Exploring Information and Communication technological software integrated in teaching and learning of Textiles, Clothing and Design programmes. A case of one selected university of Science and Technology in Zimbabwe.

[1]Dzikite, C; [2]Nsubuga, Y. & [3]Nkonki, V.

[1,2,3] *University of Fort Hare, School of Continuing and General Education, P.Bag X1314,*
King William Road, Alice, South Africa

Abstract: *The aim of this study was to explore ICT software that had been integrated in teaching and learning in Textiles, Clothing and Design programmes. The study made use of the qualitative approach and intrinsic case study design to generate the necessary data. The participants of the study were purposively and quota sampled from the Textiles and Clothing department comprising seven lecturers, two ICT technicians and thirty-two students. Three main methods were used to collect data namely in-depth interviews, focus group interviews and observations. The data were analysed for content using thematic analysis after coding. Among the major findings of the study were that there were no specific ICT software packages acquired by the university for the Textiles, Clothing and Design programmes. Instead, general design related software programs such as CorelDraw, Photoshop and Mac Paints were integrated in teaching and learning. Among the conclusions emanating from the findings were that the Textiles and Clothing programmes suffered serious shortage of suitable subject-specific ICT software to facilitate the teaching of practical components thereby compromising the effective skill acquisition in relation to ICT among students. The study recommended that the Textiles and Clothing department should align programmes to ensure the integration of subject-related educational ICT hardware and software like Gerber or Lectra in all modules of the programmes.*

Keywords: *Textiles, Clothing and Design; ICT software; CorelDraw; Photoshop*

I. Introduction

For the past decade, Zimbabwe has been limping under the effects of an economic recession which critically crippled the education sector. This has made the country to lag behind in massive digital revolution (Brooks World Poverty Institute (BWPI), 2009). Some universities have, however, made noteworthy progress towards harnessing computer technology for the purpose of teaching and learning. This effort has not been the same in all universities and has been characterised by challenges. It has been reported generally, that some departments within universities have failed to harness suitable ICT resources for teaching and learning (SARUA, 2011). Textiles, Clothing and Design programmes in universities are technical degree programmes which combine the study of every aspect related to the textiles and apparel industry (Mason, 2012). The comprehensive textile-clothing pipeline encompasses all of the production activities of the textile-apparel complex as well as the functions of distribution and retail operations to the end users. Textiles, Clothing and Design degree programmes in Zimbabwean universities include Bachelor and Master degrees in Clothing Fashion Design, Textiles Design and Technology. These programmes are highly needed in Zimbabwe as they play a key role in generating the new technological knowledge needed in the textiles and apparel industry. Concerns presented by Majoni (2014) and SARUA (2011) show that with the present economic crisis and its repercussions on the academic environments, one of the major hurdles in offering technical degrees like Textiles, Clothing and Design is the complex and costly technological software used in such programmes.The demands on the teaching of such programmes in universities, occasioned by globalisation, are that the programmes should not only provide students with merely the necessary cognitive skills and competencies but also equip them with technological, critical thinking and collaborative skills for working in a knowledge society through integrating different forms of information and communication technology (ICT) in teaching and learning. The technical training system is informed by the skills obligatory in the workplace at a time when industry change, skill development and collaboration are key elements in the makeup of the economic and social context of work in the knowledge society. According to Trilling & Fadel (2009), collaboration requires that participants be able to take actions, which, together with those of others they collaborate with in the knowledge age, lead to achievement of objectives that benefit all the collaborators. Therefore, to be able to collaborate effectively in twenty first century workplaces, graduates have to be taught to work politely with diverse teams and technologies, not only in their physical workspaces, but also in their online interactions. In teaching and

learning of Textiles, Clothing and Design programmes, ICT software satisfy a particular need such as presentation, clothing designing, illustrating, pattern making and grading, spreading, cutting and virtual prototyping. Hence this study endeavoured to answer the following research questions:

a. Which ICT software have been integrated into teaching and learning in Textiles, Clothing and Design programmes at one university of Science and Technology in Zimbabwe?
b. How are the ICT software used in teaching and learning in Textiles, Clothing and Design programmes?

II.   Literature Review

Watson, Guerin, and Ginthner's (2003) study recommended that courses in Textiles, Clothing and Design programmes ought to include modern computer-aided design and manufacture (CAD/CAM) software packages that are specifically for textiles, clothing and fashion designing and manufacturing. Adwoa-Oppong, Biney-Aidoo and Antiaye (2013) identify some examples of modern CAD software packages found in the textiles, clothing and fashion industries that need to be incorporated into the teaching and learning of Textiles, Clothing and Design programmes which are AutoCAD, OptiTex, Lectra and Gerber. Such software packages are needed in Textiles, Clothing and Design teaching and learning to perform tasks and activities required throughout the different stages of the design process such as conceptual design, preparation of design documents and cost projections.

According to Al-Mousa (2013), AutoCAD is a type of computer-aided design (CAD) program used for 2-Dimensional (2D) and 3-Dimensional (3D) design, drafting and construction of Textiles and Clothing designs and artefacts. Ding (2008:5) also indicates that "AutoCAD is effective software that can be used by design students to shape design creations because it can generate shapes and forms beyond the designer's ability". In Textiles, Clothing and Design programmes, AutoCAD software can also be used by lecturers and students to determine the most efficient cut of fabrics and to adjust the scale of the pattern for different sizes. Johnson (2005:613) studied undergraduate design students and design practitioners in the domains of fashion, architecture, graphic, product, and general design and established that "AutoCAD is not only a drafting tool, but also conceptual tool capable of assisting design students to develop new means of conceiving design ideas". This is also endorsed by Yazıcıoglu (2011) who notes that AutoCAD can document the design progress and allow independent assessment of the different stages of the design process. These studies have further strengthened the argument that AutoCAD software can be used in the teaching of design concepts in the Textiles, Clothing and Design programmes.

The second CAD/CAM software package that has been recommended by Adwoa-Oppong et al. (2013) that needs to be included into the teaching and learning of Textiles, Clothing and Design is OptiTex software. According to Park and Lee (2011), OptiTex software provides both two dimensional pattern design and three-dimensional design and manufacture. The software features 3D models and virtual prototyping as well as pattern design option. Optitex has been recognized as a leading provider of 3D Virtual prototyping and 2D CAD/CAM software solutions for the textiles and clothing industry. It also creates an avatar according to one's exact sizes and can be tried on different clothing and to determine the clothes that fit one best. OptiTex also allows the user to digitalize curves, create a personal working environment, and design a variety of patterns easily. Since designers sometimes conduct runway shows, OptiTex 3Drunway allows users to create a virtual runway show.

The other CAD/CAM software package that needs to be integrated into the teaching and learning of Textiles, Clothing and Design is Lectra. According to Lectra (2010), the Lectra software packages feature 2D and 3D programmes for design, drafting and virtual construction. Park and Lee (2011) indicate that Lectra software enables Textiles, Clothing and Design students to create technical drawings of fashion designs. Through Lectra, one can digitalises paper patterns, modify designs, create and apply grade rules. The same author emphasises that the 3D component of the software package allows for texture mapping and sample garment visualization. This gives students and lecturers the opportunity to experiment and test their designs several times through 3D/2D simulation. However, van der Merwe and van Ryneveld (2012) assert that high end fashion specific software packages such as Lectra are not for use by individuals due to cost factors and limited to departmental teaching computer laboratories owing to licensing restrictions.

The last CAD/CAM software package that has been recommended by Adwoa-Oppong et al. (2013) specifically for use in teaching and learning of Textiles, Clothing and Design programmes is Gerber. Wambau-Kamau (2012), mentions that Gerber technology is available in software packages such as Acc works studio, Acc mark 8000, Acc mark silhouette and Pattern Design 2000. The same author adds that the Gerber software packages are used for making textiles and clothing design sketches, line drawings, colour ways and fashion illustrations. It has been acknowledged by van der Merwe and van Ryneveld (2012) that Gerber software packages are excellent for pattern making, grading and marker making, and plotting. Some studies have been carried out on the use and level of adoption of CAD/CAM in Textiles, Clothing and Design programmes in universities and colleges. It has been reported that some universities have incorporated 2D CAD garment realisation, and 3D garment virtualisation in their Textiles, Clothing and Design programmes (London College

of Fashion, 2009; Nottingham Trent University, 2009). Another study that was conducted by Jefferson, Power, Jess and Rowe (2012) in India compared the use of 2D and 3D CAD technologies in Textiles and Fashion studies. The study concluded that graduates were not furnished with knowledge of 3D software technologies which reflect industry so as to enhance their employability skills. Jefferson, et al. (2012) recommend the integration of modern CAD/CAM software packages in teaching and learning of Textiles and Clothing courses so as to develop new sets of skills in students, which are industry informed and are at the cutting edge of technology. The studies reviewed above were conducted in the United Kingdom and Indian universities with advanced technologies, hence their incorporation of some 2D technologies in their Textiles, Clothing and Design courses.

Studies that have been conducted in Africa like the one by Wambau-Kamau (2012) found that appropriate software for teaching and learning was very limited in its use in Kenya's public universities. Wambau-Kamau (2012) credited the restricted use to the fact that the software packages are expensive to purchase which limits lecturers' and students' access to them. Another study by Adwoa-Oppong et al. (2013) found that insufficient computers and inadequate finances to purchase the requisite software packages were challenges confronting the Textiles and Clothing departments in Ghana universities and colleges.

While literature reviewed above show a wide-range of ICT software that has been integrated in the teaching and learning of Textiles, Clothing and Design programmes in international universities, it is however apparent that not a single study has been conducted to establish the nature of the ICT software that have been integrated into teaching and learning in Zimbabwe hence this study.

Theoretical framework

The Functionality framework was used to analyse the use of ICT software applications for teaching and learning in Textiles and Clothing programmes. This framework was developed by Patten, Sanchez and Tangney (2006) as a tool for categorizing ICT software applications that are used for educational purposes. The Functionality framework places the technological software applications into seven categories namely administrative; referential; interactive; location aware; data collection; collaborative and microworlds. The administrative applications are those that are mostly used for storing and retrieval of information (Patten etal. 2006). These applications have little pedagogical philosophy underpinning their use. Referential applications are those that enable students to access content and store documents in various formats. Interactive applications provide students with a series of exercises based entirely around question and answer activities with supporting information and images. Naismith, Lonsdale, Vavoula, and Sharples, (2005:12) comment that the interactive applications are built on the belief that learning is enabled by creating association between a particular stimulus and a response, hence, many of these are of the drill and test type aimed at encouraging memorization of information for individual learners through multiple choice style quizzes. Locationware are applications that aim to contextualize learning activities by enabling the learners to interact appropriately with their environment (Patten, etal. 2006:298). Data collection applications are subdivided into those that are scientific, reflective and multimedia. Scientific data collection applications focus on encouraging participants to learn more about their context through recording relevant information and providing immediate feedback through on-the spot analysis. Reflective applications encourage reflective social practice by focusing on storing information in the learning context for later evaluation and reflections (Mueller, Wood, Pasquale and Cruikshank).The other subcategory of data collection, the multimedia applications are used for capturing images, sound and video. It has been stressed by McGreen and Sanchez (2005) that multimedia applications tend to adopt a constructivist pedagogy that requires students to generate new ideas based on their current and previous knowledge. According to Chen, Kinshuk and Yang (2008) collaborative applications are used to establish a learning environment of knowledge sharing whilst the educational microworlds allow learners to construct their own knowledge through experimentation in constrained models of real world domains. The Functionality framework merges two perspectives of functionality and pedagogy into one framework. In this study this framework was used to analyse the ICT software applications that were used for teaching and learning in Textiles and Clothing degree programmes at the selected University of Science and Technology.

III.   Research Methodology

The intentions of this study was to take the emic approach to understanding the use of the ICT software integrated in teaching and learning in Textiles, Clothing and Design programmes at one selected university of Science and Technology in Zimbabwe. The qualitative approach accompanied by an intrinsic case study was used as it enabled the researcher to study the participants in their natural settings. Purposive sampling was used to select participant for in-depth interviews as well as for observations. The selected participants were seven lecturers, one head of the Textiles, Clothing and Design department. Quota sampling was used to select thirty-two participants for the focus group interviews from the Textiles, Clothing and Design students. In-depth interviews, observation and focus group interviews were used to generate data for the study. During the

interviews, participants were addressed using codes instead of their real names to ensure anonymity. Lecturers were allocated codes such as TCL1 representing Textiles and Clothing lecturer one. The technicians were allocated codes such as Tec 1 meaning technician one. The students were given codes such as FGS1 meaning focus group students one. The data obtained from the study 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.

IV.   Results And Discussion

Findings that surfaced from lecturers, technicians and students revealed that there was no specific ICT software packages bought by the university of Science and Technology instead there were general design-related software that had been incorporated in the teaching and learning of Textiles, Clothing and Design programmes. These are presented and discussed in the paragraphs that follow.

Use of CorelDraw

From the data that was collected from the participants, it was revealed that CorelDraw was one of the software programs used for teaching and learning in the Textiles, Clothing and Design department. One of the lecturers noted that:

> *There are no specific software for our area that had been provided by the university, but we*
> *use the general design related software ... like CorelDraw, that's for teaching (TCL 1).*

In agreement with the above views, participants from the focus group interviews disclosed that:

> *I use... CorelDraw on my laptop to create my designs and edit my drawings (FGS3: 4);*

Confirming the use of CorelDraw, one of the technicians observed that:

> *Softwares like CorelDraw are basic. Through the use of CorelDraw one can portray her ideas*
> *therefore; our students can design and illustrate their designs (Tec 1).*

Observations made by the researcher corroborated the above views for it was noted that lecturers and students had their personally-owned laptops installed with CorelDraw through the assistance of the ICT technician. It was also observed, however, that first level students had none of their laptops installed with CorelDraw whereas the second and third level students had CorelDraw on their laptops. The study revealed that CorelDraw was used to create textiles and fashion designs. It was indicated that with CorelDraw, students started from scratch to formulate ideas, sketch and finally create their textiles and fashion designs. These findings agree with Crel (2008) who unveiled that CorelDraw could be used to make technical illustrations, create garment features of textiles, clothing and fashion designs. The findings reflect on two of the categories of Functional framework called educational microworlds and multimedia software applications. The capability of CorelDraw to create garment silhouettes reflects its microworlds capability encouraging students to generate own designs on screen. This allows students to construct their own knowledge through experimentation. The capability of CorelDraw to edit photographs and images reflects its multimedia characteristics. Such a software application can be used by students to create, edit and display designs and illustrations for presentation and projects. As noted by Pattens etal. (2006), the microworlds and multimedia applications are more consistently informed in pedagogical principles as they tend to adopt a constructivist approach to learning enabling students to formulate new ideas as they try one stage after the other. This shows that with CorelDraw, students can generate their own knowledge hence pedagogically valuable in the teaching and learning of Textiles, Clothing and Design programmes.

Use of Photoshop

Emanating from the same theme of general design related software programs was the Photoshop software. The lecturers and students indicated that the Photoshop software was installed on their laptops by the technician. It was observed that first level students had none of their laptops installed with Photoshop. Students who were in their second, third and fourth year of study had the Photoshop software program on their laptops. All the participants agreed that Photoshop was used for editing photographs in preparation for constructing fashion storyboards. One of the lecturers remarked that:

> *I teach students to edit their designs using Photoshop (TCL 6).*

Authenticating the response above, students acknowledged using Photoshop indicating:

> *On my laptop there is Photoshop which l use to edit my photos when constructing fashion*
> *boards (FGS2: 3);*
> *I mostly use Photoshop to edit my designs or even different photographs. It's however*
> *challenging when adding colour and change style details (FGS3:2).*

The above views were corroborated by one of the technicians who noted that:

> *Photoshop is software which is found on these Mackintosh computers. I have also installed the*
> *software on laptops of students. It can be used to edit designs and even photographs (Tec 1).*

The findings showed that Photoshop was used mostly for editing fashion designs and to create collages or mood boards for fashion collections. Similar findings were also noted by Al-Mousa (2013) who acknowledges that Photoshop is used to make colour changes on complicated patterns as well as forming repeats and colour-ways from scratch. The efficiency of Photoshop to edit photographs and images reflects its multimedia capability as noted from the Functionality framework. This means that the software application can be used by students to import, edit and display images in Textiles, Clothing and Design courses. From the way students used the software, it can be deduced that Photoshop is pedagogically valuable in Textiles, Clothing and Design programmes as students were able to edit images and end up producing a different design. Though Photoshop was found to be a general design related software program that can be used in any design field, in Textiles and Clothing, it was noted to be beneficial as the use of such software in teaching and learning reflects a constructivist pedagogy requiring students to generate new ideas based on the images they would have edited.

Use of Mac-paint
Data collected from interviews with lecturers and focus group interviews with students showed that the Mac Paint was the third general design related software program that was used in the teaching and learning of Textiles, Clothing and Design programmes. As explained by students, the Mac paints were used for editing and making geometrical drawings. Some of the students reported that:
I use Mac paint on my laptop to create and edit my drawings (FGS2:4);
I only use Mac paint when drawing shapes to form patterns or other geometrical drawings
(FGS1: 4).
To confirm the above, observations made by the researcher indicated that first and second level students preferred to use the Mac paint to create geometrical drawings. Clarification given by one of the lecturers teaching computer-aided design commented that first level students used more of Mac paints to learn the basic skills of creating shapes, drawings and adding colour. The lecturer had this to say:

> *You see, l encourage the first year students to use Mac-Paint so that they learn the basic skills*
> *of creating shapes, drawings and adding colour for them to be able to use other design*
> *softwares (TCL 1).*

It is clear from the lecturers and students that that Mac-paint was a general design related software program that was useful to first and second level students hence it was assumed that the software was used to develop skills needed for the next level courses.This finding corroborated Koch's (1990) recommendation that Mac paint could be the first software program that could be used in a design course because it is easy to operate enabling students with limited exposure to computer quickly motivated to develop designs. The efficiency and ease of adding and editing colour with Mac paint shows that it very suitable in Textiles, Clothing and Design programmes.

Use of Adobe Illustrator
In-depth interviews with lecturers revealed that Adobe illustrator was the fourth software program found among few lecturers teaching in the Textiles, Clothing and Design programmes. One of the lecturers remarked that:
I use Adobe illustrator if making fashion illustrations which l would show students (TCL1).
From the observation the researcher made while students were doing their practical projects in one of the courses called Fashion illustration, it was discovered that not even one student had Adobe illustrators installed on their laptops hence no student was found using the software. It was observed that Adobe illustrator was installed on lecturers' laptops only. In order to affirm this observation, one of the technicians clarified that:

> *Lecturers are the ones who use this software. Students preferred CorelDraw than Adobe*
> *illustrator (Tec 2).*

This software program was not common as Photoshop and CorelDraw among the Textiles, Clothing and Design students hence was not used widely. Though Shin (2012) posits that Adobe Illustrator is the most preferred software program that can be used in textiles and fashion drawing, it was noted, in this study, that the software was not in common use among students. The fact that Adobe illustrator can handle different formats of images as has been noted by Centner and Vereker (2008), can allow students to create good quality illustrations that can be used for a variety of presentation drawings in Textiles, Clothing and Design, hence it's very useful. Against this background, it can be commented that if Adobe illustrator is effectively integrated in Textiles,

Clothing and Design programmes, it can be used by lecturers to enable students develop skills to creatively design original artefacts. In courses such as Fashion Illustration and Pattern Development, the use of this software was not even appreciated as it was observed that students produced manual and hand-made illustrations and drawings yet the software would have made a difference.

Though these software applications, CorelDraw, Photoshop and Mac paint were found to support teaching and learning of practical aspects, it was revealed that they were general design-related software that could be used by any student designer in any design field and not specifically for Textiles, Clothing and Design programmes. The capability of CorelDraw and Photoshop would not even match the efficiency and accuracy of educational software systems that are specifically for teaching and learning of Textiles, Clothing and Design courses such as Lectra-Modaris-3D-Fit software, Gerber technology and OptiTex 3D Runway. As observed by Park & Lee (2011), specific textiles, clothing and design educational software programmes can help students draw, design, develop woven textures, create flat patterns, regulate sizes, determine fabric colours, virtually test, and construct designs and prototypes.

V. Conclusion

From the study it was concluded that the Textiles, Clothing and Design programmes had serious shortage of suitable subject-specific ICT software applications and packages which compromised effective teaching and learning to foster effective skill acquisition in relation to ICT among students. Though general design related software like CorelDraw and Photoshop were pedagogically useful, these were not specifically designed to support the effective acquisition of technological practical skills that were specifically required in the textiles and clothing industry.

VI. Recommendations

From the analysis, discussion and conclusions drawn from the findings of the study, it was recommended that the Textiles and Clothing department, through the support of the university, should acquire subject related educational hardware and software like Gerber, or Lectra to teach the practical courses of the programmes. The use of the software would provide opportunities for students to acquire digital practical skills that are needed in the technological textiles and clothing industry.

References

[1].   Adwoa-Oppong, J., Biney-Aidoo, V., & Antiaye, E. (2013). Evaluating the Benefits of Computer Aided-Design (CAD) in Fashion Education: The Case of Accra Polytechnic. *Journal of Education and Practice*,4(21),73-90.
[2].   Al- Mousa, N. (2013). *An examination of CAD use in two interior design programs from the perspectives of curriculum and instructors*. An unpublished Master thesis: Queen's University Kingston; Canada.
[3].   Brooks World Poverty Institute (BWPI), (2009). Moving forward in Zimbabwe: Reducing poverty and promoting growth. Manchester: The University of Manchester. Retrieved from www.bwpi.manchester.ac.uk (March -25-2014).
[4].   Burke, S. (2006). *Fashion Computering - Design and Techniques and CAD*. Hong Kong: Everbest printers.
[5].   Centner, M., & Vereker, F. (2008). *Fashion Designer's Handbook for Adobe Illustrator*. Singapore: Blackwell publisher Ltd.
[6].   Chen, N. S., Kinshuk, C., & Yang, S. J. H. (2008). Designing a Self-contained Group Area Network for Ubiquitous Learning. *Educational Technology & Society*, 11(2), 16-26.
[7].   Cheng, G. (2009). Using game making pedagogy to facilitate student learning of interactive multimedia. *Australasian Journal of Educational Technology*,25(2), 204-220.
[8].   Crel (Corel Corporation). (2008), *CorelDraw*: Retrieved from www.corel.com/coreldraw (January 13-2015).
[9].   Ding, S. (2008). Rethinking design process: Using 3D digital models as an interface in collaborative session. *Engineering Design Graphics Journal*, 72(3), 1-9.
[10]. Jefferson, A.M., Power, J., Jess, E., and Rowe, H. (2012). Enhancing the employability of fashion students through the use of 3D CAD. *In Fashion Beyond Borders 14th Annual Conference of the International Foundation of Fashion Technology Institutes IFFTI, 17-23 March 2012,* Jaipur, India.
[11]. Jonson, B. (2005). Design ideation: The conceptual sketch in the digital age. *Design Studies*, 26(6), 613-624.
[12]. Koch, K. E. (1990). CAD in the Clothing and Textiles classroom: One approach to course development . In N.C. Rabolt (ed). *Computer Applications in Textiles and Clothing. ACPTC*, 2, 6-9.
[13]. London College of Fashion, (2009). *Courses* Retrieved from http:// www.fashion.arts.ac.uk(July 15-2015).
[14]. Majoni, C. (2014). Challenges Facing University Education in Zimbabwe. *Greener Journal of Education and Training Studies.* 2(1), 20-24.
[15]. McGreen, N., & Sa´nchez, I. (2005). Mapping challenge: A case study in the use of mobile phones in collaborative, contextual learning. In Isaias, P., Borg, C., Kommers, P. & Bonanno,. P (Eds). *Mobile learning* (pp. 213–217). Malta: International Association for Development of the Information Society Press.
[16]. Mueller, J., Wood, E., Pasquale, D., & Cruikshank, R. (2012). Examining Mobile Technology in Higher Education: Handheld Devices In and Out of the Classroom. *International Journal of Higher Education*, 1(2), 43-54.
[17]. Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2005). Literature review in mobile technologies and learning. *NESTA Future lab Series*. Retrieved from www2.le.ac.uk (July 10-2014).
[18]. Nottingham Trent University, (2009). Prospective students. Retrieved from http://www.ntu.ac.uk(December 16- 2O14)
[19]. Park, J.H., & Lee, H.J.(2011). Computer Aided Technical Design. *Journal of Textile and Apparel, Technology and Management*, 7(1), 609-622.
[20]. Patten, B., Sa´nchez, I. A., Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & Education,* 46, 294-308.

[21]. SARUA, (2011). Towards a Common Future: Higher Education in the SADC Region.   Regional Country Profiles. *SARUA Handbook: A guide to the public universities   of southern Africa*. Johannesburg: SARUA.

[22]. Shin, K. (2012). Work-Integrated Education in Fashion Design. *Asian Journal on Education and Learning* , 3(1),10-20.

[23]. Van-de-Merwe, V. D., & Ryneveld, V. (2012). A Diagnostic Teaching Methodology for Fashion Computer- aided-Design in Design projects.

[24]. Wambau-Kamau, V. (2012). *Assessment of the adoption of apparel computer aided design technology training in selected public universities in Kenya.* Master thesis: Kenyatta University.

[25]. Watson, S. A., Guerin, D. A., & Ginthner, D. A. (2003). Educators and practice: How to stay current. *Journal of Interior Design*, 29(1), 97-103.

[26]. Yazıcıoglu, D. A. (2011). The integration of interior architecture education with digital design approaches. *US-China Education Review*, 8(5), 637-658.