

The Complexity And Compatibility Of Ict Integration In The Teaching And Learning Of Agriculture In Swaziland

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ABSTRACT

In Swaziland, ICT integration in teaching and learning is at the infancy stage. Learning opportunities provided by the increasing use of technology in classrooms are not being harnessed in secondary schools. The purpose of the study was to describe ICT integration in the teaching and learning of Agriculture in relation to complexity and the compatibility of the ICT tools in Swaziland. Specific objectives were (1) to describe the complexity of ICT tools as perceived by the teachers and (2) to further describe the compatibility of ICT tools in relation to the teachers' experiences. A descriptive correlational design employing a mixed method approach was used to conduct the study. Data was collected using a Semi-structured interview guide and a survey questionnaire. The population for the study was (N=325) involving all secondary school Agriculture Teachers (N= 312) and key informants who were Agricultural Education Administrators (n=13). The Unified Theory of Acceptance and Use of Technology (UTAUT) guided the study. Descriptive statistics were used to analyse data. With regard to complexity findings revealed that (1) computers make teaching of complex concepts easy, (2) computer use fits well in my curriculum goals, and that (3) learning to use ICT in teaching is a challenge. In overall findings indicated that the ICT tools were less complex to use by the Agriculture Teachers while teaching. The study further revealed that complexities of ICT use by Agriculture teachers were brought about by the age of teachers and the frequent changing of technologies. In relation to compatibility of ICT usage findings revealed that Agriculture Teachers agreed that (1) ICT is quick in meeting information needs, (2) Working with computers make them feel comfortable, (3) ICT use in teaching was very convenient, (4) Agriculture requires more ICT assistance, (5) computers brought positive changes in the schools, and that (6) computer use suits the learners needs. The study further indicated that Agriculture teachers perceived that ICT devices were (7) compatible with existing practices, (8) ICT philosophy was compatible with the subject content, and that (9) ICT integration allows well demonstration of real situations. It is recommended that a policy articulating the need and usage of ICT integration to support teaching and learning be enacted, thus, compelling Internet service providers to extend their bandwidth of Internet to all schools. It is further

recommended, that ICT integration pedagogical skills be part of all pre-service and in-service teacher preparatory programmes.

Key words: ICT integration, complexity, compatibility.

INTRODUCTION

Swaziland is the smallest, landlocked country on the African continent located between South Africa and Mozambique Republic in Southern Africa Region (WFP, 2015). This country has been experiencing some degree of climate effects before 2013. A continuing drought since 2013 has resulted in a food shortage that has threatened hundreds of people with hunger and this has made the National Disaster Management Agency, the Ministry of Agriculture and Cooperatives and the Ministry of Education and Training advocating for food self-sufficiency and giving subsidized inputs to farmers. The economy of Swaziland is agro-based striving on Agricultural production in sugar cane, forestry, vegetables, fruit and food crops. Maize and vegetables are staple foods for Swaziland people and learners doing agriculture are taught how to grow them. The interest of the study is in promoting teaching and learning of agriculture using ICT in Secondary Schools. This can be realized when teachers integrate ICT in the teaching of agriculture.

When teachers use problem solving and desktop research via the Internet, learners as well can learn from their teachers how to search from the Internet new agricultural practices that can improve food production at local level in the mist of the continued drought and volatile climate changes. In addition, to enhance teaching and learning potentials of ICT in school, learners can also learn the use of ICT in agriculture since students are taught Modern Agriculture. Modern Agriculture is a pre-vocational subject taught to students in Swaziland Secondary Schools to take career in agriculture after school completion (Ntshangase, 2010).

According to the Swaziland General Certificate of Secondary Education (SGCSE) (2017) Agriculture syllabus, learners are expected to apply the following skills: Communication and language skills; Numeracy skills: mathematical ideas, techniques and applications; Problem-solving skills; Technological awareness and applications; Critical thinking skills; independent learning and Working with others. In this study, the skills of technological awareness and applications are underlined in bold. ICT caters for the learning of technological applications such as Word-processing, spreadsheet, modeling and desktop publishing.

The rapid growth in Information and Communication Technology has brought remarkable changes in the 21st Century, and has also affected the demands of modern societies. ICT is becoming increasingly important in people's daily lives and educational systems. Therefore, there is a growing demand on educational institutions to use ICT to teach the skills and knowledge learners need for the 21st Century (Andoh, 2012). The global integration of ICT into education has often been premised on the potential of new technological tools to revolutionise an outmoded educational system, better prepare learners for the information age, and accelerate national development efforts. In developing countries in particular, the above promises have generated a whole set of wild speculations about the necessity of educational reforms that accommodate the new tools (Albirini, 2004).

In Swaziland, the use of ICT in many settings is increasing rapidly. As a result, ICT education has become every society's effort to teach people in various settings. People need valuable knowledge and skills about computing and communication devices, software that operates them, applications that run on them and systems that are built with them (Dlamini & Dube, 2014). According to Mndzebele (2013b) Swaziland has come up with policies and strategies in a bid to harness the role of technology towards building a knowledge based society. Furthermore, Swaziland has formulated an education sector implementation plan on the use of technology to deliver electronic educational goals, assessment, and collaborative learning.

The Government of Swaziland is committed to enhancing teaching and learning through the use of ICT. An e-Government is in place within Government structures. In Swaziland 75% of secondary schools are reported to have ICT Laboratories (UNESCO, 2015). Supplying schools with computers through the Computer Education Trust and Donor Partners such as World Vision are some government initiatives to advance ICT integration in primary and secondary schools. To achieve sustainability of ICT integration in teaching, Swaziland is yet to overcome the following challenges: (1) inadequate qualified ICT teachers, (2) inadequate infrastructure, and (3) high cost of Internet connectivity (UNESCO, 2015). Furthermore, there is need to provide ICT resources, ICT skills to teachers, capacity building among teachers, and appropriate infrastructure. In 2011 and 2012 there were 146 schools in the country that had computers, 39% of the schools were in the rural areas and 19% in the urban areas. The Ministry of Education and Training ICT policy explicitly states that the emphasis on ICT should be in the rural areas (Mndzebele, 2013a)

According to Magagula (2017) the realisation of Vision 2022 of ensuring Swaziland is in the top 10% of the Medium Human Development group of countries on sustainable economic development, the Ministry of Education and Training is strengthening ICT provision of facilities and equipment to include construction of computer laboratories particularly in rural schools. Present achievements include the supply of computers to about 155 (75%) secondary schools. About 75% of all secondary schools in Swaziland are offering basic computer literacy skills to learners (Magagula, 2017). Schools are receiving assistance from the government of Taiwan to get electricity connections to ensure eligibility for provision of computers.

The effectiveness of computer technology in education is dependent upon the attitude of successful technology use. The attitude of the Agriculture Teachers towards using technologies in the classroom is a major factor in successful technology integration (Dludlu & Mndzebele, 2018). Agriculture is the backbone of the economy of Swaziland, hence teaching and learning of Agriculture in secondary schools is expected to benefit from new technologies. Education and training is a cornerstone of any meaningful and sustainable economic and social development of any country (Sife, Lwoga & Sanga, 2007). In that regard, the country's accelerated economic growth must be information knowledge driven. The diverse benefits of ICT provision to scale-up efforts is being extended to the Education sector. Ndibalema (2014) argues that teachers are key to curriculum reform and drivers of ICT utilisation and integration in teaching and learning.

The application of ICT is changing the instructional delivery approaches in secondary education including the teaching of Science and Mathematics. The pedagogical and socio-economic forces have driven teachers to adopt and incorporate ICT in teaching and learning. The utilisation and integration of ICT in teaching and learning agriculture is expected to motivate learners to engage in

food and timber production. When teachers use the problem solving and desktop research via the Internet, learners as well can learn from their teachers how to search the Internet for new agricultural practices to improve food production in the mist of volatile climate change.

Statement of the Problem

ICT integration offers unprecedented opportunities to the education system with its capacity to enhance teaching and learning in a meaningful way to achieve learning objectives. Despite the investments of ICT in secondary schools by the government of Swaziland, the body of empirical research investigating ICT integration for instructional delivery purposes remains limited. While ICT use in teaching and learning has unlimited benefits, the limited information on ICT use and its contribution in teaching and learning of Agriculture at secondary schools creates a gap in the expectations of Agriculture to serve as the backbone of the country's economy. The information gap is evident in the face of climate change and drought resulting in food shortages. ICT integration in teaching depends on the complexity and the compatibility of ICT tools combined with teacher competence. The study was therefore, conducted to describe the complexity and the compatibility of ICT integration in the teaching and learning of Agriculture in the context of Swaziland.

Purpose and objective of the study

The study was conducted to describe ICT integration in the teaching and learning of Agriculture in relation to complexity and the compatibility of the ICT tools in Swaziland. Specific objectives were (1) to describe the complexity of ICT tools as perceived by the teachers and (2) to further describe the compatibility of ICT tools in relation to the teachers' experiences.

REVIEW OF RELATED LITERATURE

The term ICT encompasses the range of hardware (desktop computers, projection technology, calculators, data logging and digital recording equipment), software applications (generic software, multimedia resources), and information systems (Intranet, Internet) available in schools (Hennessy, Ruthven & Brindley, 2003). Wang and Woo (2007) define ICT integration as a process of using any technological device to enhance teaching and learning. Expanding on Wang and Woo, Du Plessis (2010) explains that integration at school level exist in four levels, namely: (1) learning about computers, (2) using computers to transmit knowledge and (3) using computers to construct knowledge, and (4) designing and making presentations.

Adeyinka, Adedeji, Majekodunmi, Lawrence and Ayodele (2007) posit that different types of technologies can be used to support and enhance learning. Everything from video content and digital movie making to laptop computing and handled technologies have been used in the classrooms. Word processing and e-mail promote communication skills; database and spreadsheet programmes promote organisational skills; and modeling software promotes the understanding of science and mathematics concepts (Adeyinka et al., (2007).

Mathipa and Mukhari (2014) argue that the globalisation and diffusion of ICT in all aspects of life have created social systems which are driven by knowledge and technology. Due to the abundance of knowledge, educational institutions including schools cannot continue with traditional methods of teaching using textbook as the only source of information. Schools are therefore, compelled to promote the acquisition of knowledge and skills through the use of new learning technologies. Mathipa et al. (2014) further argues that ICT makes teaching and learning easier and that today's

teachers are facing a challenge of teaching “the Net Generation” who are motivated to use technologies responding to the ever changing world. Madome (2011) states that Teachers are among the critical resources of a nation. Their training should be aligned with critical national development, international vision and policies. Currently, ICT is at the centre of the country’s socio-economic development. Hence quality Teacher Education has to demonstrate this critical approach of ICT integration in practice.

The classroom is now changing its look from the traditional one. Bhattacharjee and Deb (2016) explain that education is child centered, therefore the teacher should be prepared to cope with different technologies in the classroom for making teaching and learning interesting. Wang and Woo (2007) state that the use of ICT can support new instructional approaches and make hard-to-implement instructional methods such as simulation or cooperative learning more feasible. If used properly, ICT has the potential to improve students’ learning outcomes and effectiveness.

Bordios (2016) stated three factors (1) belief towards computers, (2) confidence towards computers and (3) attitudes towards computers as determinant factors in the integration of ICT in teaching. In Bordios’ study the strongest predictor of ICT integration among the three was confidence towards computers. This implies that teachers must develop confidence towards computers over time in order to effectively integrate ICT in their practice. According to Kyalo and Nzuki (2014) continuous training for ICT applications, creating and upholding awareness for the ICT relevance in education, drawing a strategic plan for ICT infrastructure coordination, continuous ICT innovation and support and the alignment of ICT-integrated platform to the teaching and learning environment are determinants of ICT integration in tertiary institutions.

With regard to expertise: the argument advanced by Kennisnet (2013) states that ICT cannot work without skilled teachers. ICT skills referred to are the use of a computer: to organise teaching, as a teaching aid, to communicate with other teachers and the use of computer applications that assist in teaching and professional development. Content and applications: ICT integration depends on the digital content as an integral part of the subject curriculum. In this part digital learning materials that are compatible with the books that are needed. Adequate learning materials such as interactive white board, short films, and online learning are key to ICT skilled teachers. Digital learning materials include Internet searches, digital materials supplied with text books, searching digital video banks, visiting educational websites, adapting to existing digital learning materials, creating new digital learning materials and using accessing platform for developing and sharing open learning resources.

ICT competence

This is defined as being able to handle a wide range of varying computer applications for various purposes. Teachers who lack knowledge and skills of ICT use in teaching would not make informed decisions on whether to integrate ICT or not in their practice. In Basargekar and Singhayi (2017) found that computer proficiency of teachers included (1) the use of power point in class, (2) use of e-mail to communicate with other teachers and students, (3) creating and printing a document in Microsoft word, (4) and the use of Internet in class to meet certain learning goals.

Education level

Scales that measure individuals' use of computers, Internet and attitude towards computers, tend to increase with the literacy level of the individual.

Professional development

CT related training programmes develop teachers' competences in the use of technology to support classroom teaching and influence teacher's attitudes towards computers. Mndzebele, Dlodlu, and Mndebele (2017) further recommend that continued professional development be strengthened and Internet connectivity deserves special attention and up-liftment for uptake of ICT integration in Swaziland.

Technological characteristics

Innovation attributes such as relative advantages, compatibility, complexity, trialability and observability influence largely the uptake of technology by teachers in their practice. Therefore, if teachers perceive that the technology has advantages over the existing practice, compatible with their social needs, easy to adopt and results can be seen, it is likely that they will adopt and integrate it quickly (Ali et al., 2013) and (Andoh, 2012).

Sharifzadeh, Abdollahzadeh and Shariff (2008) in their study of integration of ICT in the Iranian agricultural research system conclude that successful application of ICT requires improved awareness among development actors. Technical know-how, continuous training and exchange of information are maintained by systematic realisation of the opportunities afforded by advanced information technologies. Effort expectancy is the degree to which an individual believes a particular technology requires little effort to use. Complexity and compatibility are domains of effort expectancy.

Complexity

Rogers (2003) defines complexity as the degree to which an innovation is perceived difficult to understand and use. However, it is negatively correlated with the rate of adoption. Thus, excessive complexity of an innovation is an obstacle to acceptance and use. A technological innovation might confront faculty members with the challenge of changing teaching methodology to integrate the technological innovation into their teaching, so it might have different levels of complexity. If hardware and software are user-friendly, then they might be adopted successfully for use in teaching and learning. Accuosti (2014) concluded it is difficult to evaluate technology as education tools due to its rapid evolution.

Compatibility with user experiences

Rogers (2003) defines compatibility as the degree to which an innovation is perceived as consistent with the past experiences and needs of potential users. Lack of compatibility in information technology with individual needs may negatively affect the individual's acceptance and use. Sahin (2006) further illustrates that each innovation influences teachers' opinions, beliefs, values, and views about teaching. If an innovation is compatible with an individual's needs, then uncertainty would decrease and rate of acceptance and use will increase. Liu and Kostiwa (2013) expand that even naming the innovation is an important part of compatibility. What the innovation is called should be meaningful to the potential user. What the innovation means should be clear as this is part of complexity characteristics. Rogers (2003) further concludes that an innovation that is

compatible with existing values of individuals in a society, adoption is most likely to be high by the potential users. This would be because users believe less effort was needed to put the technology into use. Innovations that offer advantages, compatibility with existing practices and beliefs, low complexity, potential trialability and observability would have a more widespread and rapid rate of integration.

Unified theory of acceptance and use of technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT), in Venkatesh, Thong and Xu (2012) is the most cited theory in ICT integration studies and was developed through review of eight models which explain ICT usage. Venkatesh, following a Morris and Davis (2003) synthesised eight user acceptance and motivation models to propose the UTAUT model. These models are: (1) Technology Acceptance Model (TAM) Davis (1989), (2) Theory of Reasoned Action (TRC) Ajzen and Fishbein (1980), (3) Motivational Model (MM) Venkatesh et al. (2012), (4) Theory of Planned Behaviour (TPB) Ajzen (1991), (5) Combination of TPB/TAM (C-TPB-TAM) Taylor and Todd (1995), (6) Model of PC Utilization (MPCU) Venkatesh et al. (2012), (7) Innovation Diffusion Theory (IDT) Rogers (2003), and (8) Social Cognitive Theory (SCT) Bandura (2005). Upon review, Venkatesh, Morris, and Davis (2003) report five limitations of prior model tests and comparisons that included: (1) the technology studied were individual-oriented as opposed to organisational technology, (2) most Key informants in these studies were students, (3) most studies well after acceptance or rejection of the usage decisions so individuals' reactions were retrospective, (4) the nature of measurement was in general cross-sectional, (5) most of the studies were conducted in voluntary usage settings making it difficult to generalize results to mandatory settings.

Venkatesh, Thong and Xu (2012) empirically compared the eight models in longitudinal studies in four different organisations among individuals that were introduced to a new technology in the workplace. The measurement was carried out at three different points in time: post training, one month after implementation and three months after implementation; while actual usage behaviour was measured over the six-month training period. The variables that have a direct influence on behavioural intentions and usage are: performance expectancy, effort expectancy, social influences, and facilitating conditions.

Consequently, this study was guided by UTAUT the framework designed by Venkatesh, Morris and Davis (2003) to determine factors contributing to ICT integration in teaching and learning agriculture. The UTAUT was adopted because it explains ICT integration in any given context and the subsequent behaviour. The context in this study is the teaching of secondary agriculture in Swaziland, a developing country. Derived from the above, UTAUT suggests that four variables are determinants of technology acceptance and integration (use behaviour), and these are; (1) performance expectancy, (2) effort expectancy, (3) social influence and (4) facilitating conditions. The UTAUT theory also suggests that the effects of these four variables are moderated by four moderating factors: (1) age, (2) gender, (3) experience, and (4) voluntariness of use.

Vankatesh, Morris, and Davis (2003) state that UTAUT explains 70% of the variance in usage intention in technology which is greater than each of the eight previous theories and their extensions. Akbar (2013) states that although UTAUT has been successfully applied in a variety of contexts, continuing to examine it in new contexts would support its ecological validity. Hence, the theory is being tested in the Swaziland context.

In Tibenderana, Ikoja-Odongo and Wokadala (2010), UTAUT is a combination of eight models of technology acceptance and use determination, thus using UTAUT was similar to using all the eight technology models in this study. UTAUT is believed to be more robust than any other technology acceptance theory in evaluating and predicting technology acceptance (Taiwo & Downe, 2013). The original UTAUT study focused on user acceptance of technologies that were newly introduced to capture the user's first perception changes with increased experience of using the technology (Akbar, 2013). It is on this strength that the UTAUT was selected as a theoretical framework to guide the study in identifying determinants of ICT integration in the teaching secondary school Agriculture in the context of Swaziland.

RESEARCH METHODOLOGY

The design of the study was a descriptive correlational survey employing a mixed method approach. Semi-structured interviews and survey questionnaire were used to collect data. Mixed-methods research is a flexible approach, where the research design is determined by what we want to find out rather than by any predetermined epistemological position. The combination of semi-structured interviews and the survey questionnaires was chosen as a comprehensive, holistic approach and integrating various aspects of the problem (Cresswell, 2013). The mixed method approach was meant to answer broader and more complex range of research questions as the study was not confined to a single method or approach (Leech & Onwuegbuzie, 2006).

Finally, the semi-structured interviews and the survey questionnaire were meant to converge both quantitative (broad numeric trends) and qualitative (detailed views) data, to better understand, identify and describe determinants of ICT integration in the teaching of secondary school Agriculture in Swaziland. Semi-structured interviews are generally organised around a set of predetermined open-ended questions with other questions emerging from the dialogue between interviewees. Semi-structured in-depth interviews are the most widely used interviewing format for qualitative research and can occur either with an individual or in groups (DiCiccon-Bloom & Grabtree, 2006).

The study used semi-structured interviews and the survey questionnaires for confirmatory and triangulation purposes. Further triangulation in the study was ensured by collecting data from different groups of key informants, that is (1) Agriculture Teachers, and the (2) key informants (Deputy Head teachers, Head teachers, Agriculture Inspectors, Curriculum designers, Curriculum evaluators, ICT inspectors and ICT teachers). In Sabina and Khan (2012); Todd (2011), and Ashatu (2009) triangulation is a process of verification that increases validity by incorporating several viewpoints and methods. In the social sciences, it refers to the combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct.

FINDINGS OF THE STUDY

Perceived complexity of ICT integration

Table 1 presents perceived complexity of ICT integration by Agriculture Teachers. Findings revealed that computers make teaching of complex concepts easy ($M = 4.92$; $SD = 1.07$) was ranked first, followed by computer use fits well in my curriculum goals ($M = 4.83$; $SD = 3.18$) while learning to use ICT in teaching is a challenge ($M = 3.17$; $SD = 1.38$). A critical look at the ranked order indicated that the ICT tools were less complex to use by the Agriculture Teachers while teaching.

Table 1: Complexity of ICT Integration by Agriculture Teachers (N=284)

Complexity items	Ranked complexity of ICT integration	
	M	SD
Computers make teaching of complex concepts easy	4.92	1.07
Computer use fits well in my curriculum goals	4.83	3.18
I have found ICT integration simple to use in teaching	4.33	1.23
Learning to use ICT in teaching is a challenge	3.17	1.38
Overall	4.31	1.72

Rating scale: 1= Strongly Disagree; 2 = Disagree; 3 = Slightly Disagree; 4 = Slightly Agree; 5 = Agree; 6 = Strongly Agree

Semi-structured interview

Key informants were of the opinion that fewer complexities are encountered in integrating ICT in teaching Agriculture in secondary schools. This was confirmed by the responses:

Age of teachers

"...With the old teachers it is more complex but the younger ones are more versatile or comfortable" "...I think one must say there are complexities in using ICT in teaching". : "...it is a challenge, though there are many alternatives to achieve same purpose". "...fewer complexities associated with ICT integration in teaching". "...fewer complexities as shown by the way teachers use it in my school" (Head teacher).

Frequency of technological changes

"... It is very hard for some to catch up as technology keeps advancing". "... therefore if frequency of practice is low, it becomes complex". "...it can also be influenced by basic courses undertaken and available devices within environment" (Inspector).

Compatibility of ICT usage

Table 2 presents opinions of Agriculture Teachers on the compatibility of ICT with the needs and their experiences. The rank order of ICT use indicators show that the seven indicators had Mean above average (3.0) starting with ICT is quick in meeting information needs (M = 5.02; SD = .87) to the last indicator that class time is enough to allow effective use of ICT (M = 4.05; SD = 1.36).

The overall mean of 4.49 and 1.16 standard deviation is an indication that in terms of compatibility, Agriculture Teachers agreed that there are features or parameters that positively influence ICT integration in the teaching of agriculture in secondary schools.

Table 2: Compatibility of ICT Use with Subject Needs in Agriculture (N=284)

Compatibility with the subject needs	Ranked compatibility of ICT use	
	M	SD
ICT is quick in meeting information needs	5.02	.87
Working with computers make me feel comfortable	4.83	1.09
I have found ICT use in teaching very convenient	4.82	1.12
Computer use suits my learners needs	4.49	1.16
Computers brought positive changes in my school	4.16	1.36
The subject I teach requires more ICT assistance	4.12	1.19
Class time is enough to allow effective use of ICT	4.05	1.36
Overall	4.49	1.16

Rating scale: 1= Strongly Disagree; 2 = Disagree; 3 = Slightly Disagree; 4 = Slightly Agree; 5 = Agree; 6 = Strongly Agree

Semi-structured interview

Key informants interview findings revealed that ICT integration is compatible with the basic requirements of the agriculture syllabus content. The findings are presented:

It allows well demonstration of real situations

"...it allows well demonstration of real situations such as draught effects on nature and the effects of weeds on maize fields". "...in the past we would draw diagrams on the board but with ICT you come up with perfect graphs and illustrations with ease" (Curriculum designer)

ICT philosophy is very compatible with the subject content

"...being a practical subject its philosophy is very compatible as videos can be used to demonstrate practical concepts such as breeding rabbits and demonstrate hydroponics farming". "...We demonstrate more practical landscaping, plants and pictures used" (Curriculum Evaluator)

ICT compatible with existing practices

"...ICTs are very compatible with existing practices in agriculture". "...agriculture uses real objects such as infestation of crops by a certain disease" (**Head teacher**).

ICT is relevant:

"...ICT is very relevant in the teaching of agriculture". "...it allows you to import ideas, information and models". "...the investigatory projects that use the ICT tools make it compatible with the subject". "... ICT help me to simplify some concepts in teaching" (**Inspector**).

DISCUSSION OF FINDINGS

Perceived complexity of ICT integration: Findings revealed that in terms of complexity, Agriculture Teachers found ICT integration in agriculture as difficult to understand and use. Complexities in ICT integration in teaching agriculture was associated with frequent changes in technology and the age of teachers. Similar sentiments were shared by Accuosti (2014) who concluded that it is difficult

to evaluate technology as an education tool due to its rapid evolution thus the complexities in integration experienced due to the frequent changes of innovations. Interview findings indicated the perceived complexity of ICT integration was associated with frequent changes taking place in technologies and ages of the Agriculture teachers. In their opinion, the older Agriculture Teachers find ICT integration in teaching as complex compared to the younger cohort.

Rogers (2003) defined complexity as the degree to which an innovation is perceived difficult to understand and use. However, it is negatively correlated with the rate of adoption. Thus, excessive complexity of an innovation is an important obstacle to its acceptance and use. Although Agriculture Teachers are motivated to integrate ICT in their practice, continuous training through in-service will eliminate complexities related to frequent advancements in technology.

Compatibility of ICT tools with the subject content, teachers' experiences and learners' needs: Findings indicated that there are parameters which positively influence ICT integration in teaching agriculture. The requirements of the agriculture syllabus were in line with the use of ICT devices and applications to support teaching and learning.

Interview findings with key informants revealed the following as indicative of the Agriculture syllabus content compatibility with ICT integration: (1) it allows demonstration of real situations, (2) ICT philosophy is compatible with the syllabus contents, (3) ICT compatible with the existing practices in Agriculture, and that (4) ICT is relevant in the teaching of Agriculture. Sharifzadeh, Abdollahzadeh and Shariff (2008) support the idea that ICT should be compatible with the subject and conclude that successful application of ICT requires improved awareness among development actors. Kennisnet (2013) in agreement with findings concludes that ICT integration depends on the digital content as an integral part of the subject matter.

Findings further revealed that Agriculture Teachers agree with the following ICT services: (1) ICT is quick in meeting information needs, (2) working with computers makes me feel comfortable, (3) I have found ICT use in teaching very convenient, and that (4) computer use suits my learners' needs. In their opinion, Agriculture Teachers acknowledged that computers have brought positive changes in schools and that agriculture requires more ICT assistance.

CONCLUSIONS

Conclusion 1: Findings of the study confirmed that ICT integration in agriculture is possible and feasible

Conclusion 2: ICT integration in teaching secondary school agriculture was associated with: (1) learner motivation, (2) involving learners, (3) improving illustration of concepts, improving learner performance, and facilitating quick access to information.

Conclusion 3: Agriculture Teachers believe that ICT integration is without effort. ICT integration is positively associated with low complexities of ICT tools and compatibility with the subject needs, teacher needs and values. ICTs are meeting information needs of learners.

Conclusion 4: The older Agriculture teachers are associated with the perception that ICT integration in teaching comes with difficulties and increase in complexity. Overall, older Agriculture teachers

believe that ICT integration in teaching requires effort, and therefore becoming complex. An increase in age of Agriculture teachers is associated with the perception that social influence and facilitating conditions support ICT integration in teaching.

Recommendations

1. Drawing from the findings and conclusions, it is recommended that The Education Sector policy should articulate clearly the role of ICT integration to enhance teaching and learning of modern Agriculture in Swaziland.
2. All pre-service teacher educational institutions should include ICT integration in teaching as one component in the curriculum. Learners who enroll in teacher training institutions are relatively young in age, thus are likely to benefit and become more competent practitioners in ICT integration
3. Agriculture teachers perceived ICT integration as consistent with their experiences, values and learners needs. It is recommended that Agriculture syllabus designers should incorporate use of ICT tools and devices in all the teaching materials sent to schools. Relevant storage devices must also accompany learners' textbooks as a digital copy of the learning material.

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