

The university, if it is to live up to its vision, should take an affirmative action and ensure use of ICT in teaching and learning is at the centre stage in keeping with its strategic plan. This is essential given the university and Government's desire for increased student enrollments in line with the Tanzania Development Vision 2025 and the evidence of youth bulge in Tanzania. Hence, the university should develop a sound long term strategy that seeks to address the existing and emerging challenges while seeing to it that, it's properly financed and executed. In the short and medium term, the university should strive to do the following:

a. Carry out holistic capacity needs assessment with the intent of addressing capacity gaps at individual, organizational and systemic levels while bringing to light the numbers and type of ICT facilities required. This will require the university administration to set aside funds for such a study and investment in ICT infrastructure in terms of equipment and related assets (e.g., new laptops to instructors, increasing the number of projectors, and providing necessary software and hardware resources to support instructors' needs).

b. The university administration through UTLIP workshops should offer professional development programs that focus on

enhancing instructors' technological proficiency, pedagogical integration of ICT tools, and troubleshooting common technical issues. This will include recruiting a competent and committed coordinator together with a critical mass of support staff to carry out the UTLIP workshops.

c. The University administration should see the necessity of having alternative source of power across the University. Alternative source of power such as generators and solar panels should be installed at different departments to ensure reliable power supply at the university.
d. The university should ensure that, sufficient ICT systems personnel/expertise are available at different departments to provide technical support to instructors on all ICT related problems. These experts should also ensure that the damaged ICT equipment are promptly repaired and replaced with new ones.
e. The university administration should recognize the importance of ICT facilities in the teaching and learning process by ensuring sufficient resource allocation at both the university and departmental levels to meet the growing demands of instructors and students.

5.3 Remarks and Future Perspectives

A similar study is needed to assess the extent of utilization of ICT facilities in teaching and learning process across the whole university. From this kind of study we can get a bigger picture in a wider spectrum on the extent to which ICT facilities are being utilized by members of academic staff in teaching and learning process at the university.

APPENDICIES

Appendix 1: Questionnaire for Instructors from College of Agriculture (CoA)

Introduction

Dear Sir/Madam

I'm, **ZUNGU REMMY MAKUNDI**, a post graduate student pursuing MSc. Agricultural Extension at SUA. Currently, I am conducting a study on **"Utilization of ICT in Teaching and Learning of Agricultural Sciences at Sokoine University of Agriculture, Tanzania."** The study is guided by three objectives which are to; identify types of ICT facilities available for teaching and learning of agricultural sciences at the University; determine the extent of utilization of ICT facilities in teaching and learning of agricultural sciences; and describe the factors that influence the use of ICT facilities in teaching and learning of agricultural sciences. In this study, ICTs are used to mean diverse set of technologies, tools, and resources used to communicate, create, disseminate, store, and manage information. In order to ensure an objective and comprehensive assessment and to capture all important results and emerging lessons, I kindly ask for your cooperation in providing evidence-based responses to each question. Your responses, which should be based on verifiable and available evidence, will provide valuable inputs for preparing my MSc Thesis. Please avoid simple Yes/No answers to the extent possible and provide brief explanations, supported by relevant evidence and references to relevant reports, which can provide further details. Please be assured that the responses you provide are for academic purposes and will strictly be kept confidential. Your assistance in responding to the following questions will help the study achieve its stated objectives. I sincerely thank you for your collaboration and cooperation.

SECTION A (PART 1): Personal background information

Please fill in where the space is provided and *tick* **(✔)** where applicable to indicate your response

1.

Department……

……

2. Sex

a) Male

b) Female

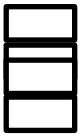
3. Age:

a) Under 30

b) 30 to 39

c) 40 to 49

d) 50 and above



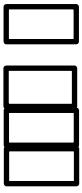
4. Teaching Experience at this University (years):

a) 10-15 years

b) 15-20 years

c) 20-25years

d) More than 25 years



5. Academic Rank:

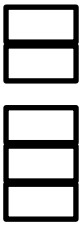
a) Assistant Lecturer

b) Lecturer

c) Senior Lecturer

d) Associate Professor

e) Professor



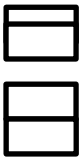
6. Teaching hours per week:

a) Fewer than 10

b) 10-20 hours

c) 20-30 hours

d) More than 30 hours



PART 2: ICTs training and skills

1. Do you always use ICTs in teaching and learning process?

Please tick **(✔)** *where applicable*

a) Yes I do ( )

b) No I don't ( )

2. When did you attend short courses on ICTs?
Please tick **(✔)** *all that are applicable.*
a) During my first training as an instructor
b) ICT workshop at the University (UTLIP)
c) Online training i.e. YouTube
Other (*please specify*): 
…….

3. Have you ever undertaken ICT professional development training in the following areas?

ITEMS	**YES**	**NO**
Introductory courses on internet use and general applications (basic word-processing, spreadsheets, presentations tools, Emailing, statistical tools)		
Equipment-specific training (operating projectors, interactive whiteboard, laptop, tablet, etc.)		
Courses on the pedagogical use of ICT in teaching and learning		
Subject-specific training on teaching and Learning applications (tutorials, zoom and Moodle platforms, etc.)		
Participate in online communities (e.g., mailing lists, groups, and blogs) for professional discussions with other instructors.		

Others (*please specify*)……

4. To what level are you confident in the following ICT related skills?
Please tick where applicable to indicate your response based on the following Likert scale
Likert scale: 5= highly confident; 4= Confident; 3= Neutral; 2= Slightly confident; 1= Not confident at all.

ITEMS	5	4	3	2	1
Produce teaching notes using a word processing programme					
Preparing Power Point Presentations for teaching and learning process					
Use emails to communicate with students					
Organize computer files in folders and Subfolders for storing teaching and learning materials					
Use a spreadsheet for compiling students' records and examination scores (e.g., Excel)					
Participate in academic discussion forums with students on the internet through video conferencing and zoom meeting					

Others (please specify with relevance to teaching and learning)
……
……

SECTION B: Available ICT Facilities for teaching and learning of agricultural sciences at the University.

1. What are the available ICT facilities for teaching and learning of agricultural sciences at the University? Please *tick* **(✓)** to indicate your response in the Table below

S/N	ICT facility	Available	Not Available
1	Desktop Computer		
2	Laptops		
3	Projectors (Overhead, LCD)		
4	Print materials (handouts, text books, posters, brochures)		

5	Boards (whiteboard, green boards and blackboard)		
6	Department computer laboratory		
7	Video conferencing media		
8	Internet services (WIFI, cable connection)		
9	Printer and photocopy machines		
10	Scanner		
11	Emailing platforms (Gmail, Yahoo)		
12	Zoom and Moodle platforms		
13	Microsoft Office (Ms. Word, Ms. PowerPoint, Ms. Excel etc.)		
14	Television Sets		
15	Public Address System (PAS) (microphones, amplifiers, speakers)		

What are other ICT facilities available for teaching and learning of agricultural sciences at the University? *Please specify*

……

……Among the available ICT facilities, which ones do you mostly use during teaching and learning processes? Why?

……

……

……Are the available ICT facilities adequate to accommodate or address the needs of the number of academic staff present in your department? *Please tick* **(✓)** *where applicable*

a) Yes ☐
b) No

(a) If NO what are the reasons for their inadequacy?

……

……

Section C: Extent of utilization of the available ICT facilities in teaching and learning of agricultural sciences at the University.

1. To what extent do you use the available ICT facilities in teaching and learning of agricultural sciences at the University? *Please tick* **(✓)** *where applicable to indicate your response based on the following Likert scale*

Likert scale: 5= very high; 4=high; 3=Neutral; 2= low; 1= very low.

S/N	ICT facility	5	4	3	2	1
1	Desktop Computer					
2	Laptops					
3	Projectors (Overhead, LCD)					
4	Print materials (handouts, text books posters, brochures)					
5	Boards (whiteboard, green boards and blackboard)					
6	Department computer laboratory					
7	Video conferencing media					
8	Printer and photocopy machines					
9	Scanner					
10	Internet Facilities(WIFI, cable connection)					
11	Emailing platforms (Gmail, Yahoo)					
12	Zoom and Moodle platforms					
13	Microsoft Office (Ms. Word, Ms. PowerPoint, Ms. Excel etc.)					
14	Television Sets					
15	Public Address System (PAS) (microphones, amplifiers, speakers)					

2. How often do you utilize the following ICT facilities in teaching and learning of agricultural sciences at the University? *Tick* **(✓)**

where applicable to indicate your response based on the following Likert scale

Likert scale: 5= always; 4=often; 3=sometimes; 2= rarely; 1= never.

S/N	ICT facility	5	4	3	2	1
1	Desktop Computer					
2	Laptops					
3	Projectors (Overhead, LCD)					
4	Print materials (handouts, posters, brochures)					
5	Boards (whiteboard, green boards and blackboard)					
6	Department computer laboratory					
7	Video conferencing media					
8	Printer and photocopy machines					
9	Scanner					
10	Internet Facilities (WIFI, cable connection)					
11	Emailing platforms (Gmail, Yahoo)					
12	Zoom and Moodle platforms					
13	Microsoft Office (Ms. Word, Ms. PowerPoint, Ms. Excel etc.)					
14	Television Sets					
15	Public Address System (PAS) (microphones, amplifiers, speakers)					

Section D: Factors influencing utilization of ICT facilities in teaching and learning of agricultural sciences at the University

1. What are the factors that encourage you toward using ICT facilities in teaching and learning of agricultural sciences at the University? *Tick* **(✔)** *where applicable to indicate your response based on the following Likert scale*

Likert scale: 5= Strongly Agree; 4= Agree; 3= Neutral; 2= Disagree; 1= Strongly Disagree.

Factors encouraging the use of ICTs	**5**	**4**	**3**	**2**	**1**
EXTERNAL FACTORS					
Availability of ICT facilities such as internet services, laptops, computer software i.e. Microsoft word, PDF reader etc.					
Accessibility of ICT facilities like LCD/overhead projectors, access to internet services etc.					
Availability of reliable power (Electricity)					
Enough time to plan for teaching materials prior to classroom instruction delivery					
Presence of large number of students in lecture rooms					
Administrative support such as provision of funds for purchasing new ICT facilities and maintenance of damaged ICT facilities					
Technical support such as enough personnel to provide technical expertise on how to operate ICT facilities i.e. Installation of computer software, designing learning materials, connecting projectors etc.					
INTERNAL FACTORS					
Instructor's positive attitude toward ICT use in teaching and learning process					
Instructor perceptions, including personal desire, intention or motivation to use ICTs in teaching and learning process					

Instructors self-confidence and knowledge on how to operate different ICT facilities during instruction delivery					
Competence and readiness to use ICT during teaching and learning process					
Instructor's teaching experience					
Instructor's teaching style including personal interest in student/learner centred approaches/andragogy					
Instructors age					
Instructors sex					

What other factors do you think influence you to use of ICT in teaching and learning process? (*Please specify*)

……

……

……

2. Is the use of ICT in teaching and learning adversely affected by the following obstacles?

Please indicate the extent to which you agree with the following as factors that deter you from using ICTs in teaching and learning process. *Tick* **(✓)** *where applicable or appropriate to indicate your response based on the following Likert scale*

Likert scale: 5= Strongly Agree; 4= Agree; 3= Neutral; 2= Disagree; 1= Strongly Disagree.

Challenges	**5**	**4**	**3**	**2**	**1**
PERSONAL CHALLENGES					
Lack of interest/ negative attitude of instructors toward using ICT during classroom instruction delivery					
Insufficient time to master new software or integrate ICT during a classroom instruction delivery					
Lack of instructor's collaboration and					

instructional support on how to use ICTs, as well as a lack of experience among cooperating instructors					
Lack of specific knowledge and skills about new technologies and how to combine it with the existing instructional content/ knowledge to support student learning					
Lack of in-service training on the use of ICT facilities					
Problems of handling large classes and large number of students to accommodate the existing technologies					
Lack of self-confidence in using ICTs for teaching					
Instructor's resistance to change, hence unable to effectively use ICTs during teaching and learning process					
COLLEGE CHALLENGES					
Inadequacy of ICT facilities and infrastructures i.e. LCD/overhead projectors, laptops etc. to support the full application of ICT in teaching and learning process					
Slow internet connectivity					
Inadequacy of ICT manpower/ technical support at the college					
Unreliable power supply at the University					
Most of the available ICT facilities are nonfunctional					
Lack of reward or incentive for using ICT in teaching and learning					
Lack of appropriate administrative support for the effective use of ICT i.e. Maintenance of damaged ICT facilities					

What other factors do you think deter you from using ICT in teaching and learning process? (Please specify)

……
……
…….

3. From your stand point of view as an instructor, what do you think should be done to improve the utilization of ICT in teaching and learning of agricultural sciences at the University?

……
……
……
……
……
……

Thank you for your collaboration and cooperation.

Appendix 2: Key informants interview schedules

1. What types of ICT facilities are available for teaching and learning of Agricultural sciences at the University/your department?
2. Are the available ICT facilities accessible to all the instructors at your department?
3. Does the University provide instructors with laptops (or tablet PC, desktop computers, notebooks) for their own use?
4. Do you think the available ICT facilities are adequate/ sufficient enough to accommodate the number of students and instructors at the university?
5. To what extent do you think these facilities are being utilized by members of academic staff at this university/your department?
6. Do you think most of the members of academic staff are competent enough/ have the ability to operate the available ICT facilities?
7. Do the recruitment procedures for new instructors include an assessment of their pedagogical competences related to ICT use?
8. At some point are the instructors pedagogical competences related to the ICT formally assessed?
9. What do you think influence them toward using these facilities in teaching and learning process?
10. What do you think hinders them toward using these facilities in teaching and learning process?
11. From your own point of view, what do you think should be done to improve the utilization of ICT in teaching and learning of Agricultural sciences at the University?

Appendix 3: Checklist for Focus Group Discussion (FGD) with students

1. What ICT facilities that are widely used by instructors during teaching and learning process?
2. Do you think the widely used ICT facilities that you have mentioned are enough to accommodate the number of students present in your class?
3. Do you have your own personal computer?
4. Do you think using ICT facilities for classroom instruction by instructors helps you in learning of Agricultural sciences?
5. What experiences do you gain when ICT facilities are been used during classroom instruction?
6. How often do the instructors utilize the available ICTs in delivering their instructions?
7. What do you think influence them to use these facilities during teaching and learning process?
8. What do you think limits other instructors from integrating ICT farcicalities during teaching and learning process?
9. From your own perspectives, what do you think should be done so as to ensure ICT facilities are integrated by your instructors during teaching and learning process?

Kuhusu Tasnifu Hii

Tasnifu hii inahusu matumizi ya vifaa vya TEHAMA katika ufundishaji na ujifunzaji wa sayansi ya kilimo katika Chuo Kikuu cha Sokoine cha Kilimo, Tanzania. Mjibu ya tasnifu hii yalionesha ya kwamba, vifaa vingi vya TEHAMA vinapatikana Chuoni. Pamoja na vifaa hivi kupatikana Chuoni, lakini vifaa hivi havitoshelezi idadi ya wakufunzi walio katika idara husika. Sambamba na hilo, ilibainika pia kuwa kiwango cha matumizi ya vifaa vya TEHAMA katika ufundishaji na ujifunzaji wa sayansi ya kilimo hapa Chuoni ni cha wastani. Tasnifu hii pia ilibaini kuwa mambo ya kitaasisi kama vile upatikanaji na ufikiaji wa vifaa vya TEHAMA, na usaidizi wa kiufundi pamoja na mambo binafsi kama vile mtazamo chanya wa mwalimu, jinsia, umri na uzoefu wa kufundisha vina mchango mkubwa katika kushawishi matumizi ya TEHAMA katika kufundishia yasansi ya Kilimo hapa Chuoni. Lakini pia matokeo yanaonesha kuwa kiwango matumizi ya vifaa ya TEHAMA kilikuwa cha wastani kutokana na sababu mbalimbali kama vile uhaba wa vifaa na miundombinu ya TEHAMA katika ngazi ya idara, usambazaji wa umeme usio na uhakika, ukosefu wa mafunzo ya kazini, matatizo ya kushughulikia madarasa makubwa na upungufu wa wafanyakazi wa TEHAMA. Hivyo basi uongozi wa chuo Kwa kuzingatia mpango mkakati wake wa sasa na sera ya TEHAMA inapaswa kuunda mkakati mzuri wa muda mrefu ambao unatafuta kushughulikia changamoto hizi. Vilevile uongozi wa chuo unahitaji kuboresha miundombinu, kutoa mafunzo ya kitaaluma kwa walimu, kutoa usaidizi wa kiufundi, na kuhakikisha upatikanaji wa umeme wa uhakika ili kuongeza matumizi ya TEHAMA katika kufundishia sayansi ya Kilimo.