Explanatory Factors Associated With ICT Integration In Teaching Secondary School Agriculture: Case Of Southern Africa (Swaziland)

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ABSTRACT

As ICT continues to make head way in the Western countries, the African countries are lagging behind and this widens the gap in respect of North–South digital divide. The focus of this paper is factors associated with integration of ICT in the teaching of secondary school agriculture. This is a case study of Swaziland, a country in Southern Africa. The study adopted a descriptive survey research design. Population of study was a census of secondary agriculture teachers and employed a survey questionnaire. Data analysis employed descriptive statistics and regression. Findings established that teachers do occasionally use ICT tools in instructional delivery. Factors influencing ICT integration: 1) Digital proficiency in using ICT tools, 2) Social influence, 3) Sharing digital content with learners, 4) Possession of personal computer, and 5) Internet connectivity. It was recommended that teacher pre-service education should prioritize integration of ICT in the teacher preparation programme. School administrators should buy into Internet connectivity for their schools.

Keywords: ICT integration; Technology adoption; Secondary education teachers; Teaching Agriculture; ICT tools;

INTRODUCTION

In developing countries, the cost associated with adopting ICT to include acquisition of hardware and software, setting up telecommunication networks, and the maintenance and repair of facilities is often prohibitive. Generally, African countries have poor infrastructure to include unreliable transportation, limited electricity supply, and telecommunication facilities. This has a bearing on the institutions capacity to maintain Internet connectivity. The cultural context of ICT adoption, language barriers, and attitudes towards ICT affect the rate of adoption (Kinuthia, 2009). Perceived difficulty the integration of ICT in teaching and learning comes from the belief that technology use is challenging, implementation requires extra time, technology skills difficult to learn, and cost of attaining and maintaining resources prohibitive.

Education as the conduit for human development needs to take heed of the changes in job market place. It is critical that the current generation of learners must be well-prepared with ICT knowledge and skills for them to face the world of work in view of the development and usage of ICT. ICT has become an important component of education in many countries, developed and developing. ICT enhances teaching and learning process by increasing learners' motivation; the use of ICT in the classroom helps in explaining difficult concepts such that learner are able to easily understand those concepts (Alazan, Bakar, Hamzah &Asmiran,

2012).The integration of ICT in education can take several forms such as information and computer networks, digital content, Internet sites, and multimedia. In Alazan, Bakar, Hamzah &Asmiran (2012), ICT integration is defined as ICT use in classroom teaching; in vocational and technical education, ICT integration involves using instructional software in the course, making presentations, carrying out activities in workshops and/or application services.

Preservice teacher education has a critical role to play in the integration of ICT in the teaching and learning. In order to produce the kind of learner that meets the contemporary labour market dictates, it is necessary to transform schools of education into the 21st century learning organisations. In short, preservice teachers must be ICT literate and updated in pedagogic innovations. This requires time allocation, resources, and a comprehensive pedagogical, technological and organisational support system (Goldstein, Shonfeld, Waldman, Forkosh-Baruch, Tesler, Zelkovich, Mor, Heilwel, Kozminsky, Zidan, 2011).

In an endeavour to enhance student learning and achievement, many schools have jumped on to the bandwagon to engage in information technology (IT). This paradigm shift in thinking has culminated in many scholars engaged in unpacking what IT integration in teaching-learning means in the school context. The infusion of ICT in educational institutions has great implications for teaching and learning. The definition of ICT integration adopted in this paper is "the use of computing devices such as desktop computers, laptops, tablets, software, or Internet for educational purposes" (Hew & Tan, 2016).

In contemporary society ICT persists with over three billion people having access to the Internet (Williams & Gift, 2016) ; with about 8 out of 10 Internet users owning a Smartphone, information and data are increasing by leaps and bounds. "This rapid growth especially in developing countries, has led ICT to become a keystone of everyday life, in which life without some facets of technology renders most clerical, work and routing tasks dysfunctional" (Williams & Gift, 2016). Of the 4.3 billion people not yet using the Internet, 90% live in developing countries. However, it is worth noting that Internet use is growing steadily at 6.6 % globally in 2014 (3.3%) with 8.7% in developed countries and 8.7% in developing countries, Internet users in developing countries doubled in five years (2009-2014), with two thirds of all people online now in the developing world (Williams & Gift, 2016). In the Sub Saharan Africa (SSA) where ICT use in teaching and learning is deemed important, the integration is not fully utilised as expected and experienced in the developed countries.

ICT Integration in Sub-Saharan Africa (SSA) school context
Including Swaziland, Governments in SSA are prioritising teacher development as critical in effectively implementing policy and curricula, using ICT to enhance teaching and learning and thus raising educational standards. In SSA, schools are increasingly being equipped with computers for teaching, learning and administrative purposes; connectivity is improving and learner enthusiasm is on the rise. Selected SSA countries are developing digital content in the respective subject areas. However, the major impediment to integration in the SSA context, including Swaziland, is treating ICT as a discrete subject in the form of computer science or information technology in the assessment by the local examination boards.

While developed countries have reported up to 41% integration of ICT into teaching and learning, the proportion remains substantially low in Africa. Singapore established four stages for ICT integration in education: Firstly, envision the future, secondly, develop country master plan, thirdly, implement initiatives and lastly evaluate and adapt Government policy for educational transformation (Nchung, Sakwa & Mwangi, 2013). In Swaziland, the use of ICT in many settings is increasing rapidly. As a result, ICT education has become basically every

society's effort to teach people under various settings because people need valuable knowledge and skills about computing and communications devices, software that operates them, applications that run on them and systems that are built with them (Dlamini & Dube, 2014).

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical foundation

Key to factors associated with theorised ICT integration is Perceived Usefulness (PU) and Perceived Ease of Use (PEU) of ICT product use. Perceived usefulness is a primary determinant and perceived ease of use is a secondary determinant of people's intention to use computers (Davis, 1989). Technology Acceptance Model (TAM) points out that perceived ease of use and perceived usefulness affects the intention to use. Perceived ease of use is defined as the extent to which a person believes that using a particular system would be free from effort and perceived usefulness as the degree to which a person believes that a particular system would enhance his/her job performance (Davis, 1989). This paper is about integration which connotes a sense of acceptance within the user environment. The TAM has been applied in developing countries. Ease of use is a major constraint for the adoption and use of the Internet innovations in Kenya (Gode, Obegi & Macharia, 2013).

Teacher characteristics

Most pre-service teachers entering college have basic ICT skills from high school and positive attitudes towards ICT integration in teaching and learning (Goldstein, Shonfeld, Waldman, Forkosh-Baruch, Tesler, Zelkovich, Mor, Heilwel, Kozminsky, Zidan, 2011). Pre-service teachers are exposed to ICT integration in courses offered in colleges, but mostly to traditional approaches while innovative models of ICT integration, e.g. collaborative learning, inquiry, web-based synchronous and asynchronous.(Successful integration of ICT in teaching and learning is largely depending on the availability of ICT infrastructure and teachers' adoption and embracing it (Mathipa & Mukhari, 2014). Teacher competency is a key and indispensable factor to ensure successful use of ICT in the teaching and learning environment. Teachers are expected to be digital competent to cope with the 21st century skills enabling them to produce learners to create and share higher order thinking skills, collaborate with other learners, and manage and control their own learning (Mathipa & Mukhari, 2014). One major challenge identified in developing countries pertaining to adoption of ICT in schools is inadequate IT professionals with education professional qualifications. To harness ICT for school purposes requires sustained investments in supporting training of teachers. Successful integration of ICT into the classroom depends on the ability of teachers to structure learning environments in non-traditional ways, merging technology with new pedagogies.

School management

In the experience of Israel, most leaders in the colleges of education do not cooperate in giving ICT giving ICT top priority nor is there strategic planning or allocation of resources (Goldstein, Shonfeld, Waldman, Forkosh-Baruch, Tesler, Zelkovich, Mor, Heilwel, Kozminsky, Zidan, 2011). Over and above teacher competency and positive attitude, adoption and use of ICT in schools require visionary leadership. School leaders as well as teachers need to be knowledgeable about the potential ICT presents in teaching and learning. If this knowledge is missing, formulated government policies and ICT investments made in the school, opportunities are missed to meet desired school reforms and goals (Mingaine & Skill, 2013). Information technology will easily and smoothly be implemented in schools if the Principal actively supports, learns as well, and provides or supports adequate continuing professional development Afshari et al. (2012). In essence, Principals are key determinants in the implementation and integrating of ICT.

Digital proficiency in the use of ICT tools
In Afshari et al. (2012) high levels of skill and knowledge proficiency of ICT would produce higher levels of technology integration among teachers. Afshari et al. further postulated that teachers with higher levels of ICT skill and knowledge would exhibit higher levels of technology integration in the classroom.

Social influence
In Liu and Kotsiwa (2013), social influence is a situation in which an individual considers using a particular technology because of other people's suggestions. Furthermore, social influence connotes the individual's internalisation of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations. Afshari et al. (2012) found that computer use in the classroom was closely associated with administrative support and peer support. In Kurga (2014) one potentially important contextual factor which shapes how technology is perceived and used by teachers is the community of practice associated with their subject.

Sharing digital subject matter content with learners
When learners know the benefits of engaging in technology, they are likely to be motivated and become frequent users of ICTs. This connotes that teachers must be competent users of technology to create platforms where information sharing can occur with learners. In Divaharan and Ping (2010) successful learning organisations, to include school, need a curriculum overarching ICT goals to provide clear direction to the key players: teachers, head of departments, ICT teachers, and learners.

Possession of personal computer
Possession of a personal computer indicates a positive attitude towards ICT integration in teaching secondary school agriculture. Ang'ondi (2013) asserts teachers who are said to have bought own personal computers in an attempt to curb the problem of inadequate ICT resources in their respective school spend more time after working hours on their school work for the benefit of learners.

Internet connectivity/availability
Alabi (2016) presents the following as barriers to ICT integration: Access to appropriate ICT equipment, lack of time for training, exploration and preparation negative attitude towards ICT, ICT anxiety, lack of ICT technical support, administrative, and instructional support, and most importantly lack of infrastructure, Internet connectivity.

Teacher work load, age, gender, and digital divide
In Kinuthia (2009) states that in many instances teachers believe that using computers deprives learners of time needed to study for their national examinations and that computers disrupt the traditional structure of the classroom. Among other things, teacher workload is a factor influencing adoption of ICT infrastructure in teaching and learning (Gode, Obegi & Macharia, 2014). Heavy teacher workload occasioned by high class enrolment as well as level of education to include computer prior experience influence perceived ease and perceived ease of use (Longe, Boateng, Longe & Olatubosun, 2010).

Age and gender are non-manipulative factors at teacher level. Computer anxiety is often highlighted as the fundamental problem behind the digital divide (Abbiss, 2008). There are contradictions in research about the influence of gender on the use of ICT (Jones, 2004). Age can influence the uptake of ICT for teaching (Prensky, 2001). There is a distinction between ICT natives, born in a digital world, and digital immigrants who have to learn the digital

language and for whom ICT will always be a second language (Andoh, 2012). Other than age and gender, the teaching subject matter influences ICT use. School subject culture are built on deep traditions and these need to considered in ICT usage as embedded in the school curriculum.

Teacher adoption and integration of ICT into teaching

Increased workload coupled with teaching with technology is critical to the participants (Ang'ondi, 2013). Factors reported contributing to increased workload were constant upgrades, student emails, the learning of new skills and continuous search of sustainable strategies. A computer coordinator noted that increased workload of teachers was alarming; on asking them to take on board yet another task an already overcrowded curriculum and extremely busy workday is pushing many teachers to the limits and beyond.

A study conducted in Kenya determined five themes on teachers' attitude and perceptions on the use of ICT in teaching and learning (Muhammed, 2010), namely: ICT infrastructure, knowledge and skills, attitudes and beliefs, and the curriculum. The study reported that ICT resources were inadequate and this was the reason most of the teachers did not have time to use the ICT room. Teachers lacked the skills to manage an ICT integrated class. Other teachers felt ICT integration in teaching was an additional bother to their already so huge burden. Lastly teachers felt that school curriculum is loaded with too much work against the backdrop of little time allocation to the extent that teachers have to find extra time to complete the syllabus. This naturally discouraged teachers to use ICT which they claim is time consuming.

Constraints encountered in the integration of ICT in the teaching of agricultural education in Nigeria were identified: (a) inadequate funding, (b) lack of motivation, (c) poor staff development, and (d) inadequately trained ICT compliant teachers (Eickelmann, 2011). ICT can be a powerful catalyst in improving teaching and learning for all and that they should play part in broadening access to ICT and engaging by empowering learners and teachers to see technology in creative and innovative ways. Educators' knowledge and willingness to adopt ICT is often associated with sociological factors such as age and teaching experience in using ICT. Supportive and hindering factors to a sustainable integration of ICT in schools were identified as the way Principals perform as school leaders and how ICT use meets the pedagogical aims (Alabi, 2016).

STATEMENT OF THE PROBLEM

Africa, in particular Sub Saharan Africa (SSA), does not have the infrastructure or the skilled manpower to ICTs adoption and integration into teaching and learning. Learning opportunities provided by the increasing use of technology in classrooms are not being harnessed in schools (Zwane & Dlamini, 1999). Integration of ICT depends on the availability of ICT infrastructure and teacher competence is the key factor indispensable. In spite of the availability of computer laboratories and other ICT tools, teachers expressed various issues impeding the use and integration of ICT (Dlamini & Dube, 2014). In the Sub Saharan region, integration is not fully embraced as expected and experienced in developed countries. In Swaziland adoption and integration of ICT is at the infancy stage. Factors associated with ICT integration in teaching agriculture at secondary schools have been inadequately documented and determined in Swaziland. The research question:

What factors are associated with ICT integration in teaching secondary school agriculture in the Swaziland context?

Purpose and objectives: The purpose was conducted to determine factors associated with ICT integration in teaching secondary agriculture in the Swaziland context, a developing country in Southern Africa. The objectives were to: 1) Describe ICT integration by agriculture

teachers in teaching secondary school agriculture in the Swaziland context; 2) Identify explanatory and predictor factors associated with ICT integration in teaching secondary school agriculture in the Swaziland context

METHODOLOGY

Research design*:** The study was a descriptive survey research design. Descriptive survey research is intended to produce statistical data about aspects of education that interest educators and policy makers. It is an approach of collecting information by using a survey. Descriptive surveys are designed to secure information on the current status of a phenomenon **Population:** The target population were agriculture teachers *(N=*312). A Census study was conducted, therefore, all agriculture teachers, both Modern Agriculture and Pre-Vocational Agriculture, were included in the study. About 284 out of 312 agriculture teachers returned usable questionnaires for analysis. ***Instrumentation: Questionnaire was used for data collection. Development of the questionnaire was guided by literature review and semi-structured interview data collected in Phase I. ***Validity*:** Survey questionnaire was validated for relevance of content by a Panel of ICT experts with experience in the teaching and learning environment. ***Reliability*** of the questionnaire was computed after pilot tested with forty (40) final year Bachelor of Science in Agricultural Education students at the University of Swaziland and coefficient was $r=.85$. ***Data collection and analysis*:** The survey questionnaires were delivered to respondents and collected on agreed dates. All questionnaires were coded to allow follow up on non-respondents. The Statistical Package for Social Science (SPSS) version 20.0 was used for data analysis. An *a priori* probability of $p \leq .05$ was established to determine the level of statistical significance. Descriptive statistics were used for analysis. Multiple regression procedures were employed to identify explanatory and predictor factors associated with ICT integration in teaching secondary school agriculture curriculum.

FINDINGS AND DISCUSSION

Findings

Objective 1: ICT integration by agriculture teachers in teaching secondary school agriculture

Means (M) and standard deviation (SD) values were computed for each item (Table 1). For purposes of interpretation of the rating scale denoted as follows: **00-99 to 2.99=*Do not use, Very rarely, Rarely*** and **3:00 to 5:00= *Occasionally, Frequently, Very frequently***. Items in the first category are**: 1)** Prepare tests using Word processing (3.52), and **2)** Search information through Internet for use in teaching (3.44). The remainder of the items fall in the second category.

Table 1:
Agriculture teacher engagement in ICT integration teaching at secondary school (N =284)

	Item	Extent of Use	
		M	SD
1	Prepare tests using Word processing	3.52	1.73
2	Search information through Internet for use in teaching	3.44	1.49
3	Search Internet for journal articles	2.22	1.76
4	Prepare teaching time table on computer	1.99	2.08
5	Use a digital camera to take pictures for lessons	1.20	1.52
6	Use a scanner to copy pictures or text	1.20	1.49
7	Keep enterprise records on a computer	0.99	1.54
8	Use mobile phone to disseminate information to learners	0.81	1.29
9	Prepare lesson plan using a computer	0.79	1.42
10	Access information on CD for teaching	0.71	1.16
11	Prepare power point slides for teaching	0.70	1.39
12	Use video clips to teach concepts	0.57	1.14
13	Use an overhead projector for teaching	0.50	1.17
14	Distribute information on flash drive to learners	0.50	1.07
15	Give assignment to learners using Internet	0.47	1.01
16	Use e-mail to send electronic materials to learners	0.44	0.64
17	Use a tape recorder for teaching	0.20	0.68
18	Use a radio in class for teaching	0.14	0.54
	Overall	**1.13**	**1.28**

Rating scale: **0** = Do not use, **1**= Very rarely (*once a month*), **2** = Rarely (*2-3 times a month*), **3** = Occasionally (*2-3 times a week*), **4** = Frequently (*almost every day*), **5** = Very Frequently (*every day*)

Objective 2: Factor associated with ICT integration in teaching secondary school agriculture

In Table 2 R^2 values indicate the amount of variance explained by independent variables, while R^2 change values present the amount of variance explained by individual independent variables. Beta values indicate the relative importance of the variables in explaining or predicting variance on the dependent variable (Du Plessis 2010). Five variables were found to explain and predict ICT integration in teaching agriculture, Key variables were: (i) Digital proficiency in using ICT tools in teaching, (ii) Social influence, (iii) Sharing digital subject content with learners as notes, (iv) Owning a personal computer, and (v) Internet connectivity in the school (Table 2).

The cumulative variance (R^2) in ICT integration explained by the independent variables was 31%. Digital proficiency of the teacher explained 14% with a beta value of .56. Adjusted R^2 measures the proportion of the variation in the dependent variable accounted for by the explanatory variable. Therefore, even though the residual of sum of squares decreases or remains the same as new explanatory variables are added, the residual variance does not change. Hence, adjusted R^2 is considered a more accurate goodness-of-fit measure of R^2. Adjusted R^2 confirms the independent variables account for 31% of the variance on dependent variable (Figure 2)

Table 2:
Explanatory and predictor factors associated with ICT integration in secondary school agriculture

Factors of ICT integration	R	R²	R² change	B	B	t-value	P
1. Digital proficiency in using ICT tools in teaching	.38	.14	.14	.56	.38	6.81	.00
2. Social influence	.46	.21	.07	.23	.27	5.04	.00
3. Sharing digital subject content with learners using ICT tools	.51	.26	.05	.45	.23	4.14	.00
4. Possession of personal computer/laptop	.53	.29	.03	.30	.17	3.23	.00
5. Internet connectivity at school	.56	.31	.02	.24	.16	3.04	.00
Constant .88							

$P \leq .05$

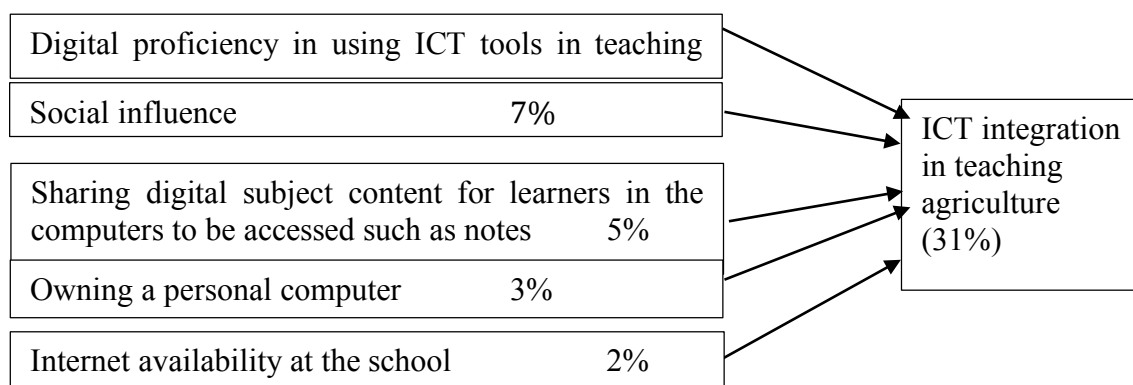Adjusted R^2 = .29; Standard error = .15

Figure 2: Explanatory factors associated with ICT integration in teaching secondary school agriculture

DISCUSSION OF FINDINGS

Objective 1: ICT integration in Teaching Secondary School Agriculture: Agriculture teachers occasionally use ICT tools in preparing tests. Furthermore ICT tools are also used in searching information on the Internet for use in teaching. These activities are occasionally (2-3 times a week) carried out. Teachers were not frequently engaged in ICT integration related tasks in their teaching. Other ICT integration related activities rarely engage in include: 1) preparing teaching time table using computers, 2) using digital camera to take pictures for lessons, and 3) using scanners to copy pictures from books.

Agriculture teachers rarely (once a month) keep enterprise records on computers, use mobile phones for dissemination of information to learners, preparing lesson plan using computers, accessing information on CDs and preparing power point presentations. These activities are tied to the use of computers. The use of radio, audio, tape recorder, e-mails electronic transmission materials to learners such as giving assignment to learners using Internet was rarely performed. ICT integration at school exist in three levels Adeyinka, Adedeji, Majekodunmi, Lawrence and Ayodele (2007): (1) learning about computers for basic computer literacy, (2) learning from computers- that is, use as transmitters of knowledge, and (3) learning with computers when learners construct knowledge by designing and creating their own representations of knowledge through mindful and challenging learning situated in realistic and meaningful context; this is generative use of computers. Findings were consistent with the Adeyinka, Adedeji, Majekodunmi, Lawrence and Ayodele (2007) that Word Processing

and e-mail promote communication skills; database and spreadsheet promote organizational skills; and modelling software promotes understanding of Science and Mathematics concepts; agriculture is an applied science.

Objective 2: Explanatory and Predictor factors associated with ICT Integration

Digital proficiency in using ICT tools in teaching: This variable accounted for 14% of the variance on ICT integration in teaching secondary school agriculture. Teachers are expected to be conversant with ICT integration to reach a stage where learners would create new knowledge responding to problems in their locality. ICT integration in teaching starts with the teacher making the teaching-learning activities learner-centred. As regard ICT integration in the classroom, teachers were found to be skilled in Microsoft Excel, digital video and animation, and simulation (Alazan, Bakar, Hamzah & Asmiran, 2012). The teachers' level of ICT skill was found to be moderate. The teachers' proficiency in using ICT tools (hardware, soft-ware & networks) are consistent with Bhattacharjee and Deb (2016) that knowledge of ICT is required in teacher education training programmes, because it helps a prospective teacher to know the world of technology for the betterment of learners. Similar findings were found with high levels of skill and knowledge proficiency of ICT producing higher levels of technology integration reflected on positive student achievements (Afshari et al. (2012). Teachers with higher levels of ICT skill, knowledge, and tools exhibit higher levels of technology integration Afshari et al. (2012).

Social influence: In this study social influence explained 7% of the variance on ICT integration. Social influence was measured using administrative support and community of practice. In this study administrative support was important for ICT integration. The community of practice among members is important in promoting frequent use of ICT tools. Teachers and learners are expected to be actively involved in technologies that promote learning in solving problems. Social influence it was confirmed is a variable explaining and predicting ICT integration (Divaharan & Ping, 2010).

One potentially important contextual factor that shapes technology is perceived and used by teachers is the community of practice associated with their subject (Divaharan & Ping, 2010). Divaharan and Ping (2010) stated that besides infrastructure and hardware support, support from administrators and colleagues seemed an important motivating factor for teachers.

Computer use in the classroom is highly associated with administrative support and peer support Afshari et al. (2012*)*. Faculty's belief in their computer competence was the greatest predictor of computer use in the classroom. In this study social influence was found to be one of the predictors of ICT integration in teaching secondary school agriculture. This confirms teachers need support from school administrators and peers.

Sharing digital subject matter content with learners: This accounted for 5% on ICT integration in teaching. Teachers use ICT tools to make learning materials accessible to learners. When learners know the benefits of engaging in technology, they are motivated. This predictor implies that teachers must be competent users of technology to create platforms where information sharing can be done with learners. Successful learning organizations, to include schools, need a curriculum focused, over-arching ICT goals to provide clear direction to key players, such as teachers and school administrators. This connotes that the whole school must have a plan for the integration of ICT.

Possession of a personal computer: In some schools it was determined that teachers were making personal investments in purchasing personal computers. Owning a personal laptop

accounted for 3% in ICT integration in teaching. Ang'ondi (2013) observed that many teachers are said to have bought their own personal computers to and curb the problem of inadequate ICT resources in their schools. Possession of a personal computer indicates a positive attitude towards ICT (Divaharan & Ping, 2010). In the context of Swaziland, the majority of agriculture teachers are reported to own personal computers.

Internet connectivity in schools: Internet connectivity in schools accounted for 2% in ICT integration. Internet is mostly used by teachers and learners to search for new information. There was a positive relationship between the usefulness of Internet for learning and teachers' willingness to interact with learners (Nyembezi, & Bayaga, 2015). Internet connectivity is a major setback in Swaziland in respect of ICT integration. The majority of agriculture teachers are in schools with no Internet connectivity. In Swaziland, the urban secondary schools are benefitting from unlimited Internet connectivity. This challenge is largely caused by service providers not prioritizing rural schools and concentrating on urban situated schools.

CONCLUSION AND RECOMMENDATIONS

Overall Conclusion

Teachers demonstrate some understanding of selecting appropriate hardware and software to make a lesson more meaningful to learners. ICT integration occasionally occurs in teaching secondary school agriculture. Agriculture teachers are moderately engaged in ICT integration activities. They are aware that ICT integration in teaching is not practical unless the subject matter content is digital. Agriculture teachers possess the knowledge of using various hardware and software for integration. As ICT integration is an instructional delivery strategy, teachers are aware of the potential benefits of using ICT to improve learning outcomes.

Teacher preparatory programmes must be redesigned to equip prospective teachers with digitisation competencies in ICT integration. Establishment of clear goals for pre-service teacher education concerning the important ICT skills is necessary to teach agriculture in the 21st century. Furthermore, the in-service teacher education sub-sector should be strengthened revamping aspects of ICT integration in teaching as an instructional delivery strategy. In-service training should infuse components of ICT integration.

Digital proficiency: ICT integration is linked to digital proficiency of the teacher in using ICTs. Agriculture teachers are expected to be proficient users of technologies. Agriculture teachers possess basic ICT integration competence acquired from the pre-service teacher preparatory programme. It is recommended that the National Curriculum Centre, producing and publishing teaching and learning materials, should be redesigned to include digitization of teaching materials.

Social influence: Social influence is a factor associated with ICT integration among the four major constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT), namely: (1) Performance expectancy, (2) Effort expectancy, (3) Social influence, and (4) Facilitating conditions; social influence is a greater factor associated with ICT integration in teaching secondary school agriculture in the Swaziland context. Social aspects speaking to ICT integration must be strengthened. Parental support can be engaged to exploit the full advantages of social influence in schools motivating teachers towards ICT integration.

Possession of a personal computer: ICT integration in teaching requires teachers to spend time using computers searching for information thus possession of a personal computer is of significance. Personal computers may either be at the workplace or at home to allow more time

on the computer. Possession of a personal computer is indicative of high level of commitment on the part of teachers.

Internet connectivity in the school: The Internet is a major element of the infrastructure for ICT integration. The Internet is used to search for new information to support teaching and learning. Internet connectivity was a significant variable in explaining and predicting ICT integration, thus a factor associated with ICT integration. Many schools do not have Internet connectivity to develop innovative approaches and adopt latest technologies.

Overall Recommendations

Continuing professional development workshop or in-service training must be redesigned to enhance teacher proficiency in the use of ICT tools and integration. This will keep teachers digitally competent. This is necessitated by the findings that digital proficiency in using ICTs explains and predicts ICT integration in teaching.

Schools should partner with business and industry as well as government development partners to mobilize ICT resources to revamp secondary schools with ICT tools. Student to computer ratio should be reduced to facilitate learning and effective acquisition of ICT skills.

School administrators must be equipped with strategies to support ICT integration, promotion of community of practice among teachers must be fostered with ICT tools availability in schools with school administrators taking the leadership role.

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