COLLABORATIVE COURSE DESIGN TO SUPPORT IMPLEMENTATION OF E-LEARNING BY INSTRUCTORS

Kassimu Ali Nihuka

DOCTORAL COMMITTEE

Chairman	Prof. Dr. E. R. Seydel ▪ University of Twente
Promotor	Prof. Dr. J. M. Pieters ▪ University of Twente
Assistant promotor	Dr. J.M. Voogt ▪ University of Twente
Members	Prof. Dr. J. J. H. van den Akker ▪ University of Twente
	Prof. Dr. Ir. P. W. Verhagen ▪ University of Twente
	Prof. Dr. P. Kirschner ▪ Open University Heerlen
	Prof. Dr. J. Moonen ▪ University of Twente
	Prof. Dr. J. van Braak ▪ University of Gent
	Prof. Dr. G. Knezek ▪ University of North Texas

The research reported in this thesis was funded by the Netherlands organization for international cooperation in higher education (Nuffic).

Nihuka, K. A.
Collaborative course design to support implementation of e-learning by instructors

Thesis University of Twente, Enschede.
ISBN 978-90-365-3235-8
DOI 10.3990/1.9789036532358

Layout: Sandra Schele
Press: Ipskamp Drukkers B.V. - Enschede

COLLABORATIVE COURSE DESIGN TO SUPPORT IMPLEMENTATION OF E-LEARNING BY INSTRUCTORS

DISSERTATION

to obtain
the degree of doctor at the University of Twente,
on the authority of the rector magnificus,
prof. dr. H. Brinksma,
on account of the decision of the graduation committee
to be publicly defended
on 28th of September 2011 at 14.45

by

Kassimu Ali Nihuka

born on the 7th of February 1970

in Namtumbo-Ruvuma Tanzania

Promotor	Prof. Dr. J. M. Pieters
Assistant promotor	Dr. J.M. Voogt

This dissertation has been approved by the promotor and assistant promotor.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURES

TABLES

PREFACE

At this moment of writing preface, I cannot suppress my feelings, that I have enjoyed my studies at the University of Twente and my stay in the Netherlands. Also, I feel I have been given a lot that I should go and give to others now! Foremost, I thank God, the almighty for this wonderful blessing, the opportunity to come this far in education.

Second, I would like to thank all the people who have helped me to accomplish this research. I wish to thank the management of the Open University of Tanzania and Prof. Tolly S. A. Mbwette (the vice chancellor) in particular for granting me a four years study leave to pursue PhD studies in the Netherlands. I would also like to thank all colleagues at the Open University of Tanzania, particularly instructors who participated in this research.

I am exceptionally grateful to Prof. Dr. Jules M. Pieters (promotor) and Associate Prof. Dr. Joke Voogt (assistant promotor) for their valuable guidance and patience exhibited while supervising this research - thank you! Both of you, created an atmosphere of critical but collegial academic discussion which made me grow academically. Joke, you were more than a supervisor to me, sincerely you were a mother! I very much enjoyed working with you. I am really thankful for your generous and enthusiastic guidance and feedback throughout my research.

I would also like to acknowledge all colleagues in the department of Curriculum Design and Educational Innovation and in the International Students Office at the University of Twente for your professional, academic and social support. In addition, I am thankful to Sandra Schele for making this book presentable and also for other administrative updates and information.

Special thanks should go to NUFFIC, the *Netherlands Organization for International Cooperation in Higher Education* for the financial support without which this research might not have come about. I am deeply thankful.

Last but not least, I appreciate the unlimited patience and sacrifices made by my beloved wife Laurensia and children Jordan, Selina and Gerald. Thank you and certainly I will make up for you!

I probably forgot many others who have in one way or the other contributed to the completion of the research and the writing of this dissertation. Please forgive me.

Finally, as I have pointed in the beginning of this preface, I have been given a lot, so I look forward to giving it to others.

Kassimu A. Nihuka

CHAPTER 1
Introduction to the study

This chapter describes the origin of the study. It begins by providing the history of distance education in Tanzania, current situation and challenges of traditional distance education delivery. Next, a highlight on the potential of e-learning technologies in addressing challenges of distance education is outlined. Also, the Chapter reveals the weaknesses of traditional format of professional development and argues for a more effective format. Last but not least, the Chapter describes research questions and rationale for design-based research. The Chapter ends up with an overview of the dissertation.

1.1 DISTANCE EDUCATION AT THE OPEN UNIVERSITY OF TANZANIA (OUT)

Distance education is a method of teaching in which students are geographically and physically separated from instructors (Keegan, 1990). Distance education extends access to education to more students who could not be accommodated in the conventional university system. This is possible because distance education has the potential to overcome or minimize barriers to education including distance, time, age, disability and circumstance (Muganda, 2002).

Distance education is not a new concept in Tanzania. Its history can be traced back to 1979 when the government of Tanzania commissioned the Anglo-Tanzanian study to explore the distance education mode of delivery particularly for university education (Cutting, 1989). The report recommended for the establishment of a correspondence institute at the University of Dar es Salaam. Later in 1988, the government of Tanzania appointed a committee (Kuhanga's report, URT, 1990) to investigate for the establishment of the Open University. The Kuhanga's report recommended the establishment of the Open University of Tanzania in 1993, as a distance education university.

Through distance education the Open University of Tanzania offers two flexibilities. It provides learning opportunities for those who could not be given places in conventional universities for reasons of their inflexible schedules. This concerns adults with or without full-time employment who can study with the university from where and when they wish. Also, the university provides methods of learning not limited in time, pace and place. Unlike in the past where a larger segment of students' population were adults, in recent years the university offers a viable option to continue studies in higher education for an increasing number of high school graduates, as a result of expansion of secondary education that Tanzania is witnessing, due to limited capacity of the conventional universities.

Distance education at the Open University of Tanzania is still traditional and dominated by print-based mode of delivery, as is the case in most sub-Saharan Africa's universities (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003). The application of e-learning technologies in the delivery of courses is limited. Mostly instructors use technologies for administrative tasks (e.g. typing of examinations and processing of examination results).

As a result of reliance on print-based mode of delivery, several challenges confront instructors and students at the Open University of Tanzania (Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009; Mahai, 2008; Ntiluhoka, 2007). The challenges are (i) delays in the delivery of study materials, course outlines and learning resources, (ii) lack of regular interaction between instructors and students, (iii) lack of immediate feedback on student learning and (iv) feelings of isolation among students. Similar challenges do exist in distance education in most sub-Sahara African's universities (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003).

The current professional development arrangements and support in the form of workshops does not help instructors to use e-learning technologies (in this case Moodle learning management system) for course delivery (Bakari, 2009). There is a need for an alternative form of professional development. The purpose of this study was to enhance professional development by providing opportunities and support for active involvement in e-learning course design and delivery through *Collaborative Course Design* so that instructors use Moodle as e-learning technology to address challenges of print-based delivery.

1.2 CURRENT SITUATION AND CHALLENGES

The Open University of Tanzania (OUT) is a public university which offers academic degrees, diploma and certificate programs in diverse fields. It has a student population of over 44,000 spread in 28 regional centres in a country of about 0.95 million square kilometres.

Like the case in most distance education universities in sub-Saharan Africa, print is the dominant mode of delivery of courses at the Open University of Tanzania. The approach is complemented by face-to-face sessions organized once in a year and limited electronic resources which are available in the university website.

For students to learn successfully in a distance education environment, a well-developed student support is necessary (Dillon & Blanchard, 1991; Molefi, 2002). Student support activities at OUT includes provision of course outlines, study materials, communications about student learning in general and guidance and counselling among others (Bhalalusesa & Babyegeya, 2000). Studies show that support for independent learning at OUT is underdeveloped (Msuya & Maro, 2002; Mahai, 2008; Ntiluhoka, 2007). As a result, instructors and students encounter several challenges due to over-reliance on the print-based mode of course delivery (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003).

As an attempt to deal with challenges of print-based mode of delivery and to offer more flexible ways of learning, the Open University of Tanzania is making efforts to implement e-learning. The efforts include the formulation of an e-learning policy, resulting in an ICT policy document, an ICT master plan and an e-learning implementation strategy (OUT, 2009abc). The university's aims and objectives are well stipulated in the ICT policy plan, which aims to (i) transform paper-based to blended learning, (ii) train instructors on e-learning courses development and (iii) motivate instructors on the use of an open source e-learning platform.

Towards realizing its aims, the university has customized Moodle learning management system for use by instructors in order to improve the delivery of courses and learning resources to students. Accordingly, through regularly organised workshops, the university enhances instructors' technological knowledge, their skills on how to develop courses and the use of Moodle to deliver courses (Mnyanyi, Bakari & Mbwette, 2010). Despite such efforts, instructors have continued to deliver their courses in the traditional way using print-based mode.

1.3 DISTANCE EDUCATION AND E-LEARNING

As pointed earlier, instructors and students in a traditional distance education such as Open University of Tanzania encounter numerous challenges. Studies from developed countries show that e-learning technologies have the potential to enhance distance education delivery (Bates, 2000; Moore, 1996; Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001). Technologies such as computer, internet, e-mail, mobile phones and others are used in flexible learning systems (in this dissertation we will focus on distance education) for delivery of courses, facilitation of access to resources, improvement of interactions with students, and provision of feedback and support to students (Collis & Moonen, 2001; Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000). When implemented and used, technologies contribute to flexible learning (Collis & Van der Wende, 2002; de Boer & Collis, 2005).

To facilitate flexibility in course delivery, e-learning technologies have made web-enhanced teaching and learning possible to complement traditional course delivery processes in distance education in some developing countries (Pan-Bandalaria, 2007). E-learning technologies such as computer and internet are also used to enhance flexibility in searching and accessing resources from webs. In some occasions, this contributes to greater students' achievement (Bates, 2000; Tschang & Senta, 2001).

E-learning technologies such as e-mails are used in distance education in most developed countries for communication and interaction between instructors and students (Thomas & Carswell, 2000). Where e-mail is used, the rapport between instructors and students' increases, provision of feedback to students improves and instructors feel that they have more interaction with their students (Pennington & Graham, 2002).

Generally, e-learning technologies make the following more flexible (i) interactions and collaboration between instructor and students (Fozdar & Kumar, 2009; Ludwing-Hardman & Dunlap, 2003), (ii) location and time barriers between instructors and students and (iii) delivery of instructional contents (Collis & Van der Wende, 2002; Thomas & Carswell, 2000).

1.4 THE NEED FOR A MORE EFFECTIVE PROFESSIONAL DEVELOPMENT STRATEGY

In this dissertation, professional development is described as an arrangement (including processes and activities) designed to enhance professional knowledge, skills, and practices of instructors so that in return they improve student learning (Guskey, 2000). As pointed earlier, traditional format of professional development (i.e. workshops) is commonly used to prepare instructors on the use of e-learning technologies. Such a strategy is criticized of its ineffectiveness (Joyce & Showers, 1995) and lack of significant impact on instructors' professional development related to the use of e-learning technologies. Also, traditional formats of professional development are fragmented and intellectually superficial (Borko, 2004).

At the Open University of Tanzania, the traditional format of professional development has been used to train instructors about e-learning course development and delivery (see for example Mnyanyi, Bakari & Mbwette, 2010). The strategy has shown to be ineffective because instructors have continued to deliver their courses in the traditional way. Since the transition from traditional print-based delivery to e-learning delivery is a curriculum innovation, the need for effective professional development arrangement for instructors is critical (Penuel, *et al*., 2007; Desimone, 2011). C*ollaborative Course Design* in design teams was used during this research as a strategy to prepare instructors on e-learning course design and delivery. The strategy is rooted in the social constructivist theory which regards social interactions in a social context as essential for cognitive and practice development (Dewey, 1916; Vygotsky, 1978) and in adult learning theory (Knowles, Holton III, & Swanson, 1998; Merriam, Caffarella & Baumgartner, 2007) which emphasizes five principles of adult learning: Adults are motivated to learn as they experience needs and interests that learning will satisfy; adults' orientation to learning is life-centred; experience is the richest resource for adults' learning; adults have a deep need to be self-directing; individual differences among people increase with age. According to Handelzalts (2009), interactions during collaborative course design allow instructors to investigate challenges in their current instructional practice, enactment of the design process when (re-)designing courses, and delivery and evaluation of the (re-designed) courses.

Effective professional development is characterised by active involvement of instructors, activities that are coherent to the context and are sustained over long duration collaboration and considers support for instructors (Borko *et al*, 2002; Clarke & Hollingsworth, 2002; Desimone *et al,* 2002; Desimone, 2011; Garet, 2001; Penuel *et al*, 2007; Porter *et al,* 2003). Such an arrangement contributes to instructors' learning not only about e-learning technologies but also about course design, delivery and implementation (Desimone *et al.,* 2002; Garet *et al.,* 1999; Jonathan & Herbert, 2000; Mishra *et al*., 2007; Koehler & Mishra, 2005; Voogt *et al.,* 2005). This implies that the success of a curriculum innovation depends on the nature of activities, duration of preparation, level of collaboration, extent of involvement and the support offered to instructors during professional development (Deketelaere & Kelchtermans, 1996; Mishra, Koehler & Zhao, 2007).

1.5 RESEARCH QUESTIONS

The study started from the premise that instructors at the Open University of Tanzania do not use e-learning technologies to deliver their courses, despite professional development efforts from the university. As a result, instructors and students have continued to experience challenges associated with print-based delivery. To address the challenges and so improve the quality of education at OUT instructors needed help to use e-learning technologies. To do so they needed professional development in order to develop competences in e-learning course design and delivery. *Collaborative Course Design* in design teams seemed a promising professional development strategy. This study's purpose was to enhance professional development by providing opportunities and support for active involvement in e-learning course design and delivery through *Collaborative Course Design* so that instructors use technologies in addressing challenges of print delivery.

Based on this purpose, the main research question for the study was formulated as, *How should Collaborative Course Design in design teams be organized as a professional development strategy to support instructors at OUT in e-learning course design and delivery?*. This question was pursued though a context- and needs analysis, a pilot study, an implementation study, and an impact study. The following sub-questions guided the study:

1. What is the feasibility of implementing an e-learning course delivery in distance education at the Open University of Tanzania?
2. How does collaborative course design and delivery in design teams contribute to instructors' professional development and the implementation of e-learning at the Open University of Tanzania?
3. How does collaborative course design in design teams contribute to instructors' professional learning?
4. What is the impact of collaborative course design and e-learning delivery on instructors' instructional practices and students' academic outcomes'?
5. What are the opportunities and challenges within the OUT of up scaling *Collaborative Course Design* as main professional development strategy for e-learning implementation at large scale?

1.6 DESIGN-BASED RESEARCH

Design-based research is defined as "*a series of approaches with the intent of producing new theories, artefacts and practices that account for and potentially impact learning and teaching in naturalistic settings*" (Barab & Squire, 2004, p.2). The approach is iterative in nature involving analysis, design and evaluation. Analysis is conducted in order to understand how to target a design (McKenney, Nieveen & Van den Akker, 2006). During this research, context- and needs analysis and literature study were conducted as part of analysis. Insights from context- and needs analysis helped in understanding professional development requirements of instructors in relation to the use of e-learning technologies to enhance distance education. In addition, literature study provided insight regarding the potential characteristics of an effective professional development arrangement (referred to as *Collaborative Course Design*). Generally, insights from both context- and needs analysis and literature study provided useful information for formulation of the initial design guidelines that shaped the professional development arrangement.

Design refers to a plan or blueprint of the professional development arrangement based on the design guidelines. The research reported in this dissertation involved two main design cycles. The first cycle involved designing and developing an initial prototype of *Collaborative Course Design.* Its activities are based on design guidelines generated from the context- and needs analysis

study (in Chapter 3) and literature study. The second cycle involved systematic revision and improvement of the first prototype based on insights from formative evaluation.

Evaluation is formative, performed to improve the quality of prototypes (McKenney, Nieveen & Van den Akker, 2006) and/or summative to determine the impact of the intervention (in this case, *Collaborative Course Design*). Both forms of evaluation were conducted during this study. The first cycle of evaluation involved formative evaluation of the initial prototype of *Collaborative Course Design* which was implemented during pilot study (reported in Chapter 3). As pointed earlier, insights from the first cycle were used to systematically revise the initial prototype to obtain a second prototype. The second prototype was evaluated during a field test (Chapters 4 & 5). Besides seeking to improve the second prototype, the evaluation also sought to determine the effectiveness of *Collaborative Course Design* on instructors' professional development. Furthermore, six months later a long term impact study was conducted to understand the opportunities and challenges of up scaling e-learning implementation through large scale *Collaborative Course Design* strategy.

1.7 OVERVIEW OF THE DISSERTATION

The activities and results from the four sub-studies mentioned in the previous section are presented in the subsequent chapters. In Chapter 2, the findings from the context- and needs analysis are presented. This study investigated research question 1 which sought to understand instructors' and students' access to e-learning technologies, their perceptions on e-learning implementation at OUT, their competences and the implications for collaborative course design in design teams and e-learning implementation at the Open University of Tanzania.

Chapter 3 reports the results from the pilot study, which explored research question 2. Particularly, the chapter presents results on experiences of instructors regarding *Collaborative Course Design in design teams* as an approach to professional development. It also discusses students' initial experiences with the redesigned courses and the delivery of courses by e-learning technologies.

The results from a follow-up implementation study are presented in Chapters 4 (for research question 3) and 5 (for research question 4). In Chapter 4, more in-depth results on the impact of collaborative course design on instructors' professional development related to e-learning course design and delivery are presented. Results on the impact of collaborative course design on instructors' instructional practices and students' academic outcomes are presented in Chapter 5.

Chapter 6 presents results on research question 5 which investigated the feasibility of up scaling *Collaborative Course Design* as a strategy for instructor professional development to support large scale implementation of e-learning at the Open University of Tanzania. Chapter 7, recapitulates the study, discusses the study's findings and implications, and presents recommendations for research and practice.
The instruments that have been used in the study can be sent on request (kassim.nihuka@out.ac.tz).

CHAPTER 2
Instructors' and students' competences, perceptions and access to e-learning technologies: Implications for e-learning implementation at the Open University of Tanzania[1]

In most sub-Sahara African countries, distance education is delivered using print materials complemented by a few face-to-face sessions. The approach is associated with a myriad of challenges some of which can be addressed by appropriately selected e-learning technologies based on the context in which they need to be used. This study was designed to understand the context of the Open University of Tanzania related to the use of e-learning technologies in distance education. A sample of 32 instructors and 208 students participated in the study. Both quantitative and qualitative data were collected. Results show that instructors and students (i) have positive perceptions about using e-learning technologies for distance education and support of students and (ii) have competences on basic computer and internet applications. It is argued that challenges related to narrow bandwidth, access, experiences and motivation of instructors to use e-learning technologies must be considered in deciding what technologies to use. Implications of the results for e-learning implementation, instructors' professional development and student learning needs are discussed.

[1] This chapter is based on Nihuka, K. A. & Voogt, J. (2011). Instructors' and students' competences, perceptions and access to e-learning technologies: Implications for e-learning implementation at the Open University of Tanzania. *International Journal on E-Learning,* 10*(1),* 63-85.

2.1 INTRODUCTION

In most sub-Sahara African countries, distance education is delivered using printed materials which are distributed to students at the beginning of academic year. One face-to-face session is arranged in a year for instructors to meet students in regional centres for real time lectures, discussions and some administrative matters.

Despite great role of print materials in the delivery of distance education, the approach is associated with several challenges (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009). The challenges include: (i) inefficient interaction among students and between instructors and students, (ii) lack of effective communication and interaction between instructors and students (iii) delays in delivery of study materials and assignments, (iv) lack of immediate feedback on students' assignments and tests, (v) outdated reading resources/study materials and (vi) feelings of isolation.

In some cases the challenges cause some of the distance learners to withdraw from studies and others contribute to delayed graduation (Carr, 2000; Galusha, 1997). E-learning technologies have great potential to enrich delivery of distance education (Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001; Mnyanyi & Mbwette, 2009). In this study, e-learning technologies refer to computers, internet, mobile phones and e-mail. These technologies (and others) can be used to systematically complement course delivery in distance education, facilitate access to resources, improve interaction and communication between instructors and students and for provision of feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000).

Despite the potential, the application of e-learning technologies in distance education in most sub-Sahara African universities is low (Hoven, 2000; Siritongthaworn, Krairit, Dimmitt, & Paul, 2006). The study discussed in this Chapter sought to understand instructors and students access to e-learning technologies, their perceptions, competences and the implications for e-learning implementation in distance education at the Open University of Tanzania.

2.2 E-LEARNING AT THE OPEN UNIVERSITY OF TANZANIA

2.2.1 Efforts to integrate e-learning

The Open University of Tanzania is a distance education institution with a student population of over 44,000 spread in 28 regional centres in a country of about 0.95 million square kilometres. Like the case in most other distance education universities in sub-Sahara Africa, print material is the main mode of course delivery and students support. To increase flexibility, the Open University of Tanzania is making several efforts to integrate e-learning technologies in education. The efforts include (among others); formulation of comprehensive institutional frameworks such as ICT policy, ICT master plan and e-learning implementation strategy (OUT, 2009abc). The university's aims and objectives are well stipulated in the ICT policy, which include to (i) transform paper-based to blended learning course delivery, (ii) train instructors on e-learning course design and development and (iii) motivate instructors on the use of an open source e-learning platform.

To realize the stated aims and objectives towards e-learning, the university facilitates transformation from paper-based to blended learning course delivery, improves the intranet to enhance communication and information sharing, enhances the use of e-learning technology as a main interaction platform between instructors and students, enhances capacity building and motivates instructors to design and develop e-learning courses.

2.2.2 Preliminary achievements

There are several achievements witnessed since 2004 as a result of the efforts towards e-learning integration at the Open University of Tanzania (Mbwette, 2008 & 2009; Bakari, 2009). The achievements relate to improvement of (i) technology infrastructure and access, (ii) instructors and students competence on technologies and (iii) student support. To improve instructors' and students' access, the technology infrastructure and service has substantially improved at the headquarters (Mbwette, 2009). The university has established four computer laboratories in Dar es Salaam headquarters (Mbwette, 2009). Also, the university has equipped seven regional centres with computer laboratories each with 10 computers connected to the internet. It is expected that each of the 7 centres will be connected to the headquarters through a Virtual Private Network (VPN).

To improve technology competence of instructors and students, the university has trained 150 students on basic technology skills and about 33 instructors on pedagogical skills related to the development of e-learning courses for delivery using Moodle (Bakari, 2009). Despite the training, instructors (except a few in the Institute of Educational Technology, IET) still deliver their courses in a traditional way using print-based materials. However, as a result of technology literacy and awareness, the use of technology for non-teaching activities in the university has improved significantly and fewer problems are reported (Bakari, 2009). Another achievement relates to the fact that the Open University has put in place Local Area Network (LAN) with Voice of Internet Protocol (VoIP) at the headquarters office in Dar es Salaam to facilitate communication and interactions (Mbwette, 2009). Currently the VoIP facility is used only for communication among staff in the university but not for instructor–student interactions. It is expected that in future the LAN and VoIP facilities will be used to improve communication and interaction between instructor and students.
In order to improve delivery of courses and reading resources to students, the university has customized Moodle for use by instructors and students, which is at a pilot stage in one of the bachelor programs in the university.

2.2.3 Challenges

E-learning implementation at the Open University of Tanzania has encountered a number of challenges (see for example Mbwette, 2009; OUT, 2009ab), which relate to (i) inadequacy of technology infrastructures and access, (ii) competences of instructors and students on technology, (iii) mindset and perceptions, (iv) limited motivation of instructors, (v) power fluctuation and (vi) narrow bandwidth. According to Bakari (2009), the university does not have enough computer and internet facilities for every instructor and students. This affects instructors' and students' access to computer and internet. Lack of sufficient technology competences of instructors and students is another challenge for effective implementation of e-learning at the Open University of Tanzania. A program to ensure that all instructors are computer and internet competent is in place and no extension of contracts is granted if an instructor has not undertaken and passed the basic technology literacy test administered by the Open University of Tanzania (Mbwette, 2009).

There is also a challenge of mindset and perceptions. Some instructors do not perceive e-learning as an effective means for teaching and learning (Bakari, 2009). Bakari argues that the university is challenged to demonstrate that e-learning can achieve university's mission. Limited motivation of instructors is another challenge for effective integration of e-learning technologies at the Open University of Tanzania. Limited motivation makes instructors reluctant to cooperate with technical staff to develop e-learning courses. Also power fluctuation which is a national issue affects effective use of e-learning technologies. According to Bakari (2009) the university has a standby generator in place at headquarters, but not in the regional centres. Narrow bandwidth is a serious challenge almost across most sub-Sahara African countries and affects e-learning implementation efforts at the Open University of Tanzania as well. This has been and in fact is a threat to sustainable mainstreaming of technologies in education (Mbwette, 2009). According to Mbwette, the arrival of SECOM in the Tanzania's sea shore in June, 2009 is expected to avert the hitherto very high costs of bandwidth access in Tanzania. This study aimed at understanding the context of the Open University of Tanzania for successful e-learning implementation.

2.3 E-LEARNING FOR DISTANCE EDUCATION

2.3.1 Potential of e-learning technologies

Distance education refers to instruction that is delivered over a distance to one or more individuals located in one or more venues (Phipps & Merisotis 1999). The term is also commonly used to describe delivery of courses or programs in which instructors and students are geographically separated by physical distance and time. The use of technology in distance education to expand access to higher education in developing countries has two objectives: to increase enrolments and the opportunities for students unable to take part in campus-based programs because they live far from existing facilities, or because their work schedules prevent them from attending regular classes.

As pointed earlier, despite opportunities of distance education, instructors and students in distance education face several challenges (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003 and Mcharazo & Olden, 2000). E-learning technologies have huge potential of enriching distance education delivery

(Bates, 2000; Moore, 1996; Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001), as such different e-learning technologies are widely used in distance education in developed countries for different purposes including redressing distance education challenges. Specifically, e-learning technologies such as computer, internet mobile phones, CDs & DVDs, multimedia, video conferencing and others are used in distance education to complement course delivery, facilitate access to resources, improve interaction and communication with students and provide feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000).

In terms of facilitating course delivery, e-learning technologies have made web-enhanced teaching and learning possible to complement traditional teaching processes in distance education in some developing countries (Pena-Bandalaria, 2007). In addition, computer and internet technologies are used for delivery of support to distance learners where through the use of such technologies, students in distance education are offered support such as tutorials, library resources, guidance and counselling, and academic and administrative consultations (Pena-Bandalaria, 2007).

E-learning technologies such as computer and internet are also used by instructors and students to search for web resources. A study by Czerniewicz and Brown (2005) in South Africa found that 61% of instructors and 63% of students used internet frequently to access electronic resources and readings resources. In some occasions, this contributed to greater students' achievement (Bates, 2000; Tschang & Senta, 2001). E-learning technologies such as e-mail are used in distance education in most developed countries for communication and interaction between instructors and students (Thomas & Carswell, 2000). Where e-mail is used, the rapport between instructors and students' increases, provision of feedback to students improves and instructors feel they have more interaction with their students (Carswell, Thomas, Petre, Price, & Richards, 1999). Moreover, e-mail technologies lead to more frequent contacts and teaching is more continuous than in traditional distance education (Thorpe, n.d). The use of mobile phones for communication and interactions in distance education is becoming popular too. Currently, many students own mobile phones and most of them use such phones for receiving and sending text messages (Fozdar & Kumar, 2007; Rao, 2009). According to Fozdar and Kumar, short messages are used in distance education to improve communication

between instructors and students and between students in the following ways; receiving feedback on assignments, providing/receiving short information about important dates, scheduling of counselling, laboratory sessions, grades and examination results. However, studies from developing countries have shown that students prefer e-mail communication more because they find e-mail more immediate than mobile phones and they feel guaranteed to receive a response within a short period of time unlike when using phones which may not be reachable (Thomas & Carswell, 2000).

The integration of e-learning technologies for content delivery and communication has opened new opportunities in distance education in most developed and some developing countries. This is because e-learning technologies allow access to course content and make communications easy for students who live in remote locations, or for those who are housebound due to health, disability or domestic responsibilities (Kirkwood & Price, 2005). When appropriately selected for distance education, e-learning technologies have the potential to (i) alleviate some common causes of withdrawal/drop out by improving interactions, collaboration and feelings of connectedness and community (Fozdar & Kumar, 2009; Ludwing-Hardman & Dunlap, 2003), (ii) diminish geographic and time barriers between instructors and students, enhances increased flexibility, faster feedback, prompt return of assignments and delivery of instructional contents (Latchman, Gillet & Bouzekri, 1999; Thomas & Carswell, 2000) and (iii) reduces students' drop outs in distance education by promoting interactions and develop feelings of connectedness and collaborative learning (Fozdar & Kumar, 2007).

2.3.2 E-learning implementation challenges

Despite huge potentials that e-learning technologies have in enriching distance education delivery in developed countries, the application of such technologies in the context of developing countries is limited (see for example Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009). E-learning technologies are not yet used pedagogically by most instructors. According to Hoven (2000) instructors and students usually use programs such as word processing, spreadsheets and graphics for preparation of examinations and other related academic works.

There are different challenges that make instructors and students in most developing countries unable to fully exploit e-learning technologies. Some of the challenges are inadequate infrastructures such as computer and internet. According to Resta and Laferriere (2008), only 4% of the African population have access and use computer and internet. On the other hand, despite the fact that availability of mobile phones for educational use enjoys a phenomenal growth across Africa (see for example Brown, 2003; Fozdar, & Kumar, 2007; McGreal, 2009; Pena-Bendalaria, 2007; Swarts & Wachira, 2010), there are some challenges associated with this technology, namely: cost (Brown, 2003 & Nnafie, 2002), limited screen size, battery span and memory and design content for m-learning delivery (McGreal, 2009). Effective use of the gadget is to some extent limited/hampered by these challenges.

Narrow bandwidth which affects internet speed is another big challenge in most developing countries. Gakio (2006) summarises the state of internet connectivity in tertiary institutions in Africa as: *too little, too expensive and poorly managed; as a result internet technology becomes even less useful for research and education purposes, (p. 41).* Gakio contents that one solution to controlling costs and improving access to internet is to press for more affordable access by, for instance: suggesting that governments open up their telecommunications markets; by joining forces with other academic institutions to negotiate better connectivity deals; by encouraging local internet service providers to set up country internet exchange points – at route traffic within the country instead of via Europe and North America; and by making use of open source systems and software.

Another challenge is lack of readily access to e-learning technologies by both instructors and students in most developing countries. The situation regarding access to different technologies is different for different stakeholders (Aguti & Fraser, 2006; Nnafie, 2002). For example in a study by Aguti and Fraser (2006) more than 60% of students in their study reported to have no access to video, computer and internet and only about 4% of the students had access to computers at home and 1% of students had access to internet at home. Also literature shows that students access e-learning technologies at different places such as home, workplace, university, or other places (Bates, 1994; Hoven, 2000; and Meyer- Peyton, 2000).

Limited competence, skills and experiences on some e-learning technologies by both instructors and students is another challenge. Some instructors and most students have limited competence, skills and experience in using new technologies (Hoven, 2000; Kirkwood & Price, 2005 and Smart & Cappel, 2006). They argued that students' knowledge and skills on e-learning technologies such as computer and internet are important towards effective use of technologies. Instructors' and students' perceptions in terms of the benefits and ease of use of technologies are also a challenge. The perceived benefits of particular technologies have great influence on whether or not to use a technology. Siritongthaworn *et al*. (2006) argues that for flexibility benefits, instructors and students agree to use e-learning technologies because they help to create convenience in terms of flexibility in time and place of learning.

Regarding ease of use of e-learning technologies, instructors and students with poor computer competences and skills perceive e-learning technologies use as difficult compared to those with comparatively good computer skills (Siritongthaworn *et al.,* 2006). In addition, beliefs about teaching and learning held by instructors are also among important challenges which influence e-learning application in higher education (Phillips, 2005). Attempts to redress this must include intensive training on computer use and on e-learning applications so as to promote positive beliefs among instructors regarding the role of technologies in education (Joint, 2003).

Successful implementation of e-learning technology requires a thorough understanding of the context. As mentioned earlier, this study was carried in order to understand the context of the Open University of Tanzania for effective e-learning implementation. The following overall research question guided the study; *what is the feasibility of implementing an e-learning course delivery in distance education at the Open University of Tanzania*? The following research sub-questions were formulated:

1. What kind of e-learning technologies do instructors and students access and where do they access them?
2. What are the perceptions of instructors and students about the use of e-learning technologies in distance education?
3. What do instructors and students perceive as the benefits of using computers and internet in distance education?

4. What basic competences on computer and internet use do instructors and students have?
5. How often do instructors and students use computers and internet for teaching and learning? What difficulties do they encounter?
6. How should instructors and students be prepared to successfully implement e-learning technologies in distance education?

2.4 METHOD

2.4.1 Design of the study

A *planning evaluation* research design was applied, because results from the study were aimed to be used to plan e-learning implementation strategies. According to Guskey (2000), *planning evaluation* is an appropriate design because it takes place prior to the implementation of an innovation and allows for the determination of needs, assessment of characteristics of participants, careful analysis of context and the collection of baseline information. This study sought to understand realities of the Open University of Tanzania from instructors and students perspectives for effective e-learning integration in course delivery. Instructors and students were involved in the study so that they own the intervention right from the initial stage. This information is necessary especially in deciding about what e-learning technologies to use in distance education. Moreover, the information helped to make informed decisions regarding best ways to prepare instructors on e-learning course design and delivery.

2.4.2 Participants

Instructors

All instructors (N=47) from two faculties (Faculty of Education and Faculty of Science, Technology and Environmental Studies) and one institute (Institute of Continuing Education) were invited to participate in the study. Thirty two instructors (80%) responded. Instructors had an average age of 37 years ranging from 27-70 years. There was 1 professor, 6 lecturers & senior lecturers, 15 assistant lecturers and 9 tutorial assistants. Instructors had an average of 3.5 years of working experience within the university. Of the 32 instructors, 19 were males and 13 females.

Students

A total of 300 students spread over three regional centres were invited to participate in the study. The three centres were selected for logistical reasons: they were easy to reach and they had comparatively a large proportion of the student population. Students were selected because they participated in the courses offered by the selected academic units i.e. Faculty of Education, Faculty of Science, Technology and Environmental Studies and Institute of Continuing Education. 208 students (69.3%) responded across regional centres in the following proportions: Dar es Salaam (159), Coastal (23) and Morogoro (26). There were 126 males and 82 females aged between 22 and 55 years. Students were in different years of study.

Instruments

A structured questionnaire was used to collect data from instructors and students[2]. Many items in the questionnaire were common for both instructors and students, but some were specific for each group. Some scales in the questionnaires were adapted from the Technology Proficiency Self- Assessment (TPSA) Instrument (Christensen & Knezek, 2001) and a technology scan questionnaire developed by a Dutch consultant agency *(STOAS)* (http://www.stoas.nl/stoas_com/stoas_com_homepage.php). The questionnaires were in Likert scale type. Statistics mainly means, standard deviations, percentages and effect size were computed and presented accordingly.

2.5 RESULTS

2.5.1 Access and access points for e-learning technologies

Access to e-learning technologies

Instructors and students access to different e-learning technologies was investigated during the study. Figure 2.1 presents the state of access of instructors and students to different e-learning technologies.

---

[2] The instruments used in this study can be sent on request (kassim.nihuka@out.ac.tz).

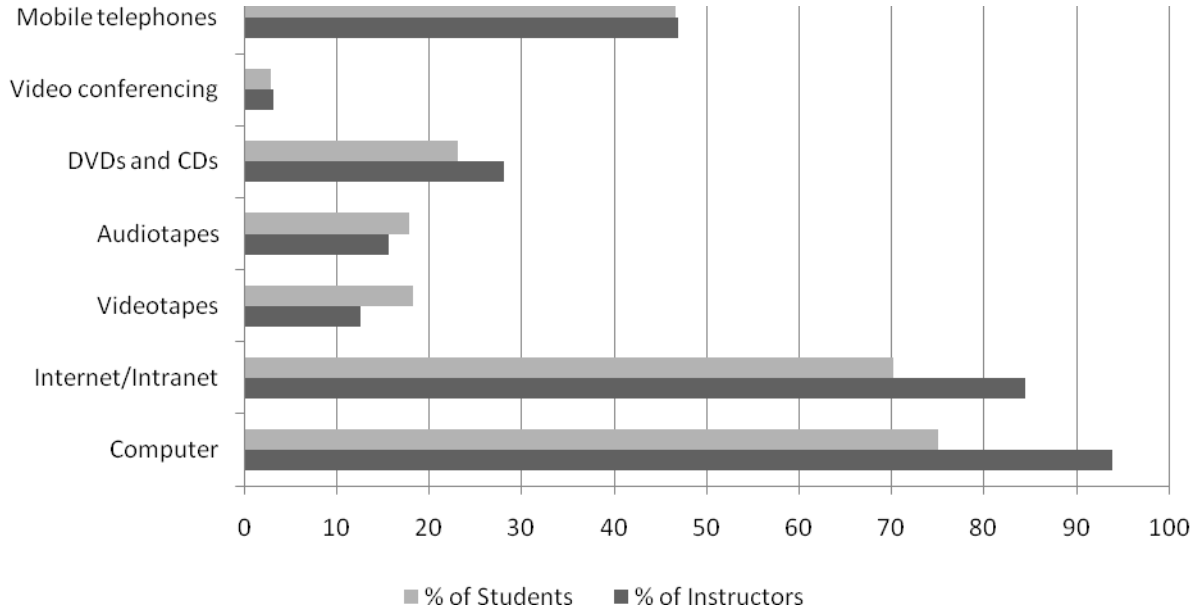


Figure 2.1 Access to e-learning technologies by instructors and students

As presented in Figure 2.1, results show that majority of instructors and students have access to computers (93.8% vs75%) and internet/intranet (84.4% vs 70.2%). Instructors have relatively higher access to computers and internet technologies than students. Less than half of the instructors and students have access to mobile phones (46.9% vs 46.6%) respectively. Very few instructors (3.1%) and students (2.9%) have access to video conferencing. In addition, results also demonstrate that less than a third of instructors (28.1%) and students (23.1%) have access to DVDs and CDs. Despite some access to mobile phones, computer and internet; both instructors and students confirmed during interviews that e-mail and mobile phones are never used for delivery of courses and communication.

Access points for e-learning technologies

Table 2.1 presents data related to places that instructors and students normally access e-learning technologies.

Table 2.1 *Access points for e-learning technologies by instructors and students*

	% of Instructors *(N=32)*	% of Students *(N=208)*		
Access points	**Headquarters**	**DSM*** *(n=159)*	**Coastal** *(n=23)*	**Morogoro** *(n=26)*
Library of the Open University of Tanzania in DSM	71.9	52	95	11.5
Regional centre offices	22.0	23.0	8.70	0.0
Workplace	93.8	37.7	8.70	34.60
Home	18.8	23.2	4.30	3.80
Internet cafes	75.0	66.0	52.20	88.50

Note: DSM*=Dar es Salaam.

Results show that over three-quarters of instructors' access computers and internet in their offices at their workplace (93.8%), in the library of the Open University of Tanzania (71.9%) and in internet cafes (75%). Only less than one-third of instructors access technologies at regional centre offices (22%) and in their homes (18.8%). A majority of students (95%) in the Coastal regional centre have access to computer and internet at the university library. Slightly more than half of students in the Coastal region access technologies in internet cafes. A small proportion of students access such facilities at the Coastal regional centre offices (8.7%), at their workplaces (8.7%) and in their homes (4.3%). More than half of students in Dar es Salaam access technologies at the university library (52%) and internet cafes (66%). In Dar es Salaam only one-third of students access technologies at workplaces. Less than one-third of them access technology facilities at the regional canter (23%) or at home (23.2%). In Morogoro results show that more than three-quarters (88.5%) of students access technologies from internet cafes and slightly more than one-third (34.6%) of them access such facilities at their workplaces.

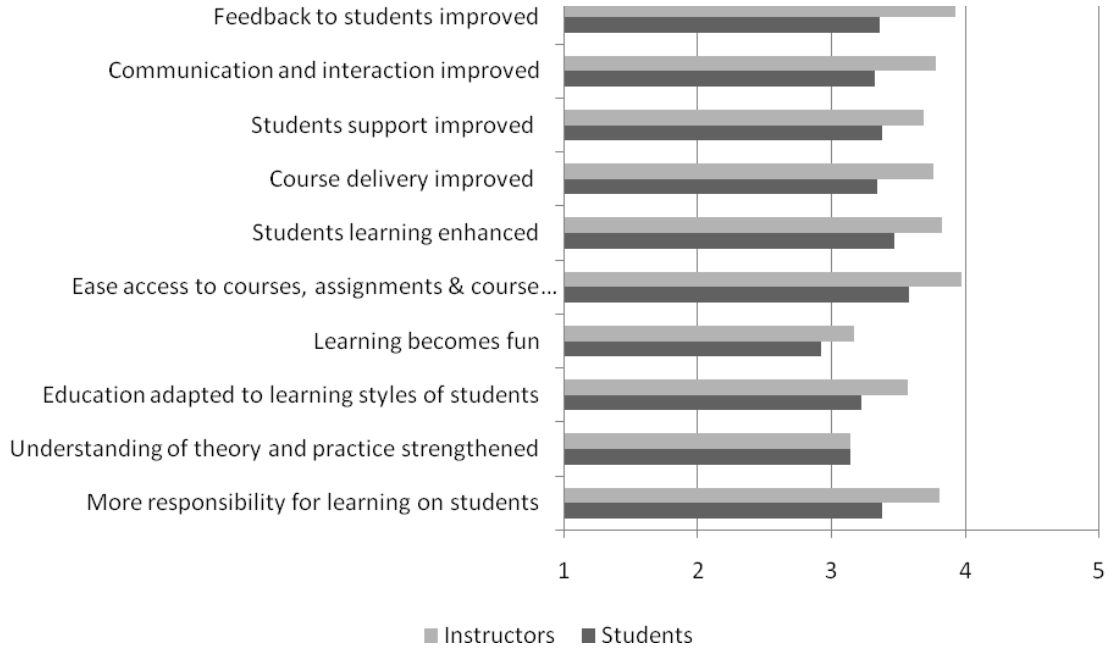
2.5.2 Perceptions and perceived benefits

Perceptions on technology

Instructors and students were asked to express their perceptions on the use of computers and internet as e-learning technologies in distance education. Overall, both instructors and students are receptive about using computers and internet as e-learning technologies. Instructors expressed a higher mean value (M = 4.75, SD = 0.44) compared to students (M = 4.48; SD = 0.81).

Perceived benefits of e-learning technologies

Figure 2.2 presents means on instructors and students perceived benefits of using technologies for teaching and learning. It is apparent that both instructors and students perceived benefits associated with e-learning technologies as shown by mean values between 2 and 4, which means that the perceived benefits range from small to very large benefits. Instructors consider the following as first priority benefits of e-learning technologies (i) accessibility by students to courses, assignments and course outlines, (ii) enhancement of students' learning, (iii) improvement of feedback to students. For students the first priority benefits of e-learning technologies are: (i) more responsibility for their learning, (ii) easy access to courses, assignments and course outlines and (iii) enhancement of their learning. Results also show that both instructors and students perceive the following as the least benefits of e-learning technologies; (i) understanding of the relationship between theory and practice, (ii) education adapted to learning styles of students and (iii) learning becomes fun.



Note: Scale; 1= no benefit, 2= small benefit, 3= large benefit and 4= very large benefit

Figure 2.2 Perceived benefits of e-learning technologies by instructors and students

2.5.3 Competences, uses and difficulties

Competences on computer and internet use

Instructors' and students' competences on basic computer and internet applications were investigated and the results are presented in Figure 2.3.

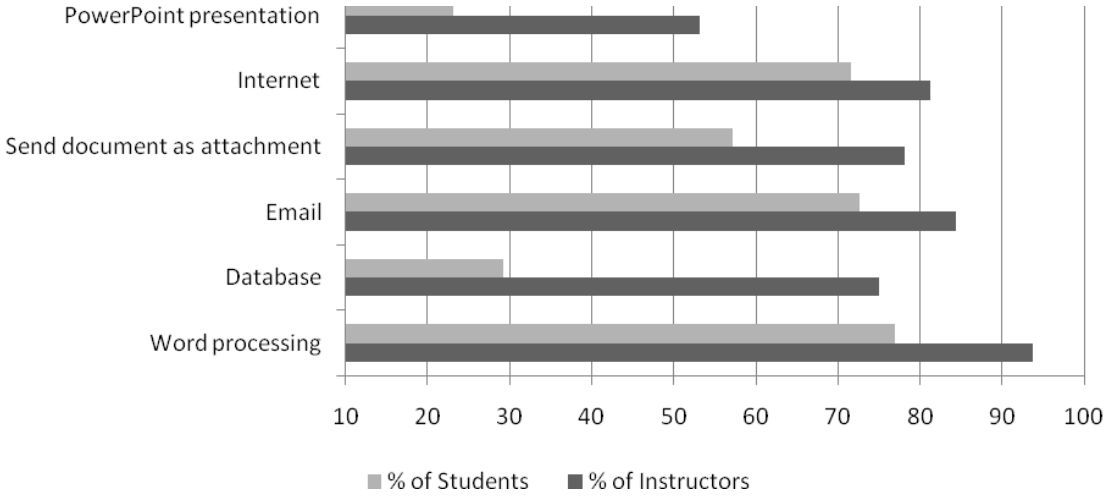


Figure 2.3 Basic technology competences of instructors and students

The results in Figure 2.3 demonstrate that students' competences are relatively lower than those of instructors. Specifically, more than three-quarters of instructors are competent in using word processing (93.8%), e-mail (84.4%), sending documents as attachments (78.1%), and internet (81.3%). Results from interviews with instructors revealed that they acquired basic technology competences either through workplace-based training, as part of university education or by self-learning. On the part of students, results show that about three-quarters of them are competent in using word processing (76.9%), e-mail (72.6%) and internet (71.6%). However, only less than two-thirds of students (57.2%) can send documents as attachments. Compared to instructors, results show that students' competences on database and powerpoint presentations is relatively low, 29.3 % (students) as opposed to 75% (instructors). Interviews with students showed that a few students who had skills on how to use power point were not practicing it and the skills just fade away over time.

Common uses of computer and internet

The frequency by which instructors and students use technology was also investigated during the study as reported in Table 2.2 and 2.3.

Table 2.2 *Instructors' use of computer and internet*

Applications	N	Mean	SD
Delivery of assignment and course materials	30	2.37	1.1
Setting examinations	31	2.74	1.1
Provision of educational resources	29	1.38	0.8
Guidance and counselling	30	1.77	1.2

Note: Scale. 1=never, 2=at least 2-3 times per year, 3=at least 3-4 times per year, 4=throughout the year and NA=not applicable.

Results in Table 2.2 reveal that to a limited extent, instructors use computers and internet for delivery of educational materials and setting of examinations. Specifically, they use computers for (i) delivery of assignments and course materials for at least between 2-3 times per year (M=2.37, SD=1.1) and for setting examinations for at least between 3-4 times per year (M=2.74, SD=1.1). Hardly any of the instructors use technology for the provision of educational resources (M=1.38, SD=0.8) and for guidance and counselling (M=1.77, SD=1.2). The interviews revealed that although instructors use e-mail for non-educational communications, they hardly use e-mail to send assignments, course outlines and study materials to students. Table 2.3 compares the use of computers and internet between instructors and students.

Table 2.3 *Instructors and students use of computer and internet compared*

	Instructors			Students			
Applications	*N*	*Mean*	*SD*	*N*	*Mean*	*SD*	**Effect size**
Processing of examination results using database	31	3.13	1.1	190	1.81	0.9	0.55
Develop study materials using word processing program	29	2.00	1.2	201	2.53	1.0	-0.23
Teaching and learning using *atutor*, *moodle or audio/ videotapes*	30	1.23	0.7	190	1.14	0.4	0.08
Communication through e-mail	30	2.73	1.1	200	2.78	1.0	-0.02
Searching for materials	31	3.42	1.0	200	2.65	1.0	0.36
PowerPoint presentation	29	1.69	0.9	190	1.61	0.9	0.04

Note: Scale. 1=never, 2=at least 2-3 times per year, 3=at least 3-4 times per year, 4=throughout the year and NA=not applicable.

Results demonstrate that on average instructors and students use computers and internet for at least 3-4 times per year to search for materials (Instructors: M = 3.42, SD = 1.0; Students: M = 2.65, SD = 1.0). Also, they both use computers and internet for at least 2-3 times per year for communication through e-mail

(Instructors: M=2.73, SD=1.1; Students: M= 2.78, SD=1.0) and for word processing (Instructors: M=2, SD=1.2; Students: M=2.53, SD=1.0). Hardly any of the students (M=1.81, SD=0.9) use database program compared to the instructors who expressed that on average they use database programs at least 3-4 times per year usually for processing examination results (M= 3.13, SD = 1.1). In addition, instructors use computers and internet for at least 2-3 times per year for delivery of assignments and course materials (M=2.37, SD=1.1) and for setting of examinations (M=2.73, SD=1.1). Moreover, results show that the majority of the instructors and students never use e-learning technologies for teaching and learning processes (Instructors: M=1.23, SD=0.7; Students M=1.14, SD=0.4) and for making power point presentations (Instructors: M=1.69, SD=0.9; Students: M=1.61, SD=0.9). It is apparent of Table 2.3 that instructors use database (effect size = 0.55) and internet (effect size = 0.36) more than students.

Difficulties when using computers and internet

In Table 2.4 results related to difficulties encountered by instructors and students when using the computer and the internet are presented.

Table 2.4 *Difficulties encountered by instructors and students*

	Instructors			**Students**			**Effect size**
Areas of difficulties	*N*	*Mean*	*SD*	*N*	*Mean*	*SD*	
Availability of access points	28	2.36	0.8	172	2.28	0.8	0.05
Slow network	30	2.53	0.6	175	2.42	0.8	0.08
Unsuitable computers	30	2.17	0.9	170	2.19	0.8	-0.01
Experience in using computer	31	1.68	0.7	185	2.10	0.9	-0.25

Note: Scale, 1=no constrain, 2=not so important constrain and 3=important constrain.

Results in Table 2.4 illustrate that both instructors and students encounter related difficulties when using computer and internet (effect size = 0.05 and below). Specifically, instructors and students feel that difficulties related to availability of access points (Instructors: M = 2.36, SD = 0.8; Students: M = 2.28, SD = 0.8), slow network (Instructors: M=2.53, SD=0.6; Students: M=2.42, SD=0.8) and unsuitability of computers (Instructors: M=2.17, SD=0.9; Students M=2.19, SD=0.8) are constraints, but not so important as experience in using computers for students (M=2.10, SD=0.9) is. The latter however is not a constraint for most instructors (M=1.68, SD=0.7). It was found during interviews that instructors share computers with 4-5 other colleagues in the

office. As for students, interviews revealed that the number of computers in the laboratory is insufficient compared to the number of students who visit the university library in a day. Other interview results with students showed that there are no technology facilities for students in the regional centres.

2.5.4 Preparation of instructors and students learning needs

Instructors' professional development needs

Data related to instructors' professional development needs were also solicited during the study. In terms of willingness, the majority of instructors (90%) are willing to participate in e-learning training. Regarding the content of the training, results in Table 2.5 show that the majority of instructors prefer the following as the content: (i) design of e-learning courses (96.6%), (ii) make courses available in a learning system (93.8%), (iii) how to deliver courses using appropriate e-learning technologies (93.8%) and (iv) facilitation of students learning in an e-learning environment (100%).

Table 2.5 *Suggestions regarding content of the training*

Suggested content	**Frequency** *(n)*	**% of Instructors**
Designing of e-learning courses	31	96.6
Make courses available in a learning system	30	93.8
Course delivery by e-learning technologies	30	93.8
Facilitation of students	32	100

Students' learning needs

Students' learning needs for effective e-learning implementation were also determined during the study. Results in Table 2.6 reveal that more than three-quarters of the students indicated the following learning needs; orientation on e-learning technologies (79.8%) and strategies on how to learn using e-learning technologies (76.9%). More than two-thirds indicated basic technology skills to get more experience (66.3%) and provision of a student manual on how to use specific technologies (68.7%) as important learning needs. About half of the students (54.8%) indicated support on how to find information from university website as a learning need.

Table 2.6 *Students' learning needs for e-learning implementation*

Students learning needs	**Frequency** *(n)*	**% of students**
Orientation on e-learning technologies	180	79.8
Students manual on e-learning	172	68.8
Strategies on e-learning	178	76.9
Basic skills on computer and internet	185	66.3
Help on how to find information from OUT's website	169	54.8

Note: OUT=Open University of Tanzania.

2.6 CONCLUSIONS AND DISCUSSION

This study was designed to understand the context of the Open University of Tanzania and its implications for successful e-learning implementation. Results have shown that it is feasible to implement e-learning to enhance distance education delivery at the Open University of Tanzania. Both instructors and students have competences on basic computer and internet applications and are positive to use technologies in distance education. Despite limited access to technology, instructors access technology in their offices by sharing with some colleagues. Unexpectedly, instructors' and students' access to mobile phones, CDs and DVDs was below 50%, while researcher's experience with the Open University of Tanzania shows that access to such technologies is increasing.

On the other hand, students access to computers and internet in regional centres is a challenge because of lack of such facilities in the centres. Students in Dar es Salaam and Costal centres access technologies at the university library in Dar es Salaam. Also, to a limited extent, students access computer and internet facilities at internet cafes and at their workplaces. Despite new investments in technological infrastructure, students' access was still a problem in 2008, when data for this study were collected. The available technologies to which instructors and students have limited access can still be used to enrich course delivery and improve student support at the Open University of Tanzania.

According to the instructors and students in this study, technologies can be used (among other uses) to (i) facilitate access to course, assignments, course outlines and reading resources, (ii) improve communication and interactions between instructors and students, (iii) provision of immediate and effective

feedback to students. There already exist numerous best examples regarding appropriate ways to use technologies for educational purposes in sub-Sahara Africa (c.f. Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001; Czerniewcs & Brown, 2005; Fozdar & Kumar, 2007).

As pointed earlier, instructors and students alike are positive to use e-learning technologies in course delivery. This is among important conditions for successful implementation of technologies in an institution (Phillips, 2005). In addition, the majority of instructors and students have basic competences on computer and internet use and they currently use technologies such as computer and internet at a limited extent. For example, instructors use them for setting examinations and tests, processing examination results and for searching information. This result corroborate to those reported in other studies (c.f. Hoven, 2000). On the other hand, students use computer and internet for word processing and searching of reading materials. Other studies emphasize that instructors and students competences on basic applications are also necessary conditions for successful implementation of technology-related innovations (Hoven, 2000; Kirkwood & Price, 2005; Smart & Cappel, 2006).

Based on the results of this study, we suggest that ambitions to implement e-learning at the Open University of Tanzania must consider contextual realities. In this case challenges such as narrow bandwidth, access (to computers, internet, mobile phones, CDs, DVDs and the like), instructors and students' perceptions, motivation, and experiences on selected technologies must be considered. For example, since narrow bandwidth is a big challenge in most sub-Sahara African countries which affects internet connectivity and speed (Gakio, 2006), the use of online systems may seem un-ideal. This implies that offline systems, CDs or DVDs may be more appropriate for course delivery in such a situation. Concurrently, technologies such as mobile phones and e-mail may be used to improve communication and interactions between instructors and students. In this way delivery of courses, resources, assignments and provision of immediate feedback can be improved and students may feel connected to their instructors (as found in other studies by Czerniewics & Brown, 2005; Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000).

It is also argued that instructors' competences on basic computer applications may not necessarily be sufficient for e-learning technologies application in distance

education. This implies that an appropriate professional development arrangement for instructors is necessary in order to prepare them on how to transform their traditional courses into e-learning courses. Particularly, instructors need training on e-learning course design, uploading of courses in a learning system, deliver courses using e-learning and facilitation of student learning in new learning environment. Consideration of characteristics of a quality professional development such as active involvement of instructors, collaboration and support are among determining condition for the success of an innovation (Ball & Cohen, 1996; Deketelaere & Kelchtermans, 1996; Mishra *et al.,* 2007).

The nature of the instructors who participated in this study is one major limitation to the generalization of the results to a different context. Instructors accepted to participate in the study because (among other things) the university management encourages instructors in the university to use e-learning technology such as Moodle in teaching.

CHAPTER 3
E-learning course design in design teams of instructors: Experiences in the Open University of Tanzania[3]

Collaborative Course Design in design teams is reported as a promising professional development strategy. This study explored the potential of this strategy in preparing instructors on course redesign for e-learning delivery in the context of the Open University of Tanzania (OUT). Three instructors from the Institute of Continuing Education (ICE) at OUT worked in a design team and were supported on how to transform their traditional courses into e-learning courses. A sample of 67 Foundation course students from ICE was invited to study in an e-learning environment through offline Moodle learning management system (LMS) supported by e-mail and mobile phones for a period of three months. Quantitative and qualitative data were collected from instructors and students. This contribution discusses experiences of instructors on Collaborative Course Design in a design team and presents students experiences with the redesigned e-learning courses. The findings show that despite its challenges, each design team had a significant return in terms of professional development of instructors and improvement of students support.

3.1 INTRODUCTION

Print media delivered to students through postal services or carried by instructors is the dominant approach for course delivery in distance education in most sub-Sahara African countries. The approach is often complemented by

[3] This chapter is based on the article, Nihuka, K. A & Voogt, J. (in press). Collaborative course design in Teacher Design Teams: Experience in the Open University of Tanzania. *International Journal of Learning Technologies.*

some regularly organized face-to-face sessions where instructors meet students for real time teaching and learning. The different challenges that confront instructors and students at the Open University of Tanzania as identified and discussed in Chapter 2 include (i) inefficient interaction between students and instructors, (ii) lack of effective communication and interaction (iii) delays in delivery of study materials, course outlines and assignments, (iv) lack of immediate feedback on students' assignments and tests, (v) outdated reading resources and (vi) feelings of isolation.

E-learning technologies have potential in addressing most of these challenges (Hoven, 2000; Moore, 2003) and a wide set of technologies are available to enhance learning in distance education. For over a decade the Open University of Tanzania has done several efforts to integrate Moodle as a Learning Management System (Bakari, 2009). The efforts include (among others) the formulation of comprehensive institutional frameworks such as ICT Policy, ICT Master Plan and E-learning Implementation Strategy (OUT, 2009 a,b,c).

According to the ICT policy, the university aims (among other things) to (i) transform paper-based course delivery to a blended learning approach and (ii) train its instructors on e-learning course development. Towards this end, professional development for instructors is an important endeavour at the Open University of Tanzania. Several programs have been conducted to orient instructors on e-learning technologies integration. However, the trend is that instructors did not transform their courses into e-learning courses and still deliver them in a traditional way. Thus, these programs seem ineffective in orienting instructors on course design, development and delivery.

The following challenges are reported on e-learning integration at the Open University of Tanzania (Bakari, 2009; Mbwette, 2009; OUT, 2009a, (b): (i) inadequacy of ICT infrastructures affecting instructors and students' access to technologies, (ii) ICT competence among some instructors and students, (iii) mindset and perceptions of some instructors, (iv) limited motivation among instructors, (v) power unreliability and (vi) narrow bandwidth which affect internet speed.

Since the transition to e-learning is a curriculum innovation, professional development for instructors is necessary in order to prepare them on the

innovation (Penuel *et al.,* 2007). According to Ball & Cohen (1996), Deketelaere & Kelchtermans (1996) and Mishra, Koehler, & Zhao (2007) the success of a curriculum innovation depends on the extent to which instructors are actively involved in the professional development program. This study used *Collaborative Course Design* in a design team as a professional development strategy to prepare instructors for e-learning course delivery. The strategy is based on research findings on effective professional development of instructors (Borko *et al*, 2002; Clarke & Hollingsworth, 2002; Desimone *et al,* 2002; Garet, 2001; Penuel *et al*, 2007; Porter *et al,* 2003) which are rooted in social constructivist theory (Dewey, 1916; Vygotsky, 1978) and adult learning theory (Knowles, Holton III, & Swanson, 1998; Merriam, Caffarella, & Baumgartner, 2007). This Chapter reports experiences of instructors regarding the design team. It also discusses students' experiences on redesigned courses and about the e-learning delivery.

3.2 DESIGN TEAM OF INSTRUCTORS

3.2.1 Concept and potential

Waddoups *et al.* (2004) provide a list of definitions of design teams from the perspective of participants of such teams. They describe design teams as '*a cooperative group working together to produce a unit of instruction, in a design team members are involved in creating a product, reshaping and synthesizing the product and in many ways creating a new fashion and a collaborative group working together and building a community' (p.17).*

Central to these definitions is the idea of (i) working together, cooperation among members in designing; (ii) (re)designing of courses or units of instruction or creating new fashion and (iii) building a community. These features allow instructors in the team to collaborate and support each other towards realizing a common goal. Design teams have the potential to positively impact instructors' professional development (Ball & Cohen, 1996; Deketelaere & Kelchtermans, 1996; Koehler, Mishra & Yahya; 2007; Penuel *et al.,* 2007).

Little (1997) distinguished four types of collegial collaborations which includes; storytelling, helping each other, sharing of ideas and experiences, and joint working. Collaborations in design teams is also fostered through (formal)

presentations, interactions during training (and in design teams) and sharing of ideas about technology integration to colleagues (Waddoups *et al*., 2004). Design teams can have different number of participants, for different tasks and with different kinds of support (Mishra *et al.,* 2007; Nieveen *et al*., 2005).

3.2.2 Course design in design teams

Koehler *et al*.(2007) and Mishra *et al.* (2007) argue that design teams provide opportunity for instructors' professional development through learning-by-design. This claim is attested by several other studies which report about instructors benefiting professionally by working in teams to design and/or develop courses (e.g. Handelzalts, 2009; Mishra *et al.* 2007; Nieveen *et al.* 2005; Simmie, 2007).

The patterns and dynamics by which instructors' work in design teams are quite diverse. However, most publications reveal that in order to accomplish a common goal, instructors in design teams and team meetings work collaboratively (see for example Handelzalts, 2009) and individually on specific tasks as decided by the team. Instructors in design teams engage in professional dialogues about curriculum design/development and implementation. Design teams contribute to professional development because instructors become team players and designers of curriculum as argued by Simmie, (2007). Nevertheless, appropriate support for design teams during e-learning course design is necessary.

3.2.3 Support for design teams designing e-learning courses

Instructors in design teams require appropriate pedagogical and technical support when transferring their courses from traditional into e-learning courses (Bates, 2000; Bianco *et al*., 2002). Pedagogical support is needed with respect to e-learning course design (Telnova, 2005), planning (Bianco *et al*., 2002), and the creation of their own course environment. A well-structured template with inbuilt instructional approach is quite effective in supporting instructors in course design (Telnova, 2005). Also, instructors require pedagogical support related to designing students' activities and instruction so that e-learning doesn't include just delivery of content (Telnova, 2005). One-to-one support for instructors engaging in e-learning activities, development and implementation and continuous personal coaching to ensure a fearless familiarization with e-learning skills needed for e-learning are also necessary (Bianco *et al.,* 2002).

Additionally, technical support is also an important requirement for instructors to effectively integrate e-learning technologies (Sife *et al*., 2007). Instructors need to be supported on activities like installation of computers and its accessories, installation of software, maintenance, network administration, and security management (Bakari *et al.,* 2005). In addition, instructors (and students) may need some basic skills related to troubleshooting to overcome common technical problems when using technologies. This is because in most of the developing countries including Tanzania, technical support personnel are scarce (Bakari *et al*., 2005).

More importantly, members in a design team require support that enables them to work collaboratively as a team. According to Radinsky, Smolin, Lawless, and Newman (2003) team members require support related to how to form cohesive team, benefit from each other's experience and solve problems together. Moreover, members need support on how to design together, allowing for equal participation of team members.

Supporting design teams lead to increased output. According to Radinsky *et al.* (2003), design teams offer possibilities for deeper learning than in traditional professional development. Also, they argue that collaborative design through design teams offer instructors great potential for transforming their instruction.

Not only instructors, but also students need skills on how to learn in an e-learning environment and on how to use particular e-learning technology (Dzakiria, 2004). Efforts towards e-learning integration must therefore take into account the need to provide (technical) support to students during e-learning. According to Dzakaria (2004) students' support is crucial in predicting students' motivation to use e-learning technologies. Student support in an e-learning course is offered by way of peer interaction during the course, from technical staff or the course instructor (Concannon, Flynn & Campbell, 2005). In this respect, synchronous and asynchronous technologies are useful for facilitating provision of feedback and interactions between instructor and students in a course (Brown, 2005; Franklin, 2007).

3.3 FOCUS OF THE STUDY

The following was the main research question for the study: *How does collaborative e-learning course design and delivery in design team contribute to instructor professional development and implementation at the Open University of Tanzania?* The following sub-questions were formulated to guide the study:

1. What are instructors' experiences with the participation in the professional development (workshops and design team)?
2. What did instructors' perceive as things they have learned from participation in design team?
3. What support do instructors need during e-learning course design and delivery?
4. How did instructor's practice change as a result of participation in design team?
5. What are students' experiences with the e-learning courses and the delivery?

3.4 CONTEXT

Results reported in this Chapter were preceded by a context and needs analysis study (i.e. Nihuka & Voogt, 2011 in Chapter 2). This study revealed that, although instructors at OUT had competences on basic computer applications, competences related to integration of e-learning technologies to enhance distance education delivery was a challenge. As a result, the majority of instructors used computer and internet only to a limited extent such as typing of examinations, processing of examination results and delivery of assignments.

Besides, the findings also showed that instructors were receptive on using e-learning technologies for course delivery in distance education. For most instructors, the first priority benefits of using e-learning technologies were conceived to be access to courses, assignments and course outlines by students, and in effect, enhancement of students' learning and improvement of feedback to students.

In terms of challenges, Chapter 2 reports narrow bandwidth which affects internet speed as a serious challenge in Tanzania. As such the study reported in this Chapter considered offline Moodle LMS supported by e-mail and mobile phones as e-learning technologies.

The majority of instructors expressed willingness to participate in a professional development arrangement to learn about e-learning technologies and to develop related competences. The instructors preferred the content of the arrangement to include skills on how to design e-learning courses, how to upload courses in a learning system, how to deliver courses using e-learning technologies and how to facilitate student learning in an e-learning environment.

Three instructors from the Institute of Continuing Education (ICE) at the Open University of Tanzania (OUT) were invited to participate in the study so as to explore the potential of design teams in preparing instructors towards e-learning application.

Two regional centres (Dar es Salaam and Iringa) participated in the implementation of the e-learning courses. These two centres were selected for reasons of convenience and because they had functional computer laboratory with internet connectivity.

3.5 PROFESSIONAL DEVELOPMENT THROUGH COLLABORATIVE COURSE DESIGN IN DESIGN TEAMS

3.5.1 Design guidelines

The results of context and needs analysis in Chapter 2 and findings from a review of literature on effective professional development guided the design of the *Collaborative Course Design* arrangement. Specifically the following conditions and design guidelines were used:

1. Instructors of the Open University of Tanzania possess basic computer and internet skills, but lack appropriate e-learning skills (Nihuka & Voogt, 2011);
2. Among other things, instructors learn e-learning skills best through active involvement, and collaboration (Desimone *et al.,* 2002; Koehler *et al*., 2007; Mishra *et al*., 2007);
3. Instructors require support related to technical aspects, course design, course delivery using e-learning technologies and facilitation of student learning (Bates, 2000; Bianco *et al*., 2002; Nihuka & Voogt, 2011);

4. Introduction workshops are crucial for acquainting instructors in design teams with theoretical foundations and the rationale for innovation and implementation strategies (Joyce & Showers, 1995).

3.5.2 Phases and timeframe of the professional development

The professional development involved introductory activities in workshops and working in a design team. To support the instructors on course redesign process, two workplace-based workshops (the first lasting for 3 hours and the second for 2 hours) spread in a period of two months were conducted. Both workshops were based on a sound professional development model (Joyce & Showers, 1995) and design guidelines generated from the context and needs analysis study and the review of literature.

Start-up workshop
The aim of this workshop was to discuss with instructors the theoretical underpinnings of technology integration in distance education. Its content was: (i) presentation and discussion of the theoretical rationale underlying e-learning integration, (ii) demonstration of a Moodle-mediated e-learning course, (iii) identify part of the courses to be redesigned, (iv) discussion of the potential of collaboration in design teams, and (v) decide on how frequent the teams should meet and for what tasks. At this stage the researcher's role was that of a facilitator. In addition, two other members of staff that had a background on e-learning were also invited as facilitators.

Course design
Three instructors worked in a design team for a period of two months. The design team aimed to provide instructors an opportunity for collaboration and interactions with each other towards e-learning course redesign. They met once every week for an hour in order to discuss and support each other on the course redesigning process. The design team provided an avenue for collegial discussions and support for each other. The following three courses were finally redesigned *Biology, Business studies and Economics, and English language*.

During the first design team meeting, instructors re-examined the content of their respective courses that required redesigning and agreed that each should design at least 5 lessons. They worked out an action plan to guide course design tasks and developed a common template on how to organize the designed

courses. Instructors collected soft copies of resources for their respective courses which could be uploaded in Moodle. The resources included course outlines, assignments, study materials, power point lectures, lecture notes and articles.

In the subsequent design team meetings, the instructors met to discuss mostly pedagogical issues as this is what brought them together as a design team. The discussions were centered on issues such as how to organize courses and resources in offline Moodle LMS, uploading of resources, and availability of articles, scanning of some resources and most importantly on how to support students during the course. During this stage the researcher was just an observer and provided pedagogical support for instructors where necessary. In addition, a technical staff was available to support instructors on technical issues.

Final workshop

The final workshop was conducted after instructors had completed the redesign of their courses in the design team. The workshop aimed at sharing and discussing appropriate modalities on how to deliver e-learning courses. It also aimed at refining the redesigned courses and how to facilitate student learning. The content for the final workshop was: (i) presentations and discussion of the redesigned e-learning courses, (ii) discussion of the appropriate modality to deliver courses and discussions on how to use e-mail and mobile phones to complement the current face-to-face and postal services communication, to provide immediate feedback to students, facilitate communication and interactions and delivery of course outlines, assignments and additional reading materials. Instructors spent a week to improve their courses before they were uploaded by the technical staff into offline Moodle LMS installed in 25 PCs in one computer laboratory at the headquarters in Dar es Salaam and 10 PCs in another computer laboratory in the Iringa Regional Center. For this stage the researcher remained as a facilitator and provided pedagogical clarifications and support. Technical staff helped on technical roles such as uploading of courses into the Moodle LMS.

Implementation of e-learning courses

A selected group of 67 students (that is 48 from Dar es Salaam and 19 from Iringa) were invited to access e-learning courses from computer laboratories in their regional centres (Dar es Salaam, and Iringa respectively). During this stage, instructors and the researcher worked together to orient students on how to access e-learning courses and how to navigate in Moodle during the course.

Students were asked to interact with instructors via e-mail and mobile phones whenever they required specific support from course instructors. The researcher liaised with instructors and directors in the two regional centres to monitor students' use of courses and resources in Moodle. Technical staff was involved for the provision of technical support to students. Students accessed e-learning courses for a period of three consecutive months.

3.6 METHODS

3.6.1 Design of the pilot study

The study reported in this Chapter is part of ongoing design-based research. According to McKenney, Nieveen and Van den Akker (2006), "design-based research has a strong link with practice, has the potential to help develop more effective educational interventions and offers opportunities for professional learning during the research process" (p.72). The study in the former chapter involved redesign of courses in design teams and piloting them with students.

3.6.2 Participants

Instructors

A team of three instructors participated in the pilot study. Table 3.1 provides an overview of the background characteristics of the instructors, which shows that instructors in the design team had good knowledge and skills on computer applications and internet.

Table 3.1 *Background characteristics of instructors*

	Instructors		
Characteristics	**Biology instructor**	**Business studies and economics instructor**	**English instructor**
	T1	**T2**	**T3**
Gender	female	male	male
Age	32	34	31
Years of experience at the university	1	3	1.5
Knowledge and skills on:			
Computer applications	good	good	good
Internet	good	good	good

Students

Sixty seven (67) foundation course students participated in this study. Table 3.2 provides background characteristics of the students. Note that students were drawn from Dar es Salaam and Iringa. In terms of computer competence, students in Dar es Salaam were average compared to colleagues in Iringa who were good. Students in the two regions reported different frequencies of computer use.

Table 3.2 *Background characteristics of students*

	Regional Centres	
	Dar es Salaam	**Iringa**
Gender		
Male	19	14
Female	29	05
Computer competence: M(SD) *	3.2(0.8)	3.9(0.3)
Frequency of computer use: M(SD) **	2.5(1.3)	3.8(0.4)

Note: Scale: * 1=none, 2=poor, 3=average and 4=good,** 1=once per week, 2=at least 2-3 times per week, 3=at least 4-5 times per week and 4=everyday.

3.6.3 Instruments

Instructors' questionnaire and interviews

Questionnaires were administered to all the three participating instructors at the end of the workshops, design phase and implementation phase to explore their experiences of working in a design team. Based on the issues raised in the questionnaires, a total of three in-depth interviews (one interview at each phase) were conducted with the instructors at the end of each phase. Using the questionnaires and interviews, data on instructor experiences of working in a design team, support received and challenges encountered were collected. Instructors responses in interviews were audio taped, transcribed and major themes were identified and clustered (Miles & Huberman, 1994).

Students' questionnaires and focus group interviews

Questionnaires were administered to students after the implementation of the redesigned e-learning courses. The questionnaires inquired students' perceptions and experiences with e-learning courses. Four follow-up focus group interviews with students in Dar es Salaam and Iringa were conducted to investigate the experiences with e-learning courses more in-depth. Ease of availability of students for the interviews were considered during selection. Data from

questionnaires were analyzed using SPSS by computing descriptive statistics such as Means, Standard Deviations and frequencies. Students responses in interviews were audio taped, transcribed and major themes were identified and clustered (Miles & Huberman, 1994).

Researcher's logbook and design team observations

A logbook was kept by the researcher in order to document the process of working in the design team and on students' experiences with the e-learning course. Information recorded in the logbook was analyzed qualitatively using data reduction technique. Recorded observations were scrutinized and major themes were identified and clustered (Miles & Huberman, 1994).

3.7 RESULTS

3.7.1 Instructors' experiences with professional development

Workshops

Generally, the instructors found the workshops interesting, according to their expectations and useful for their professional growth. They pointed out that the workshops enhanced their understanding of (i) e-learning course design , (ii) course delivery using offline Moodle LMS and (iii) the use of e-mail and mobile phones for communication, interaction and provision of feedback to students. According to the instructors, the workshop had several strengths such as being focused and involvement of participants. They also appreciated that the program fitted well with their daily schedules.

Instructors identified the following aspects of the workshops as useful: organization of the workshop, relevance of handouts, presentations, discussions, demonstrations and group works. The few demonstrations on how to use offline Moodle and how to use mobile phone, and a lack of incentives during the workshop were reported as a weakness of the workshops. The instructors also expressed some concerns related to the costs involved in using mobile phones to communicate with students. They realized that sending short messages was comparatively cheaper.

Design team

Instructors expressed that they liked the idea and that it was interesting working in the team. Specifically instructors liked collaborations, discussions, free conversations, advice and the support offered in the design team. Instructors pointed out that they benefited from the collaboration and discussions in the design team especially in terms of enhancing their skills on course design, delivery using e-learning technologies and on how to support students. Instructors strongly agreed that the support that was offered in the design team was useful and increased their confidence in e-learning course design. Instructors in the design team expressed that they encountered several challenges when working in the team as presented in Table 3.3. Generally, instructors found working in a design team quite demanding but appreciated its gains.

Table 3.3 *Challenges of working in design team*

Challenges	**Solutions that worked**
Time	Fitting design tasks into instructors schedules and that of the university, redesigned existing courses, flexible program which could be stretched over time
Course design task itself	Providing more time to work on course redesign i.e. 2 ½ months instead of 2 months only, support whenever necessary
Workload	The above solutions made instructors feel normal
Support	Support providing on demand necessary
Negotiations	Instructors got time to share their ideas; learned how to listen to each other and develop a common understanding over issues
Team playing	The team became harmonious over time
Technical	Addressed accordingly
Access	Addressed accordingly

Note that in Table 3.3 instructors considered the following as challenges: time, workload, course design task, support, negotiations and team playing, technical and access to technologies. Most of these challenges were attended to accordingly as shown in the same table.

3.7.2 Instructors learning in design teams

Instructors reported what they have learned as a result of their participation in the design team. Professionally, instructors generally expressed with satisfaction the knowledge they had gained about course redesign skills and the use of offline Moodle. Also, as a result of working in the design team,

instructors reported to have learned about how and when to use e-mail and mobile phone technologies for communication, interaction and provision of feedback to students during the e-learning course.

Instructors found the idea of using e-mail and mobile phones to support students during the e-learning course interesting. However, they had different views regarding the usability of e-mail, mobile phones and postal services to support students. One instructor had the view that it was expensive to maintain mobile phones but agreed that short messages were convenient.

Generally, instructors liked e-mail more than mobile phones because they feel that e-mail are free to use although it requires regular checking and reading of mails and replying on time.

Instructors reported to have learned team working skills and tolerance. They learned tolerance on how to cope with colleague's different ideas, on how to compromise and develop a common understanding and more importantly team working.

3.7.3 Instructors support

Instructors felt they received the support they needed during course design in teams. Instructors expressed that they appreciated pedagogical support on the following activities: on how to redesign courses, on how to use the templates to organize the redesigned courses and on how to upload courses into offline Moodle LMS. They also expressed that they appreciated technical support related to installation of Moodle software, uploading of powerpoint lectures into offline Moodle LMS, uploading of resources such lecture notes, course book, assignments and course outlines into Moodle LMS.

Instructor did not need pedagogical and technical support for activities such as designing of students' activities, writing instructions for the course, preparation of powerpoint slides and assembling of computer accessories. Additionally, instructors felt that they required less support during e-learning delivery compared to the course development stage. Mostly instructors needed support on how to send collective e-mail replies to students.

Instructors provided different suggestions to improve the provision of support to design teams as presented in Table 3.4. According to the instructors, improvement of support will make instructors more effective and complete course development on time.

Table 3.4 *Suggestions for improvement of support in design team*

Suggestions
▪ Identification of specific tasks for instructors to work on during course development
▪ Support on how to search articles
▪ Provision of sample structure on how to organize e-learning course ▪ There should be 2 technical staff per team
▪ Visit instructors at agreed intervals and regularly ▪ Need for plenary sessions for discussions about courses and how to improve them ▪ Teams must contain instructors teaching related courses so that they can help each other meaningfully
▪ More awareness sessions required
▪ Improved facilities for e-learning course development
▪ Institutional budget should consider e-learning enhancement

Also, instructors encountered some challenges during course delivery. In terms of pedagogical challenges, instructors encountered problems related to students' infrequent access of the e-learning courses in the Moodle LMS. To address this challenge, instructors had to organize a meeting with students at the respective centres to introduce the courses to the students. Moreover, instructors had to encourage students to access their courses and were required to provide immediate feedback or replies to students.

Another reported challenge was the wish of the students to be provided with immediate feedback. The instructors reported that they had to reply students request by e-mail as first thing in the morning during the course.

In addition, instructors encountered some technical and access challenges during course delivery. These challenges included power fluctuations and cuts, slow internet speed, how to run *course back up* and course restoration, and e-mail delivery failures. Also, instructors experienced some challenges related to costs involved in using mobile phones and reachability of some students.

3.7.4 Instructor practices

In addition to using the traditional print-based course delivery, instructors in the study used offline Moodle LMS to deliver their courses. In terms of supporting students, the instructors reported that the following practices had changed: delivery of assignments and extra reading resources to students. According to the instructors, e-mail and mobile phones were used for communication and interaction with students and for responding to student's e-mail, questions and for feedback on students' tasks to a large extent.

Two out of three instructors (who used postal service for about 1-2 times during the course to deliver assignment to students) indicated to have used postal services during the course. Moreover, none of the instructors in the study used e-mail for delivery of assignments, course outlines and extra reading resources during the course. Mobile phones were only used for clarification of concepts and provision of information about assignments and course outlines. According to the instructors, this is because mobile phones are expensive in terms of purchasing of credit, for calling to different service providers and unreachability of some students during the course.

Another practice that also changed as a result of working in the design team is instructors' mind-set regarding support seeking. As a result of working in the design team, instructors preferred to go for support to colleagues instead of working in isolation. Instructors associated all these changes not only with working in the design team, but also with the support given when working in the design team.

3.7.5 Students' experiences with e-learning courses

Result in Table 3.5 shows that generally students found the e-learning courses interesting, as indicated by mean values higher than 3. Students liked the structure of the course and its clear organization (M = 4.2; SD = .72). The layout of the course was appropriate (M = 4.2; SD =.83). The delivery approach of the e-learning course was well supported by e-mail (Mean 4.3; SD 0.73) and mobile phone (M = 3.9; SD =.99) technologies. It was easy to follow the links and navigation in Moodle (M = 4.0; SD =1.0).

Table 3.5 *Students experiences with courses and delivery*

Experiences with courses	**Mean** *(N=67)*	**SD**
The course is generally interesting	4.4	0.67
The course is clear	4.2	0.80
Structure of the course is clear	4.2	0.72
Layout of the course is appropriate	4.2	0.83
Organization of the course is clear	4.3	0.76
Delivery of the course is well supported by e-mail	4.3	0.73
Delivery of the course is well supported by mobile phone	3.9	0.99
Easy to follow links and navigations in the moodle	4.0	1.0
Reading materials were relevant and useful	4.2	0.62
I liked using moodle LMS	4.3	1.0
enjoyed using e-mail to communicate and interact with lecturers	4.0	1.0
Enjoyed using a mobile phone during the course	3.4	1.4
The course allowed easy access to course outlines	4.5	0.73
The course allowed easy access to assignments	4.5	0.70
The course allowed easy access to reading resources	4.6	0.68

Note: Scale: 1=strongly disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly agree.

Students liked the way they accessed resources from offline Moodle. The e-learning course allowed for easy access to course outlines (M = 4.5; SD =.73), assignments (M = 4.5; SD =.70) and extra reading resources (M = 4.6; SD =.68). Students found the reading resources relevant and useful. For communication and interactions, results in Table 5 show that students enjoyed using e-mail (M = 4.0; SD = 1.0) and mobile phones (M = 3.4; SD = 1.4) to communicate and interact with instructors.

Table 3.6 presents frequencies of communication and interaction between students and instructors using different technologies during the e-learning courses.

Table 3.6 *Frequency of communication and interaction with instructors*

	Never			1-2 times during the course			3-6 times during the course			7-10 times during the course		
Reasons for communications and interactions	**E-mail**	**Mobile phone**	**Postal service**	**E-mail**	**Mobile phone**	**Postal service**	**E-mail**	**Mobile phone**	**Postal service**	**E-mail**	**Mobile phone**	**Postal service**
Assignments	16.4	31.3	76.1	17.9	32.8	19.4	41.8	29.9	1.5	23.9	06	1.5
Course outlines	17.9	47.8	91	31.3	20.9	4.5	23.9	17.9	1.5	23.9	13.4	1.5
Ask for reading resources from instructors	35.8	52.2	94	20.9	14.9	1.5	19.4	16.4	1.5	23.9	16.4	1.5
Clarification of concepts	39.4	47.8	94	16.7	16.4	0	15.2	20.9	03	28.8	14.9	1.5
Receiving feedback from instructors	19.4	46.3	91	28.4	14.9	3	22.4	14.9	4.5	28.4	23.9	0
Responding to e-mail	25.4	46.3	92.5	22.4	17.9	1.5	19.4	09	1.5	26.9	26.9	03

Note that only a few students used postal services during the course in favour of e-mail and mobile phones. For example it is clear in Table 3.6 that at least 42% of the students used e-mail for about 3-6 times during the course for sending assignments to lecturers. Again, over 31% of students in the study used e-mail for about 1-2 times during the course to communicate with lecturers on issues related to course outlines. In addition, 28% of students used e-mail to receive feedback from lecturers and 22% used e-mail to respond to e-mail from instructors during the course.

Results from interviews revealed that, according to students e-learning courses had several weaknesses such as: too few powerpoint slides in some courses, too few reading resources, inflexibility of the e-learning course to location and time due to the use of offline Moodle, lack of reliable printing and photocopying facilities during the course.

Moreover, like instructors, students also encountered several technical and access related challenges. Students reported to have encountered the following technical problems: incompetency in uploading attachments to e-mail, lack of basic trouble shooting skills, and bouncing back of some e-mail. They also encountered challenges related to access to computers, power cuts and fluctuations, slow internet speed, e-mail avoidance by some lectures, expenses

related to e-mail and mobile phones, lack of access to printer and photocopy facilities during the course, some instructors were not reachable by mobile phones and lack of time to work on computers.

3.8 CONCLUSIONS AND DISCUSSION

The results in this Chapter have shown that instructors had positive experience of working in a design team as an approach to professional development. Instructors were enthusiastic about working in the design team and students were satisfied with the courses they accessed through offline Moodle LMS. The instructors benefited from collaboration in design team because they enhanced their skills on course redesign for e-learning delivery and on how to support students during the course. Such a result ware also reported in other studies (Desimone *et al.,* 2002; Jonathan & Herbert, 2000; Mishra *et al.,* 2007).

As a result of pedagogical and technical support provided to the instructors, they managed to produce e-learning versions of their courses. The issue of support in helping instructors redesign there courses is not peculiar to this study because it is also reported in de Boer (2004). During this study, instructors were provided pedagogical support on how to plan redesign process of their own courses, how to carry out the actual redesign process, and the creation of their own e-learning courses. The biggest challenge for the researcher was to ensure that the appropriate technical support was available for the instructors whenever they required.

The results have shown that for design teams to be effective there is need for systematic and timely provision of required (technical and pedagogical) support to the teams and also to individual instructors' in the teams. As an attempt to address the lack of enough technical staff (as pointed in Bakari *et al.* 2005) there is need for training of instructors and students on basic troubleshooting skills.

As a result of collaboration in design team, instructors developed professionally and their course delivery practices changed. Instructors used offline Moodle LMS to complement the traditional print-based delivery mode. Additionally, instructors used e-mail and mobile phone to communicate and interact with

students (as found in a number of other studies (Pennington, & Graham, 2002; Poole, 2000; Meel, 1999).

Despite enormous returns, instructors conceived working in design team as challenging and time demanding. This is because instructors are also involved in other duties in the regional centres. Harmonizing tasks of the team to instructors' schedules and the university almanac was found to be an effective strategy during the study.

During this study, majority of students appreciated the support received from their instructor during the course. According to Dzakaria (2004) adequate support for students is crucial in motivating them to use e-learning technologies. E-learning delivery was useful in addressing challenges of print-based delivery because it improved flexibility in terms of access to assignments, course outlines, reading resources and interactions with instructors (as pointed out in Collis & Van der Wende, 2002).

Results in this study have generated several implications to inform the design of professional development arrangement for the next study. Regarding design of the professional development, among other guidelines, the consideration of a sound format of providing support which includes regular general meetings for instructors in design teams is necessary. Certainly, the regular general meetings are likely to contribute to more outputs to the instructors because of increased collaborations. Instructors (and students) must get the opportunity to explore the importance of using short text messages as an alternative to making phone calls in mobile phones since the latter was found to be expensive. There is also need for the technical staff to be readily available for instructors (and students) during e-learning courses. Besides, regular visits to the instructors especially during course redesign should be arranged to effectively support instructors in the process. Moreover, there is a need to establish a harmonious state between the introduction workshop and activities of design team on one hand and schedules of instructors and the university almanac on the other.

In conclusion, *Collaborative Course Design* in design teams contributed to instructor's professional knowledge and growth on how to systematically design e-learning courses and to deliver them using technologies. Instructor collaboration in the design team have the potential in promoting instructors'

competences in using e-learning technologies to enhance distance education delivery. However, this finding cannot be generalised to other distance education universities in sub-Sahara Africa. In particular the level of the ICT infrastructure and the ICT competences of instructors and students determine how e-learning course delivery can be implemented successfully.

Based on the experiences discussed in this Chapter, we increased the number of instructors in design teams and conducted a follow-up study reported in Chapter 4 and 5.

CHAPTER 4
Collaborative e-learning course design: Impacts on instructors[4]

Efforts by universities in sub-Sahara Africa to promote professional development of instructors on course design and delivery by e-learning technologies to enhance distance education have often lacked meaningful impacts. This study investigated the impact of Collaborative Course Design on instructors' professional learning about design of e-learning courses and delivery at the Open University of Tanzania (OUT). Six design teams of instructors, each with 2 instructors participated in the study and redesigned their print-based courses for delivery using offline Moodle LMS supported by e-mail and mobile phones. A total of 36 interviews from 12 instructors were collected. The interviews were collected after each of two workshops and after the course redesign process. Results show that despite challenges, the strategy contributed to professional learning of instructors who were also satisfied about their experience with collaborative course design. Instructors' background determined the kinds of support they required during course design and delivery. It is suggested that Collaborative Course Design should be up scaled to support large scale implementation of e-learning at OUT.

4.1 INTRODUCTION

Distance education in sub-Sahara Africa is still traditional characterized with print materials. The approach is associated with challenges which hamper student learning (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003). Such challenges include (i) delays in the delivery of course outlines, study materials

[4] This chapter is based on Nihuka, K. A & Voogt, J. (Submitted a). Collaborative e-learning course design: Impacts on instructors. *Australasian Journal of Educational Technology*.

and untimely access to learning resources, (ii) lack of regular and effective communication between instructors and students, (iii) lack of immediate feedback from instructors to students' about their learning, and (iv) outdated learning resources and (vi) feelings of isolation.

Similar situation exists at OUT (Ntiluhoka, 2007; Mnyanyi & Mbwette, 2009; Nihuka & Voogt, 2011). As a result students experience delays in receiving study materials and learning resources, they lack regular interactions with instructors and there is delay in receiving feedback from course instructors (Nihuka & Voogt, 2011). As an attempt to address such challenges using appropriately selected e-learning technologies, the OUT has already organized professional development programs (mostly workshops and seminars) to prepare instructors about e-learning integration. However, such efforts have often lacked serious impacts on instructors' practices in terms of using technologies. Instructors have continued delivering courses in the traditional way using prints despite access to some technologies such as computers and internet (Nihuka & Voogt, 2011).

Since literature shows that *Collaborative Course Design* has the potential in preparing instructors about innovation implementation (Penuel *et al.,* 2007; Simmie, 2007; Mishra, Koehler & Zhao, 2007; Voogt, 2010), the strategy was piloted at OUT to determine its potential in preparing instructors on course redesign and delivery using e-learning technologies (Chapter 3). Results in Chapter 3 show that instructors were enthusiastic about *Collaborative Course Design* and they benefited from the strategy. It was recommended based on the results that a follow-up study to investigate the impact of *Collaborative Course Design* should focus more in-depth in instructors' professional development on e-learning course design and delivery. This forms the focus of the current Chapter.

4.2 COLLABORATIVE COURSE DESIGN IN DESIGN TEAMS

4.2.1 Collaborative design and professional development

Four levels of collaboration related to instructors' professional development can be distinguished (Little, 1997). The first level is storytelling, which involves occasional and sporadic content-related interactions between instructors and

exchange ideas. The second level is help. At this level instructors seek specific help from a colleague. However, the extended help is often times limited to the subject of the help requested. Sharing documents is a third level of collaboration. This is a routine of sharing of materials and methods. It also involves the open exchange of ideas and opinions between instructors. The fourth level is joint work which refers to the encounters among instructors that share a responsibility for teaching. This form of collaboration includes collective conception of autonomy and a group affiliation grounded in professional work. This fourth level of collaboration in particular in the form of collaborative course design has gained popularity as a strategy for professional development in the developed world (e.g. Handelzalts, 2009; Mishra *et al.* 2007; Penuel *et al.* 2007; Waddoups, Nancy & Earle, 2004).

Collaboration during collaborative course design in design teams contribute to improved professional development of instructor (Desimone *et al.* 2002; Jonathan & Herbert, 2000; Mishra *et al*. 2007; Voogt *et al*. 2005). This is because the strategy engages instructors in the investigation of problems in their educational practice, enactment of the design process when (re-) designing courses, and delivery and evaluation of the (re-designed) courses (Handelzalts, 2009). Also, collaborative design contributes to improvement of instructors' knowledge and competences on course design (see for example Handelzalts, 2009; Nieveen *et al.* 2005). It is also effective in improving instructors learning of pedagogies and skills on instructional design which in turn impact on their practices (Mishra *et al*, 2007; Nieveen *et al*, 2005).

Specifically, collaboration in design teams that focuses on the uses of technology in educational practice contributes to professional learning about (i) technology and technology integration in teaching, (ii) course design and (iii) pedagogies & design of e-learning instruction (Koehler & Mishra, 2005; Mishra *et al.* 2007; Voogt *et al.* 2005). Through collaboration in design teams, instructors acquire knowledge of e-learning technologies; they become positive and develop competence on the use of e-learning technologies in teaching (Koehler & Mishra, 2005; Mishra *et al.* 2007; Voogt *et al.* 2005). Voogt and colleagues found that, instructors became positive about technology and no longer avoided technology in their lessons.

4.4.2 Support for design teams

Design teams provide a secure space where instructors' creativity flourish and where dialogue about teaching and learning by e-learning technology are reflected upon (Radinsky, Smolin, Lawless & Newman, 2003; Simmie, 2007). Supporting design teams then becomes important because it makes instructors benefit more from the outcomes of interactions in such teams. The following are the main content of support that is offered to instructors during course design and delivery: technological and pedagogical support (Bianco *et al.* 2002; Mishra *et al.* 2007; Radinsky, *et al.* 2003; Sife *et al*. 2007; Waddoups *et al,* 2004). According to Sife *et al*. (2007) technical support for instructors in design teams is an important part for them to learn about e-learning course design and delivery. Instructors need support on installation of computer, accessories and software, maintenance, network administration, and security management (Bakari *et al.* 2005; Poumay, Dupont, Georges & Leclercq, 2001).

Pedagogical support in design teams is necessary because most instructors feel difficulties in transferring their courses from traditional into e-learning courses (Bates, 2000; Bianco *et al.* 2002; de Boer, 2004). According to Telnova, (2005), a well structured template with inbuilt instructional approach is useful in supporting instructors to design and organize their courses and student activities in a learning management system.

There are different formats for organizing support for instructors in design teams (Bennett, Agostinho, Lockyer, Harper & Lukasiak, 2007; Simmie, 2007; Voogt, *et al.* 2005; Voogt, 2010). Workshops blended with other strategies are one of the useful formats for promoting professional learning of instructors (Voogt, *et al.* 2005; Voogt, 2010) and are used for introduction activities (Joyce & Shower, 1995). General meetings are another format of organizing support for instructors in design teams (Handelzalts, 2009; Thousand & Villa, 1993). Regularly convened general meetings bring instructors together for critical reflection and discussion of their experiences, challenges and opportunities related to innovation that they are working on. General meetings format allows provision of support to all instructors at once instead of paying much attention to individuals and they allow collaborations and support between instructors (Moonen, 2000).

4.3 PURPOSE OF THE STUDY

The purpose of the study reported in this Chapter was to understand the impact of *Collaborative Course Design* in design teams in promoting instructor professional development on e-learning course design and delivery. The main research question was: *How does Collaborative Course Design in design teams contribute to instructors' professional learning?* The following sub-questions guided the study:

1. How did instructors experience learning in design teams?
2. What did instructors report to have learned from collaborative course design?
3. How did the support offered to the design teams contribute to instructors' learning?

4.4 METHODS

4.4.1 Design of the study

This study employed multiple case study research design. Yin (2003) describes a case study research design as an appropriate method for investigating a particular phenomenon within its real-life context when the phenomenon and context are closely related. This was the case in this study as instructors use of e-learning technologies at the Open University of Tanzania (OUT) is strongly influenced by their perceptions and constraints at the university. Two cases, i.e. Faculty of Science, Technology & Environmental Studies (FSTES) and Institute of Continuing Education (ICE) were explored during the study. Instructors involved in the study were considered as units of analysis and OUT as the context of the study.

4.4.2 Participants

The study comprised of twelve instructors, eight from the Faculty of Science, Technology and Environmental Studies (FSTES) and four from the Institute of Continuing Education (ICE). The instructors from FSTES were selected because they were involved in teaching courses which were identified by the faculty to be converted into e-learning courses. The four instructors from ICE were selected based on their interest to participate in the study and because they had

basic computer applications skills. The 12 instructors (8 males, 4 females) formed 6 pairs of teams referred to as *design teams of instructors*. All instructors were based in Dar es Salaam. The average age of the instructors was 37 and 41 in FSTES and ICE respectively. Instructors had different teaching experiences and all had excellent computer and internet skills.

4.4.3 Instruments and data analysis

Interview guides were used for data collection. The interview guide contained questions that probed information related to instructor experiences with design teams and the impact of *Collaborative Course Design* on instructors' professional development on e-learning course design and delivery. Each instructor was interviewed three times at the end of the two workshops and after course design. A total of 36 interviews were collected, transcribed, transported into *Atlas.Ti*. Deductive and inductive coding was used to analyze the data (Miles & Huberman, 1994). Samples of interview responses of four instructors from each of the two workshops and course design, together with a list of codes were re-coded by a colleague in the department of the University of Twente. An inter-rater reliability, Kappa .84 (p=.000) was computed based on SPSS program.

4.5 CONTEXT OF THE STUDY

The study reported in this chapter builds from a previous study reported in Chapter 3 which was conducted to explore experiences of instructors on design teams as a strategy to professional development. It also sought to understand students' experiences on redesigned courses and about the e-learning delivery. Results in Chapter 3 reveal that instructors were enthusiastic about working in the design team and students were satisfied with the courses they accessed through offline Moodle LMS. Instructors benefited from collaborations in the design team because they enhanced their skills on course redesign for e-learning delivery and on how to support students during the course.

Despite enormous returns, instructors had several concerns, which included (i) working in design teams is challenging and time demanding and (ii) needed more support in design teams. The current study dealt with these concerns in the following ways: first, the study harmonized the programs of the

introduction workshops and activities of design team to the schedules of instructors and to the university almanac. Second, the study improved the support system by employing workshops and regular general meetings as a format for offering support to the design teams. And third, time was devoted during the workshops and general meetings to discuss how to use templates and the need for using short text messages as an alternative to making phone calls. It was recommended in Chapter 3 that a follow-up study should investigate more in-depth impact of *Collaborative Course Design* in design teams on instructors' professional learning about e-learning course design and delivery at OUT. This forms the focus of this Chapter.

4.6 PROFESSIONAL DEVELOPMENT

4.6.1 Design guidelines

Based on the outcomes of pilot study and field experience, the conditions and design guidelines were elaborated and revised as follows:

1. Instructors of the Open University of Tanzania possess basic computer and internet skills, but lack appropriate e-learning skills (Nihuka & Voogt, 2011).
2. Instructor learning is effective when (Desimone *et al.,* 2002; Koehler *et al*., 2007; Mishra *et al*., 2007);
   (i) are involved actively in the learning process,
   (ii) activities are coherent to context,
   (iii) professional development is spread over time, and
   (iv) there is collaboration.
3. Introduction activities in workshops to acquaint instructors in design teams with theoretical foundations and the rationale for e-learning course delivery and strategies is crucial (Joyce & Showers, 1995).
4. (a) Instructors require support related to technical, course design, e-learning course delivery strategies and facilitation of student learning (Bates, 2000; Bianco *et al*., 2002; Nihuka & Voogt, 2011).
   (b) Sustenance of support for design teams through general meetings is important for large group of instructors (Handelzalts, 2009; Nihuka & Voogt, 2011).

4.6.2 Collaborative course design arrangement

On the basis of guidelines identified in previous section, *Collaborative Course Design* was developed, involving introduction activities in two workshops (Ws) and general meetings (GMs) as a format for offering support to instructors during course design in design teams. Two workshops were conducted; one before and the other after course redesign. In the first *workshop* instructors were introduced to course redesign process after which they worked in design teams for 10 weeks to redesign their courses. The workshop lasted for three hours and it included (i) presentations and discussions of challenges of print delivery and rationale for e-learning integration, (ii) demonstration on how to redesign courses and (iii) discussions about collaborations in design teams and general meetings (GMs). The second *workshop* was conducted immediately after the course redesign process. It lasted for two hours and introduced instructors to e-learning delivery issues. Five GMs were convened during course redesign where instructors from all design teams came together to discuss and reflect about their courses, the redesign process and clarify their experiences and concerns. In addition, four GMs were organized during course delivery and were used for (i) providing pedagogical support, (ii) instructors' discussion about redesigned courses, challenges and strategies and (iii) for providing feedback to each other.

4.6.3 Implementation of e-learning

A total of 12 traditional distance education courses were redesigned into e-learning courses and uploaded into offline Moodle LMS in a computer laboratory in three different regional centres, namely Dar es Salaam, Singida and Manyara. In each centre, all 12 courses were uploaded in a computer which was networked through a Local Area Network (LAN) to the rest of the computers in the laboratory. This allowed convenient access to the courses by students from any computer within the laboratory.

Students following the redesigned courses from FSTES and ICE were oriented on how to access courses and other learning resources in offline Moodle in their respective regional centres. The orientation focused on how to access courses and how to use e-mail and mobile phones to interact with course instructors. Students accessed courses through offline Moodle LMS for a period of 12 weeks.

4.7 RESULTS

4.7.1 Instructors' experiences with design teams: Satisfaction

Instructors were satisfied about their experience in the design teams. The results in Table 4.1 indicate five sub-clusters that were identified in the data about the strength of the design teams: clarity of the rationale, potential of e-learning technologies, improvement of confidence and promotion of competence.

Table 4.1 *Instructors' satisfaction with design teams*

	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE***), (n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Satisfaction	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
Clarity of the rationale	x	x	x	x	x	x	x	x	x	x	x	x
Potentials of e-learning technologies	x	x	x	x	x	x	x	x	x	x	x	x
Improvement of confidence	x	x			x	x	x	x	x	x		
Promotion of competence	x	x	x	x	x	x	x	x	x	x	x	x

Note: DT = design team, T1-T12 = Teachers/Instructors 1-12.

All instructors found design teams satisfactory because they provided an opportunity for discussions which contributed to the *clarity of the rationale* for e-learning implementation. According to instructors, the discussions improved their awareness of the reasons for using e-learning as testified for example by T1 "*The discussion about the reasons for e-learning integration in teaching was one of the strong points of the program. Before professional development I didn't see a reason why I should consider using technologies in teaching of my courses. I feel that technologies can be one of the solutions to some of the challenges I find during teaching of my course*" (T1, Interview 1). All instructors were also satisfied with design teams, because it promoted awareness of the potentials of e-learning technologies and how to use them for communication with students. A comment from T3 exemplifies the opinions, "*The training enlightened me about the potential of Moodle technology as an answer to the challenges of, lack of regular communication, poor achievement of students' etc which comes with dependence on traditional Open and Distance Learning mode.* and *it created opportunity for discussions and sharing ideas with colleagues about the potential of e-learning technologies… I think I can use e-mail for communication with students in my courses*" (T3, Interview 1).

Six instructors from FSTES and two instructors from ICE mentioned that design teams *improved their confidence* in course redesign and in using Moodle as evidenced in the following statement: "*I liked the idea of designing courses in teams. I found it interesting and it provided me confidence in being able to modify my course according to the template we agreed upon. I feel that I am confident enough to design my course and use Moodle to facilitate teaching*" (T4, Interview 1). All instructors were satisfied with design teams because it promoted their *competence* in using technologies for (i) communication and (ii) delivery of courses and resources. Design teams also promoted instructors' competence in using technologies for providing feedback to students.

4.7.2 Instructors' experiences with design teams: Challenges

Table 4.2 provides different challenges that instructors encountered when working in design teams.

Table 4.2 *Challenges encountered by instructors in design teams*

	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE),** *(n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Challenges	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
Time		x			x	x	x		x			x
Power cuts & unreliability	x	x	x	x	x	x	x	x	x	x	x	x
Narrow bandwidth	x	x	x	x	x	x	x	x	x	x	x	x
Seniority (difference in academic rank)								x				
Unfamiliarity between instructors			x									
Limitations of offline Moodle system	x	x	x	x	x	x	x	x	x	x	x	x
Limited office space & access to computer and internet	x	x	x	x	x	x	x	x	x	x	x	x
Insufficient allowance		x	x	x	x				x		x	

Note: DT = design team, T1-T12 = Teachers/Instructors 1-12.

Six instructors indicated *time* as a challenge for design teams. Time was reported in two perspectives. In the first perspective instructors felt that the actual time for the workshops was actually *short* and they required more time. T10 expresses his concerns as follows: "*The professional development [workshops] was too short for me because everything was done only in one day. I think this is why*

certain topics were not discussed in detailed, e.g. a topic on theoretical understanding of design teams which was done in a hurry. I could benefit more if we had it for at least five full days. This could allow more time to explore and discuss the details on how to design courses. I think this could make us more comfortable and skilful" (T10, Interview 1).

In the second perspective, instructors expressed that collaborating in design teams was *time consuming* because of too many demanding university routines. The following statement of T5 is an example: *"I found collaborative course design so time demanding because of the busy schedule at the university. We are already loaded with invigilation of examinations, marking, and supervision of teaching practices and field training. It was difficult for me to meet and work with my colleague in the team on regular bases"* (T5, Interview 2). As a way of dealing with the situation, majority of instructors pointed out that they redesigned their courses during out of office hours and shared their courses to colleagues in general meetings and in respective teams, as evidenced in the following statement *"Getting time from busy routine to work in design team was a big challenge. However, I learned from colleagues during one of the general meetings that I can do my work [in the evening or night] after the supervision of field practices, face-to-face or teaching practice; I find hard maintaining it but it worked in some days by sacrificing other things"* (T3, Interview 2).

Powercuts and unreliability in the electricity and narrow bandwidth was experienced as a challenge by all instructors. It hampered the writing of courses, the uploading of courses and resources into Moodle and handling e-mail. When there was a powercut, they had to wait until there was electricity and improved internet signal.

Seniority (difference in academic rank) was reported by one instructor (i.e. T8) as one of the challenges of working in design teams. T8 explained that she felt she could learn more (about course design and delivery) from discussions than just listening to long stories of a more senior colleague. Specifically, she expressed that *"I found it difficult and uncomfortable for me to collaborate (work together) with a more senior colleague in our team because he was so senior to me and was higher in rank and designing a course for the first time was already a challenging activity for me. He was giving too long explanations over issues and I felt uncomfortable to criticize or whatever. I found myself listening more that discussing. I think I could learn more through dialogue as colleagues than just listening to one person"* (T8, Interview 2). In another situation, results show that one instructor

(T3) reported that working with an unfamiliar colleague in a team was a challenge as he explained "*I found working in a team with unfamiliar colleague as a challenging moment for me especially at the beginning*" (T3, Interview 2).

Instructors in all design teams expressed concerns about the limitations of the offline Moodle LMS. Instructors explained that offline Moodle was inflexible in space and time and that it required them to come to their office or to a computer laboratory to access or update courses or resources. Lack of personal office space was a challenge to all instructors when working in design teams, particularly because they shared an office with one or two other colleagues, which caused limited access to computer and internet. One of the instructors (T7) indicated that he had to come to his office quite early in some days in order to conveniently use the computer and internet facilities.

Last but not least, the results indicate that half of the instructors complained about the allowance provided to instructors for transport. When asked for suggestions, instructors suggested that the allowance should be increased (without suggesting an amount) in order to motivate instructors for the training. One of the instructors had the following to say "*The allowance was not adequate. The researcher should consider increasing the amount next time for instructors so that we are motivated to work*" (T9, Interview 1).

4.7.3 Contribution of collaborative course design to instructors' professional learning

Table 4.3 presents perceptions of instructors regarding the contribution of *Collaborative Course Design* to their professional learning.

Results in Table 4.3 indicate that all instructors explained that through their participation in design teams they have concrete procedures at their disposition which they can follow during e-learning course design. A comment by one of the instructors, was "*I feel I benefited from the workshop and working in design teams because the training provided specific procedures on how to design traditional courses into e-learning courses. There was also a support system set to go for. These, together with the templates discussed during the workshops contributed to my learning about course design using the procedures*" (T10, Interview 2).

Table 4.3 *Contribution of collaborative course design to instructors' professional learning*

Aspects of professional learning	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								Institute of Continuing Education (ICE), *(n=4)*			
	DT 1		DT 2		DT 3		DT 4		DT 5		DT 6	
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Course design												
Concrete procedures	x	x	x	x	x	x	x	x	x	x	x	x
Preparation of powerpoint slides	x				x				x	x	x	x
Use of templates	x	x			x	x			x	x	x	x
Course delivery												
Use Moodle system in course delivery	x	x	x	x	x	x	x	x	x	x	x	x
When to interact with students by e-mail and mobile phones	x	x	x	x	x	x	x	x	x	x	x	x

Note: DT = design team, T1-T12 = Teachers/Instructors 1-12.

Most instructors in FSTES had already the knowledge of powerpoint preparation before working in design teams, but two instructors in FSTES and all instructors in ICE reported that they learned how to prepare powerpoint slides for their e-learning courses in design teams. Eight instructors reported that they benefited from using templates in organizing their e-learning courses. According to one of the instructors (i.e. T11), the templates that were provided in the design teams guided them to design their courses and made them learn how to transform traditional courses into e-learning courses, "*I found the templates useful. They were specific and guided me when designing my print based course into e-learning course and this together with the regular support from the technical staff, helped me learn how to transform a course into e-learning course*" (T11, Interview 3).

All instructors shared the experience that working in design teams also contributed to their knowledge and skills in using Moodle LMS for course delivery. All instructors agreed that working in design teams contributed to knowledge about *when to interact with students* through e-mail and short text messages. In addition, results indicate that the gained knowledge helped instructors develop more positive perception about e-mail and mobile phones: "*The discussions in the teams were helpful for me. I learned about when to provide feedback to students during the course. I never thought about using e-mail and messages to communicate with students for various purposes. I use e-mail to communicate with friends and relatives but never thought of using it in teaching like I did during the delivery of my course*" (T9, Interview 3).

4.7.4 Pedagogical support contributing to instructors' learning

Table 4.4 presents the pedagogical support that was reported useful for instructors' professional learning in design teams.

Table 4.4 *Pedagogical support*

	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE),** *(n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Kinds of support	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
How to design courses:												
Content identification	x				x				x			
Prepare student activities	x	x		x	x	x	x	x			x	
Prepare powerpoint slides	x				x				x	x	x	x
Convert study materials into electronic lectures		x		x		x	x		x	x	x	x
Use templates to organize courses	x	x	x	x			x	x	x	x	x	x
Use & navigate in Moodle LMS							x		x	x	x	x
Timely response to students e-mail/requests	x		x	x		x	x			x	x	x
When to use e-mail & mobile phones to send feedback	x	x	x	x	x	x	x	x		x	x	x

Note: DT = design team, T1-T12 = Teachers/Instructors 1-12.

Regarding the support on course content identification, three instructors pointed out that the support was useful and contributed to their learning about how to identify resources and things to consider for developing e-learning courses. For example T1 said "*the support during course design and in the general meetings on how to identify content for the course were useful, it made me learn and become aware of how and what to consider during course design to develop my course. These made me competent in getting my course redesigned on time*" (T1, Interview 2).

A couple of instructor did not require the support on content identification. They pointed out several reasons: Some felt *conversant in content identification because of their background in education* (e.g. T8, 9, 11 & 12), others mentioned that design teams and general meetings were *time consuming* (e.g. T4, 6 & 7), and they *lacked time* to participate in the meetings (e.g. T8). Eight instructors, most from FSTES, found the support offered to the design teams on how to construct and organize students' activities in e-learning courses useful. An exemplary

answer from T1 was *"I found the support useful, together with the collaborations in teams and meetings; I learned how to formulate and organize students' activities during the course design process. I found it even more very useful especially when designing students' activities myself"* (T1, Interview 1).

Furthermore, all instructors from ICE and only two from FSTES mentioned that the support on how to prepare powerpoint slides for inclusion in the e-learning courses enhanced their learning to prepare slides for their courses. The rest of instructors in FSTES indicated that they did not require support on powerpoint preparation because they felt they had the needed skills.

Half of the instructors from FSTES and all instructors from ICE appreciated the support related to the conversion of print study materials into electronic lectures for the e-learning courses, as evidenced by T4 *"I found the support offered during general meetings as interesting and useful because I learned how to summarize lectures from print study materials for inclusion in the e-learning course. This support enhanced competence on how to make summary of the lectures from print study materials* (T4, Interview 2).

Moreover, interview data showed that all instructors, except two found the support on how to use templates to organize courses also useful. They indicated that the support helped them to learn a systematic approach to design and organize courses. *"The support on a systematic course design and use of template to organize a course was useful for me. I feel that the competence that I acquired from in using a template help me to organize my e-learning course in the given template"* (T8, Interview 2).

All four instructors from ICE and one instructor from FSTES reported that the support on the use of Moodle and navigation in the system was also useful. According to the instructors the support sharpened their understanding about how to use Moodle system and how to navigate through the system for checking students' e-mail and other things. Results show that majority of instructors in FSTES did not require support on how to use Moodle and navigation in the system. However, the concern for majority of instructors was that the offline Moodle system "*did not address the problems of location/space and time because it required students to visit Regional Centre offices or headquarters to access the courses. In addition, they pointed out that access to e-mail was sometimes affected by power fluctuations, regular powercuts and slow internet speed*" (T3, Interview 4).

Eight instructors appreciated the support in terms of the ideas about when to respond to students' e-mail and requests. The instructors expressed that they learned about the need to respond to students on time to avoid discouragement on the part of students: "*the support enhanced my knowledge about the need to respond to students mails on time so that they are not discouraged by delayed responses. I learned about when to support students by responding to their e-mails and also about when to write them encouragement e-mails particularly at the beginning of the course because they required regular explanations on how to access courses in Moodle*" (T11, Interview 4).

Except for one, all instructors shared the opinion that the support on *when to use e-mail and mobile phones to send feedback to students* during the course was useful. They clarified that the support helped them learn about how to write more focused feedback to students (e.g. T5) and how to deal with bulky e-mails by composing a collective e-mail to students (T3). As T3 puts it *I liked the support on how to deal with bulk of students' e-mails, the support helped me learn more about how to compose a collective e-mail to students when writing feedback"*(T3, Interview 4).

4.7.5 Technical support contributing to instructors' learning

Table 4.5 presents the technical support that was identified by instructors to be useful for their professional learning in design teams.

Table 4.5 *Technical support*

	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE),** *(n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Kinds of support	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
Installation of Moodle *(including Apache, php & mysql)*	x	x	x	x	x	x	x	x	x	x	x	x
Searching & downloading resources from internet		x	x		x				x	x	x	x
Uploading of resources in Moodle LMS	x						x		x	x	x	x
Updating resources in Moodle LMS			x	x	x				x	x	x	x
Virus problems							x		x	x	x	x
Internet connection problems								x	x	x	x	x

Note: DT = design team, T1-T12 = Teachers/Instructors 1-12.

Results indicate that instructors in all teams found the support on installation of Moodle programs helpful. The support helped to avoid frustrations during course design and that it made them persist in the course design task. This was illustrated by the following utterance from one of the instructors *"The support on the installation of Moodle in my Computer was very useful because then I was able to continue with course design task. The helped to avoid frustrations during course design and made me experience the course design process more"* (T2, Interview 2).

All instructors from ICE and three from FSTES reported that the support on how to search and download resources from the internet was also useful. Specifically, they expressed that the support contributed to their learning of suitable search strategies to use during course design. They also learned how to retrieve relevant resources from the internet for different aspects of their courses.

Results in Table 4.5 reveal that the majority of instructors in the FSTES did not require support on how to upload resources in Moodle LMS. Instructors in this category explained that they had knowledge on how to deal with most technical problems and that they did not encounter any serious problem as evidenced in this statement, *"I personally did not require support of any kind during course delivery because I have knowledge of how to deal with most technical problems. And I did not encounter any serious teaching problem"* (T2, Interview 3). However, all instructors in ICE found the support on how to upload resources in Moodle LMS quite useful. They felt that the support helped them benefit professionally as illustrated in the following response *"The support was useful to a greater extent. The support and discussions on how to develop a course bit by bit and on how to upload the entire course in the Moodle were helpful. The support contributed to my professional learning about course design; in fact the general meetings helped me catch up with my colleagues because sometimes I missed working in my team. The only challenges were; it was time demanding to attend general meetings and sometimes people were not focused in some of the meetings"* (T9, Interview 2).

The support on how to update resources in the Moodle LMS was reported useful by all instructors in ICE and only three instructors from FSTES (i.e. T 3, T4 & T5). The support enhanced instructors' knowledge of how to add or remove documents in Moodle to improve their courses. Besides, results show that compared to their counterparts in ICE, instructors in FSTES (except T7) did not require support related to fixing virus-related problems. According to the

instructors in ICE, the support prevented frustrations and made them enjoy using Moodle during course delivery.

Also, results reveal that instructors in FSTES did not require support on internet connection problems, which was reported useful by all instructors in ICE. One of the instructors in ICE shared that, "*the support was relevant because it addressed problems that I encountered during e-learning course delivery, such as internet connections, downloading of articles for students and writing of collective e-mail to students"* (T12, Interview 4).

Besides the perceived usefulness of technical support, two major challenges were reported by instructors which related to (i) presence of *few technicians* (i.e. only 2) (T10, Interview 2) and (ii) *unavailability* of the technical staff especially when engaged in other duties (T3 & T4, Interview 2). Instructors suggested that, "*there should be a technical staff in each faculty/institute to provide support to the instructors on technical problems because without it course design and delivery by e-learning technologies can become too difficult task to accomplish"* (T8, Interview 2).

4.8 CONCLUSIONS AND DISCUSSION

The study reported in this Chapter investigated the impact of *Collaborative Course Design* strategy in promoting instructors professional development on e-learning course design and delivery at the Open University of Tanzania. Results have shown that despite challenges, the strategy had positive impact on instructors' professional development. The strategy helped instructors to transform their print based courses into e-learning courses and use Moodle LMS to deliver courses to students. These results are consistent to other studies by Mishra *et al.,* 2007; Simmie, 2007; Voogt, 2005; Voogt, 2010.

Instructors were satisfied about their experience with *Collaborative Course Design*. Through the strategy, instructors acquired knowledge about potentials of e-learning technologies and rationale for using them. According to Walker and Johnson (2008), such knowledge contribute to instructors' decision to consider using e-learning in their courses. Moreover, the strategy promoted instructors confidence and competence in course design.

Consistent to other studies (e.g. Desimone *et al.,* 2002; Mishra *et al.,* 2007; Voogt, 2010), instructors learned several skills during *Collaborative Course Design* which included the use of template and the concrete procedures which they can follow during e-learning course design. They also learned how to prepare powerpoint slides, use of Moodle and decide the right time to interact with students using e-mail and mobile phones. Instructors developed competence and confidence in using e-learning technologies such Moodle and e-mail. This is likely to contribute to improved practices (Mishra *et al.,* 2007; Nieveen *et al.,* 2005) and lead to improvement of instructional practice and improved academic outcomes of students (Nihuka & Voogt, submitted b).

Results have also revealed that the support that was offered during *Collaborative Course Design* contributed to the effectiveness of the strategy on instructors' professional development. Pedagogical support was offered to instructors during preparation of student activities, conversion of print materials into electronic lectures, how to use templates, how to use and navigate in Moodle and when to use e-mail and mobile phones. In addition, instructors were offered technical support related to installation of programs (e.g. Moodle), how to search resources from internet and uploading of courses in Moodle. However, this study also showed that the kind of support that instructors required was to a greater extent influenced by their science or education backgrounds. Without support, instructors could find it difficult to transform their courses into e-learning courses (Bates, 2000; Bianco *et al.,* 2002) and perhaps *Collaborative Course Design* could have less impact on instructors' professional development.

Nevertheless, instructors encountered several challenges during course design and delivery. There were challenges of powercuts and limited access to computer and internet as indicated in Nihuka and Voogt (2011). It was observed however that although the challenge of powercut persisted, the situation of access to computer and internet was improved in 2010 compared to the situation reported in Nihuka (2008). Slow speed of internet due to narrow bandwidth and inflexibility of offline Moodle LMS were also of concern to the instructors. Perhaps the initiative to connect the national research and educational networks (NRENs) in Africa to the global research and education network community (GÉANT) in Europe (Mbwette, 2008) shall improve the current bandwidth. Otherwise, results in this article (also in Nihuka & Voogt, in press) have

demonstrated the potential of offline systems such as offline Moodle LMS for bandwidth-challenged sub-Sahara African countries. In the current study, offline Moodle LMS allowed ease access to course outlines and learning resources for students in the Regional Centres, which seemed serious challenges then (see for example Mnyanyi & Mbwette, 2009; Nihuka & Voogt, 2011).

Results discussed in this article may not be generalized across universities in sub-Sahara Africa because of their diversity. The knowledge of specific contexts and their needs are necessary for successful implementation of e-learning technologies in education. Above all, supporting instructors on e-learning integration through collaborative course design is a learning experience for both researcher and instructors. More research is needed on how to use *Collaborative Course Design* as a strategy to promote e-learning implementation in education in the context of sub-Sahara Africa. Unlike traditional workshops and seminars, *Collaborative Course Design* is effective in promoting instructors professional development related to e-learning course design and delivery. Moreover, the OUT should consider up scaling *Collaborative Course Design* in order to support large scale implementation of e-learning in the university. In Chapter 5, we report on the impact of *Collaborative Course Design* and e-learning delivery on instructors' instructional practice and students' academic outcomes respectively.

CHAPTER 5
The impact of collaborative course design and e-learning delivery on instructors' practice and students' academic outcomes[5]

The potential of e-learning in improving instructors' instructional practice, addressing challenges of print delivery and in improving students' outcomes are widely reported. However, efforts to implement e-learning in sub-Sahara Africa's universities to harness such potential have been ineffective. In this study collaborative course design was used in Chapters 3 and 4 to prepare instructors on e-learning course design and delivery. This study investigated the impact of collaborative course design and e-learning delivery on instructors' instructional practices and academic outcomes of students respectively. A total of 12 instructors and 337 students (experimental group) and 216 students (control group) from the Open University of Tanzania participated in the study. Results have shown that collaborative course design (i) contributed to instructors' preparedness in course design and e-learning delivery and (ii) improved instructional practice of instructors. E-learning delivery (i) addressed challenges of print-based delivery and (ii) had positive impact on academic outcome of students. Moreover, students were satisfied with their experience with the courses. Recommendations for up scaling of e-learning implementation and professional development of instructors are suggested.

[5] This chapter is based on the article, Nihuka, K. A & Voogt, J (Submitted b). The impact of collaborative course design and e-learning delivery on instructors' instructional practice and students' academic outcomes. *Journal of Distance Education.*

5.1 INTRODUCTION

The Open University of Tanzania (OUT) is a distance education institution where prints are the dominant instructional practice of delivering its programs and courses. OUT uses postal services and/or own transports to deliver print study materials to regional centres for students at the beginning of the academic year. The outcomes in Chapter 3 illustrate that the current instructional practice is associated with challenges such as delays in delivery of course outlines, study materials, lack of regular interactions between instructors and students, delays or lack of feedback on student learning and feelings of isolation among students. Encouragingly, studies show that e-learning technologies have the potential to (i) enrich delivery of courses and learning resources (Bates, 2000; Pena-Bandalaria, 2007; Tschang & Senta, 2001), (ii) facilitate access to learning resources, (iii) alleviate feelings of disconnectedness by improving interactions between instructors and students (Fozdar & Kumar, 2009; Ludwing-Hardman & Dunlap, 2003; Thomas & Carswell, 2000) and (iv) provide feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000). Also, e-learning technologies have the potential to improve student academic outcomes (Bates, 2000; Tschang & Senta, 2001).

Besides the potential of e-learning, the implementation of such technologies in most universities in sub-Sahara Africa is still very low (Hoven, 2000; Siritongthaworn, Krairit, Dimmitt & Paul, 2006; Sife, Lwoga & Sanga, 2007). According to Sife, Lwoga, & Sanga, (2007) one of the major barriers to e-learning implementation is lack of systematic approaches to the preparation of instructors on e-learning course design and implementation. Considering OUT as an example, instructors' preparation for the use of e-learning has been dominantly provided through workshops which have shown to be ineffective (Bakari, 2009). As a result, instructors at OUT have continued to deliver their courses using traditional print-based mode.

Other studies have demonstrated that collaborative course design, as a strategy for professional development of instructors is effective in improving instructors' skills on e-learning course design, technology implementation and pedagogies (Koehler & Mishra, 2005; Mishra *et al.,* 2007; Voogt, 2010). An effective professional development arrangement involves instructors actively, includes reform oriented activities which are sustained over time, and provides

follow-up support and opportunity for collaboration (Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet *et al.,* 2001; Penuel, Fishman, Yamaguchi & Ghallagher, 2007; Simmie, 2007).

This strategy was used at OUT to prepare instructors on e-learning course design and delivery (Chapters 3 and 4). Results on the impact of *Collaborative Course Design* on instructors' professional learning in Chapter 4 show that instructors in design teams transformed their print-based courses into e-learning courses which were delivered via Moodle LMS supported by e-mail and mobile phones. Students enrolled in the courses were then oriented on how to learn in this new environment. The students accessed the courses offered in Moodle for a period of 12 weeks. As earlier on said in Chapter 4, this Chapter discusses results on (i) the impact of collaborative course design and e-learning delivery on instructors' instructional practices and on students' academic outcomes respectively.

5.2 E-LEARNING IMPLEMENTATION IN DISTANCE EDUCATION

5.2.1 Challenges of e-learning implementation

In most sub-Sahara Africa's universities, the implementation of e-learning technologies to enhance distance education is limited (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000). Most universities are confronted with challenges such as (i) perceptions about e-learning technologies (Bakari, 2009; Phillips, 2005; Siritongthaworn *et al*., 2006), (ii) access to infrastructures (Aguti & Fraser, 2006; Nnafie, 2002; Resta & Laferriere, 2008), (iii) Narrow bandwidth (Gakio, 2006) and (iv) limited competence, skills and experiences on e-learning technologies by both instructors and students (Hoven, 2000; Kirkwood & Price, 2005; Smart & Cappel, 2006).

Instructors' perception about e-learning technologies is one of the challenges for a successful e-learning implementation in distance education (Bakari, 2009; Siritongthaworn *et al*., 2006). According to Bakari (2009), some instructors do not perceive e-learning as an effective means for teaching and learning. The perceived benefits of particular technologies have great influence on instructors' decision on whether to use a technology or not. In addition, beliefs about

teaching and learning held by instructors are also among important challenges which influence e-learning implementation in their courses (Phillips, 2005).

Access to the ICT infrastructure is another serious challenge. Only 4% of the African population have access and use computer and internet (Resta & Laferriere, 2008). Also, despite the fact that availability of mobile phones for educational uses enjoys a phenomenal growth across Africa (Pena-Bendalaria, 2007), the effective use of the gadget is to some extent limited by challenges such as; cost (Brown, 2003; Nnafie, 2002), limited screen size, battery span, memory and design content for m-learning delivery (McGreal, 2009). In sub-Sahara Africa's universities, studies have shown that access to different e-learning technologies is different between instructors and students (Aguti & Fraser, 2006; Nnafie, 2002). For example Aguti and Fraser (2006) reported that more than 60% of students in their study lacked access to video, computer and internet.

Narrow bandwidth which affects internet speed is another big challenge in most sub-Sahara African countries. According to Gakio (2006), the state of internet connectivity in tertiary institutions in Africa is characterized by: *too little, too expensive and poorly managed; as a result internet technology becomes even less useful for research and education purposes,* (p. 41).

Limited competence and skills by both instructors and students is also a challenge towards implementation of e-learning technologies (Hoven, 2000; Kirkwood & Price, 2005; Smart & Cappel, 2006). Large proportion of instructors and most students have limited competence and skills in using new technologies (Hoven, 2000; Kirkwood & Price, 2005; Smart & Cappel, 2006). They argue that students' knowledge and skills on e-learning technologies such as: computer and internet are important towards effective use of technologies. Instructors and students with poor computer competences and skills perceive e-learning technologies use as difficult compared to those with good competence and skills on computer use (Siritongthaworn *et al.*, 2006).

5.2.2 Instructor-student interaction through e-learning technologies

Among other uses, e-learning technologies are used in most developed countries to enhance interactions among instructors and students (Dabbagh & Kitsantas, 2005) and for providing feedback to students (Dunn & Lingerfelt,

2004; Malikowski & Theis, 2006). Increased interactions as a result of application of e-learning technologies lead to increased students satisfaction, retention and graduation rates in distance education (Malikowski & Theis, 2006). Also, e-learning technologies such as e-mail are useful for providing feedback to students in the form of instructors' comments (Malikowski & Theis, 2006). Moreover, students find interactions through e-mail communication interesting and useful for exchanging information among themselves and between them and instructors (Dabbagh & Kitsantas, 2005).

5.2.3 Course delivery, access and academic outcomes

E-learning technologies such as learning management systems are commonly used to deliver courses and learning resources to students (Dunn, 2004). According to Malikowski & Theis (2006), course delivery by a learning management system provides convenient, individualized and high quality instruction. Besides, e-learning technologies enhance access to learning resources by students (Dunn, 2004; Papastergious, 2006).

In terms of improving students' academic outcomes through e-learning implementation, existing studies provide mixed evidence. Although, studies by Bates (2000) and Tschang and Senta (2001) report significant improvements in students' academic outcomes as a result of e-learning application in teaching and learning, a study by Summers, Waigandt and Whittaker (2005) reports no significant difference of outcomes between e-learning and traditional groups. Summers *et al.,* 2005 found that in order for students to benefit from e-learning technologies, instructors need to organise courses such that they adequately take the following into account: (i) course tasks characteristics, (ii) student characteristics, (iii) student motivation and (iv) instructor characteristics. Summers *et al.,* (2005) argue that when the mentioned attributes are not taken into consideration, students are likely to experience fewer benefits from e-learning.

5.3 INTERVENTION

The professional development intervention involved collaborative course design and delivery. Collaborative course design consisted of workshops, course design in design teams, and general meetings of the design teams. The

redesigned courses were delivered during course delivery. During course delivery the general meetings continued. Instructors from the Faculty of Science, Technology and Environmental Studies (FSTES) and the Institute of Continuing Education (ICE) were invited to the workshops (the first one prior to course design and the other one at the end of course design.

The first workshop which lasted for three hours aimed to prepare instructors on how to redesign their print-based courses into e-learning courses. It also oriented instructors on e-learning course design particularly on how to plan and write different materials for e-learning courses (e.g. preparing powerpoint slides, searching resources, lesson notes, and study materials etc.). The workshop used presentations and demonstrations of exemplary e-learning courses that were developed during the pilot study developed in Chapter 3 to stimulate discussions on course design. Two instructors facilitated during the workshop.

After the first workshop, instructors worked in design teams to redesign their courses. The emphasis was to redesign existing courses rather than developing new ones. Instructors spent two and a half months to redesign their courses. Five general meetings were convened for the teams where questions were answered, topics discussed and choices made. Also the general meetings served for the design teams to discuss different challenges, issues and problems related to course redesign process. Appropriate support was provided to the design teams in the general meetings.

A final workshop, lasting two hours was convened after all e-learning courses were developed to orient instructors on e-learning course delivery and on how to use e-mail and mobile phones to interact with students during the course. The redesigned courses were then delivered to students in the regional centres through Moodle LMS. Twelve courses were installed in Moodle LMS in a computer laboratory in Dar es Salaam, Singida and Manyara regional centres. In between, four general meetings were convened for instructors to reflect about the on-going course delivery. The courses were delivered during 12 weeks.

5.4 PURPOSE OF THE STUDY

The purpose of the study reported in this Chapter was to investigate the impact of *Collaborative Course Design* and e-learning delivery on instructors' instructional practice and on students academic outcomes at the Open University of Tanzania (OUT). The main question was formulated as: *What is the impact of collaborative course design and e-learning delivery on instructors' instructional practices and students academic outcomes?* The following sub-questions guided the study:

1. In which ways did collaborative course design contribute to instructors' preparedness for e-learning implementation?
2. How did instructional practices of instructors change during e-learning implementation?
3. How did students' experience e-learning implementation?
4. What was the impact of e-learning implementation on students' academic outcomes?

5.5 METHODS

5.5.1 Design of the study

To answer research questions 1 and 2 a *multiple case* research design (Yin, 2003) was employed. Two contexts, i.e. Faculty of Science, Technology & Environmental Studies (FSTES) and Institute of Continuing Education (ICE) were explored during the study. Instructors involved in the study were considered as units of analysis and OUT as the context of the study. The same design was used to collect data from students for answering research question 3. In respect, three contexts i.e. Dar es Salaam, Singida and Manyara regional centers were considered and students involved in the study were regarded as units of analysis. To answer research question 4 a quasi-experimental research design was employed. Students in Dar es Salaam, Singida and Manyara regional centers were purposefully assigned into experimental and control groups. Mainly the criteria of geographical location, knowledge and access to computer and internet were considered. The experimental group comprised of students who were located in the township and had knowledge and access to computer and internet, either at OUT headquarter or in their respective centers. While the control group

mostly comprised of students from both township and remote areas who lacked knowledge and/or access to computers and internet. Students in the experimental group were oriented on how to use Moodle LMS during the course, after which they accessed courses for a period of 12 weeks through computers in the computer laboratory in their respective regional centers.

5.5.2 Participants

Instructors

Twelve instructors, eight from the FSTES and four from the ICE participated in the study and delivered their courses to students in the regional centers through Moodle. The instructors from FSTES were selected because they were involved in teaching courses which were identified by the faculty to be converted into e-learning courses. The four instructors from ICE were selected based on their interest to participate in the study. All instructors were based in Dar es Salaam and had the average age of 37 and 41 in FSTES and ICE respectively. Instructors had different teaching experiences and all had excellent computer and internet skills.

Students

A total of 553 students drawn from Dar es Salaam, Singida and Manyara regional centres participated in the study (Table 5.1). The table provides background characteristics of students based on students' questionnaire. There were 337 students in the experimental group and 216 students in the control group.

Table 5.1 *Student background characteristics*

	Regional Centres		
Characteristics	**Dar es Salaam**	**Singida**	**Manyara**
Students in the e-learning delivery (experimental group)	210	76	51
Faculty/Institute			
FSTES	63	38	35
ICE	275	90	52
Gender			
Male	102	31	24
Female	107	45	28
Computer experience	1.5 yrs – 2yrs	4 months -1 yr	4 months – 1 yr
Computer skills	good	good	good
Frequency of Computer use	at leat 4-5 times per week	at leat 2-3 times per week	at leat 2-3 times per week
Access to Computer and Internet	at OUT library & Internet cafe	at workplace, Regional centre & Internet cafe	at Regional centre & Internet cafe
Students in the print based delivery (control group)	128	53	35

5.5.3 Instruments and data analysis

The following instruments were used: *Interview guide for instructors*, *Course analysis guide, Questionnaire for students* and *University examination for students.* Interview guide for instructors were used to collect data from instructors on the impact of collaborative course design on instructors' instructional practices. Each instructor was interviewed at the end of course delivery. A total of 12 interviews were collected, transcribed and transported into *Atlas.ti*. Deductive and inductive coding was used to analyze the data. Clusters and sub-clusters were identified (Miles & Huberman, 1994). Samples of interview responses of four instructors together with a list of codes were re-coded by a colleague in the department of the University of Twente. An inter-rater reliability, Kappa .84 (p=.000) was found, indicating good reliability.

Courses that were redesigned by instructors in the design teams were analyzed using the *Course analysis guide* which was developed for the study. The guide sought to explore the kind of learning resources that each course contained. Questionnaires were administered to students in the experimental group in each regional centre at the end of the 12 weeks. The questionnaire explored

students' experiences with e-learning courses and delivery. Around the same time, University Examinations (UE) were administered to students (from both experimental and control groups) to determine the impact of e-learning courses and delivery on their academic outcomes. Data from Questionnaires and UE were analysed using SPSS where descriptive statistics (means, standard deviations and frequencies) were computed. In addition, *t-tests* and *ANOVA post-hoc test* were used to calculate differences.

5.6 RESULTS

5.6.1 Instructors' preparedness for e-learning implementation

Results in Table 5.2 show that *Collaborative Course Design* contributed to instructors' preparedness to e-learning implementation in four ways. The strategy (i) promoted knowledge of *challenges* of print-based delivery and *reasons* for e-learning implementation; (ii) provided *support* and(iii) allowed *encouragement* from colleagues.

Table 5.2 *Contribution of collaborative course design to instructors' preparedness for e-learning implementation*

	Faculty of Science, Technology & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE),** *(n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Ways	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
Challenges/reasons	x	x	x	x	x			x	x	x		x
Support	x	x			x	x			x	x	x	x
Encouragement	x	x	x	x	x	x	x	x	x		x	

Note: DT=design team, T1-T12= Teachers/Instructors.

All instructors (except T6 and T7 from FSTES and T11 from ICE) indicated that working in design teams made them discuss the challenges they encounter in print-based delivery. They indicated further that they used design teams to discuss the reasons for e-learning how such technologies can address the challenges. According to the instructors, such an opportunity contributed to their preparedness to use e-leaning technologies as evidenced by T12, *"I knew the challenges of delivering courses by study materials but I never took time to think*

about them nor thought of using technologies. The professional development was so specific in stimulating discussions on the challenges in the general meetings that are caused by dependence on print based teaching. It provided opportunity to discuss the best way to address the challenges by technologies. This contributed to using Moodle in my teaching" (T12, Interview 1).

According to the instructors, despite few demonstrations, dialogues in design teams helped them understand why they should consider using Moodle, e-mail and mobile phones in their teaching. The following statement of T4 is an example, *"The workshops were useful despite few demonstrations on how to use Moodle. They (the workshops) opened up discussions about why e-learning technologies should complement print delivery of course. The professional development made me aware of the reasons for using e-learning technologies in the teaching process, which contributed to my using of Moodle and e-mail to deliver courses"* (T4, Interview 1).

It is evident from Table 5.2 that the support offered to the instructors also helped instructors feel prepared to implement e-learning. Support was expressed in two perspectives. In the first perspective, instructors (particularly those in FSTES) indicated *"support by the faculty and the university management contributed to the implementation of Moodle in course delivery"* (T7, Interview 1). In the second perspective, all instructors in ICE and a half of instructors in the FSTES indicated that the pedagogical and technical support offered by the support staff and colleagues also promoted their confidence which contributed to e-learning implementation in their teaching. A comment from T12, expressed the experiences of the majority of instructors, *"I found the supportive environment in the design team as a contributing factor to successful implementation of e-learning technologies in my teaching. The pedagogical and technical support offered during the professional development ensured sufficient experience in integrating technologies in the delivery of courses. I enjoyed working with colleagues and supporting each other; this made us competent in using Moodle, e-mail and mobile phones for course delivery"* (T12, Interview 4).

Also majority of the instructors (except T10 & 12) felt that e*ncouragement* contributed to e-learning implementation in two perspectives. In the first perspective, instructors indicated that *"encouragement by colleagues in the design teams and general meetings motivated them to transform their courses for delivery using e-learning technologies"* (T9, Interview 2). In the second perspective, majority of the instructors from FSTES (exemplified by T5) expressed that

encouragement by colleagues in the faculty and the board members who were very supportive of the e-learning implementation idea, contributed to the use of Moodle in the faculty" (T5, Interview 1).

5.6.2 Instructional practice of instructors

All instructors used Moodle LMS to deliver courses and resources to students. The following statement by one of the instructors expressed the experience of the majority of the instructors: "*Developing the courses was a bit challenging but I enjoyed using Moodle to deliver my course. I found using it [Moodle] interesting and useful particularly because it allowed delivery of learning materials and articles to students during the course*" (T10, Interview 4).

Analysis of the redesigned courses in Moodle LMS revealed that there was diversity in terms of how much learning resources are contained in each course (Table 5.3). Note that most of the courses contained course outlines (all but one), study materials, lesson notes, powerpoint slides (all but one) and review questions (all but one).

Table 5.3 *Learning resources contained by courses in Moodle LMS*

	Faculty of Science & Environmental Studies (FSTES), *(n=8)*								**Institute of Continuing Education (ICE),** *(n=4)*			
	DT 1		**DT 2**		**DT 3**		**DT 4**		**DT 5**		**DT 6**	
Resources and materials	**T 1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**	**T11**	**T12**
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
Course outline		x	x	x	x	x	x	x	x	x	x	x
Study material			x	x	x		x	x		x	x	x
Articles	x	x	x	x		x			x	x	x	
Lesson notes	x	x	x	x	x	x	x	x	x	x	x	x
Lesson activity						x		x	x			
Powerpoint slides	x	x	x	x	x	x	x	x		x	x	x

Note: FSTES=Faculty of Science, Technology and Environmental Studies, ICE= Institute of Continuing Education, DTs= design teams, T1-T12=Teachers/Instructors, C=Courses,

5.6.3 Interaction with students

Instructors used e-mail and mobile phones (mostly text messages) to interact with students during the course more than before. None of the instructors reported to have used postal services during the course. The statement by one of the instructors (T6) is an example, "*Unlike before, I communicated with students*

regularly through e-mails and sometimes text messages. I had to check my e-mails regularly than before to make sure that I don't miss replying student's e-mails on time. Previously I used e-mail only for communicating with friends and relatives but now I can use it to communicate with students" (T3, Interview 4). The majority of the instructors expressed that they used e-mail mostly for provision of (i) course outlines, (ii) learning resources such as study materials and articles and (iii) feedback to students.

5.6.4 Students experience with e-learning courses

Results in Table 5.4 show that students in all studied regional centres found the *courses clear* (M = 4.4, SD = .60: Dar es Salaam; M = 4.3, SD = .60: Singida; M = 4.4, SD = .56: Manyara). They felt that e-learning made interaction and communication with instructors more *flexible* (M = 4.4, SD = .58: Dar es Salaam; M = 4.3, SD = .48: Singida; M = 4.3, SD = .51: Manyara).

Table 5.4 *Students experience with courses and e-learning delivery*

	Regional centres		
E-learning characteristics	**Dar es Salaam** *(n=210)* ***Mean(SD)***	**Singida** *(n=76)* ***Mean(SD)***	**Manyara** *(n=51)* ***Mean(SD)***
Course clarity	4.4 (.60)	4.3 (.60)	4.3 (.56)
Flexibility	4.4 (.58)	4.3 (.48)	4.3 (.51)

Note: Scale: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree

5.6.5 E-learning and challenges of print-based instruction

The specific ways that e-learning technologies addressed challenges of print-based instruction are presented in Table 5.5. Results show that students across regional centres reported that e-learning technologies improved *learning support* (M = 3.9, SD = .61: Dar es Salaam; M = 3.8, SD = .55: Singida and M = 3.7, SD = .58: Manyara). According to students e-learning improved provision of advice, guidance and counselling, and improved provision of feedback by instructors.

Table 5.5 *Ways that e-learning technology addressed challenges of print-based delivery*

	Regional centres		
	Dar es Salaam *(n=210)*	**Singida** *(n=76)*	**Manyara** *(n=51)*
Ways	***Mean(SD)***	***Mean(SD)***	***Mean(SD)***
Learning support	3.9 (.61)	3.8 (.58)	3.7 (.58)
Delivery	4.2 (.71)	4.0 (.79)	4.3 (.54)
Limitations	2.7 (1.1)	2.5 (1.0)	2.3 (.98)

Note: Scale: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree

Also results indicate that e-learning technologies enhanced course *delivery* (M = 4.2, SD = .71: Dar es Salaam; M = 4.0, SD = .79: Singida and M = 4.3, SD = .54: Manyara). In particular, with e-learning, students were able to get sufficient and up-to-date learning resources during the course and there was timely delivery of course outlines. The major students' concern was the fact that offline Moodle system was *limited* to location and time (M = 2.7, SD = 1.1: Dar es Salaam; M = 2.5, SD = 1.0: Singida; M = 2.3, SD = .98: Manyara). No significant difference in *learning support, delivery* and *limitations* were found between regional centres.

A large proportion of students in all three regional centres indicated that it was easier to access courses and resources in e-learning than in print-based delivery (Table 5.6). Particularly, students accessed course outlines (64.3%: Dar es Salaam, 75%: Singida and 80.4%: Manyara), articles (85.2%: Dar es Salaam, 90.8: Singida and 92.2%: Manyara), lecture notes (86.2%: Dar es Salaaam, 89.5%: Singida and 92.2%: Manyara) and soft copies of study materials (83.3%: Dar es Salaam, 77.6%: Singida and 80.4%: Manyara) much easier in e-learning.

Table 5.6 *Access to resources between e-learning and print-based delivery*

	Perceived ease of access to learning resources (in %)					
	Easier in e-learning delivery			**Easier in print delivery**		
Resources	**DSM** *(n=210)*	**SGD** *(n=76)*	**MNY** *(n=51)*	**DSM** *(n=210)*	**SGD** *(n=76)*	**MNY** *(n=51)*
Course outlines	64.3	75.0	80.4	29.0	18.4	15.7
Articles	85.2	90.8	92.2	6.7	6.6	5.9
Lecture notes	86.2	89.5	92.2	4.8	3.9	3.9
Study materials (soft copies)	83.3	77.6	80.4	5.7	9.2	9.8

Note: DSM=Dar es Salaam, SGD=Singida & MNY=Manyara

5.6.6 E-learning technologies for interaction

The frequency by which students used e-mail, mobile phone and postal services to interact with instructors during the course are presented in Table 5.7. Results reveal that students in all centres indicated the delivery of courses was well supported by communication technologies, i.e. e-mail and mobile phone (M = 3.9, SD = .78: Dar es Salaam; M = 3.8, SD = .94: Singida; M = 4.0, SD = .61: Manyara). There was no significant difference in students' experiences with e-learning courses between regional centres. Also, results reveal that students in Dar es Salaam used e-mail more frequent, i.e. three to six times during the course compared to their counterparts in other centres [(M = 3.1, SD = .49: Dar es Salaam; M = 2.3, SD = .69: Singida; M = 2.2, SD = .63: Manyara), p=.000].

Table 5.7 *E-learning technologies for interaction*

	Regional centres		
	Dar es Salaam *(n=210)*	**Singida** *(n=76)*	**Manyara** *(n=51)*
Ways	***Mean(SD)***	***Mean(SD)***	***Mean(SD)***
E-mail	3.1 (.49)	2.3 (.69)	2.2 (.63)
Mobile Phone	1.6 (.63)	2.4 (.43)	2.2 (.33)

Note: Scale: 1=never, 2=1-2 times during the course, 3=3-6 times during the course & 4=7-10 times during the course

Students in Singida and Manyara used mobile phones more frequently, i.e. once or twice during the course compared to students in Dar es Salaam [(M = 1.6, SD = .11: Dar es Salaam; M = 2.4, SD = .43: Singida; M = 2.2, SD = .33: Manyara), p = .000]. None of students in all regional centres used postal services to interact with instructors during the course.

5.6.7 Students' academic outcomes

The impact of e-learning delivery on students' academic outcomes is presented in Table 5.8. Results show that e-learning delivery had positive impact on academic outcomes of students in all courses (but three), as indicated by respective *t-test* values. The magnitude of the impact of e-learning delivery on academic outcomes is indicated to be between medium and large (*effect size* values between 0.3 and 0.6).

Table 5.8 *Students' academic outcomes in e-learning and traditional print-based delivery*

	E-learning delivery		Print-based delivery		Significance level	Effect size
Courses	***n***	***Mean(SD)***	***n***	***Mean(SD)***	*t-test*	*(Cohen's d)*
Introduction to probability and statistics	95	49 (23)	55	48 (11)	t=0.08, df=142, p=ns	0.06
Communication skills for IT	82	54 (15)	55	48 (11)	t=2.40, df=134, p<.05	0.46
Computer ethics & cultural implications	82	56 (13)	55	51 (09)	t=2.77, df=134, p<.01	0.45
Information systems planning & management	82	56 (12)	55	49 (13)	t=3.44, df=111, p<.01	0.56
Introduction to computer security	82	55 (14)	55	50 (09)	t=2.37, df=135, p<.05	0.42
Introduction to microcomputer applications I	82	52 (13)	55	45 (11)	t=3.11, df=130, p<.01	0.58
Introduction to numerical methods	82	53 (12)	55	54 (07)	t=-0.82, df=131, p=ns	-0.10
Network design & administration	82	55 (11)	55	50 (11)	t=2.90, df=111, p<.01	0.45
Physics	256	55 (13)	161	50 (11)	t=3.95, df=415, p<.01	0.42
Development studies	256	54 (12)	161	53 (12)	t=1.11, df=350, p=ns	0.08
Communication skills	256	52 (12)	161	49 (11)	t=2.65, df=364, p<.01	0.26
Geography	256	55 (13)	161	51 (12)	t=3.67, df=415, p<.01	0.32

5.7 CONCLUSIONS AND DISCUSSION

The study in this Chapter aimed to understand the impact of *Collaborative Course Design* and e-learning delivery on instructors' instructional practice and on students' academic outcomes at the Open University of Tanzania. Results have shown that *Collaborative Course Design* had positive impact on instructors' instructional practice. Consistent with other studies (e.g. Tschang & Senta, 2001; Voogt *et al.,* 2005 & 2010), C*ollaborative Course Design* was effective in preparing instructors to use Moodle LMS (supported by e-mail and mobile phone) to

deliver courses. As a result of C*ollaborative Course Design*, instructors developed positive perception regarding the use of both e-mail and mobile phones. According to the instructors, e-mail was useful for sending course outlines, additional learning resources (e.g. articles) and feedback to students (as found in Dabbagh & Kitsantas, 2005).

It was also established during the study that C*ollaborative Course Design* provided instructors the opportunity to discuss challenges of their traditional instructional practice, rationale and the potential that e-learning technologies have. As found in Simmie, (2007), the support offered to instructors during course design and delivery, collaborations and encouragements by colleagues were critical and contributed to the effectiveness of C*ollaborative Course Design*.

On experiencing e-learning for the first time, students had positive experience with e-learning delivery. They found courses to be clear in terms of content, structure layout and organization. Interactions with instructors were made flexible by e-mail and mobile phone communications and none of students used post services during the course. Unlike in traditional print-based delivery, students in e-learning delivery used communication technologies that they found convenient in their centres to interact with instructors during the course for different learning needs. Whereas e-mail seemed convenient for students in Dar es Salaam, those in Singida and Manyara preferred mobile phones (usually short text messages). Perhaps, access to communication technologies influenced students' decision on what technology to use. According to Malikowski and Theis (2006), increased interactions lead to increased satisfaction and retention of students in distance education.

On the part of student learning, results have revealed that consistent to other studies (e.g. Bates, 2000; Tschang & Senta, 2001) e-learning delivery had positive impact on students' academic outcomes in all (but three) courses. In addition, the e-learning courses had a positive medium effect size on academic outcomes of students. According to Cohen (1988), it is worthwhile investing resources on educational innovations with a medium effect size. The success in student learning is associated to the fact that e-learning technologies addressed challenges of print-based delivery. Particularly, e-learning improved delivery of courses and access to course outlines, soft copies of study materials and articles were. Similar results are reported in other studies (e.g. Bates, 2000; Dunn, 2004;

Papastergious, 2006; Tschang & Senta, 2001). According to Summers *et al.,* 2005, reasons such as motivation of students, nature of lesson activities, student characteristics and instructor characteristics make students benefit more from an e-learning environment. The major concern of students however was on the limitation of offline Moodle in terms of location and time since it required the students to visit the centre to access courses and resources.

It is recommended that the university should consider investing resources towards up scaling of e-learning implementation for course delivery across faculties and institutes. In this case, C*ollaborative Course Design* can be used in preparing instructors on e-learning course design, delivery and implementation. Together with this, efforts should be made to understand the available opportunities and challenges that can support or hinder large scale e-learning implementation at the Open University of Tanzania. The promising results of C*ollaborative Course Design* as a strategy for e-learning implementation also offer possibilities for other distance education universities in sub-Sahara Africa. More studies are needed to explore how to organize C*ollaborative Course Design* as a strategy for instructors' preparation in the context of sub-Sahara Africa.

CHAPTER 6
Feasibility of up scaling collaborative course design for large scale implementation of e-learning at the Open University of Tanzania[6]

This article discusses the feasibility of up scaling Collaborative Course Design (CCD) in design teams as a strategy for large scale implementation of e-learning at the Open University of Tanzania (OUT). The strategy is considered promising because it contributes to instructors' learning about e-learning course design and delivery. A single-embedded case design was used and both qualitative and quantitative data were collected from management and instructors. Results show that there are opportunities that make large scale implementation of Collaborative Course Design as a main strategy for professional development of instructors on e-learning course design and delivery at large scale at OUT feasible. The opportunities relate to the management, institutional conditions and support structures. More efforts are needed in addressing challenges of limited access to technologies, narrow bandwidth and unreliable electricity so as to make e-learning course design and delivery effective, affordable and sustainable. In addition, there is need for better alignment between plans for action for large scale e-learning implementation at university and faculty/institute level. It is concluded that the identified conditions make Collaborative Course Design a promising and feasible strategy to prepare instructors for e-learning course design and delivery at OUT and in other sub-Saharan Africa's universities.

---

[5] This chapter is based on Nihuka, K. A., & Voogt, J. (Submitted c). The feasibility of up scaling collaborative course design for large scale implementation of e-learning at the Open University of Tanzania. *Studies in Continuing Education.*

6.1 INTRODUCTION

The Open University of Tanzania (OUT) is a public university which offers academic degrees, diploma and certificate programmes in diverse fields. It is a distance education institution which became operational in 1993. The university which has a student population of over 44, 000 spread all over the country, is administered through 28 regional centres. Each regional centre has a regional director who manages the centre and coordinates students' support such as distribution of study materials, course outlines, counselling services and some administrative matters.

The university has over 42 programs on offer including degrees, diplomas and certificates distributed in 5 faculties and 2 institutes. Typically, all programs are delivered through print-based mode with only one face-to-face session per year. Similar to findings from studies in other distance education institutions in sub-Saharan Africa (Dzakaria, 2004; Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009), OUT is confronted with many challenges (Nihuka & Voogt, 2011) such as (i) delays in the delivery of study materials and extra learning resources, (ii) lack of regular interaction between instructors and students, (iii) lack of immediate feedback on student learning and (iv) feelings of isolation among students.

Towards addressing these challenges, the Open University of Tanzania (OUT) formulated a comprehensive ICT Policy (among other efforts) to guide e-learning implementation (OUT, 2009a). According to the policy, the university aims to transform print-based to blended delivery of courses and train instructors on e-learning course development. Starting in 2004, the university has been organizing regular professional development programs for instructors through workshops which have shown to be ineffective (Bakari, 2009). Instructors have kept their traditional way of delivering courses.

Nihuka and Voogt (2011) explored the potential of the implementation of e-learning technologies at OUT taking into account problems with limited bandwidth, the existing ICT infrastructure, and the need for effective professional development of instructors. They recommended to use offline Moodle learning management system as an appropriate interim solution in addressing challenges of limited bandwidth and a professional development

arrangement which involved instructors actively in e-learning course design and delivery to create ownership as e-learning is considered an innovation of instructors' teaching practices.

Collaborative Course Design in design teams was used as a strategy for professional development to prepare instructors on course design and course delivery in two small scale studies with (in total) 15 instructors. The strategy is based on research findings on effective professional development of instructors (Borko *et al*, 2002; Clarke & Hollingsworth, 2002; Desimone *et al,* 2002; Garet, 2001; Penuel *et al*, 2007; Porter *et al,* 2003) which are rooted in social constructivist theory (Dewey, 1916; Vygotsky, 1978) and adult learning theory (Knowles, Holton III, & Swanson, 1998; Merriam, Caffarella, & Baumgartner, 2007). The strategy had the following characteristics: active participation of instructors to promote ownership of e-learning implementation, activities sustained over a long period of time, opportunities for collaboration within and between design teams and support for instructors. The strategy was identified as promising, because it improved instructors' skills on e-learning course design and delivery and created ownership with the innovation (Koehler & Mishra, 2005; Mishra *et al.,* 2007; Voogt, 2010).

The strategy contributed to (i) instructors' knowledge on e-learning course design, (ii) transformation of print based courses into e-learning courses and (iii) delivery of courses by Moodle LMS (supported by e-mail and mobile phone). Students were satisfied with their experiences with e-learning courses and delivery, which improved (i) delivery of courses, (ii) access to courses, course outlines, study materials and learning resources, (iii) interactions between instructor and students, (iv) provision of feedback and (v) academic achievement of students (Nihuka & Voogt, in press & submitted a). The present study investigated the feasibility within OUT for up scaling *Collaborative Course Design* as a strategy for professional development of instructors on e-learning implementation at large scale.

6.2 RESEARCH QUESTIONS

The promising results of the two small studies with *Collaborative Course Design (CCD)* as a professional development strategy supporting e-learning implementation was the main reason for initiating this study, which took place

6 months after the last study. Of the 15 instructors involved in the two small scale studies 12 instructors still delivered their course through e-learning and used offline Moodle. Ten of them were still using email and 5 used mobile phones to interact with their students. The present study sought an answer to the main research question: *What are the opportunities and challenges within the OUT of up scaling Collaborative Course Design in design teams as main professional development strategy for e-learning implementation at large scale?* Management and instructors (both involved and not involved in CCD) of OUT participated in the study. The following sub questions were formulated to guide the investigation:

1. What are perceptions of instructors about the use of e-learning course delivery?
2. What are perceptions of instructors about *Collaborative Course Design* as a professional development strategy for large scale implementation of e-learning?
3. What are perceptions of the management (at the university, faculty and institute level) about the use of e-learning course delivery?
4. What are perceptions of management about *Collaborative Course Design* as a professional development strategy for large scale implementation of e-learning?
5. What institutional conditions are available/needed at OUT to support up scaling of e-learning course delivery?

It is assumed that an in-depth case study of the feasibility of up scaling of *Collaborative Course Design* as strategy for instructor professional development to support large scale implementation of e-learning implementation at OUT would also provide useful insights in feasible strategies for e-learning implementation in other distance education universities in sub-Saharan Africa.

6.3 TOWARDS UP SCALING OF COLLABORATIVE COURSE DESIGN

Fullan (2007) describes implementation as the process of putting into practice an idea, program or set of activities or structures, new to the people attempting or expected to change. Although implementing educational innovations at piloting and small scale is less demanding and easy to handle, large scale implementation is difficult (Clarke & Dede, 2006; Dede, Honan & Peters, 2005). It is difficult because large scale implementation involves adapting an innovation which was successful in a local context to effective usage in a wide context (Clarke & Dede, 2006). Above all, Dede *et al.,* (2005) argue that large

scale implementation requires maintaining effectiveness, affordability and sustainability of the innovation, which make it even more difficult.

A clear understanding of factors that support large scale implementation of a successful innovation in a particular context is critical (Dede & Honan, 2005). Several factors are required for successful large scale implementation of innovation (Dede & Nelson, 2005; Fullan, 2007; Hoven, 2000; Means & Penuel, 2005; Smart & Cappel, 2006; Sife *et al.*, 2007). These factors are categorized into three major groups, namely (i) management, (ii) institutional conditions and (iii) support for instructors.

6.3.1 Management

The commitment and interest of the management is an essential ingredient to large scale implementation of an innovation (Dede & Honan, 2005; Stoltenkamp, *et al.*, 2007). There needs to be a careful alignment between different management levels and between the management and the majority of the instructors regarding implementation of the innovation (Dexter, 2008; Fullan, 2007).

According to Fullan, (2007), the management is in a position to shape the organizational conditions, such as the development of shared goals and climate for collaboration for successful implementation. Effective implementation of an innovation requires a management that practices distributed leadership (Dexter, 2008; Langran, 2006; Spillane, 2005). Dexter (2007) elaborates the notion of distributed leadership for the implementation of e-learning technologies in educational institutions. She argues that management that promotes e-learning "*distributes technology leadership across a team of people that altogether provide technology expertise and decision making authority and who take responsibility for in setting direction, developing people, and making the organization work for educational technology*" (p. 20). One important characteristic of distributed leadership is to organize effective professional development for its instructors. Management that foresees and provides appropriate professional development for instructors is also essential for effective up scaling of an innovation (Arabasz & Baker, 2003; Dede & Nelson, 2005; Joint, 2003). According to Dede and Nelson, (2005) and Walker and Johnson, (2008), training should be regularly provided so as to accommodate new and inexperienced instructors.

6.3.2 Institutional conditions

Policy

Conducive institutional ICT policy is essential for large scale implementation of e-learning (Bakari, Mbwette, & Shemwetta, 2008; Sife, Lwoga, & Sanga, 2007). According to Bakari *et al.,* (2008) institution's ICT policy should be carefully aligned with the institution strategic plans because it helps the management to be consistent and more focused in coordinating e-learning course implementation. They also suggest that ICT policy should be interpreted into an appropriate ICT master plan and implementation strategy which provides detailed specification of priorities and the associated allocation of resources. When functional, ICT policy provides a framework for successful e-learning course implementation (Sife *et al.,* 2007).

ICT infrastructure

Access to ICTs such as computers, internet, learning management systems, e-mail and mobile phones is a necessary condition for large scale implementation of e-learning (Sherry & Gibson, 2002; Siritongthaworn *et al*., 2006). However, access to e-learning technologies in most sub-Saharan Africa's universities and also at OUT, is still limited (Aguti & Fraser, 2006; Hoven, 2000; Meyer-Peyton, 2000). To improve access to computer and internet, Internet cafes are being used by instructors and students as access points for such technologies (Nihuka & Voogt, 2011; Nnafie, 2002). In addition to limited access, challenges such as narrow bandwidth, unreliable and frequent powercuts (Cuban, Kirkpatrick & Peck, 2001; Gakio, 2006; Siritongthaworn *et al*., 2006) also interfere with up scaling successful e-learning innovations.

Incentives

The existence of incentive schemes for instructors is a critical condition for successful large scale implementation of e-learning in higher education (Collis & Van der Wende, 2002; Leem & Lim, 2007; Stoltenkamp Kles & Njenga, 2007). Also Lim and Khine (2006) found that instructors are more likely to be motivated both intrinsically and extrinsically if they are offered incentives during large scale implementation of e-learning course delivery. Incentives include provision of monetary rewards, reducing the workload of instructors (Leem & Lim, 2007), the provision of a laptop (Stoltenkamp, Kles & Njenga, 2007), and opportunities for educational scholarship and professional development (Brent, Felder, Hirt, Swtzer & Holzer, 1999).

6.3.3 Support for instructors

Instructors need pedagogical and technical support to be able to use e-learning course delivery effectively (Bates, 2000; de Boer, 2004). Pedagogically, instructors require support related to (i) e-learning courses design and development (ii) formulation of student activities and (iii) how to facilitate students' learning in an e-learning environment (Dzakiria, 2004; Telnova, 2005). In addition, instructors' competence in specific pedagogical approaches is also essential for up scaling of e-learning (Arabasz & Baker, 2003; Siritongthaworn *et al.,* 2006). Instructors need technical support on installation of programmes, operation, maintenance, networking and security among others (Nihuka, 2008). Besides, instructors need support from the management in terms of motivation and resources (Fullan, 2007; Stoltenkamp *et al.,* 2007; Walker & Johnson, 2008; Woodrow, 1992). In general, effective support for instructors plays a role during large scale implementation of e-learning course delivery (Sife *et al*., 2007). With support, instructors find up scaling of innovation, such as e-learning, easier and more interesting when they are supported accordingly (Walker & Johnson, 2008).

Together with support, instructors' positive attitude also contributes to their willingness to use e-learning course delivery and in fact is key to implementation of innovation (Walker & Johnson, 2008). Instructors who are positive to e-learning are likely to use technologies to enhance delivery of their courses and interaction with students. Moreover, instructors' possession of knowledge of the potential of e-learning is equally important because it determines one's decision whether or not to use e-learning course delivery (Walker & Johnson, 2008). The issue of instructors' perceptions on practicality of e-learning technologies is also crucial. According to Siritongthaworn *et al,* (2006), the perceived practicality of particular technologies has influence on instructors' decision to use such a technology in education.

In conclusion, effective professional development is necessary for ensuring support for instructors, development of positive attitudes, knowledge and in understanding practicality of e-learning technologies. *Collaborative Course Design* in this case, is a promising professional development arrangement because it contributes to instructors' learning about e-learning course design, delivery and implementation (Desimone *et al.,* 2002; Mishra *et al.,* 2007; Voogt *et al.,* 2005). In a sustainable professional development strategy, instructors are actively involved in order to develop ownership with the innovation.

Furthermore, institutional conditions and management support needs to be in place in order to be able to make up scaling *Collaborative Course Design* a sustainable strategy for large scale implementation of e-learning.

6.4 METHODS

6.4.1 Design

This study employed a *single-embedded case* research design. Yin (2003) describes a case study research design as an appropriate method for investigating a particular phenomenon within its real-life context when the phenomenon and context are closely related. This was the case in this study as instructors' use of e-learning technologies at the Open University of Tanzania (OUT) is strongly influenced by their perceptions and constraints in the context. One case, *Collaborative Course Design* by instructors was explored during the study with instructors and management involved in the study as units of analysis and OUT as the context of the study.

6.4.2 Participants

Management
Five representatives from the management participated in the study, including the vice chancellor (VC) from the university management (further referred to as *top management*), four deans from four faculties and one director from one institute (further referred to as *middle management*).

Instructors
Two groups of instructors were involved in the study. All instructors from *study 1* (N=3) and *study 2* (N=12) were involved in this study (further referred to as *CCD instructors*). Instructors came from the Institute of Continuing Education (ICE) and the Faculty of Science, Technology and Environmental Studies (FSTES). In addition, twenty instructors (N=20) not previously involved in *Collaborative Course Design* (further referred to as *not CCD instructors*). The *not CCD instructors* (N=5 per faculty/institute) were randomly selected from three faculties and one institute. The total group of instructors consisted of 20 males and 15 females, average age between 36 and 43 and average years of teaching

experience between six and eight. The composition of instructors included assistant lecturers, lecturers, senior lecturers and professors.

6.4.3 Instruments and data analysis

Interview questions and structured questionnaires were used for data collection. Interviews were conducted with the vice chancellor, deans from faculties and the director from the institute. Interviews were guided by open ended questions. Appropriate follow up questions were generated and used to solicit more information from interviewees. All interviews were audio taped. The responses were transcribed; major themes were identified using data reduction techniques and reported (Miles & Huberman, 1994). Structured questionnaires developed for this study were used to collect data from all instructors. The questionnaires comprised of *yes-no* and 5-point Likert scales. Data from structured questionnaires were analysed using SPSS (ver. 18) where descriptive statistics mainly frequencies, means and standard deviation were computed. Non-parametric, Mann-Whitney U-Tests were computed to determine the difference between *CCD instructors* and *not CCD instructors*.

6.5 RESULTS

6.5.1 Reasons for using/willingness to use e-learning course delivery

Follow-up on *CCD instructors* showed that they were still using Moodle learning management system for course delivery. E-mail and mobile phone were also used for interaction with students during the course. The findings on *not CCD instructors* revealed that they were willing to use e-learning course delivery (M = 4.05, SD = 1.0).

In Tables 6.1, 6.2 and 6.3 results show that the reasons for instructors' use/willingness to use e-learning course delivery were related to the *potential* of e-learning course delivery, the *practicality* of e-learning course delivery and the *support* offered. In Table 6.1 results show that *CCD instructors* were still using e-learning course delivery because they understood the potential of e-learning technologies.

Table 6.1 *Potential of e-learning as perceived by instructors*

E-learning technology address	**CCD instructors** *(N=15)* ***M(SD)***	**Not CCD instructors** *(N=20)* ***M(SD)***	**Mann-Whitney U-test p-values**
Delivery of courses	3.7(1.2)	2.3(1.5)	.003
Delivery of learning resources	3.7(1.2)	2.3(1.4)	.004
Regular interactions	3.9(1.3)	2.5(1.5)	.004

Note: Scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, CCD=Collaborative course design

Specifically, the findings show that *CCD instructors* understand that e-learning course delivery have potential in addressing delays in delivery of courses (M = 3.7, SD = 1.2), learning resources (M = 3.7, SD = 1.2) and facilitation of interactions with students (M = 3.9, SD = 1.3). On the other hand, *not CCD instructors* tend to disagree (M = between 2.3 – 2.5) with the potential of e-learning for course delivery. The Mann-Whitney U-test (Table 1) shows a significant difference in instructors' understanding of the potential of e-learning course delivery between the two groups.

Practicality of e-learning technologies is another reason for using/not using e-learning course delivery among instructors (Table 6.2). The results indicate that both groups see the practicality of e-learning, particularly with regard to the use of Moodle and e-mail. However they see the interaction with students as time consuming and are more neutral towards the practicality of mobile phones. Both groups do think that e-mail for interaction is less costly, but *non CCD instructors* are a little unsure about this.

Table 6.2 *Perceived practicality of e-learning by instructors*

	CCD instructors *(N=15)*	**Not CCD instructors** *(N=20)*	**Mann-Whitney U-test**
	M(SD)	***M(SD)***	**p-values**
Moodle LMS enhances delivery of courses	3.9(1.3)	3.9 (1.1)	0.79
Moodle LMS enhances delivery of leaning resources	3.9(1.4)	4.0 (1.1)	0.83
E-mail improves interactions with students	3.9(1.3)	3.9 (1.0)	0.50
E-mail enhances provision of feedback to students	4.1(1.2)	3.9 (1.0)	0.30
Mobile phones improves interaction with students	3.5(1.4)	3.8 (1.1)	0.80
Mobile phones enhance provision of feedback to students	3.4(1.5)	3.4 (1.1)	0.62
Interaction with students through e-mail is less costly	4.7(0.5)	4.0 (0.0)	0.0001
Interaction with students through e-mails is not time consuming	1.6(0.5)	1.6 (0.5)	1.00
Interaction with students through e-mail is attractive	3.5(0.9)	3.9 (1.2)	0.13

Note: Scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, CCD=Collaborative course design

Table 6.3 indicates that *CCD instructors* were still using e-learning technologies because there was (i) technical (M = 4.4, SD = 1.1) pedagogical support (M = 4.2, SD = 1.1) offered when needed and (ii) easy access to computer and internet (M = 3.3, SD = 1.2). The *not CCD instructors* are willing to implement e-learning because of the availability of technical support (M = 4.3, SD = 1.0) and easy access to computer and internet (M = 3.8, SD = 1.2).

Table 6.3 *Support offered to instructors*

	CCD instructors *(N=15)*	**Not CCD instructors** *N=20)*	
	M(SD)	***M(SD)***	**p-values**
Technical support available when needed	4.4(1.1)	4.3 (1.0)	0.64
Pedagogical support available when needed	4.2(1.1)	2.5 (1.2)	0.001
There is easy access to e-learning technologies	3.3(1.2)	3.8 (1.2)	0.22
Regular professional development provided	4.0(0.9)	3.5 (1.2)	0.31
Faculty/institute allocates time for course development	1.7(0.8)	1.4 (1.0)	0.10

Note: Scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, CCD=Collaborative Course Design

Also results show that in both categories of instructors, although regular professional development is provided to instructors when needed (M = 4.0, SD = 0.9: *CCD instructors*; M = 3.5, SD = 1.2: *not CCD instructors*), faculties and institutes do not allocate time for course development (M = 1.7, SD = 0.8: *CCD instructors*; M = 1.4, SD = 1.0: *not CCD instructors*). *Not CCD instructors* were, compared to *CCD instructors*, not aware of pedagogical support available for instructors (p = 0.001).

6.5.2 Instructors' perceptions on collaborative course design

Instructors in both groups are positive about participating in collaborative course design as a strategy for professional development (M = 3.8, SD = 1.3: *CCD instructors*; M = 4.0, SD = 1.1: *not CCD instructors*). There was no significant difference between the two groups.

Reasons for participating in collaborative course design

Table 6.4 presents different reasons for instructors' willingness to participate in collaborative course design as a strategy for professional development. Unlike their counterparts, the majority of *CCD instructors* were more positive to participate because the strategy allows collaboration with colleagues (p < 0.001), promotes competence in using Moodle (p = 0.005) and improves confidence in designing e-learning courses (p < 0.001).

Table 6.4 *Reasons for participating in collaborative course design*

	CCD instructors *(N=15)*	**Not CCD instructors** *(N=20)*	
	M(SD)	***M(SD)***	**p-values**
Allows collaborations with colleagues	5.0(0.0)	4.4(0.5)	0.0001
Improves confidence in designing an e-learning course	4.3(0.5)	3.6(0.5)	0.001
Promotes competence in designing an e-learning course	4.3(0.5)	4.5(0.5)	0.10
Promoted competence in using Moodle LMS	4.9(0.4)	4.3(0.8)	0.005
Opportunity to learn from each other in an informal way	4.3(0.4)	4.7(0.5)	0.03
Relaxed atmosphere convenient for designing an e-learning course	4.1(1.2)	3.3(1.1)	0.05
Creates an avenue for exchange of ideas on e-learning implementation	4.0(0.0)	4.6(0.5)	0.0001
Comfortable to work with an unfamiliar colleague in a design team	4.2(0.8)	4.4(0.5)	0.72
Comfortable to collaborate with senior colleagues in a design team	4.2(0.8)	4.6(0.5)	0.16

Note: Scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, CCD=Collaborative course design

Furthermore, results in Table 6.4 reveal that, compared to *CCD instructors,* the *not CCD instructors* are even more positive to participate in collaborative course design because they see the strategy as a potential avenue for exchange of ideas about e-learning ($p < 0.0001$). Additionally, instructors in both groups would like to participate in collaborative course design because the strategy promotes competence in designing e-learning courses (M =4.3, SD = 0.5: *CCD instructors*; M = 4.5, SD = 0.5: *not CCD instructors*). Also, all instructors feel comfortable to work with unfamiliar or more senior colleagues during course design.

Challenges of collaborative course design

Results in Table 6.5 indicate that instructors in both groups find collaborative course design time consuming (M = 4.0, SD = 1.0: *CCD instructors*; M = 3.8, SD = 1.3: *not CCD instructors*). Unlike *CCD instructors*, the *not CCD instructors* identified busy schedule as a challenge for them to participate in collaborative course design ($p < 0.005$). Both groups do not consider working with more

senior (M=1.8, SD=0.4 for *CCD instructors*; M= 1.6, SD = 0.5 for *not CCD instructors*) colleague as a challenge.

Table 6.5 *Challenges of collaborative course design*

	CCD instructors *(N=15)*	**Not CCD instructors** *(N=20)*	
	M(SD)	***M(SD)***	**p-values**
The strategy is time consuming	4.0(1.0)	3.8(1.3)	0.97
Will have no time to participate because of my busy schedule	2.1(1.3)	3.5(1.2)	0.002
The strategy is difficult for me	1.6(0.5)	2.6(1.0)	0.001
Prefer working on my own when designing an e-learning course	1.9(1.0)	2.5(1.2)	0.16
Uncomfortable to work with more senior colleagues in a design team	1.8(0.4)	1.6(0.5)	0.21

Note: Scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, CCD=Collaborative course design

6.5.3 Perceptions of the management on the use of e-learning course delivery

Generally, the management is positive and interested about e-learning course delivery for two major reasons. First, it was pointed out by the *top management* that e-learning course delivery is important because it will enhance efficiency of distance education as evidenced in this statement, *there is no way that open and distance learning can become efficient without ICT, that is why we (the university) are investing extensively towards using ICT in teaching and also in other operations.* Second, both *top* and *middle management* indicated that e-learning course delivery is likely to improve enrolment of students, facilitate access to educations and enhance course delivery.

The top management confirmed the existence of an ICT steering committee (in which deans and directors are members) that foresees ICT implementation activities in the university. It was further pointed out by the top management that *"the university has recruited three instructional designers and is introducing a position of deputy vice chancellor responsible for learning technologies and director of educational technologies starting in July, 2011"(interview Vice Chancellor).*

Both, *top* and *middle management* reported that regular training (workshops) are provided to instructors under the Swedish International Development Agency's (SIDA) capacity building project on how to develop e-learning courses and on the use of Moodle system.

6.5.4 Management perceptions on collaborative course design

Interview responses indicated that the majority of the management is positive to use collaborative course design to support large scale implementation of e-learning. According to the management, collaborative course design is suitable for large scale implementation of e-learning because "*it allows useful collaboration, allows learning course design by doing, emphasizes on instructors' support and encourages continued dialogue between instructors*" (Majority of the management). The top management pointed out that "*the university is willing to provide time, support and other resources to support up scaling CCD*" (Vice Chancellor).

Furthermore, the *middle management* pointed out that collaborative course design has the potential to support large scale implementation of e-learning because the approach is systematic and is conducted at the workplace. However, the *middle management* had concerns that "*the approach is challenging especially in making instructors' collaboration a continuous process*" (Dean, Faculty of Law).

6.5.5 Institutional conditions

Policy

The management confirmed the existence of ICT policy, ICT master plan and ICT implementation strategy, which are aligned to the rolling strategic plan of the university. In addition, the *top management* added that there is an incentive scheme available in the university to motivate and encourage instructors to use e-learning course delivery, as indicated in the following statement, "*We have put in place ICT policy, ICT policy, master plan and implementation strategy and incentives, all to provide useful guidelines for staff (instructors) and to encourage them (and students) to use ICTs in teaching of courses and learning*" (interview Vice Chancellor).

Interview responses from *middle management* indicated that only one faculty incorporated e-learning implementation activities in its action plan although it was not among the top priorities of the faculty. The statement made by one of

the respondents from *middle management* is an example, "*We have e-learning integration issues infused in our action plan but e-learning integration has not been a priority in the faculty for a long time*" (Dean, Faculty of Law).

Three major types of incentives are in place for motivating and encouraging instructors to use e-learning in course delivery as captured in this statement by the top management, "T*he university provides incentive of 500 USD per course developed and qualified to be uploaded into a learning management system, to pay the cost of e-learning conference attendance and/or letter of recognition to instructors who has shown effort in implementing e-learning* (Vice Chancellor). Moreover, it was learned from interviews with the *middle management* that there existed no incentive schemes at the level of faculties and institutes.

ICT infrastructure

Table 6.6 presents the kinds of ICT infrastructures that are available in the university for e-learning implementation at large scale. Instructors in both groups identified computer, internet, phone, printer and photocopier technologies to be available in their faculties/institutes.

Table 6.6 *Available/needed infrastructures for e-learning implementation*

	Available	**Needed***		
	CCD instructors + not CCD instructors *(N=35)*	**CCD instructors** *(N=15)*	**not CCD instructors** *(N=20)*	
	Yes (%)	*M(SD)*	*M(SD)*	**p-values**
Computer	89.7	2.6(0.6)	2.7(0.6)	0.82
Internet	89.7	2.9(0.3)	2.6(0.8)	0.08
Phone	79.5	1.5(0.5)	1.6(0.5)	0.63
CD-ROM	33.3	1.9(0.9)	1.4(0.4)	0.14
Printer	69.2	1.5(0.5)	1.8(0.4)	0.04
Scanner	20.5	2.9(0.4)	2.3(0.9)	0.03
Photocopier	56.4	1.4(0.5)	1.9(0.4)	0.006
Video player	12.8	1.2(0.4)	1.4(0.5)	0.34
LCD	33.3	1.1(0.4)	1.3(0.5)	0.22
Television	2.6	1.1(0.3)	1.3(0.5)	0.14
Digital camera	12.8	2.1(0.8)	1.3(0.4)	0.001
Projector	35.9	2.8(0.6)	2.6(0.5)	0.13

Note: *Scale; 1=Low priority, 2=Medium priority and 3=High priority, CCC=Collaborative course design

The kinds of ICT infrastructures needed by instructors for large scale e-learning implementation are also given in Table 6.6. *CCD instructors* indicated that computer, internet and projector are needed at a high priority. These results concur with the interview responses by the majority of *middle management* who indicated the need for computers for instructors who are currently sharing computer with colleagues as evidenced by a response from one of the respondents, *"The university is investing a lot on ICT infrastructure such as computers, but we still need more computers in the faculty for instructors because currently a computer is shared by 3-4 instructors"* (Dean, Faculty of Education).

Moreover, both *CCD instructors* and *not CCD instructors* identified phones and printer as medium priority. Unlike their counterparts, *CCD instructors* identified digital camera ($p = 0.001$) as medium priority for e-learning implementation. All instructors indicated video player, LCD and television technologies as low priority.

Technical support

Results in Table 6.7 show that technical support for most of problems is available in the university (indicated by percentages between 71.4 and 89.7).

Table 6.7 *Available/needed technical support for e-learning implementation*

	Available	**Needed***		
	CCD instructors + not CCD instructors *(N=35)*	**CCD instructors** *(N=15)*	**Not CCD instructors CCD** *(N=20)*	
	Yes (%)	***M(SD)***	***M(SD)***	**p-values**
Installation of software	71.4	2.8(0.4)	2.5(0.7)	0.18
Uploading of resources in Moodle	74.4	2.7(0.7)	2.6(0.7)	0.98
Uploading of courses in Moodle	71.8	2.7(0.7)	2.7(0.6)	0.49
Updating courses in Moodle	71.8	1.6(0.5)	2.3(0.4)	0.001
Installation of printer	71.8	1.5(0.5)	1.5(0.5)	0.85
Installation of scanner	74.4	2.4(0.7)	2.0(0.8)	0.13
Fixing virus problems	76.9	3.0(0.0)	2.2(0.6)	0.04
Internet connection problems	79.5	1.5(0.5)	1.5(0.5)	0.0001
PC power problems	76.9	2.5(0.7)	2.6(0.5)	0.94
Creating group e-mail for students	74.4	1.5(0.5)	1.6(0.5)	0.92
Repairing operating system	89.7	1.6(0.5)	1.9(0.2)	0.01

Note: *Scale; 1=Low priority, 2=Medium priority and 3=High priority

In terms of needed technical support, results in Table 6.7 show that high priority technical supports for instructors in both categories are installation of software, uploading of resources and courses in Moodle and PC power problems. The following technical supports are identified by both categories of instructors as medium priority: installation of printer and scanner, scanning of virus and creating group e-mail for students. Also, *not CCD instructors* indicated technical support related to updating of courses in Moodle ($p = 0.001$) and internet connection ($p < 0.001$) as medium priority.

Pedagogical support

Table 6.8 provides the kinds of pedagogical support that are available in the university and/or needed for large scale implementation of e-learning. Note that the majority of instructors identified the following pedagogical support to be available: preparation of powerpoint slides, how and when to develop courses, course organization and how to compose collective e-mail (percentages between 56.4 and 69.2). This indicates that a large minority of instructors is not aware of the availability of pedagogical support in the university.

Table 6.8 *Available/needed pedagogical support for e-learning implementation*

	Available	**Needed***		
	CCD instructors + not CCD instructors *(N=35)*	**CCD instructors** *(N=15)*	**not CCD instructors** *(N=20)*	
	Yes (%)	*M(SD)*	*M(SD)*	**p-values**
How to use template during course design	30.8	2.9(0.3)	2.7(0.7)	0.006
Course content identification	25.6	1.1(0.3)	1.2(0.4)	0.45
Formulate student activities	30.8	1.4(0.5)	1.5(0.5)	0.42
Preparation of powerpoint slides	69.2	2.6(0.7)	2.4(0.7)	0.24
How and when to develop courses	61.5	2.9(0.3)	2.6(0.7)	0.05
How to convert print-based lectures to powerpoint slides	33.3	2.6(0.7)	2.8(0.4)	0.52
Course organization	56.4	2.3(0.6)	1.2(0.4)	0.0001
Timely response to students	30.8	1.3(0.4)	1.4(0.5)	0.0001
How to compose collective e-mail to students	59.0	1.4(0.5)	1.0(0.3)	0.15
Right time to send feedback to students	25.6	1.5(0.5)	1.1(0.3)	0.01

Note: *Scale; 1=Low priority, 2=Medium priority and 3=High priority, CCD=Collaborative course design

Regarding needed pedagogical support, instructors in both categories indicate the following support as high priority: how to use a template during course design, how and when to develop courses and how to convert print lectures into powerpoint slides. The pedagogical support related to course identification,

deciding the right time to respond to students and how to compose collective e-mail to students are considered by all instructors as low priority.

6.6 CONCLUSIONS AND DISCUSSION

The study presented in this article aimed at getting a better understanding of the feasibility of up scaling *Collaborative Course Design* as a strategy for professional development of instructors to support e-learning implementation at large scale at the OUT. The results of the study showed that it is feasible to implement large scale *Collaborative Course Design* to support instructors in e-learning course design and delivery. According to the management, *Collaborative Course Design* allows learning about course design by doing, emphasizes support and encourages continued dialogue between instructors. These results conform the benefits of *Collaborative Course Design* reported in studies from Garet *et al.* (2001) and Penuel *et al.* (2007). In instructors' perspective, the strategy promotes competence in designing e-learning courses.

The major limitation of the study is that it was carried out at a small scale with a limited number of respondents. But the limitation was minimized by the fact that the study was built upon (i) in-depth understanding of the way *Collaborative Course Design* can benefit instructors in course design and delivery (Nihuka & Voogt, in press, submitted a) and (ii) the positive experiences of students who enrolled in the e-learning courses, with respect to their learning and their achievement (Nihuka & Voogt, submitted b).

The following opportunities make large scale *Collaborative Course Design* sustainable for supporting instructors in e-learning course design and delivery at OUT: determined management, conducive institutional conditions and support structures. In terms of management, results have shown that the management at all levels is committed and interested about e-learning course delivery at large scale. According to Fullan (2007), a committed management is more likely to shape the organizational conditions that are needed for up scaling of the innovation. The management finds e-learning useful and shares the opinion that e-learning course delivery contributes to the improvement of students' enrolment and access to distance education. On the other hand, results showed non-existence of (e-learning) action plans at the level of

faculties/institutes. This indicates that there is need for better alignment between plans for action for large scale e-learning implementation at university and faculty/institute level, for *Collaborative Course Design* to be sustainable.

Another opportunity that makes large scale *Collaborative Course Design* sustainable at OUT is the existence of an ICT steering committee which includes deans and directors as members. Additionally, the university is introducing the position of deputy vice chancellor in-charge of learning technologies and of director of educational technology. It would be desirable if the committee and the new leadership positions promote distributed leadership in the university (Dexter, 2008) so as to foster large scale e-learning implementation. It is suggested that up scaling *Collaborative Course Design* as a sustainable strategy to support instructors in e-learning course design and delivery (Dede *et al.,* 2005) should be a major point of attention for the new leadership at OUT. The major threat however is the existence of a gap between the ambitions of the top management and the ambitions of the middle management regarding e-learning. It is the role of the new leadership therefore to develop more shared goals on e-learning course delivery with middle management in faculties and institutes, so that instructors experience that e-learning course design and delivery has a high priority in the university. According to Fullan (2007), management that promotes shared goals is likely to make up scaling of an innovation successful.

Existence of a comprehensive ICT policy, an ICT master plan and an ICT implementation strategy, which are well aligned to the rolling strategic plan of the university, is also an opportunity for sustainability of large scale *Collaborative Course Design* implementation. Such conditions are crucial (Bakari *et al.,* 2008; Sife *et al.,* 2007) for large scale implementation of e-learning course delivery.

In addition, availability of (limited) access to technologies for instructors is an important requirement for sustainability of large scale *Collaborative Course Design* and e-learning implementation. We found that technologies such as computer, internet, phones, printers and photocopiers are available in the university and are essential for implementation of e-learning at large scale (c.f. Sherry & Gibson, 2002; Siritongthaworn *et al.,* 2006). However, limited access to technologies, narrow bandwidth and unreliable electricity are potential threats to large scale implementation of e-learning. Regarding challenges of narrow bandwidth, the

university is optimistic that efforts to connect the national research and educational network (NREN) in Africa to the global research and education network community (GÉANT) in Europe will improve the situation (Mbwette, 2008).

Large scale *Collaborative Course Design* strategy is sustainable at OUT because the university has in place an incentive scheme which includes awards of 500 USD per course developed and uploaded into a learning management system, recognition letter and/or covering expenses to participate in an e-learning conference. Incentives motivate instructors to use e-learning (Fullan, 2007; Lim & Khine, 2006; Stoltenkamp *et al.,* 2007) and consequently a need for a sustainable large scale professional development for instructors.

Last but not least, the existence of centralized technical support within OUT is another opportunity that make up scaling *Collaborative Course Design* sustainable. The majority of the instructors indicated that there is pedagogical support in the university, but a large minority does not know about it. Apparently, pedagogical support is not well structured and therefore not visible for many instructors. This is a challenge which needs to be addressed by the new e-learning leadership. According to the instructors, pedagogical support such as the use of a template during e-learning course design, and skills in how to design and develop courses and conversion of print-based lectures into powerpoint slides, is a high priority. It is expected that the effort by the management to recruit three instructional designers would meet the pedagogical needs of instructors by supporting *Collaborative Course Design* through design teams. With the three instructional designers the visibility of the pedagogical support in the university could become much better. It is therefore necessary that instructors use the benefits of *Collaborative Course Design* as a useful environment to deliver pedagogical support just in time (c.f. de Boer, 2004).

Collaborative Course Design is an effective strategy for supporting instructors on e-learning course design and delivery (c.f. Nihuka & Voogt, in press & submitted a). This is because the strategy considers (among other things) active involvement of instructors during professional development which promotes ownership of the innovation and allows collaboration during course design and delivery. It also regards coherence of activities and instructor support as a crucial component of professional development. According to Desimone (2011), active involvement, collaboration, coherence of activities and instructor support are critical

components of an effective professional development arrangement. Moreover, the strategy is affordable because it can be conducted within the university using the available resources and infrastructures. The challenge is to harmonize professional development activities to that of instructors and of the university.

Based on the identified opportunities, large scale implementation of *Collaborative Course Design* to support large scale implementation of e-learning at OUT is feasible. However, the management should consider addressing the challenges so as to make up scaling of *Collaborative Course Design* sustainable, effective and affordable (c.f. Dede *et al.,* 2005). Under conditions identified in this study, *Collaborative Course Design* is a promising and feasible strategy to prepare instructors for e-learning course design and delivery at the OUT and in other universities in sub-Saharan Africa.

CHAPTER 7
Reflection

This chapter presents reflections and conclusions on the study. It first recapitulates the aims, research questions, design-based research approach and the main findings of the study. This is followed by reflection of the benefits and trade-offs of design-based research in relation to this study. The reflection on the potential of Collaborative Course Design with reference to findings of the study and existing literature is also presented. The chapter is concluded with recommendations for future research and practice.

7.1 RECAPITULATION

7.1.1 Research aim and questions

The study was formulated on the premise that instructors at the Open University of Tanzania did not use e-learning technologies to deliver their courses, despite professional development efforts from the university. Consequently, instructors and students continued to experience the challenges of print-based delivery. To address the challenges, and so improve the quality of education at OUT instructors needed help to use e-learning technologies. To do so they needed professional development in order to develop competences in e-learning course design and delivery. C*ollaborative Course Design* in design teams seemed a promising professional development strategy. The purpose of this research was to enhance professional development of instructors by providing opportunities and support for active involvement in e-learning course design and delivery through *Collaborative Course Design.* It was expected that instructors use technologies in addressing challenges of print delivery. Based on this purpose, the main research question for the study was formulated as, *How should collaborative course design in design teams be organized as a professional development strategy to support instructors at OUT in e-learning course design and delivery?* This

question was pursued through a context- and needs analysis to identify opportunities for e-learning and subsequent needs with instructors, a pilot study to test the effectiveness of collaborative course design, an implementation study and an impact study to measure opportunities and challenges for up scaling *Collaborative Course Design* for e-learning implementation at large scale, each of which was guided by the following sub-questions:

1. What is the feasibility of implementing an e-learning course delivery in distance education at the Open University of Tanzania?
2. How does C*ollaborative Course Design* and delivery in design teams contribute to instructors' professional development and the implementation of e-learning at the Open University of Tanzania?
3. How does C*ollaborative Course Design* in design teams contribute to instructors' professional learning?
4. What is the impact of C*ollaborative Course Design* and e-learning delivery on instructors' instructional practices and students' academic outcomes'?
5. What are the opportunities and challenges within the OUT of up scaling *Collaborative Course Design* as main professional development strategy for e-learning implementation at large scale?

Research approach

The study employed a *design-based research* approach. The approach helped in developing an effective educational intervention through collaboration between the researcher and instructors who participated in the study (McKenney, Nieveen & Van den Akker, 2006; Walker, 2006). In this study, design-based research was used to design an initial version of the professional development arrangement (*Collaborative Course Design*), based on insights from context- and needs analysis and literature study. Outcomes from the formative evaluation were used as input to revise and improve *Collaborative Course Design*. The following sub-section summarizes the main results from four different but related studies (i.e. context- and needs analysis study, pilot study, implementation study and impact study).

7.1.2 Main results

Context– and needs analysis

The purpose of context- and needs analysis (Chapter 2) study was to understand the status-quo of the Open University of Tanzania regarding

instructors' and students' perceptions, access, competences on technologies and its implications for e-learning implementation in the university. The study was guided by research question 1 and explored instructors' professional development requirements to be able to use e-learning course delivery. It involved 47 instructors from Faculty of Education (FoE), Faculty of Science, Technology and Environmental Studies (FSTES) and Institute of continuing Education (ICE). A total of 208 students from the same faculties and institute, spread in Dar es Salaam, Coastal and Morogoro regional centres were also involved in the study. Outcomes revealed that instructors and students were positive about using e-learning and had basic knowledge on computer and internet applications. Both instructors and students perceived the benefits of using e-learning in distance education. Although access to computer and internet by instructors was limited, they had access to such technologies in their offices (by sharing with colleagues), the university library and in internet cafes. Students had access to computer and internet at the university library (for those closer to Dar es Salaam), internet cafes and recently in some regional centres. Unexpectedly, access to mobile phones by instructors and students was low, although access to mobile phones is on the increase in Tanzania (Swarts & Wachira, 2010) and in sub-Saharan Africa in general (Pena-Bendalaria, 2007).

The print-based mode of delivery, complemented by one face-to-face session per year was dominant. This made instructors and students encounter challenges related to delays in delivery of courses, course outlines, and learning resources, lack of regular interactions, delayed feedback and feelings of isolation on the part of students, similar to findings in other studies (Dzakiria, 2004; Ludwig-Harman & Dunlap, 2003). Furthermore, instructors lacked skills on pedagogical use of e-learning technologies. Instructors needed training on how to prepare e-learning courses, how to deliver courses by e-learning technologies and how to support students in an e-learning environment. Besides, narrow bandwidth associated with low speed of internet was a serious challenge. Based on the results and in consideration of the challenges, it was concluded that it was feasible to use e-learning course delivery at the Open University of Tanzania and that an alternative approach to professional development was needed to prepare instructors.

Pilot study

The pilot study explored research question 2 which aimed to understand instructors' experiences with C*ollaborative Course Design* in a *design team* and students' experiences about the redesigned courses and e-learning delivery. This small scale pilot study involved three instructors and 67 students taking foundation courses in the Institute of Continuing Education (ICE), drawn from Dar es Salaam and Iringa. Insights from the context– and needs analysis (Chapter 2) were input for the selection of e-learning technologies and the design of *Collaborative Course Design* as a professional development strategy, reported in Chapter 3. By considering the challenge of narrow bandwidth, offline Moodle learning management system was identified to complement print-based delivery. In addition, e-mail and mobile phones were identified to be used for interactions between instructors and students (based on the fact that in reality most instructors and students possess mobile phone). *Collaborative Course Design* as a professional development strategy lasted for 5 months (i.e. 2 months for course design and 3 months for course delivery) and was considered appropriate to support and prepare instructors on e-learning course delivery. The strategy involved introduction activities in workshops, course design and design team meetings. Introduction workshops provided an avenue for discussion of the theoretical underpinnings of e-learning, demonstration of e-learning courses, and strategies of course delivery. The actual redesign of e-learning courses was done during course design phase and instructors met regularly in design team meetings for reflection and discussion of the redesigned courses. In addition, feedback took place during the design process and the general meetings (Joyce & Showers, 1995; Scott & Miner, 2008).

The findings of the pilot study revealed that instructors were enthusiastic about working in design teams. Despite of the fact that working in design teams was challenging and time demanding for instructors, the active involvement of instructors through *Collaborative Course Design* contributed to their professional development. The strategy helped them transform their traditional courses into e-learning courses and use Moodle in the teaching process. Generally, students were satisfied with the redesigned courses, the use of Moodle and found the interaction with instructors during the course more flexible.

Implementation study

A follow-up study investigated more in-depth the effects of *Collaborative Course Design* on instructors' professional development, instructional practices and students' academic outcomes. The study was guided by research questions 3 and 4. Twelve instructors (i.e. 8 from Faculty of Science, Technology and Environmental Studies, FSTES and 4 from Institute of Continuing Education, ICE) participated in a *Collaborative Course Design* intervention for $5^1/_2$ months (i.e. $2^1/_2$ months for course design and 3 months for course delivery). The intervention was prolonged and spent $2^1/_2$ months for introduction workshops and course design course activities (compared to 2 months during the pilot study). Duration for general meetings and course delivery was maintained at 3 in order to fit to the university's schedule of examinations. The redesigned courses were installed in computers in Dar es Salaam, Singida and Manyara regional centres. A total of 553 students from FSTES and ICE drawn from the three regional centres followed the courses for a period of 3 months.

The findings on research question 3 which investigated the impact of *Collaborative Course Design* on instructor professional learning are presented in Chapter 4. *Collaborative Course Design* promoted instructors' knowledge of the potential of e-learning and the rationale for using e-learning course delivery. It also improved their skills on course design particularly related to concrete procedures they can use during course design, preparation of powerpoint slides and the use of a template to design a course. Also, the approach promoted instructors' competence and confidence in using Moodle LMS and on deciding the appropriate time to interact with students via email and/or mobile phones (usually short text messages). Besides, regular powercuts, limited access to computers and internet and narrow bandwidths were among the challenges during the study, however, they had limited effect on the outcomes of the study. Moreover, different kinds of pedagogical and technical support contributed to the positive effect of *Collaborative Course Design*. It was concluded that collaborative course design contributed to instructors' professional learning related to e-learning course design and delivery.

Results for question 4 which sought to understand the impact of *Collaborative Course Design* and e-learning delivery on instructors' practice and students' academic outcomes are presented in Chapter 5. The findings demonstrated that *Collaborative Course Design* contributed to instructors' preparedness to

implement e-learning by providing opportunities to identify and discuss challenges of print-based delivery and reasons for e-learning implementation. It also provided necessary support and encouraged collaboration with colleagues. Furthermore, unlike in print-based mode, e-learning provided flexibility in terms of access to course outlines, study materials and other learning resources such as articles (as argued in Collis & Van der Wende, 2002). However, instructors and students found offline Moodle inflexible in terms of location and time, but the use of e-mail and mobile phones flexible for interactions between students and instructors. Students used technology that was convenient and reliable in the regional centres. E-learning course delivery contributed to improved academic outcomes of students participating in the e-learning courses compared to students taking the same courses in print-mode. It was concluded that *Collaborative Course Design in design teams* had positive effects on instructors' instructional practices and academic outcomes of students.

Impact study

The impact study, guided by research question 5 investigated the feasibility within OUT for up scaling *Collaborative Course Design* as a strategy for professional development of instructors on e-learning implementation at large scale (Chapter 6). Five representatives from the management participated in the study including the vice chancellor, four deans and one director. Fifteen instructors who participated in *Collaborative Course Design* during pilot and implementation study and 20 instructors not previously involved in *Collaborative Course Design* participated in the study.

Findings revealed that several opportunities make the implementation of *Collaborative Course Design* at OUT to support instructors on e-learning course design and delivery at large scale feasible. The management at all levels is committed and interested about e-learning course delivery, finds it useful and sees its contribution to the improvement of students' enrolment and access to distance education. The university has in place an ICT steering committee which includes deans and directors as members and is introducing the positions of deputy vice-chancellor in-charge of learning technologies and director of educational technology. There exists a comprehensive ICT policy, an ICT master plan and an ICT implementation strategy, which are well aligned to the rolling strategic plan of the university. Moreover, the university has in place an incentive scheme which includes awards of 500 USD per course developed and qualified to

be uploaded into a learning management system, a recognition letter and/or covering expenses to participate in an e-learning conference. There is also centralized technical support within OUT. Such conditions make up scaling of *Collaborative Course Design* effective, affordable and sustainable (Dede *et al.*, 2005).

Several challenges were identified that need attention of the management so as to make up scaling of *Collaborative Course Design* effective, affordable and sustainable at OUT. These include the need for more shared goals on e-learning course delivery between all levels of management in the university so that instructors in faculties and institutes consider e-learning as a priority, and alignment of different management levels, in particular between university level and the faculty/institute level so that e-learning implementation plans are also reflected in the action plans of faculties and institutes. Other challenges are limited access to technologies, narrow bandwidth, unreliable electricity and lack of well-structured pedagogical support in the university.

It was concluded that the available opportunities are conducive for large scale implementation of *Collaborative Course Design* as strategy for professional development to support implementation of e-learning at OUT. However, the management should consider addressing the challenges so as to make up-scaling of *Collaborative Course Design* effective, affordable and sustainable.

7.1.3 Design-based research: Benefits and trade-offs

Benefits

The design-based research benefited this study in different ways. First, it allowed *collaboration* between the researcher, instructors, students and other stakeholders. In a specific way, collaboration during context- and needs analysis was useful and helped to better understand the problem of e-learning implementation at OUT. Moreover, through the design-based approach it was possible to collaborate with instructors in developing e-learning courses in design teams (as solution to practical challenges of print delivery). Such a benefit where instructors collaborate with a researcher to develop educational innovation through design-based research is also reported in Kafai (2005). Through formative evaluation, design-based research helped in developing and improving the professional development (i.e. *Collaborative Course Design*) arrangement.

The other benefits relate to the outcomes of design-based research, which include theory on design guidelines for professional development and artefacts (also called curricular products). In terms of theory, the study has contributed to the body of knowledge related to the link between context realities, selection of e-learning technology and formulation of an effective professional development arrangement that fit the context and creates ownership. It has also generated specific procedural design guidelines that can be used to develop a professional development arrangement to support e-learning implementation. The design guidelines include (i) definition of instructors basic knowledge and skills on computer and internet, (ii) identification of appropriate technologies for e-learning course delivery, (iii) engaging instructors actively in design and delivery of courses as a learning opportunity, (iv) making activities coherent to the context, (v) focusing on sustaining activities and providing opportunities for collaboration, and (vi) paying attention to support for instructors during course design and delivery. However, the design guidelines should not be considered as a cookbook recipe or as McKenney *et al.,* (2006) phrases it "*the design guidelines are not intended as recipes for success, but to help others select and apply the most appropriate knowledge for specific design and development tasks in their own settings*" (p.73).

Regarding artefacts (also called curricular products) the study has generated e-learning courses which can also be used in other situations as exemplary curriculum materials for professional development of instructors. Also the research has generated an effective, sustainable and affordable professional development arrangement which can be used in preparing instructors on e-learning course design in a context similar to OUT.

Furthermore as a result of participating in course design and delivery, design-based research contributed to professional development of instructors and improvement of their instructional practices. Outcomes of the study showed that instructors grew professionally by acquiring skills and competences on how to design and deliver courses using Moodle system. Moreover, as a result of professional development, instructors' instructional practice was improved and e-learning technologies seemed effective in enhancing provision of immediate feedback to students, facilitating interactions (between instructors and students) and in improving academic outcomes of students in most courses.

Trade-offs

The major trade-off of design-based research during this research was that the approach rendered multiple roles on the part of the researcher, that of a facilitator, (co)designer and a researcher. On one hand the multiple roles were useful because they provided opportunity to gain deeper insights into the strengths of and weaknesses of *Collaborative Course Design* (c.f. McKenney *et al.,* 2006). The insights (theory and context realities) helped in improving the professional development arrangement for effective impact on instructors' instructional practices. But on the other hand, balancing the roles was quite challenging. The researcher had to minimize the possibility of participants responding positively because they were under study (Hawthorne effect), which might have influenced instructors' responses in the favour of the researcher. Hawthorne effect was minimized by encouraging an atmosphere where instructors were continuously invited to exercise their discretion and express opinions.

7.1.4 The potential of *Collaborative Course Design* in design teams as a strategy for instructors' development on e-learning implementation

The study used *Collaborative Course Design* in design teams as a strategy to support instructors in e-learning course design and delivery to address challenges of print-based delivery. As described in Chapter 1, e-learning implementation at the Open University of Tanzania was supported by workshops for instructors. Over time, the arrangements proved to be ineffective in supporting instructors to use e-learning technologies, and hence to realize e-learning implementation. The workshops did not provide opportunities for productive collaboration between instructors and technical staff at first place. *Collaborative Course Design* in design teams was useful during this research in the following various ways.

Encouraged active engagement of instructors: Effective professional development arrangement provides opportunities for active engagement, learning of instructors and fostering of ownership (Garet *et al.,* 2001; Lieberman, 1996; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). C*ollaborative Course Design* in design teams allowed active engagement of instructors, especially during activities in workshops, course design (in design teams) and during course delivery. At each stage instructors shared ideas, discussed (dilemmas and challenges) and made reflections (on redesigned courses, the process of course

design and on pedagogies during course delivery) and could use the generated ideas to improve their courses and/or delivery strategies. Results presented in this dissertation showed that C*ollaborative Course Design* contributed to instructors' professional development in course design and delivery (Chapter 3 and 4) and improved instructional practices of instructors which impacted positively on students' academic outcomes in most courses (Chapter 5).

Considered activities coherent to context: Activities during *Collaborative Course Design* involved redesigning existing courses and were conducted within the university. This helped in making the activities compatible to schedules of both the university and instructors. Locating professional development activities within instructors' job helped instructors to link ideas from the training to their teaching (cf. Garet, *et al.,* 2001). In this research, such activities had more influence on changing instructors teaching practice (c.f. Darling-Hammond & McLaughlin, 1996).

Sustainability of activities: Professional development activities that are spread over a reasonable duration of time are more likely to contain the kind of learning opportunities necessary for instructors to implement new knowledge into practice (Desimone *et al.,* 2002; Brown, 2004). Activities during C*ollaborative Course Design* reported in this dissertation were spread in a period of 5-5$^{1}/_{2}$ months. Both in previous studies (Brown, 2004; Garet *et al.,* 2001) and in this study, the longer duration of activities was important in two ways, namely: (i) provided instructors opportunity for in-depth discussion on course design, student learning and pedagogical strategies, and (ii) allowed instructors to try out new practices and obtain feedback on their practices.

Allowed collaboration of different stakeholders: Unlike in traditional workshops, *Collaborative Course Design* fostered collaboration between the researcher, instructors and support staff together. Collaboration provides opportunity for instructors to discuss concepts, skills and problems during professional development, which promote implementation of an innovation (Desimone *et al.,* 2002; Garet *et al.,* (2001). During this research, collaboration of different stakeholders had three main benefits. First, collaborations in design teams and general meetings, helped instructors to learn concrete procedures they can follow during course design and e-learning implementation (Chapter 4). Second, collaboration enhanced instructors' skills on course design and on specific

strategies to support students in an e-learning environment (Chapter 3). Third, through design teams, collaboration contributed to instructors' preparedness in using the Moodle learning management system for course delivery and acquired knowledge regarding when to use e-mail and short text messages to interact with students (Chapter 5). Consequently, *Collaborative Course Design* contributed to improved instructional practice, which addressed challenges of print-based delivery and leading to improved academic outcome of students.

Follow-up support: Collaborative Course Design considered support for instructors during course design and delivery. The support offered during course design in design teams and in the general meetings was useful in different ways. It is evident in Chapter 3 that pedagogical support offered to instructors helped them to be able to use templates to organize their courses as e-learning courses, plan, design courses and upload them in Moodle. Also, instructors found technical support on how to install Moodle in computers and uploading of resources and courses in Moodle useful. Pedagogical and technical support promoted instructors' confidence (as found in Arabasz & Baker, 2003) which contributed to the use of e-learning course delivery (Chapter 5). Findings in Chapter 6 indicated that several technical and pedagogical support are needed in order to sustain *Collaborative Course Design*, at OUT. Specifically, instructors need technical support related to installation of software and uploading of resources and courses in Moodle. Also, instructors need pedagogical support on the use of template to design courses, how and when to develop courses and how to convert print-based lectures to powerpoint slides.

Challenges: Collaborative Course Design as a strategy for professional development had several challenges. One of the challenges was to operationalize *Collaborative Course Design* through carefully integrating elements of effective professional development. The elements included sustained activities, active engagement of instructors, collaboration and support. The challenge was to decide how much and at what proportion should each of the elements be featured in the arrangement. Also, executing such an arrangement was a challenging experience too for the researcher because of the fact that the strategy was time demanding both for instructors and researcher.

Another challenge was a risk of instructors spending most of the time on their usual job activities and having little time for professional development

activities. In such a situation, instructors felt there was limited time to complete course redesign activities or to attend general meetings. This was evident for some instructors who could not attend some of the general meetings during the study. In this case, instructors' self-motivation and interest on e-learning, which made them find time to redesign e-learning courses even outside working hours, helped in getting courses completely redesigned.

Time was another challenge during *Collaborative Course Design.* According to the instructors working in design teams was challenging and time consuming. This is because most instructors are involved in other duties of the university such as invigilation of examinations, face-to-face, teaching/field practice and others. Harmonizing and making activities of Collaborative Course Design coherent to the schedule of the university and of the instructors helped to encourage instructors' participation in the professional development.

The other challenge related to regular powercuts and unreliable electricity. At times, this challenge hampered development of courses, delayed uploading of courses in the Moodle system and in responding to students' e-mail. Instructors had to wait until there was electricity.

7.2 RESULTS

The following main research question guided the study: *How should Collaborative Course Design in design teams be organized to support instructors at OUT in e-learning course design and delivery*? Findings have shown that *Collaborative Course Design* organized into introduction workshops, course design in design teams and general meetings with pedagogical and technical support is effective in supporting instructors in e-learning course design and delivery at OUT. The strategy was based on the following elements which rendered it effective in promoting professional development of instructors: active involvement of instructors, had activities which were coherent with the local context and instructors' duties, it provided opportunities for collaboration and follow-up support (as suggested in Desimone *et al.,* 2002; Garet *et al.,* 2001; Penuel *et al.*, 2007).

The introduction workshop conducted at the beginning of professional development was effective in introducing theoretical foundations of e-learning, course design and delivery to instructors. At the end of course design, a workshop provided opportunity for instructors to discuss about e-learning course delivery strategies. In between workshops, instructors redesigned their courses in design teams. The organization of the introduction activities was guided by a model by Joyce and Showers which included provision of feedback during the design process and the general meetings (Joyce & Showers, 1995). The idea of general meetings where design teams come together for (pedagogical) support, discussion, feedback and reflections was useful especially at OUT where pedagogical support is ill-structured. The pedagogical support that was offered in general meetings and/or on demand by instructors promoted the professional development of instructors and their competence in designing e-learning courses. Also, discussions in general meetings generated ideas on how to deal with instructors' pedagogical needs collectively.

Pedagogical and technical support were key elements in helping instructors during e-learning course design and delivery. As found in Beanco, et al., (2002), Mishra et al. (2007), and Telnova, (2005), more regular pedagogical support was required during course design than during course delivery. During course design instructors required pedagogical support related to preparation of student activities, conversion of print-based lectures into electronic lectures, how to use template to design courses, how to use Moodle and how to navigate in the system, and when to use e-mail and mobile phone. Only limited pedagogical support was required during course delivery, mostly related to how to write a collective e-mail as a way to deal with bulky emails of students. Accordingly, instructors considered pedagogical support such as the use of templates, course design and development, conversion of print-based lectures into powerpoint slides as a high priority for large scale implementation of e-learning. According to Walker and Johnson, (2008), existence of well-structured pedagogical support makes instructors find up scaling of e-learning-related innovation easier and interesting.

Technical support was required for instructors both during course design and delivery. Support on installation of Moodle programs, searching, uploading and updating (resources), fixing viruses and internet connection problems were useful. The support promoted instructors' confidence in course design and in

using e-learning technologies during the course. Similar results were found in other studies (Poumay *et al.,* 2001; Sife *et al.,* 2007).

The importance of technical support for successful e-learning implementation is widely emphasized in literature (Bates, 2000; Bianco *et al.,* 2002). In this study, instructors identified installation of programs and uploading of courses and resources in a learning management system as high priority technical support for large scale implementation of e-learning. Given the encouraging results, it is worthwhile considering up scaling of *Collaborative Course Design* to support large scale implementation of e-learning at OUT.

Evidence from this research show that *Collaborative Course Design* with pedagogical and technical support improved professional development of instructors, developed specific skills on e-learning course design and delivery and enhanced instructional practice of instructors (Tschang & Senta, 2001; Voogt *et al.,* 2005). As s result of the collaboration, rooted in social constructivist (Dewey, 1916; Vygotsky, 1978) and in adult learning theory (Knowles *et al.,* 1998; Merriam *et al.,* 2007), instructors redesigned their traditional print-based courses and used e-learning technologies (offline, because of the limited bandwidth) to deliver courses. Because of that, e-learning delivery enhanced access to courses by students, improved learning support for students and contributed to better academic outcomes of students.

Given encouraging results from the study, up-scaling *Collaborative Course Design* to support large scale e-learning implementation at OUT was seen inevitable. Several opportunities were identified within OUT to support up scaling of the *Collaborative Course Design* strategy, including determined management, existence of conducive institutional conditions and support structures. Besides, attention of the management is needed in addressing challenges of limited access to technologies, narrow bandwidth and unreliable electricity so as to make *Collaborative Course Design* effective, affordable and sustainable (as argued in Dede, 2005).

In conclusion, *Collaborative Course Design* is a promising strategy for professional development of instructors on e-learning course design and delivery at the OUT. The strategy can also be used to support instructors on e-learning course design and delivery in other distance education universities in sub-Saharan Africa which share challenges of print delivery. The strategy

contributes to professional development of instructors in e-learning course design and delivery and improves instructional practices by using e-learning technologies. Results in this research showed that e-learning course delivery is effective in addressing challenges of print-based delivery which are common in most distance education institutions in sub-Sahara Africa (c.f. Dzakiria, 2004; Ludwig-Harman & Dunlap, 2003).

7.3 RECOMMENDATIONS

Further research

This study has contributed to the understanding of the relationship between *Collaborative Course Design,* instructor professional development, e-learning implementation and improvement of student learning. Specifically, the research has contributed to instructors' professional development and to the enhancement of their instructional practice in e-learning. The research has contributed to theory by generating an understanding of the impact of *Collaborative Course Design* on instructors professional development and ultimately on student learning. The theory related to *what* and *how* to support instructors during e-learning implementation is also a crucial contribution of this research. In addition, the study has contributed to the knowledge about opportunities and challenges for up scaling C*ollaborative Course Design* to support e-learning implementation at large scale. Such knowledge can be used to guide e-learning implementation in other universities similar to OUT in sub-Saharan Africa.

However, there is still more to be explored concerning *Collaborative Course Design* in design teams and e-learning implementation particularly in sub-Saharan Africa. The following are some directions for future research: In this research e-mail and mobile phones were used as tools for interaction between instructors and students. Among other things results in this study showed that mobile phone was useful for students outside Dar es Salaam who lacked reliable access to computer and internet. Future research should investigate how *Collaborative Course Design* can be used to support instructors on how to use mobile phone to complement print-based delivery. This is relevant given the enormous increase in access to mobile phones in developing countries and so providing ubiquitous access to the internet (Resta, 2011). Such a study can also explore the effectiveness of mobile phones in addressing challenges of the

print-based mode of delivery, and how to keep this affordable and realize this in the context of sub-Saharan Africa.

Results have also shown that e-mail and mobile phone communication improved interaction between instructors and students during this study. Future research should focus on how to support collaborative learning among students through the use of computer, e-mail, mobile phones or the combination of these. In this respect, the available literature on *Computer Supported Collaborative Learning* (CSCL) (c.f. Kirschner, Martens & Strijbos, 2004; Mahdizadeh, 2007) provides useful examples on how to realize the same in the context of OUT and sub-Saharan Africa in general.

Also, future research should seek to refine further the opportunities and challenges for up-scaling *Collaborative Course Design* to support e-learning implementation at large scale. To study this, a large scale *Collaborative Course Design* strategy can be designed based on the identified opportunities. Systematic investigation of the effectiveness of the intervention on instructors' practices and students' learning could provide insights for further refinement of opportunities and challenges for up-scaling the strategy.

Implications for practice

Collaborative Course Design in design teams used in this research appeared an effective strategy in supporting instructors on e-learning course design and delivery. The strategy promoted instructors' professional development and improvement of instructional practices which enhanced students' academic outcomes. It is important that the university management and educational technology department at the Open University of Tanzania in particular, are aware of what constitutes effective professional development arrangement. Elements of such activities which are sustained over time, active engagement of instructors, collaboration, and follow-up support, are important when designing a professional development program for instructors (Darling-Hammond & McLaughlin, 1996; Garet *et al.,* 2001; Lieberman, 1996; Loucks-Horsley *et al.,* 2003).
A clear understanding of context, realistic needs of instructors and students, and appropriate literature should inform the design and development of sound professional development arrangement on e-learning implementation. Based on the context, a step-by-step approach towards e-learning implementation is important. This means, first an attempt should be made to involve instructors

who are interested and are willing to implement e-learning technologies in their courses. Courses developed by such instructors can be used as exemplary curriculum materials to showcase other instructors in the university. Second, it is important that an e-learning innovation is piloted and the lessons learned should enlighten the next step of large scale implementation.

Support (professional development, pedagogical and technical) remains critical for successful e-leaning implementation. Instructors require pedagogical support mostly during course design and less during delivery. On the other hand they (instructors) require technical support almost throughout course design and delivery. Appropriate formats such as workshop activities and general meetings as used in this research are useful in organizing support for instructors during e-learning implementation.

It is emphasized that large scale implementation of *Collaborative Course Design* to support e-learning implementation at large scale should be preceded by a thorough understanding of the available opportunities and challenges. This helps to fit the intervention on the opportunities and at the same time working out strategies to overcome the challenges for effectiveness and sustainability of the intervention (Dexter, 2008).

REFERENCES

Aguti, J. N., & Fraser, W. J. (2006). Integration of information communication technologies (ICTs) in the distance education bachelor of education programme, Makerere University, Uganda. *Turkish Online Journal of Distance Education, 7*(3), 89-104.

Arabasz, P., & Baker, M. (2003). *ECAR respondent summary: Evolving campus support models for e-learning courses.* Retrieved from: http://www.educause.edu/ir/library/pdf/ERS0303/ekf0303.pdf on 12th May, 2006

Bakari, J. K., Mbwette T. S. A., & Shemwetta, D. (2008). *Policies, master plans and a rolling strategic plan in effective implementation of ICT infrastructure and services: Case study of the Open University of Tanzania*. The 5th Pan-Commonwealth Forum on Open Learning, 13-17 July 2008 at the University of London, UK.

Bakari, J. K. (2009). *ICT at the Open University of Tanzania: Achievements, challenges and future prospects*. Report presented during Rolling Strategic Plan review at Golden Tulip Hotel, 17th – 18th April, 2009, Dar es Salaam-Tanzania.

Bakari, J. K., Tarimo, C. N., Yngstrom, L., & Magnusson, C. (2005*). State of ICT security management in the institutions of higher learning in developing countries: Tanzania case study*. Paper presented at the Fifth IEEE International Conference on Advanced Learning Technologies (ICALT, 2005).

Ball, D. L., & Cohen, D. K. (1996). Reform by the book: What is – or might be – the role of curriculum materials in teacher learning and instructional reform. *Educational Researcher, 25*(9), 6-8.

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, *13*(1), 1–14.

Bates, A. W. (2000). *Managing technological change: Strategies for college and university leaders.* San Francisco: Jossey-Bass, Inc.

Bates, A. W. (1994). Distance education, educational technology. In T. Husén, & T. N Postlethwaite (Eds.), *The international encyclopaedia of education*. Oxford: Pergamon.

Bennett, S., Agostinho, S., Lockyer, L., Harper, B., & Lukasiak, J. (2007). Supporting university teachers create pedagogically sound learning environment using learning designs and learning objects. *IADIS International Journal*, *4*(1), 16-26.

Bhalalusesa, E., & Babyegeya, E. (2000). The Open University of Tanzania. In V. V. Reddy, & S. Manjulika (Eds.). *Towards virtualization of open and distance Learning.* New Delhi, India: Kogan Page.

Bianco, M., Collis, B., Cooke, A., & Margaryan, A. (2002). Instructor support for new learning approaches involving technology. *Staff and Educational Development International 6*(2), 129-148.

Borko, H. (2004). Professional development and teacher learning; Mapping the terrain. *Educational Researcher*, *33*(8), 3-15.

Borko, H., Elliott, R., & Uchiyama, K. (2002). Professional development: A key to Kentucky's educational reform effort. *Teaching and Teacher Education, 18*, 969-987

Brent, R., Felder, R. M., Hirt, D., Sitzer. D., & Holzer, S. (1999). A model program for promoting effective teaching in colleges of engineering. *Proceedings of the 1999 annual ASEE meeting,* ASEE, June, 1999.

Brown, T. H. (2003). *The role of mobile learning in the future of e-learning in Africa*. Paper presented at the 21st ICDE World Conference. Hong Kong. Retrieved from http://www.tml.tkk.fi/Opinnot/T-110.556/2004/Materiaali/brown03.pdf on 21st August, 2008.

Brown, J. L. (2004). *Making the most of understandings by design.* Washington, DC: Association for Supervision and Curriculum development.

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education*, *46*(23), 39-41.

Carswell, L., Thomas, P., Petre, M., Price, B., & Richards, M. (1999). Understanding the 'electronic' student: Analysis of functional requirements for distributed education. *Journal of Asynchronous Learning Networks, 3*(1), 7-18.

Christensen, R., & Knezek, G. (2001). Instruments for assessing the impact of technology in education. *Computers in the Schools*, *18*(2/3), 5-25.

Clarke, J., & Dede, C. (2006). *Robust designs for scalability.* Paper discussed at the AECT Research Symposium June 22-25, 2006, Bloomington, Indiana. Retrieved from http://muve.gse.harvard.edu/rivercityproject/documents/AECT_Symposium_Clarke_Dede_final.pdf on 7th May, 2011.

Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education, 18,* 947-967.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and expectations*. London: Routledge.

Collis, B., & Van der Wende, M. C. (Eds.). (2002). *Models of technology and change in higher education*. Centre for Higher Education Policy Studies, University of Twente, The Netherlands. Retrieved from http://www.utwente.nl/cheps/documenten/ictrapport.pdf. on 12th March, 2008.

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality and benefits of e-learning? *British Journal of Educational Technology, 36*(3), 501–512.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technology in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813-834.

Cutting, A. K. (1989). *The role of media technology within the proposed Open University of Tanzania.* A report prepared at the request of the Commonwealth of Learning for the planning committee of the proposed Open University of Tanzania, Dar es Salaam-Tanzania.

Czerniewcz, L., & Brown, C. (2005). Information and communication technology in teaching and learning practices in Western Cape higher education institutions. *Perspectives in Education, 23*(4), 1-18.

Dabbagh, N., & Kitsantas, A. (2005). Using web-based pedagogical tools as scaffolds for self-regulated learning. *Instructional Science, 33,* 513-540.

Darling-Hammond, L., & McLaughlin, M. (1996). Policies that support professional development in an era of reform. In M. McLaughlin, & I. Oberman (Eds.), *Teacher learning: New policies, new practices*. New York: Teachers College Press.

De Boer, W. (2004). *Flexibility support for a changing university.* Doctoral thesis. Enschede, The Netherlands: University of Twente.

De Boer, W., & Collis, B. (2005). Becoming more systematic about flexible learning: Beyond time and distance. *Research in Learning Technology, 13*(1), 33–48.

Dede, C., & Honan, J. P. (2005). Scaling up success: A synthesis of themes and insights. In C. Dede, J. Honan, & L. Peters, (Eds.). *Scaling up success: Lessons learned from technology-based educational innovation.* New York: Jossey-Bass.

Dede, C., & Nelson, R. (2005). Technology as proteus: Digital infrastructure that empower scaling up. In C. Dede, J. Honan, & L. Peters, (Eds.). *Scaling up success: Lessons learned from technology-based educational innovation.* New York: Jossey-Bass

Dede, C., Honan, J., & Peters, L., Eds. (2005). *Scaling up success: Lessons learned from technology-based educational innovations*. New York: Jossey-Bass.

Deketelaere, A., & Kelchtermans, G. (1996). Collaborative curriculum development: An encounter of different professional knowledge systems. *Teachers and Teaching: Theory and Practice, 2*(1), 71-85.

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from three-year longitudinal study. *Educational Evaluation and Policy, 24*(2), 81-112.

Desimone, L. M. (2011). A primer on effective professional development. *Phi Delta Kappan, 92*(6), 68-71.

Dewey, J. (1916). *Democracy and education. An introduction to the philosophy of education.* New York: Free Press.

Dexter, S. (2007). *Show me the leadership: The impact of distributed technology leadership teams' membership and practices at four laptop schools.* Paper presented at the 88th Annual Meeting of the American Educational Research Association, Chicago, IL.

Dillon. C., & Blanchard, D. (1991). *Education for each: Learner driven distance education:* Paper presented at the second American symposium on research in distance education. The American centre for the study on distance education. Pennsylvania: The Pennsylvania State University

Dunn, D. L., & Lingerfelt, D. (2004). Integrating WebCT into the computer science curriculum. *Journal of Computing Sciences in Colleges, 19*(4), 335-341.

Dunn, T. K. (2004). The interplay between a course management system and pre-service teachers' knowledge, beliefs and instructional practices. *The Journal of Interactive Online Learning, 2*(3), 1-7.

Dzakiria, H. (2004). Technology does not always teach distance learners, but effective distance teachers do. *Malaysian Online Journal of Instructional Technology*, *1*(1), 60-81.

Fozdar, B. I., & Kumar, L. S. (2007). Mobile learning and student retention. *International Review of Research in Open and Distance Learning*, *8*(2), 1-18.

Fullan, M. (2007). *The new meaning of educational change* (4th Ed.). New York: Teachers College Press.

Gakio, K. (2006*). African tertiary institutions connectivity survey*. Report commissioned by the International Development Research Centre of Canada. Retrieved from http://www.aau.org/renu/docs/ATICS2006.pdf on 20th September, 2009.

Galusha, J. M. (1997). Barriers to learning in distance education. *Interpersonal Computing and Technology*, *5*(3), 6-14.

Garet, M. S., Birman, B. F., Porter, A. C., Desimone, L., & Herman, R. (1999). *Designing effective professional development: Lessons from the Eisenhower program (and) technical appendices.* Washington: US Department of Education.

Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

Guskey, T. R. (2000). *Evaluating professional development*. Thousands Oaks: Corwinn Press.

Handelzalts, A. (2009). *Collaborative curriculum development in teacher design teams.* Doctoral Thesis. Enschede, The Netherlands: University of Twente.

Hoven, K. (2000). *A study on the potential of information and communication technologies in university education in Tanzania. A case study of the University of Dar es Salaam.* Master of art thesis. The Netherlands: Nijmegen University.

Huberman, M. (1988). Teachers' careers and school improvement. *Journal of Curriculum Studies, 20*(2), 119-132.

Joint, N. (2003) Information literacy evaluation: Moving towards virtual learning environments. *Electronic Library, 21*(4), 322–334.

Jonathan A. S., & Herbert M. T. (2000). The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching*, *37*(9), 963-980.

Joyce, B., & Showers, B. (1995). *Student achievement through staff development: Fundamentals of school renewal* (2nd ed.). White Plains, NY: Longman.

Kafai, Y. B. (2005). The classroom as "living laboratory": Design-based research for understanding, comparing and evaluating learning science through design. *Educational Technology, 65*(1), 28-34.

Kalinga. A. E., Bagile, R. B. B., & Trojer, L. (2007). An interactive e-learning management system (e-LMS): A solution to Tanzanian secondary schools' education. *World Academy of Science, Engineering and Technology, 2*(7), 109-112.

Keegan, D. (1990). *Foundations of distance education* (3rd ed.). London: Routledge.

Kirkwood, A., & Price, L. (2005*).* Learners and learning in the twenty-first century: What do we know about students' attitudes towards and experiences of information and communication technologies that will help us design courses? *Studies in Higher Education, 30*(3), 257–274.

Kirschner, P. A., Martens, R. L., & Strijbos, J. (2004). CSCL in higher education. In J. W. Strijbos, P. A. Kirschner, & R. L. Martens (Eds.), *What we know about CSCL, and implementing it in higher education* (pp. 3-30). Boston: Kluwer Academic Publishers.

Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of Educational Computing Research, 32*(2), 131-152.

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education, 49*(3), 740–762.

Langran, E. (2006). Technology leadership: Principals and technology coordinators working together. In C. Crawford et al., (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2006* (pp. 2108-2113). Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/22378 on 7th May, 2011

Latchman, H. A., Gillet, S. D., & Bouzekri, H. (1999). Information technology enhanced learning in distance education and conventional education. *IEEE Transactions on Education, 42*(4), 247-254.

Leem, J., & Lim, B. (2007). The current status of e-learning and strategies to enhance educational competitiveness in Korean higher education. *International Review of Research in Open and Distance Learning*, *8*(1), 1-18.

Lieberman, A. (1996). Practices that support teacher development: Transforming conceptions of professional learning. In M. McLaughlin, & I. Oberman (Eds.), *Teacher learning: New policies, new practices.* New York: Teachers College Press.

Lim, C. P., & Khine, M. S. (2006). Managing teachers' barriers to ICT integration in Singapore schools. *Journal of Technology and Teacher Education, 14*(1), 97-125.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Beverly Hills: Sage.

Little, J. W. (1997). The persistence of privacy: Autonomy and initiative in teachers' professional relations. *Teachers College Record*, *91,* 509–536.

Loucks-Horsley, S., Love, N., Stiles, K., Mundry, S., & Hewson, P. (2003). *Designing professional development for teachers of science and mathematics.* Thousand Oaks, CA: Corwin Press.

Ludwig-Hardman, S., & Dunlap, J. C. (2003). Learner support services for online students: Scaffolding for success. *International Review of Research in Open and Distance Learning, 4*(1), 1-15.

Mahai, L. (2008). Provision of institutional support services to distance learners: A case study of Mwanza and Kagera regional centres for the Open University of Tanzania. *Studies in Adult Education, 64,* 1-80.

Mahdizadeh, H. (2007). *Student collaboration and learning: Knowledge construction and participation in an asynchronous computer supported collaborative learning environment in higher education*. Doctoral Thesis. The Netherlands: Wageningen University. Retrieved from http://library.wur.nl/wda/dissertations/dis4241.pdf, on 1st June, 2011

Malikowski, S. R., & Theis, J. G. (2006). *Distance education courses: How course management systems are used and factors affecting use*. Paper presented during the 22nd Annual Conference on Distance Teaching and Learning.

Mbwette, T. S. A. (2008). *Statement for new and continuing students of the Open University of Tanzania delivered on orientation day*. Retrieved from http://www.out.ac.tz/administration/vc.html on 17th January, 2009

Mbwette, T. S. A. (2009). *A decade of delivery of open and distance education by the Open University of Tanzania in Africa and beyond.* Paper presented in an International Forum on "A decade of Distance Education in the Commonwealth: Achievements and challenges". Abuja-Nigeria. Retrieved from http://www.out.ac.tz/administration/vc.html on 5th September, 2009.

McGreal, R. (2009). *Mobile devices and the future of free education.* Paper presented at Maastricht's 23rd International Conference on Distance Education, 2009. Retrieved from: http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final_paper_296Cosmas.pdf on 25th June, 2009.

Mcharazo, A., & Olden, A. (2000). Fulfilling the learning resource requirements of students at the Open University of Tanzania. *Journal of Librarianship and Information Science, 32*(4), 204–14.

McKenney, S., Nieveen. N., & Van den Akker, J. (2006). Design research from a curriculum perspective. In J. J. H. van den Akker, K. Gravemeijer, S. McKenney, & N. Nieveen (Eds.), *Educational design research.* London: Routledge.

Meel, D. E. (1999). E-mail dialogue journals in a college calculus classroom: A look at the implementation and benefits. *Journal of Computers in Mathematics and Science Teaching, 18*(4), 387-413.

Means, B., & Penuel, W. R. (2005). Scaling up technology-based educational innovations. In C. Dede, J. Honan, & L. Peters, (Eds.). *Scaling up success: Lessons learned from technology-based educational innovation.* New York: Jossey-Bass.

Meyer-Peyton, L. (2000). Elements of a successful distributed learning program. In L. K. Lau (Ed.), *Distance learning technologies: Issues, trends and opportunities.* Hersey & London: IDEA Group Publishing.

Miles, M. B., & Huberman, A. M (1994). *An expanded source book, qualitative data analysis* (2nd ed.). London: SAGE Publications.

Mishra, P., Koehler, M. J., & Zhao, Y. (2007). *Faculty development by design: Integrating technology in higher education.* Charlotte, NC: Information Age Publishing.

Mnyanyi, C. B. F., & Mbwette, T. S. A. (2009). *Open and distance learning in professional development in third world countries.* Paper presented at Maastricht's 23rd International Conference on Distance Education, 2009. Retrieved from: http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final_paper_296Cosmas.pdf on 25th June, 2009

Molefi, F. (2002). *Support services for distance education students at the department of non-formal education.* Paper presented at the distance education workshop for Setswana part-time writers, DNFE, April, 1998.

Moonen, J. (2000). *Institutional perspectives for on-line learning: Return on investment*. Internal report. Enschede, The Netherlands: University of Twente.

Moore, M. (1996). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education*. London: Routledge.

Moore, M. G. (2003). Preface. In M. G. Moore, & W. Anderson (Eds.), *Handbook of distance education*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Msuya, J., & Maro, F. (2002). The provision of library and information services to distance learners: The Open University of Tanzania (OUT). *Journal of Librarianship and Information Science, 52,* 183–191.

Muganda. C. K. (2002). Gender equity in education and children at risk: The role of distance education and open learning. *Huria Journal*, *4*(1), 32-44.

Nieveen, N., Handelzalts, A., Van den Akker, J. J. H., & Homminga, S. (2005). *Teacher design teams: A scenario for school-based curriculum innovation.* Paper presented at the ECER 2005, Dublin, Ireland.

Nihuka, K. A. (2008). *The feasibility of e-learning integration in course delivery at the Open University of Tanzania*. Master of educational science and technology Thesis. Enschede, The Netherlands: University of Twente.

Nihuka, K. A., & Voogt, J. (2011). Instructors and students competences, perception and access to e-learning technologies: Implications for e-learning technologies at the Open University of Tanzania. *International Journal on E-learning, 10*(1), 63-85.

Nihuka, K. A., & Voogt, J. (in press). E-learning course design in teacher design teams: Experiences in the Open University of Tanzania. *International Journal of Learning Technology.*

Nihuka, K. A., & Voogt, J. (submitted). Collaborative e-learning course design: Impacts on instructors. *Australasian Journal of Educational Technology.*

Nihuka, K. A., & Voogt, J. (submitted). The impact of collaborative course design and e-learning delivery on instructors' instructional practice and students' academic outcomes. *Distance Education.*

Nihuka, K. A., & Voogt, J. (submitted). Feasibility of up scaling collaborative course design for large scale implementation of e-learning at the Open University of Tanzania. *Studies in Continuing Education.*

Nnafie, I. (2002). *Internet cafés in Dar es Salaam: Problems and opportunities.* Master of Science Thesis. The Netherlands: Eindhoven University of Technology.

Ntiluhoka, G. (2007). Suitability and availability of study materials for effective learning: Lessons from the Open University of Tanzania. *Journal of Adult Education Tanzania, 15,* 31-60.

Open University of Tanzania. (2009a). *Information and communication technology (ICT) policy plan for 2009/10 – 2013/14*. Dar es Salaam, Tanzania

Open University of Tanzania. (2009b). *Information and communication technology (ICT) master plan for 2009/10-2013/14*. Dar es Salaam, Tanzania

Open University of Tanzania. (2009c). *E-learning Implementation Strategy for 2009/10-2013/14.* Dar es Salaam, Tanzania.

Open University of Tanzania. (2009d). *Rolling strategic plan for 2008/09 – 2012/13.* Dar es Salaam, Tanzania.

Papastergious, M. (2006). Course management systems as tools for the creation of online learning environments: Evaluation from a social constructivist perspective and implications for their design. *International Journal on E-learning, 5*(4), 593-622.

Pennington, T., & Graham, G. (2002). Exploring the influence of a physical education listserv on K.12 physical educators. *Journal of Technology and Teacher Education, 10*(3), 383-405.

Pena-Bandalaria, M. D. (2007). Impact of ICTs on open and distance learning in a developing country setting: The Philippine experience. *International Review of Research in Open and Distance Learning, 8*(1), 1-15.

Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Ghallagher, L. P. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal, 44*(4), 921-958.

Peters, O. (1996). Distance education in industrial society. In D. Keegan (Ed.), *Theoretical principles of distance education*. London: Routledge.

Phillips, R. A. (2005). Challenging the primacy of lectures: The dissonance between theory and practice in university teaching. *Journal of University Teaching and Learning Practice, 2*(1), 1-17.

Phipps, R., & Merisotis, J. (1999). What's the difference: A review of contemporary research on the effectiveness of distance learning in higher education. *Journal of Distance Education, 14*(1), 102-114

Poole, D. (2000). An e-mail activity: Preservice teachers' perceptions of authenticity. *Journal of Technology and Teacher Education, 8*(1), 13-28.

Porter, A., Garet, M. S., Desimone, L. M., & Birman, F. (2003). Providing effective professional development: Lessons from the Eisenhower program. *Science Educator, 12*(1), 23-40.

Poumay, M., Dupont, C., Georges, F., & Leclercq, D. (2001). *Support, training and regulation as key success factors in developing e-learning – Cases study of the LabSET -ULg, in Belgium*. Paper presented at the 2nd WBLE Conferences, Lund, Sweden.

Radinsky, J., Smolin, L., Lawless, K., & Newman, M. (2003). *School-university collaborative design teams: Curriculum design as a vehicle for professional development in teaching with technology*. Proceedings of the Annual Meeting of the Society for Information Technology and Teacher Education (SITE), 2003.

Rao, V. C. (2009). *Planning personalized alert services for open distance learners: A study on the students of Dr. B. R. Ambedkar Open University, India.* Paper presented at Maastricht's 23rd International Conference on Distance Education, 2009. Retrieved from: http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final_paper_296Cosmas.pdf on 25th June, 2009.

Resta, P., & Laferriere, T. (2008). Issues and challenges related to digital equity. In J. Voogt, & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education*. New York: Springer

Senzige, J. P., & Sarukesi, K. (2003). *An approach to ICT based school education in Tanzania.* African Studies Association of Australasia and the Pacific 2003, Conference Proceedings - African on a Global Stage

Scott, V., & Miner, C. (2008). Peer coaching: Implication for teaching and program improvement. *Teaching and Learning Journal*, *1*(3), 1-11.

Sherry, L., & Gibson, D. (2002). The path to teacher leadership in educational technology. *Contemporary Issues in Technology and Teacher Education* [Online serial], *2*(2), 178-203.

Sife, A. S., Lwoga, E. T., & Sanga, C. (2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. *International Journal of Education and Development using Information and Communication Technology, 3*(20), 57-67.

Simmie, G. M. (2007). Teacher design teams (TDTs)—building capacity for innovation, learning and curriculum implementation in the continuing professional development of in career teachers. *Irish Educational Studies*, *26*(2), 163-176.

Siritongthaworn, S., Krairit, D., Dimmitt, N. J., & Paul, H. (2006). The study of e-learning technology implementation: A preliminary investigation of universities in Thailand. *Educational Information Technology, 11,* 137–160.

Smart, K. L., & Cappel, J. J. (2006). Students' perceptions of online learning: A comparative study. *Journal of Information Technology Education, 5,* 201-219.

Spillane, J. P. (2005). Distributed leadership. *The Educational Forum, 6*(9), 143-50.

Stoltenkamp, J., Kles, C., & Njenga, J. (2007). Institutionalizing the e-learning division at the University of the Western Cape, South Africa. *International Journal of Education and Development Using Information and Communication Technologies*, *3*(4), 143-152.

Sugiyama, M. (2005). *Exploring the practical use of ICT tools by teachers for making supplemental teaching/learning materials in secondary schools in Tanzania.* Master Thesis. Enschede, The Netherlands: University of Twente.

Summers, J. J., Waigandt, A., & Whittaker, T. A. (2005). A comparison of student achievement and satisfaction in an online versus a traditional face-to-face statistics class. *Innovative Higher Education, 29*(3), 233-250.

Swarts, P., & Wachira, E. M. (2010). *Tanzania: ICT in education situational analysis.* Report by global e-Schools and Communities Initiatives (geSCI). Retrieved from http://gesci.org/assets/files/Knowledge%20Centre/Situational%20Analysis_Tanzania.pdf, on 29 May, 2011.

Telnova, T. (2005). *Development of template for learning objectives within the learning content management system eXact for Digitale Universiteit*. Master Thesis. Enschede, The Netherlands: University of Twente.

Thomas, P., & Carswell, L. (2000). Learning through collaboration in a distance education environment. *Educational Technology and Society, 3*(3), 373-383.

Thorpe, M. (n.d). *The impact of ICT on lifelong learning, 23-32*. Retrieved from http://www.col.org/SiteCollectionDocuments/PSeries_LLLDHE_CH03.pdf on 28th Aug, 2009.

Thousand, J. S., & Villa, R. A. (1993). Collaborative teams: A powerful tool to school restructuring. In R. A. Villa, J. S. Thousand, W. Steinback, & S. Steinback (Eds.), *Restructuring for caring and effective education: An administrative guide to creating heterogeneous schools*. Baltimore: Brookes Publishing.

Tschang, F. T., & Senta, T. D. (2001). Introduction. In F. T. Tschang, & T. D. Senta, (Eds.), *Access to knowledge: New information technologies and emergence of the Virtual University.* Tokyo: United Nations University, Institute of Advanced Studies.

United Republic of Tanzania. (URT). (1982). *The Makweta commission report*. Dar es Salaam, Tanzania.

United Republic of Tanzania. (URT). (1990). *Report of the committees of the establishment of an open university of Tanzania.* Dar es Salaam, Tanzania.

Voogt, J., Almekinders, M., Van den Akker, J., & Moonen, B. (2005). A 'blended' in-service arrangement for classroom technology integration: Impacts on teachers and students. *Computers in Human Behaviour,* 21*(2005),* 523-539.

Voogt, J. (2010). A blended in-service arrangement for supporting science teachers in technology integration. *Journal of Technology and Teacher Education, 18*(1), 83-109.

Vygotsky, L. S. (1978). *Mind in society. The development of higher psychological processes*. Cambridge, Massachusetts: Harvard University Press.

Waddoups, G. L., Wentworth. N., & Earle, R. (2004). Principles of technology integration and curriculum development: A faculty design team approach. *Computers in the Schools, 21*(1/2), 15-23.

Walker, D. (2006). Towards productive design studies. In J. J. H. van den Akker, K. Gravemeijer, S. McKenney, & N. Nieveen (Eds.), *Educational design research.* London: Routledge.

Walker, G., & Johnson, N. (2008). Faculty intentions to use components for web-enhanced instruction. *International Journal on E-Learning, 7*(1), 133-152.

Woodrow, J. E. (1992). Locus of control and student teacher computer attitudes. *Computers in Education, 14*(5), 421-432.

Wright, P. W. (2000). *A best practices approach to the use of information technology in education.* Paper presented in Society for Information Technology Teacher Education International Conference in San Diego, California. Proceedings of SITE 2000 (February 2000).

Yin, R. K. (2003). *Case study research design and methods* (3rd ed.). London: SAGE Publications.

ENGLISH SUMMARY
Introduction to the study

Distance education at the Open University of Tanzania (OUT) is dominated by a print-based mode of delivery . Because of that, several challenges confront instructors and students at OUT, which include (i) delays in the delivery of print study materials, course outlines and learning resources, (ii) lack of regular interaction between instructors and students, (iii) lack of immediate feedback on student learning and (iv) feelings of isolation among students. Most of these challenges are rampant in other distance education universities in sub-Saharan Africa (Dzakiria, 2004; Ludwig-Harman & Dunlap, 2003).

Studies from developed countries show that e-learning technologies such as computer, internet, e-mail, mobile phones and others are used in distance education to enhance the delivery of courses, facilitation of access to resources, improvement of interactions with students and provision of feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000). In recognizing the potential of e-learning, since 2004 OUT has embarked on instructors' professional development through workshops. Despite the workshops, instructors at OUT continued to deliver their courses traditionally. Because the transition to e-learning delivery is considered a curriculum innovation, effective professional development was critical. *Collaborative Course Design* in design teams is applied in this dissertation as a strategy for effective professional development in preparing instructors on course (re-)design and delivery of courses using Moodle learning management system (Moodle LMS). Collaborative Course Design in design teams implies that instructors collaborate in the (re-)design of courses in teams of at least two persons. The strategy is based on research findings on effective professional development of instructors (Borko *et al*, 2002; Clarke & Hollingsworth, 2002; Desimone *et al,* 2002; Garet *et al.*, 2001; Penuel *et al*, 2007; Porter *et al,* 2003) which are rooted in social constructivist theory (Dewey, 1916; Vygotsky, 1978) and adult learning theory (Knowles *et al.,* 1998; Merriam, *et al.,* 2007). The

strategy had the following characteristics: active participation of instructors, activities sustained over a long period of time, opportunities for collaboration within and between design teams and support for instructors. In this way ownership of instructors towards e-learning was promoted, which was assumed to contribute to e-learning implementation at OUT.

The purpose of this study was to enhance professional development of instructors' ability to (re-)design and teach e-learning through *Collaborative Course Design,* courses by providing opportunities and support for active involvement in e-learning course design and delivery. Instructors learn to use Moodle LMS as a technology to address challenges of print-based delivery.

RESEARCH DESIGN AND QUESTIONS

The study employed *design-based research* approach (Barab & Squire, 2004)). The approach is useful because it helps in developing an effective educational intervention (i.e. *Collaborative Course Design*) and offered an opportunity for professional development of instructors (McKenney *et al.,* 2007; Walker, 2007). The research was guided by the main research question: *How should collaborative course design in design teams be organized to support instructors at OUT in e-learning course design and delivery?.* This question was pursued through a context- and needs analysis, a pilot study, an implementation study and an impact study, each of which was guided by the following sub-questions:

1. What is the feasibility of implementing an e-learning course delivery in distance education at the Open University of Tanzania?
2. How does *Collaborative Course Design* and delivery in design team contribute to instructors' professional development and the implementation of e-learning at the Open University of Tanzania?
3. How does *Collaborative Course Design* in design teams contribute to instructors' professional learning?
4. What is the impact of *Collaborative Course Design* and e-learning delivery on instructors' instructional practices and students' academic outcomes'?
5. What are the opportunities and challenges within the OUT of up scaling *Collaborative Course Design* as a main strategy for e-learning implementation at large scale?

MAIN RESULTS

Context– and needs analysis

The purpose of context- and needs analysis study was to understand the status-quo of the Open University of Tanzania regarding whether or not it is feasible to use e-learning technologies in the university. The study was guided by research question 1. Outcomes revealed that print-based mode of delivery, complemented by one face-to-face session per year was dominant. As a result, instructors and students encountered challenges such as delays in the delivery of courses, course outlines, and learning resources, lack of regular interactions, delayed feedback and feelings of isolation on the part of students, similar to findings in other studies (Dzakiria, 2004; Ludwig-Harman & Dunlap, 2003). Furthermore, instructors lacked skills in the pedagogical use of e-learning technologies. Instructors needed training on how to prepare e-learning courses, how to deliver courses by e-learning technologies and how to support students in an e-learning environment.

Regarding using e-learning technologies, instructors and students were positive about e-learning, and had basic knowledge and skills in computer use and internet applications. Both instructors and students perceived benefits of using e-learning in distance education. Although access to computer and internet by instructors was limited, they had access to such technologies in their offices (by sharing with colleagues), the university library and in internet cafes. Students had access to computer and internet at the university library (for those closer to Dar es Salaam), internet cafes and in some of the regional centres of OUT. Unexpectedly, access to mobile phones by instructors and students was low, although access to mobile phones is on the increase in Tanzania (Swarts & Wachira, 2010) and in sub-Saharan Africa in general (Pena-Bandalaria, 2007).

Besides, narrow bandwidth associated with low speed of internet was identified as a serious challenge. It was concluded that it was feasible to use e-learning course delivery at the Open University of Tanzania and that an alternative professional development could be used as a strategy to prepare instructors.

Pilot study

The pilot study explored research question 2 which aimed to understand instructors' experiences of working in a d*esign team* and instructors' and students' experiences about the redesigned courses and e-learning delivery through Moodle LMS. Insights from context– and needs analysis were input for selection of e-learning technologies and the designing of *Collaborative Course Design* as a professional development strategy. Because of the challenge of narrow bandwidth, Moodle LMS was used offline to complement print-based delivery of courses. In addition, e-mail and mobile phones were identified to be used for interactions between instructors and students (based on the fact that in reality most instructors and students possess mobile phone). During eight weeks *Collaborative Course Design* (consisting of an introduction workshop, course design in design teams and general meetings with pedagogical and technical support) was applied to support and prepare instructors, who collaborated in a design teams, on e-learning course design and delivery.

The findings revealed that instructors were enthusiastic about working in design teams. Active involvement of instructors through C*ollaborative Course Design* contributed to their professional development. They transformed their traditional courses into e-learning courses and used Moodle LMS (offline) to deliver the courses. Students were satisfied with the redesigned courses and found interaction with instructors during the course more flexible than during the print-based mode of course delivery. However, instructors found working in design teams challenging and time demanding.

Implementation study

A follow-up study investigated more in-depth the effects of C*ollaborative Course Design* on instructors' professional development, instructional practices and students' academic outcomes. The study was guided by research questions 3 and 4. The findings on research question 3 showed that *Collaborative Course Design* in design teams promoted instructors' knowledge and skills on course design particularly related to concrete procedures they can use during course design, preparation of powerpoint slides and the use of a template to design a course. Also, the approach promoted instructors' competence and confidence in using Moodle LMS and on deciding how and when to interact with students via email and/or mobile phones (usually short text messages). Besides, regular

powercuts, limited access to computers and internet and narrow bandwidths were among the challenges during the study. The challenges had limited effect on the outcomes of the study. It was concluded that collaborative course design in design teams contributed to instructors' professional learning related to e-learning course design and delivery.

Results for question 4 demonstrated that *Collaborative Course Design* contributed to instructors' preparedness to implement e-learning by providing opportunities to identify and discuss challenges of print-based delivery and reasons for e-learning implementation. It also provided necessary support and encouraged collaboration with colleagues. Furthermore, unlike in print-based mode, e-learning provided flexibility in terms of access to course outlines, study materials and other learning resources such as articles (as argued in Collis & Van der Wende, 2002). However, instructors and students found offline Moodle LMS inflexible in terms of location and time, but the use of e-mail and mobile phones flexible for interactions between students and instructors. Students used technology in the regional centres of OUT and found e-learning convenient and reliable. E-learning course delivery contributed to improved academic outcomes of students in most of the courses. It was concluded that *Collaborative Course Design* had a positive effects on instructors' instructional practices and academic outcomes of students.

Impact study

The impact study, guided by research question 5 investigated the feasibility within OUT for up scaling *Collaborative Course Design* as a strategy for professional development of instructors on e-learning implementation at large scale. Findings revealed several opportunities that make implementation of large scale *Collaborative Course Design* convenient to support instructors on e-learning implementation at large scale at OUT. The management at all levels is committed and interested in e-learning course delivery. They find it useful as it contributes to the enhancement of the enrolment numbers and students' access to distance education. The university has in place an ICT steering committee which includes deans and directors as members and is introducing positions of deputy vice chancellor in-charge of e-learning technologies and director of educational technology. There exists a comprehensive ICT policy, an ICT master plan and an ICT implementation strategy, which are well aligned to the

rolling strategic plan of the university. Also, results showed that there is (limited) access to technologies such as computer, internet, phones, printers and photocopiers for instructors in the university. Moreover, the university has in place an incentive scheme which includes awards of 500 USD per course developed and qualified to be uploaded into Moodle LMS, recognition letter and/or covering expenses to participate in an e-learning conference. There is also centralized technical support within OUT.

The following challenges were identified that need attention of the management: the need for more shared goals on e-learning course delivery so that instructors in faculties and institutes see e-learning as a priority, alignment of different management levels with the needs of instructors in faculties/ institutes so that e-learning implementation plans are reflected in the action plans of faculties and institutes. Other challenges are limited access to technologies, narrow bandwidth, unreliable electricity and lack of well-structured pedagogical support in the university.

It was concluded that the available opportunities make it convenient to realize *Collaborative Course Design* at large scale, in order to contribute to for large scale implementation of e-learning at OUT. However, the management should consider addressing the identified challenges.

OVERALL CONCLUSIONS

The research reported in this dissertation investigated *how collaborative course design in design teams should be organized to support instructors at OUT in e-learning course design and delivery.* It has been established that *Collaborative Course Design* organized as an introduction workshop, course design in design teams and general meetings with pedagogical and technical support is effective in supporting instructors in e-learning course design and delivery at OUT. The introduction workshop at the beginning of professional development was effective in promoting theoretical foundations about e-learning, course design and delivery among instructors. At the end of course design, workshop provided opportunity for instructors to discuss about specific course delivery strategies.

The idea of general meetings for pedagogical support, discussion, feedback and reflections was useful especially at OUT where pedagogical support is ill-structured. The pedagogical support promoted professional development of instructors and competence in designing e-learning courses. Also, discussions in the general meetings generated ideas on how to deal with instructors' pedagogical needs collectively. As found in other studies (c.f. Beanco, *et al.,* 2002; Telnova, 2005) regular pedagogical support was required more during course design than during course delivery.

Technical support was required by instructors both during course design and at delivery. Support on the installation of Moodle, searching, uploading and updating (resources), fixing viruses and internet connection problems were useful. The support promoted instructors' confidence in course design and in using Moodle LMS during the course. Similar results were found in other studies (e.g. Pomay *et al.,* 2001; Sife *et al.,* 2007).

Collaborative Course Design was effective because it promoted ownership of the innovation which enhanced confidence in using Moodle LMS, e-mail and mobile phone. Also, through collaborations and interactions in the workshops, general meetings and in design teams, *Collaborative Course Design* helped instructors to acquire concrete procedures at their disposition which they can follow during e-learning course (re-)design, they learned how to prepare powerpoint slides, how to use template to organize their courses and how to use Moodle LMS for course delivery. Moreover, activities which were coherent to the local context coupled with follow-up support made it easier for instructors to practice skills acquired from the professional development arrangement.

Given the encouraging results, up scaling of *Collaborative Course Design* to support large scale e-learning implementation at OUT was found inevitable. Several opportunities were identified within OUT to support up scaling of *Collaborative Course Design* strategy, including determined management, existence of conducive institutional conditions and support structures. Besides, attention of the management is needed in addressing challenges of limited access to technologies, narrow bandwidth and unreliable electricity so as to make e-learning effective, affordable and sustainable (as argued in Dexter, 2008).

RECOMMENDATIONS

Further research

The following are some directions for further research:

- Further research should investigate how *Collaborative Course Design* can be used to support instructors on how to use mobile phones to complement the print-based delivery of courses. Such a study can also explore the effectiveness of mobile phone in addressing challenges of print-based mode, including how to keep this affordable and how to realize this in the context of sub-Saharan Africa.
- Further research should focus on how to support collaborative learning of students through the use of computer, e-mail, mobile phone or combination of these. In this respect, the available literature on *Computer Supported Collaborative Learning* (CSCL) (c.f. Kirschner *et al.,* 2004; Mahdizadeh, 2007) provides useful insights.
- Also, further research should seek to refine the understanding of the opportunities and challenges for up scaling *Collaborative Course Design* to support e-learning implementation at large scale.

Implications for practice

The following recommendations are made to improve practices towards e-learning implementation at the Open University of Tanzania:

- It is important that the university management and educational technology leadership at OUT in particular, is aware of what constitutes effective professional development. Elements such active engagement of instructors, activities which are coherent to the local context, collaboration and follow-up support are important when designing a professional development arrangement for instructors (Desimone, 2011; Garet *et al.,* 2001; Loucks-Horsley *et al.,* 2003).
- The university management needs to understands the context and the needs of instructors and students, and have knowledge of appropriate literature, to inform the design and development of effective professional development for instructors, in order to implement e-learning implementation at large scale at OUT.

- The management should recognize and consider support (professional development, pedagogical and technical) for successful e-leaning implementation by instructors.
- It is emphasized that large scale implementation of *Collaborative Course Design* to support e-learning implementation at large scale should be preceded by a thorough understanding of the available opportunities and challenges.

NEDERLANDSE SAMENVATTING
Introductie op het onderzoek

Het afstandsonderwijs van de Open University van Tanzania (OUT) heeft de vorm van correspondentie-onderwijs, waarbij studiematerialen via de post worden verstuurd naar de student. Door het correspondentie-onderwijs worden docenten en studenten van de OUT geconfronteerd met verschillende uitdagingen, waaronder (i) vertragingen in de levering van schriftelijke studiematerialen, (ii) gebrek aan interactie tussen docenten en studenten, (iii) gebrek aan directe feedback op het leren van de student, en (iv) het gevoel van isolatie bij studenten. De meeste van deze uitdagingen komen ook veel voor bij andere Afrikaanse universiteiten ten zuiden van de Sahara die afstandsonderwijs verzorgen (Dzakiria, 2004; Ludwig-Hardman & Dunlap, 2003).

Onderzoek uit ontwikkelde landen toont aan dat e-learning technologieën, zoals computers, internet, e-mail, mobiele telefoons etc., worden gebruikt in afstandsonderwijs om cursussen te verrijken, toegang tot bronnen te faciliteren, interacties met studenten te verbeteren, en om feedback en steun aan studenten te kunnen leveren (Ludwig-Hardman & Dunlap, 2003; Pen-Bandalaria, 2007; Wright, 2000). De OUT erkent het potentieel van e-learning en heeft sinds 2004 ingezet op het opleiden van docenten in het gebruik van e-learning technologieën door middel van workshops. Ondanks deze workshops bleven de docenten aan de OUT hun cursussen op de traditionele wijze aanbieden.

Omdat de overgang van correspondentie-onderwijs naar e-learning kan worden gezien als een curriculuminnovatie, is effectieve professionele ontwikkeling van docenten van groot belang. In dit proefschrift werd *Collaborative Course Design* in ontwerpteams toegepast als strategie voor effectieve professionele ontwikkeling. Collaborative Course Design in ontwerpteams houdt in dat docenten in teams van tenminste twee personen samenwerken in het (her-)ontwerp van hun onderwijs. In dit onderzoek (her) ontwerpen docenten gezamenlijk hun cursussen in cursussen die met e-learning

technologieën worden ondersteund en ondersteunen de teams elkaar in het implementeren van de herontworpen cursus. Er werd gebruik gemaakt van Moodle als Learning Management System (Moodle LMS). De strategie is gebaseerd op onderzoek naar effectieve professionele ontwikkeling van docenten (Borko *et al*, 2002; Clarke & Hollingsworth, 2002; Desimone *et al,* 2002; Garet, 2001; Penuel *et al*, 2007; Porter *et al,* 2003) en vindt zijn oorsprong in het sociaal constructivisme (Dewey, 1916; Vygotsky, 1978) en het leren van volwassenen (Knowles *et al.,* 1998; Merriam, *et al.,* 2007). De strategie had de volgende kenmerken: actieve deelname van docenten activiteiten lopen gedurende een lange tijdsperiode, creëren van mogelijkheden voor samenwerking binnen en tussen ontwerpteams en ondersteuning voor docenten. Op deze wijze wordt het eigenaarschap van docenten bij de vernieuwing (het gebruik van e-learning in afstandsonderwijs) bevorderd, wat naar verwachting bijdraagt aan de implementatie van e-learning in de onderwijspraktijk van de OUT.

Het doel van dit onderzoek was om bij te dragen aan de professionalisering van docenten van de OUT in e-learning voor afstandsonderwijs door middel van *Collaborative Course Design,* door hen actief te betrekken bij en te ondersteunen in e-learning cursusontwerp en de implementatie van e-learning cursussen. Docenten leren Moodle LMS gebruiken als een technologie om de uitdagingen van het traditionele correspondentie-onderwijs aan te pakken.

ONDERZOEKSDESIGN EN ONDERZOEKSVRAGEN

Het onderzoek heeft het karakter van ontwerpgericht onderzoek (Barab & Squire, 2004). Ontwerpgericht onderzoek is een waardevolle benadering, omdat deze behulpzaam is bij het ontwikkelen van een effectieve onderwijsinterventie (i.e. *Collaborative Course Design*) en gelegenheid biedt voor de professionele ontwikkeling van docenten (McKenney *et al.,* 2007; Walker, 2007). De centrale onderzoeksvraag voor het onderzoek luidde: *Hoe zou Collaborative Course Design in ontwerpteams moeten worden georganiseerd om docenten aan de OUT te ondersteunen bij e-learning cursusontwerp en implementatie?* Deze vraag werd gevolgd door een context- en behoeften analyse, een pilot study, een implementatie-onderzoek en een impactonderzoek, die elk geleid werden door de volgende sub-vragen:

1. Wat is de haalbaarheid van de implementatie van e-learning in het afstandsonderwijs van de Open Universiteit van Tanzania?
2. Hoe draagt *Collaborative Course Design* in ontwerpteams bij aan de professionele ontwikkeling van docenten in ontwerp en implementatie van e-learning aan de Open Universiteit van Tanzania?
3. Hoe draagt *Collaborative Course Design* in ontwerpteams bij aan het professionele leren van docenten?
4. Wat is de impact van *Collaborative Course Design* en de implementatie van e-learning op de onderwijspraktijk van docenten en de leerresultaten van studenten?
5. Wat zijn de kansen en uitdagingen binnen de OUT voor het opschalen van *Collaborative Course Design* als hoofdstrategie voor e-learning implementatie op grote schaal?

VOORNAAMSTE RESULTATEN

Analyse van context en behoeften

Het doel van dit onderzoek was om de status quo van de Open Universiteit van Tanzania met betrekking tot e-learning te begrijpen, en na te gaan of het haalbaar is om e-learning technologieën binnen de universiteit te gebruiken. Het onderzoek werd geleid door onderzoeksvraag 1. Uit de resultaten bleek dat correspondentie-onderwijs aangevuld met één face-to-face sessie per jaar, het meest gangbaar was. Als gevolg hiervan kwamen de docenten en studenten uitdagingen tegen, zoals vertragingen in de levering van de cursussen, cursusoverzichten, en leermiddelen, gebrek aan regelmatige interactie, vertraagde feedback en gevoelens van isolatie bij de studenten, vergelijkbaar met de bevindingen uit andere onderzoeken (Dzakiria, 2004; Ludwig-Hardman & Dunlap, 2003). Verder ontbraken vaardigheden voor didactisch gebruik van e-learning technologieën bij de docenten. Docenten hadden training nodig over hoe e-learning cursussen moeten worden voorbereid, hoe cursussen door middel van e-learning technologieën kunnen worden aangeboden aan studenten, en hoe studenten in een e-learning omgeving ondersteund worden.

Ten aanzien van het gebruik van e-learning technologieën waren docenten en studenten positief en zij hadden een basale kennis over en vaardigheden in

computergebruik en internetapplicaties. Zowel docenten als studenten zagen de voordelen van het gebruik van e-learning voor afstandsonderwijs. Hoewel de toegang tot computer en internet voor de docenten beperkt was, hadden zij toegang tot zulke technologieën in hun kantoor op de universiteit (door te delen met collega's), de universiteitsbibliotheek en internetcafés. Studenten hadden toegang tot computers en internet in de universiteitsbibliotheek (voor degenen dichtbij Dar es Salaam), internetcafé's en in enkele van de regionale centra van de OUT. Tegen de verwachting in bleek dat docenten en studenten slechts beperkte toegang hadden tot mobiele telefoons, hoewel er sprake is van toenemend gebruik van mobiele telefoons in Tanzania (Swarts & Wachira, 2010) en in Afrika ten zuiden van de Sahara (Pena-Bendalaria, 2007). Het gebruik van smalband internet werd geïdentificeerd als een grote uitdaging.

Er werd geconcludeerd dat het haalbaar was om e-learning te gebruiken aan de Open Universiteit van Tanzania en dat een alternatieve professionele ontwikkeling nodig was als strategie om docenten voor te bereiden.

PILOT STUDY

In de pilot study werd onderzoeksvraag 2 bestudeerd, met als doel inzicht te verwerven in de ervaringen van docenten in het werken in een ontwerpteam en de ervaringen van studenten en docenten met de herontworpen cursussen en de overdracht van de e-learning cursussen via Moodle LMS. Inzichten uit de context- en behoefteanalyse golden als input voor de selectie van e-learning technologieën en het ontwerpen van *Collaborative Course Design* als professionele ontwikkelingsstrategie. Door rekening te houden met de uitdaging van smalband internet, werd Moodle LMS offline gebruikt als aanvulling op het traditionele correspondentie-onderwijs. Daarbij werden e-mail en mobiele telefoons geïdentificeerd om gebruikt te worden voor interacties tussen docenten en studenten (gebaseerd op het feit dat in de realiteit de meeste docenten en studenten mobiele telefoons bezitten). Gedurende acht weken werd *Collaborative Course Design* (bestaande uit een introductieworkshop, cursusontwerp in ontwerpteams, en algemene bijeenkomsten waarin didactische en technische ondersteuning werd geboden) ingezet als strategie om docenten te ondersteunen en voor te bereiden op e-learning cursusontwerp en -implementatie.

De bevindingen wezen uit dat de docenten enthousiast waren over het werken in ontwerpteams. Actieve betrokkenheid van docenten door middel van *Collaborative Course Design* droeg bij aan hun professionele ontwikkeling. Zij transformeerden hun traditionele cursussen in e-learning cursussen en gebruikten Moodle LMS om de cursussen aan te bieden aan studenten. Studenten waren tevreden met de herontworpen cursussen en vonden de interactie met docenten tijdens de cursus flexibeler dan bij het gebruikelijke correspondentie-onderwijs. Docenten vonden het werken in ontwerpteams echter uitdagend en tijdrovend.

IMPLEMENTATIE-ONDERZOEK

In een vervolgonderzoek werden de effecten van *Collaborative Course Design* op de professionele ontwikkeling van docenten, de praktijk van het lesgeven, en de leerresultaten van de studenten meer diepgaand onderzocht. Het onderzoek werd gestuurd vanuit onderzoeksvragen 3 en 4. De bevindingen over onderzoeksvraag 3 toonden aan dat door *Collaborative Course Design* in ontwerpteams de kennis en vaardigheden van de docenten over cursusontwerp bevorderd werden, vooral de kennis en vaardigheden gerelateerd aan concrete procedures die ze konden gebruiken tijdens het ontwerpen van de cursus, de voorbereiding van PowerPoint slides, en het gebruik van een template om een cursus te ontwerpen. De benadering bevorderde ook de competentie en het vertrouwen van de docenten in het gebruik van Moodle LMS en in het nemen van beslissingen over hoe en wanneer interactie met studenten via e-mail en/of mobiele telefoons (meestal korte tekst boodschappen) gewenst is. Het regelmatig uitvallen van stroom, gebrekkige toegang tot computers en internet en smalband internet, behoorden tot de uitdagingen van het onderzoek. De uitdagingen hadden een beperkt effect op de resultaten van het onderzoek. Er werd geconcludeerd dat *Collaborative Course Design* in ontwerpteams een bijdrage leverde aan het professionele leren van docenten met betrekking tot e-learning cursusontwerp en -implementatie.

De resultaten voor vraag 4 tonen aan dat *Collaborative Course Design* een bijdrage leverde aan de bereidheid van docenten om e-learning te implementeren, door gelegenheid te bieden voor het identificeren en bespreken van uitdagingen van correspondentie-onderwijs en door redenen aan te dragen

voor e-learning implementatie. Het leverde de ondersteuning die nodig was en moedigde samenwerking met collega's aan. Daarbij leverde e-learning, anders dan bij de schriftelijke modus, flexibiliteit in termen van toegang tot cursusoverzichten, studiematerialen en andere leerbronnen zoals artikelen (zoals ook beargumenteerd in Collis & van der Wende, 2002). Docenten en studenten vonden offline Moodle echter inflexibel wat betreft locatie en tijd, maar ze vonden het gebruik van e-mail en mobiele telefoons voor interacties tussen studenten en docenten flexibel. Studenten gebruikten technologie die voorhanden was in de regionale centra van de OUT en vonden her gebruik gerieflijk en betrouwbaar. Het gebruik van e-learning via Moodle LMS droeg bij aan verbeterde resultaten van studenten in de meeste cursussen. Er werd geconcludeerd dat *Collaborative Course Design* positieve effecten had op de praktijk van lesgeven van docenten en op de leerresultaten van studenten.

Impactonderzoek

Het impactonderzoek, geleid door onderzoeksvraag 5, onderzocht de haalbaarheid binnen de OUT van het opschalen van *Collaborative Course Design* als een strategie voor professionele ontwikkeling van docenten voor e-learning implementatie op grote schaal . De bevindingen lieten zien dat er verschillende kansen zijn die implementatie van grootschalig *Collaborative Course Design* geschikt maken om docenten te ondersteunen bij het implementeren van e-learning op grote schaal aan de OUT. Het management op alle niveaus is gecommitteerd aan en geïnteresseerd in e-learning. Ze vinden e-learning bruikbaar en vinden dat het bijdraagt aan de verhoging van het aantal inschrijvingen en de toegang van studenten tot, afstandsonderwijs. De universiteit heeft een ICT stuurgroep waarin decanen en directeuren zitting hebben. De OUT introduceert de posities van adjunct vice-chancellor verantwoordelijk voor e-learning technologieën en directeur van onderwijstechnologie. Er is sprake van een breed ICT beleid, een ICT masterplan en een ICT implementatiestrategie; goed afgestemd met het lopende strategische plan van de universiteit. De resultaten lieten ook zien dat er (beperkte) toegang is tot technologieën zoals computers, internet, telefoons, printers en fotokopieerapparaten voor docenten aan de universiteit. Daarbij heeft de universiteit een beloningsschema waaronder: beloningen van 500 USD per e-learning cursus die ontwikkeld is en gekwalificeerd om geüpload te worden naar Moodle LMS, een brief van erkenning, en/of de dekking van

kosten van deelneming aan een e-learning conferentie. Er is ook gecentraliseerde technische ondersteuning binnen de OUT.

De volgende uitdagingen werden geïdentificeerd die aandacht van het management vergen: de behoefte aan een meer gedeelde doelstelling voor het gebruik van e-learning in het onderwijs, zodat docenten in faculteiten en instituten e-learning als prioriteit gaan zien, het op een lijn brengen van verschillende managementniveaus met de behoeften van docenten in faculteiten/instituten zodat e-learning implementatieplannen gereflecteerd worden in de actieplannen van faculteiten en instituten. Andere uitdagingen zijn de gebrekkige toegang tot technologieën, smalband internet, onbetrouwbare levering van elektriciteit en gebrek aan goed gestructureerde didactische ondersteuning in de universiteit.

Er werd geconcludeerd dat de beschikbare kansen het mogelijk maakt om *Collaborative Course Design* grootschalig te implementeren, ten einde e-learning op grote schaal aan de OUT in te voeren. Het management zou echter moeten overwegen om de geïdentificeerde uitdagingen aan te pakken.

ALGEMENE CONCLUSIES

Het onderzoek gerapporteerd in dit proefschrift onderzocht hoe *Collaborative Course Design* in ontwerpteams georganiseerd zou moeten worden om docenten aan de OUT te ondersteunen bij het ontwerpen en implementeren van e-learning cursussen. Er is vastgesteld dat *Collaborative Course Design,* georganiseerd als het geheel van een introductieworkshop, cursusontwerp in ontwerpteams en algemene bijeenkomsten om didactische en technische steun aan te bieden, effectief is in het ondersteunen van docenten bij het ontwerpen en implementeren van e-learning cursussen aan de OUT. De introductieworkshop aan het begin van de professionele ontwikkeling was effectief in het bevorderen van een theoretische ondergrond over e-learning, cursusontwerp en -implementatie onder docenten. Aan het eind van het cursusontwerp leverden workshops gelegenheid voor docenten om te discussiëren over specifieke cursus-overdracht strategieën.

Het idee van algemene bijeenkomsten voor didactische ondersteuning, discussie, feedback en reflecties was nuttig, vooral in de OUT situatie waar dergelijke ondersteuning slecht gestructureerd is. De didactische ondersteuning bevorderde de professionele ontwikkeling van docenten en hun vaardigheid in het ontwerpen van e-learning cursussen. Daarbij werden in de algemene bijeenkomsten gezamenlijk ideeën gegenereerd over hoe men om zou kunnen gaan met de didactische behoeften van docenten. Zoals ook in andere onderzoeken werd aangetoond (cf. Beanco, *et al.,* 2002 ; Telnova, 2005), was de didactische ondersteuning meer nodig tijdens het cursusontwerp dan tijdens de implementatie van de cursus.

Voor docenten was technische ondersteuning zowel tijdens cursusontwerp als bij de cursusimplementatienodig. Ondersteuning was nuttig bij de installatie van Moodle, het zoeken, uploaden en updaten (bronnen), opruimen van virussen en tot stand brengen van internetverbindingen. De ondersteuning bevorderde het vertrouwen van docenten in hun cursusontwerp en in het gebruik van Moodle LMS tijdens de cursus. Soortgelijke resultaten werden gevonden in andere onderzoeken (e.g. Pomay *et al.,* 2001; Sife *et al.,* 2007).

Collaborative Course Design was effectief omdat het een gevoel van eigendom van de innovatie bevorderde waardoor het vertrouwen in het gebruik van het Moodle LMS, e-mail en mobiele telefoon werd verhoogd. Ook werden docenten, door samenwerking en interacties in de workshops, algemene bijeenkomsten en ontwerpteams, met behulp van *Collaborative Course Design* geholpen om concrete procedures tot hun beschikking te krijgen die ze kunnen volgen tijdens e-learning cursus (her)ontwerp, ze leerden hoe ze PowerPoint slides kunnen voorbereiden, hoe ze templates kunnen gebruiken om hun cursussen te organiseren en hoe ze Moodle LMS kunnen gebruiken. Daarnaast maakten activiteiten, die coherent waren aan de lokale context, gekoppeld aan follow-up ondersteuning, het makkelijker voor docenten om de opgedane vaardigheden te oefenen.

Gegeven de bemoedigende resultaten, werd het opschalen van Collaborative Course Design, om op grote schaal e-learning implementatie aan de OUT te ondersteunen, onontkoombaar geacht. Meerdere kansen werden geïdentificeerd voor de opschaling van *Collaborative Course Design* binnen de OUT, waaronder vastbesloten management, het bestaan van bevorderlijke

institutionele condities en ondersteunende structuren. Daarnaast is aandacht van het management nodig in het omgaan met uitdagingen als gebrek aan toegang tot technologieën, smalband internet en onbetrouwbare levering van elektriciteit om e-learning effectief, betaalbaar en duurzaam te maken (zoals beargumenteerd in Dexter, 2008).

AANBEVELINGEN

Verder onderzoek

Voor verder onderzoek zijn hier een aantal suggesties:

- Verder onderzoek zou moeten nagaan hoe *Collaborative Course Design* gebruikt kan worden om docenten te ondersteunen in het gebruik van de mobiele telefoon als aanvulling op het correspondentie-onderwijs. Een dergelijk studie kan ook de effectiviteit van de mobiele telefoon in het omgaan met uitdagingen van correspondentie-onderwijs onderzoeken, inclusief de beheersbaarheid van de kosten en hoe het gebruik van de mobiele telefoon in de context van Afrika ten zuiden van de Sahara..
- Verder onderzoek zou zich moeten focussen op hoe samenwerkend leren van studenten ondersteund kan worden door middel van het gebruik van computers, e-mail, mobiele telefoon of een combinatie van deze technologieën. In dit opzicht levert de beschikbare literatuur over Computer Supported Collaborative Learning (CSCL) (cf. Kirschner *et al.*, 2004; Mahdizadeh, 2007) bruikbare inzichten.
- Verder onderzoek moet ook op zoek naar een verfijnd begrip van de mogelijkheden en uitdagingen voor het opschalen van *Collaborative Course Design* om grootschalige e-learning implementatie te ondersteunen.

Implicaties voor de praktijk

De volgende aanbevelingen dienen om de huidige praktijk ten opzichte van e-learning implementatie aan de Open Universiteit van Tanzania te verbeteren:

- Het is belangrijk dat het management en vooral het onderwijskundig leiderschap van de universiteit zich bewust is van kenmerken van effectieve professionele ontwikkeling. Elementen zoals actieve betrokkenheid van docenten, activiteiten die coherent zijn aan de lokale context, ondersteuning

bij samenwerking en follow-up, zijn belangrijk bij het ontwerpen van de ontwikkeling voor docenten (Desimone, 2011; Garet *et al.,* 2001; Loucks-Horsley *et al.,* 2003).

- Het management van de universiteit moet inzicht hebben in de lokale context en in de behoeften van docenten en studenten, en kennis hebben van passende literatuur, om het ontwerp en de ontwikkeling van effectieve professionele ontwikkeling van docenten te kunnen realiseren, teneinde op grote schaal e-learning te kunnen implementeren. Het management moet ondersteuning (professionele ontwikkeling, didactische en technische ondersteuning) voor succesvolle e-learning implementatie door docenten herkennen en overwegen.
- Er moet worden benadrukt dat grootschalige implementatie van *Collaborative Course Design* om de invoering van e-learning op grote schaal te ondersteunen voorafgegaan moet worden door een zorgvuldig begrip van de aanwezige mogelijkheden en uitdagingen.