Lecturers' Competencies in Information and Communication Technology (ICT) for Effective Implementation of ICT-Integrated Teaching and Learning in Textiles and Clothing Degree Programmes

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ABSTRACT The disruptive and rapid changes that technology is undergoing means that university lecturers must be increasingly prepared in order to remain up-to-date with knowledge. This paper is a qualitative case study that explored the extent to which lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning. The participants of the study were purposively sampled from the Textiles and Clothing department, comprising eight lecturers. In-depth interviews and observations were used to generate data. The results obtained indicate that lecturers had both limited ICT knowledge and skills for use in their teaching practice. It was concluded that lecturers lacked adequate technological-pedagogical-content knowledge essential for teaching in the digital society. Based on the findings of the study, the paper recommends the need for universities to strengthen the technological-pedagogical-content knowledge of lecturers through continuous professional development in order to implement ICT in a critical way.

INTRODUCTION

The importance of technological-pedagogical education in the economic development of Textiles and Clothing industry in Zimbabwe and worldwide is dramatically growing. As a result, Zimbabwe introduced technical degree programmes such as Textiles and Clothing in universities of Science and Technology for the development of a productive society. Zimbabwe's aim in implementing technical degrees in universities after independence was also based on the premise that after graduation, students would contribute immensely towards the economic growth of the country through the acquired technological skills (Zengeya 2012). Textiles and Clothing programmes focus on the study of every aspect related to the design and production of the textile products as well as the functions of distribution and retail operations to the end users (Kent-Onah and Mastamet-Mason 2013). The demands on the teaching of such programmes in universities, necessitated by globalisation, are that the programmes should not only provide

students with simply the necessary cognitive skills but also equip them with practical and technological competencies for working in a knowledge society. The technical training system is informed by the skills obligatory in the workplace at a time when digital competencies are key elements in the makeup of the economic and social context of work in the knowledge society. Therefore, to be able to work effectively in the digital workplaces, Textiles and clothing programmes need to continuously provide students with new technologies capable of rapidly adapting to a fast changing work environment and ensuring they are prepared to respond to the unpredictable demands of the sector. As has been observed by Marshall (2009), today's textiles and clothing designers may be expected to design different brands for different cultures, present work in just one fashion city and sell to stores in other continents. With such a scenario, it is necessary for textiles and clothing students to be well educated in the nuances of the growing global markets, sub-cultures and a variety of information and communication technologies.

The Textiles and Clothing industry's uncertain future and the complex demands placed on

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designers are affecting the teaching and learning of textiles and clothing programmes (Nyoni 2015). It follows that universities that prepare students for careers in textiles, clothing and design should provide an environment that not only exposes students to traditional technologies but also integrates all forms of technologies into all teaching and learning processes so that students become comfortable in a digital environment. By integrating technologies in all areas, programmes aim to prepare students to succeed in the evolving global industry while having the ability to synthesise their practice in order to create products. As has been observed by Moodly and Drake (2016), the inextricable relation of ICT to the quality of education cannot be trivialised in teaching and learning should a country seek to remain internationally competitive.

It has been reported by Srivastava (2014) that by 2017 around sixty-nine percent of the world's population is expected to use a range of ICT devices. Reflecting global trends, technological device penetration in Zimbabwe as in March 2016 reached around fifty percent (Gambanga 2016). Given the availability of technological devices, universities in Zimbabwe made initiatives to take the valuable benefits of these technologies to enhance the practice of teaching and learning in universities to meet the needs of a generation for whom ICT devices are becoming an integral part of their everyday. The Zimbabwe Research and Education Network (ZimREN) was instituted to put in place a robust fibre-optic backbone devoted to academic and research activities in institutions of higher learning (Ministry of Higher and Tertiary Education Strategic Plan 2010-2016). It cannot, however, be assumed that the provision of technological infrastructure will somehow cause lecturers to use ICT successfully to enhance their teaching and student learning. Chikwature et al. (2016) established that the traditional teaching methods were still dominant and the use of ICT is poor among lecturers in tertiary institutions in Zimbabwe. While in Zimbabwe the number of graduates from universities has increased since five years ago, this has not transformed into positive economic development (Dzidonu 2010). These graduates were reported by Dzidonu (2010) to be technologically unrefined resulting in severe technological skill deficiencies in textiles and clothing industries. Lack of critical technological competencies among graduates in Zimbabwe was highlighted by Zhan-

gazha (2014) who attributed it to poor use of ICT during student training.

Renowned academics have bemoaned the skills and competencies the lecturers possess for them to implement ICT integrated teaching and learning effectively in university teaching (Majoni 2014). Due to economic and political uncertainty in Zimbabwe, a large number of trained and well experienced academic staff left Zimbabwe since 2008. The exodus of highly experienced professionals left universities with critical shortages of human resources. Though efforts have been made by the Ministry of Higher and Tertiary Education to retain teaching staff through the human resources retention schemes and intellectual home link facility, reports show that the country still continues to experience skill loss to neighbouring countries due to political and economic instability (The Herald 2015). Given the depressing economic environment, it could be argued that it is unsurprising that the lecturers who were hired to replace the ones who left were either Bachelor or Master Degree holders who were inexperienced to manage and effectively implement ICT integrated teaching and learning in universities. ICTs have brought about major changes in the way teaching and learning is approached in universities. This, in turn, has led ICT competencies among teaching staff to be considered as a means of achieving in graduates a greater chance of success in the scientific and professional fields where they will develop their professional activity (Mohammadyari and Singh 2015). In the light the above, this paper argues that the way lecturers implement ICT integrated teaching depend on the competencies they possess in relation to ICT.

Research Question

This paper was guided by the following research question:
• To what extent do Textiles and Clothing lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning?

Theoretical Framework

The Technological-Pedagogical-Content Knowledge (TPACK) framework was used in this paper to help analyse the knowledge and skills

possessed by lecturers to effectively integrate ICT in their teaching. As introduced by Mishra and Koehler (2006), the TPACK framework consists of seven different knowledge areas which are Technology knowledge (TK), Content knowledge (CK), Pedagogical knowledge (PK), Pedagogical Content knowledge (PCK), Technological content knowledge (TCK), and Technological Pedagogical Knowledge (TPK). TK refers to an understanding of the way technologies are used in a specific content whereas CK may be defined as a thorough grounding in subject matter or command of the subject. PK includes "generic knowledge about teaching approaches, methods of assessment and knowledge of different theories about learning" (Mishra and Koehler 2006: 1026). According to Ottenbreit-Leftwich (2010), PCK is knowledge about how to combine pedagogy and content effectively whilst TCK is the knowledge about how technology may be used to provide new ways of teaching content. TPK is made up of generic knowledge regarding how technology can be used for general pedagogic aims (Colvin and Tomayko 2015). These six components come together to form the seventh component which is the TPACK from which the name of the framework was derived. TPACK, therefore, synthesises knowledge of each of the bodies of knowledge described above with a focus on how technology can be uniquely crafted to meet pedagogical needs of certain content in specific contexts (Koehler et al. 2011). It includes an understanding of the intricacy of relationships between students, teachers, content, practices and technologies. All the knowledge areas of TPACK described above are considered within a particular contextual framework and are thus interrelated.

METHODOLOGY

The intention of this paper was to take the emic approach to understanding the extent to which lecturers' competencies in ICT support effective implementation of ICT integrated teaching and learning. One university of Science and Technology in Zimbabwe was selected as it was found to be the only university offering programmes related to the design of textiles, clothing and fashion products. The qualitative approach accompanied by an intrinsic case study was used as it enabled the researchers to study the participants in their natural settings. Purpo-

sive sampling was used to select participant who comprised eight lecturers including one head of the textiles and clothing department. In-depth interviews and observations were used to generate data for the study. During in-depth interviews and observations, the researchers used the three components of the TPACK namely technological knowledge, technological content and technological-pedagogical knowledge. This was done to determine the extent to which lecturers had developed competencies necessary for effective implementation of ICT integrated teaching. The data obtained were analysed for content using thematic analysis after coding. In this method, data analysis was determined deductively using the research questions and inductively through multiple readings and interpretations of raw data.

RESULTS

The data obtained are presented according to sections that include biographical data, and the extent to which lecturers' competencies in ICT support effective implementation of ICT-integrated teaching and learning in Textiles and Clothing programmes.

Biographical Profiles of Participants

Table 1 presents the biographical profiles of the participants who consisted of eight lecturers including one head of the textiles and clothing department. The biographic profiles were used to obtain insight into the educational and professional experiences of the participants that assisted in the discussion and interpretation of findings. The data showed that most lecturers possessed a Master qualification and none of them had a post-graduate certificate in higher education. Most lecturers indicated that they had ICT skills which they obtained during their Master degree studies and workshops focussing mostly on basic ICT skills like Microsoft word, Excel, PowerPoint and Publisher. These participants also indicated that these basic skills were just general and not related to the teaching of the Textile and Clothing programmes. The data showed that lecturers had never come across ICT training related-teaching with a range of ICT in Textiles and Clothing programmes. The biographical profiles of the participants are used in the discussion section to interpret findings related to the competencies of lecturers.

Table 1: Biographical profiles of lecturers

Participant code	Gender	Age in years	Qualifi-cation	Area of speciali-sation	Post- graduate certificate in higher education	Teaching experi-ence in years	ICT training
TCL1	Male	35	Master's degree	Textiles Technology	No	5	Computer Aided Design course as part of Masters qualification
TCL2	Female	51	Master's degree	Nutrition	No	29	2-day workshop on Ms Power Point and Excel
TCL3	Female	42	Master's degree	Textiles and Clothing	No	27	Master course covering Microsoft Excel, Word, Power Point, Publisher and access
TCL4	Female	39	PhD	Textiles and Clothing	No	16	Master course covering Microsoft excel, word, Power Point, publisher and Access
TCL5	Female	54	Master's degree	Textiles and Clothing	No	29	2 days workshop on Ms Power Point and Excel
TCL6	Male	46	Bachelor's degree	Art and Design	No	16	Master course covering Microsoft excel, word, Power Point, Publisher and Access
TCL7	Female	39	Master	Textiles and Clothing	No	16	Masters course covering Microsoft Excel, Word, Power Point, Publisher and Access
TCL8	Female	55	Master	Textiles and Clothing	No	More than 20 years	2 days workshop on Microsoft office packages

The Extent to Which Textiles and Clothing Lecturers' Competencies in ICT Support Effective Implementation of ICT-integrated Teaching and Learning

With respect to the nature of the competencies, the data generated revealed the following results which are presented and discussed under categories of the TPACK framework such as basic technological skills, technological content knowledge and technological pedagogical knowledge.

Beliefs of Lecturers

It was evident from the data that lecturers were optimistic towards implementing ICT inte-grated teaching for they indicated that they had "positive feeling towards using ICT but the resources available at the University were barring them from using ICT effectively." Lecturers took the views that there were a number of courses within the textiles and clothing programs which could benefit through the use of ICT but were still being done by manual methods like pen and pencils as quoted; "ICTs are very useful especially in courses such as Fashion Illustration for they are best handled with ICT but there are no ICT that have been bought by the University for these courses." This suggests that lecturers had positive beliefs towards implementing ICT inte-grated teaching and learning as they indicated that the ICT were beneficial to Textiles and Cloth-

ing teaching and learning. However, the tools available limited them from teaching effectively using a variety of ICT.

Basic Technological Skills

As evidenced from the observation during teaching sessions, lecturers were able to use basic Microsoft Office package like Word processer, spreadsheets and PowerPoint. The following excerpt suggested that lecturers came across the basic skills of operating computers when they were doing their undergraduate and Master degrees in the late years of 2007 and 2009 respectively, "During my Master studies, there was a three-month course focusing on Power-Point, Word, Excel and Publisher only. It was not advanced, it was just general." This suggests that after obtaining their Master qualification, most lecturers had never done any other relevant upgrading course. Those lecturers who completed their Master's degree around 2011 displayed vast knowledge on the use of ICT software as confirmed by the following excerpt; "I have no problems using ICT software for designing like CorelDraw but my greatest challenge is on using other software for teaching purposes." All the above excerpts indicate that most lecturers possessed basic technological skills like using Microsoft word and searching on the internet. For teaching, most lecturers were able to use PowerPoint for presentation only.

Technological Content Knowledge

There were mixed responses from the lecturers on how content can be changed by the application of technology as they alluded to the fact that so much has changed since the time they trained from colleges and universities and the content they learnt was outdated as reflected by the following excerpt; "When we got training from college and then university, the content was related to the use of manual machinery. Due to technological advancement, the machinery being used has since changed and this makes us incapacitated to manipulate the different content and teach with the various technologies." This is a broad response that showed a lack of understanding on how subject content can be changed by applying technology. From other lecturers' responses, it was contended that "new issues

coming up as a result of technological advancement were included as part of the content taught." Other lecturers claimed that "content does not change, but how one delivers that content is what changes through these technologies. As an example where one would want students to illustrate the Victorian era and how it influence current trends using the different ICT." These excerpts suggest that lecturers had limited technological content knowledge that enables them to understand how the content they teach can be changed by the application of technology. Though lecturers showed that they had knowledge of concepts, theories and were specialists in the content of the textiles and clothing subject area, they had limited knowledge on how they can represent certain content in new ways through various technologies that was not possible before. The lack of technological content knowledge might have been worsened by the fact that lecturers had no post graduate certificates in higher education as was noted from their biographical profiles.

Technological Pedagogical Knowledge

Data that surfaced from interviews with lecturers and observations showed that lecturers were not comfortable to incorporate a variety of ICT as pedagogical tools. Lecturers indicated that they needed assistance for preparing and editing the content they wanted to teach with specific ICT. One of the lecturers uncomfortably conceded that; "I need some assistance for I am not very comfortable with some of the ICT. I find challenges to use even the e-learning platform for instructional purposes." Another lecturer shared the following sentiments "I am not saying I am perfect but at least I can do it, so far I can deliver using PowerPoint but at times, I get assistance from colleagues who are well versed when l want to use other ICTs." These excerpts from lecturers revealed their lack of technological pedagogical knowledge. This was also confirmed by the head of the department who admitted that "not many of the lecturers can utilise ICT as pedagogical tools." A further explanation by the head of the department showed that lecturers were afraid to experiment with a variety of ICT for teaching and learning of students. It was clear that lecturers were not very competent to manipulate and use a variety of ICT in teaching.

DISCUSSION

With respect to the beliefs of lecturers, though results reports indicated that ICT has clear benefits to the teaching and learning of students, the ICT resources were very limited to change the pedagogical roles of lecturers from being transmitters to facilitator of information. This finding is suggested by Ahmed (2016) and Adetimirin (2016) that teaching staff develop positive beliefs towards ICT if provided with adequate ICT to use during teaching and learning. This becomes an enabling factor which Govender and Chitanana (2016) advance in their argument that could lead to effective implementation of ICT in teaching and learning. Thus to understand effective implementation of ICT integrated teaching by lecturers and how their beliefs can be positively changed, there is need to think of ICT integrated teaching as a network that comprise computers, applications, learning material, learners in addition to competencies of the lecturers.

Although the findings revealed that lecturers had the basic skills to operate digital technologies such as spreadsheets, most of the lecturers were not able to use other ICT like blogs in their teaching. This result of the research affirms the notion of the TPACK framework that technological skills 'only' do not enable lecturers to teach effectively with ICT. This finding confirm Eid-Al-harbi (2014)'s view that lecturers should have the technological knowledge that goes beyond digital literacy including knowledge of how to change the purpose of a variety of technological software so that they can be used for teaching and learning. The mere mastering of technological skills is not enough hence lecturers needed to continuously learn new content and pedagogy as ICT evolves. This finding finds support from Johansson (2012)'s assertion that universities have concentrated on developing teaching staff's technological skills at the expense of training them on how to use the ICT to teach students. Training lecturers on new forms of knowledge and ICT competence for teaching would help lecturers to develop methodologies that would ensure that their students engage in learning styles necessary for effective acquisition of ICT skills suitable to practise competently in the technological workplaces.

The finding on limited technological content knowledge possessed by lecturers resonate with those of Ojeniyi and Adetimirin (2016) who indi-cated that a number of teaching staff lacked knowledge that enabled them to represent content in different ways through the use of technology. The limited technological content knowledge possessed by lecturers implied that they faced challenges in understanding the manner in which the subject content can be changed by the application of particular ICTs as elucidated by the TPACK framework. This was also aggravated by the poor ICT software and infrastructure at the university to such an extent that lecturers had limited hands-on practice. Adequate technological content knowledge affords lecturers the confidence to guide students to design and create fashion designs on the screens of their laptops (Park and Lee 2011) and to develop new sets of skills in students, which are industry informed and are at the cutting edge of technology (Jefferson et al. 2012).

A similar finding on lack of technological-pedagogical knowledge among university lecturers was also noted by Cazco et al. (2016) in Chimborazo. Though it was noted that network such as local, wide and wireless was available at the university to provide internet based technologies; these were not fully exploited by textiles and clothing lecturers to develop new pedagogical approaches that were appropriate for the tools at hand. This finding substantiate earlier studies of Johansson (2012) who found out that teaching staff lacked understanding on how certain technologies are used in teaching. However, in studies by Tena et al. (2016) in Spain, it was revealed that university lecturers demonstrated a greater command, whether in terms of technology or use of the ICT tools in teaching. The success of the experience was dependent on the support and attitudes of the university management. Support and attitudes of university management might be the greatest factor that is lacking among universities in Africa especially in Zimbabwe as this could affect lecturers' practice of developing adequate ICT competencies necessary for teaching.

Looking at ICT integrated teaching and learning through the TPACK lens therefore requires one to recognize the interplay between technological content and technological pedagogical knowledge as important competencies that lecturers should possess for effective implementation. Having technological pedagogical knowledge enables the lecturer to have the confidence to shape learning opportunities for students as

has been observed by Colvin and Tomayko (2015). Against this background, it could be noted in this paper that the Textiles and Clothing lecturers' competencies in ICT supported effective implementation of ICT integrated teaching and learning to a very lesser extent. This comes back to the need for the lecturers to strengthen knowledge that is underpinned by sound pedagogical principles as informed by the TPACK framework. Effective implementation of ICT integrated teaching requires developing a thorough understanding of the complex relationships between technology, content and pedagogy, and using this understanding to develop suitable context-specific teaching and learning strategies. This has implications for the university to have continuous professional development for lecturers. As has been noted by Engelbrecht and Ankiewicz (2016) continuous professional development of teaching staff, has become an indispensable tool due to the competitive nature of societies which is a direct consequence of 'globalisation and technological development'.

CONCLUSION

The results obtained indicate that lecturers lacked technological-pedagogical content knowledge that could enable them to prepare lessons and select appropriate technological resources and pedagogical strategies for teaching students relevant content. This could result in lecturers failing to effectively implement ICT into their teaching. This has a detrimental effect on digital competencies in the training of university students.

RECOMMENDATIONS

The study recommends the following practical recommendations for encouraging effective implementation of ICT integrated teaching and learning in Textiles and Clothing programmes, not only to university management and Textiles and Clothing departments and lecturers at the university under study but also at other universities working under similar conditions.

There is need for lecturers to strengthen knowledge that is underpinned by sound pedagogical principles as informed by the TPACK framework in order to implement ICT in a critical and sensible way. The University should have continuous professional development ICT courses for lecturers to facilitate adaptation to the implementation of ICT in teaching and learning environments.

LIMITATIONS

As this was an exploratory study on understanding university lecturers' competences in ICT on implementing ICT integrated teaching and learning in textiles and clothing programmes in Zimbabwe, its scope could be too narrow to provide results which could be generalised.

SUGGESTIONS FOR FUTURE RESEARCH

It is suggested that the study could be conducted using a different framework and at a number of universities in order to compare the results. This could provide detailed information for the development of an innovative educational tool for undertaking future national and international studies on ICT competence in higher education.

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