

The Sustainable Implementation of a Master's Programme in IT for Education in a Developing Context

Johannes C. Cronjé

<https://orcid.org/0000-0002-9838-4609>

Cape Peninsula University of

Technology,

University of Pretoria, South Africa

johannes.cronje@gmail.com

Emmanuel Arthur-Nyarko

University of Cape Coast, Ghana

enyarko72@yahoo.co.uk

Palmas Anyagre

University of Cape Coast, Ghana

pany1989@gmail.com

Abstract

This article gives an account of the joint implementation by the sponsor, the host institution and the partner institution of a master's programme in Information and Communication Technology for Education at a leading African university in 2005. The success of the programme was such that it became a flagship programme at the institution. In the context of many failed joint implementations of such programmes, the question that arose and that prompted the writing of this article was, "Why did this programme succeed?" The literature indicates two elements that contribute to successful implementations: the individuals responsible for the course, and the support the institution gives. Interviews with the course coordinator, university administrators, alumni and current students, and an analysis of course documents and students' research output revealed the nature of the activities of certain individuals and also of the institutional support factors that led to the success of the programme. Based on the study conducted, this article provides some suggestions that other implementers of similar projects may find useful.

Keywords: programme implementation; adoption of innovation; e-learning; capacity-building



Introduction

In 2003 the United Nations Educational, Scientific and Cultural Organization (UNESCO), through the International Institute for Capacity Building in Africa (IICBA), selected the University of Cape Coast Centre for Continuing Education in Ghana as one of three sites in Africa to pilot a master's programme in Information and Communication Technology (IT) for Education (MEd). The moderator of the programme was a prominent South African university that was already running a similar programme. In April 2012, the first author visited Ghana to evaluate the MEd (IT) course that he had helped to establish, a project he had undertaken *without ever having been to Ghana*. The two other initiatives had floundered, but here was a vibrant, integrated course that was growing to be one of the flagship programmes of the relevant university. Not only that, the programme was beginning to make a difference in the country as a whole, with graduates being appointed at neighbouring universities and continuing to work on their doctorates. When one project out of three succeeds, the temptation is to concentrate on the two that failed, rather than to interrogate the success of the one that succeeded. This article describes the implementation of the successful MEd (IT) programme in Ghana in the hope that it will assist institutions in other countries (therefore in other contexts) to improve their chances of implementing similar projects that are sustainable in the long term. Two questions drove the writing of this article:

- What were the elements that led to the successful implementation of the course?
- What were the circumstances that led to these elements' contribution to the success of the course?

The key assumption in this article is that the course was indeed successful, an assumption that is based on the positioning of the course on the qualification structure of the university and the fact that it has produced 155 successful graduates over a period of 10 years without any assistance from an external institution. In addition, five of the graduates have since obtained doctoral degrees.

The development of the course started in the year 2000 when Cronjé (the first author) and his university were asked to assist with the development of a master's programme in IT for education at a university in Sudan. In 2006, after having run for a period of six years, the success of the course was substantiated (Cronjé 2006). Towards the end of that project, its sponsor, the IICBA, indicated that it wished to replicate the programme in three other countries. This caused a capacity problem: Cronjé was a full-time professor at a South African university and, likewise, his two colleagues who had co-presented the master's programme in Sudan in their free time, occupied full-time positions at other institutions. They simply did not have the time to replicate their activities at three other universities in Africa. Lack of capacity is a central problem that

the author addressed in the current study, and the question it sought to answer was, “How does one extend the capacity of capacity builders?”

The problem was addressed through following a model according to which the facilitators of the courses at the three participating universities, as well as the sponsoring university, would work jointly on one of the campuses for a period of three or four days. At that time, Cronjé or one of his colleagues presented a specific module to a group of master’s students. Staff members of the three participating universities acted as assistants in teaching the module and participated as much as they could. Thereafter they returned to their own institutions and taught the module to their own students. This process was repeated every three months in rotation on the campuses of the other three participating institutions. The first day was spent de-briefing the students of the particular university on the work that they had done in the interim period, as well as moderating the students’ work that the facilitators from the other two institutions brought along. The next three days were spent on briefing the students and the facilitators on the work to be done for the next module. After 18 months, having completed the coursework, the students wrote dissertations of limited scope under the supervision of their local university staff. The degrees the students obtained were regarded as degrees fully obtained at their own institutions. Each institution registered the qualification according to its own internal practices.

The aim of the course was to build capacity at university level. The rationale was to train novice academics responsible for teacher development in the use of IT for education. After obtaining their MEd (IT) degrees, the graduates (lecturers) were responsible for teacher training in IT for Education at their respective universities. The programme focused on three related professional skills:

- Preparing and producing educational software for various categories of learners and giving relevant input
- Designing and delivering subject matter content on computers to supplement classroom teaching
- Using multimedia to present lessons both directly and online

Literature Review

The purpose of the literature review done for the current study was to determine elements that should be considered when evaluating the design of sustainable university courses in teaching with technology. The review is reflective rather than prescriptive in the sense that the author reflects on the extent to which the experiences of the participants in the project resonate with the findings in relevant literature. The process followed was to control the selection of the literature reviewed.

This article resonates, in particular, with the five trans-region themes identified by Kirschner et al. (2015) and the proposal for a research agenda for IT for Education in developing countries. These authors argue that in addition to access, factors such as methods of teaching and learning, self-efficacy, educational background, age and gender should be taken into account, as well as the usability of the technology. They stress that the use of IT, specifically mobile phones and open educational resources, to improve teaching and learning is more important than studying the technology itself. The value of local context and culture should not be underestimated, and community involvement and teacher training are crucial (Kirschner et al. 2015, 21).

Inter-university collaboration is well known and frequent. Nevertheless, in the early phases of this project the developers took careful note of two reasons why collaborative initiatives may be hard to sustain. The first reason relates to managerial and strategic issues and the second one to operational and technical issues. At a managerial level, it could be because “most educational technology programs across the continent have focused largely on the technology itself and put very little emphasis on the practical implications of the use of ITs to meet broad educational objectives” (Kirschner et al. 2015, 15). At an operational level, one of the reasons for frequent failure may well be that “most academics in higher institutions struggle to shift from traditional teaching and learning strategies to technology-enhanced pedagogy” (Kirschner et al. 2015, 13).

If the first step in developing a sustainable course is to establish the need, then the need for teacher-development programmes in IT for education is very clear. Howie (2010) elaborates on this and makes the following recommendations for the successful integration of computers into school teaching:

- Focus on the teachers and teacher training and not on the technology.
- Use pilot studies to test theories and strategies before going to scale.
- Use existing telecommunications infrastructure where possible before investing in new infrastructure.
- Introduce computers gradually.
- Decentralise technical assistance and training.
- Use robust processes for assessment, monitoring and evaluation.

In Ghana specifically, the lack of good teacher training in the integration into and use of IT in the curriculum has been identified as a problem to be addressed (Agyei 2012).

From a practical perspective, Abell and Long (2010) propose seven actions to ensure that e-learning is an enabling technology for transforming education in Africa:

1. Focus on teachers and communities.
2. Be flexible with hardware choices.

3. Design the solutions for multiple learning environments.
4. Do not just teach computers.
5. Take advantage of the inherent flexibility of e-learning to allow for customised content and expanded usage.
6. Leverage cloud computing to extend learning beyond the classroom.
7. Focus on the actual learning experience.

To implement these actions, Tossy (2014) proposes following an Evolutionary Collaborative Partnership Model (ECPM). The first step in the evolution process involves determining the context of key e-learning drivers, and this is followed by identifying the problem, setting the direction, structuring the process and finally delivering the outcomes. In the section on assessment that follows the methodology section, the article describes the involvement of such a collaborative partnership.

Theoretical Underpinning

The analysis of the findings of this article is based on a set of seven “assumptions” for constructivist learning in higher education across national boundaries that Cronjé (2006, 285, 286) proposed for a similar project. These assumptions are still valid and they are also highly relevant to the current study, in which, in fact, they are expanded.

The assumptions are:

1. The curriculum should be designed in such a way that it provides relevant experiences from which students can construct their own learning.
2. Interpretation is personal and the student’s point of view must be valued, but not at the expense of primary concepts.
3. Active learning tasks should incorporate assessment strategies that determine the extent to which experience has been converted into skills.
4. Multiple collaborative perspectives should focus on primary concepts.
5. The curriculum should be adapted “on the fly” if the real-life situation demands it.
6. Testing should be unobtrusive and focused on determining areas where the student should improve.
7. Administrative flexibility should be designed into the system from the outset.

Method

Following Tossy’s (2014) proposal, the research method employed in this study was a blend of what Plomp and Niveen (2013) refer to as educational design research and what Cooley and Lohnes (1976) describe in their seminal work as evaluation research in education. In essence, the method of the current research comprised developing and

testing an intervention with the purpose of extracting guidelines for future practice. In other words, a model was designed and implemented to produce an educational outcome, after which the success or failure of the resultant educational programme was evaluated. The research followed a mixed method approach, gathering both narrative and numeric data. The latter terms are preferred to the terms qualitative and quantitative as suggested by Plowright (2011). In our attempt to find out why the programme succeeded, we identified narrative inquiry as the appropriate approach since we were interested in “the meanings that people ascribe to their experiences” (Trahar 2009, 2).

The research design followed the ADDIE (analysis, design, development, implementation, evaluation) model that is commonly used in instructional design. This article gives a narrative description of the analysis of the situation that led up to the course and also of the design and implementation of the course itself. Cronjé conducted an external evaluation of the course in 2012, a document analysis in 2014 and an analysis of the pass rates up to the end of 2015 in 2016.

Analysis

The intervention described in this article refers to an 18-month full-time or a two-year part-time MEd (IT) programme. Elements covered in the goal analysis and the target population analysis are listed below.

Goal Analysis

The objectives of the course were to:

1. Prepare educators to be able to design learner-friendly content for learning through the medium of the computer.
2. Train educators to be capable of establishing, managing and maintaining networking systems for schools, districts and regional educational setups.
3. Prepare trainers of personnel in various institutions to carry out techniques of needs assessments and to design relevant computer-assisted training modules for training in both personal-contact and online settings.
4. Prepare educators by building their skills and techniques to produce and use multimedia, including video and television, in teaching and to support classroom learning.
5. Equip educators with the skills to design and operate websites for schools and educational institutions and to use these to supplement teaching and learning.
6. Prepare educators and trainers by giving them the skills to produce educational software and package learning content in compact form for self-learning.
7. Equip educators and school managers with the skills to design and use computer-based learning management systems.

Target Population Analysis

The course targeted five groups:

1. Graduate teachers who run the computer laboratories of their schools
2. Subject teachers who wish to use multimedia in teaching
3. Human resource development and/or academic support staff in all institutions
4. Providers of distance education who wish to embark on the online delivery of learning materials
5. Administrators and/or managers of public and private institutions

Candidates applying for the programme had to have a Bachelor of Education (BEd) degree in any discipline or a bachelor's degree, such as a Bachelor of Arts (BA), a Bachelor of Science (BSc) or a Bachelor of Commerce (BCom), together with a Diploma in Education or a Postgraduate Diploma in Education, and they were required to have attended a computer literacy course in MS Word, Excel, PowerPoint and Access.

Design

The course consisted of coursework and a mini-dissertation. It could be attended as a full-time or part-time course, the former being residential and the latter non-residential. The part-time students attended lectures fortnightly from Fridays at 16:00 to Sundays at 14:00. Full-time students were expected to undertake an 18-month practice-oriented coursework programme (three semesters) whereas the part-time students were expected to do a 24-month practice-oriented coursework programme (four semesters). In addition to the coursework, students had to complete a research study in IT in Education and submit their dissertation reports to the School of Graduate Studies and Research. Submission of a dissertation was a requirement for completing a master's degree. Each student was assigned to an academic counsellor and demonstrators who assisted them on an individual basis to solve academically related issues.

Development

The day-to-day running of the programme took place at the MEd (IT) unit/office. This office was set up right after the programme had been introduced. The office administrator and other administrative staff were responsible for administrative duties and reported directly to the College Provost. The main duties of the MEd (IT) unit or office were twofold: performing MEd (IT)-related functions and managing the College students' records; and rendering IT support services. Fulfilling MEd (IT) roles was the core function of the unit. It was the unit's responsibility to attract prospective applicants for the programme, provide students with the needed support to complete the programme, and assign students to supervisors who could assist them with their research.

Other roles of the unit included the following:

1. Mounting appropriate courses for the semester
2. Helping students with registration
3. Inviting lecturers to teach various courses
4. Assigning courses to lecturers to enter students' scores
5. Assigning students to dissertation supervisors
6. Liaising with the School of Graduate Studies and Research to assign internal assessors to evaluate students' dissertations
7. Assessing students' comb-bound copies of their dissertations
8. Preparing timetables for students and lecturers
9. Maintaining the computer laboratory

Implementation

The courses were mounted at the beginning of every semester. The MEd (IT) programme had a course registration officer and an examination officer. The course registration officer was responsible for mounting the courses and the examination officer was responsible for assigning courses to lecturers after the students had completed the course. The third author has been the registration officer since the inception of the programme.

Most of the lecturers teaching courses on the programme were from different departments within the Faculty of Education. Therefore they had to be invited every semester to teach the courses mounted, and these invitations were in the form of written letters. These lecturers taught various levels of the programme.

Evaluation

This article covers two types of evaluation that were carried out: a formative evaluation of the design, development and implementation of the course (as discussed in the preceding sections), and a summative evaluation of the course consisting of the external review and document analysis (to be discussed next).

The external review of the course was done by the first author who had been the consultant at the inception of the programme. The consultation involved designing the initial curriculum, appointing the external lecturers who would train the facilitators, and teaching some of the courses in the initial phase. After the first two years, the first author withdrew from the project completely, and thus could serve as an external reviewer six years later. The external review involved scrutinising the course documentation such as the 2012 progress report and selected course manuals. In addition, interviews were conducted with the course leader (and third author), four lecturers on the programme, two graduates of the programme, and one student who had recently submitted a thesis

for final review. The director of the centre where the course was offered and the provost of the relevant university were also interviewed. Furthermore, a recently submitted thesis was reviewed. Finally, an overview of the course completion rates until 2015 was conducted in July 2016.

Discussion

The external reviewer's findings in evaluating the MEd (IT) course are discussed in terms of the two research questions.

Question 1: What Were the Elements That Led to the Successful Implementation of the Course?

In the qualitative external review of the MEd (IT) programme, consideration was given to three of the adequacies that Hannafin and Peck (1988) found to be reliable when evaluating a course, namely technological adequacy, curriculum adequacy and pedagogical adequacy. In other words, the questions you should ask yourself are whether you are using the right equipment, teaching the right material, and teaching it the right way. Although Hannafin and Peck suggested this classification years ago, it remains a highly useful one for course evaluations.

Technological Adequacy

The reviewer's finding was that the technological facilities that the course provided were adequate. At the time the evaluation was done, two laboratories were available—one for first-year students and one for second-year students. The number of computers available was more than sufficient (there were almost two computers per student), and the interviews indicated that many of the students had their own laptop computers and Internet devices. Common problems that were experienced included virus infestations over the network and unstable connectivity. Although many students also owned other mobile devices such as smart phones and tablet computers, these were not as commonly used for teaching and learning in 2012 as they are today.

Curriculum Adequacy

The first point in evaluating the course was to look at the course name. The reviewer recommended that the specialisation area of the MEd course should be indicated as information technology (IT), which would allow for the abbreviated course name MEd (IT) and which could double up as standing for MEd in instructional technology. Instructional technology is the preferred American term, but it may not find support in other countries. Therefore, calling it "IT" would satisfy both groups.

The course progress report that the evaluator was given access to focused on three professional skills:

1. Preparing and producing educational software for various categories of learners and giving inputs
2. Designing and delivering subject matter content on computers to supplement classroom teaching
3. Using multimedia in presenting lessons both directly and online

The reviewer recommended that the term “multimedia” used in the third skill should be changed to “computers as processing tools for teaching and learning.” A fourth skill should be added, namely, acquiring the technical know-how to modify, upgrade and maintain computer and networking hardware and software. This skill is essential if graduates of the programme are to be deployed to schools and universities where technical experts may not be available and graduates may have to train them.

To keep abreast of technology, the reviewer recommended the adding of an eighth course objective to the seven already mentioned under the section Goal Analysis, namely, “Teaching in an information-rich environment.” This objective would accommodate the rapid growth of Internet usage and the constantly expanding variety of rich resources that are becoming available. The amended curriculum can now incorporate mobile learning and open educational resources.

The reviewer found that the programme was comprehensive, covering the entire field of computers for education in 12 courses spread over 18 months, and ending off with the writing of a mini-dissertation. There were some instances of overlap between various modules. Some of the modules, such as statistics, although they were presented in the programme’s dedicated computer laboratory, were taught by staff from other departments in the university, with the result that the content taught was generic. As happens with a course run over a long time by enthusiastic staff, the scope becomes too large and students may be over-burdened.

Selected Modules of the MEd (IT) Course

Computers in Education and Human Development

As the title implies, the module covers a very broad spectrum of applications, from pre-school to university and to adult education and training. The coursework can also be updated quickly should the technology change. Given the rapid advances in tablet technology, smart phones and cloud storage, changing the module name to Technology for Education and Human Development could be considered. The content of the module includes sections on the history of educational computing, leaders in the field, and the “future” of computers in education. The module serves as an introduction to the whole programme. Aspects such as theory and research, behaviourism, constructivism, criteria for evaluation and text pictures are revisited in later modules.

Programming Language for Education 1

This course teaches Visual Basic. It is a challenging course, but the students like it very much. Unfortunately, the exercises given to the students come from a generic programming text book and the students are asked to design a database for an imaginary clothing manufacturer. With a little creativity this could be changed to a database that would be relevant to educators. The students mentioned that they wanted more instructor support in this course. Given that good programmers tend to teach themselves, students could rather be taught how to access appropriate self-teaching materials on the Internet, such as codecademy.com.

Learning Theory for Computers in Education

This module focuses on behaviourism and computers, cognitive learning and computers, as well as constructivism and computers. In the opinion of the reviewer, the module does not deal comprehensively enough with the computer as an information processor and with the relationship between computers in education and information processing models of learning. Generally, it needs a specific section on when to apply which theory for the optimal use of technology.

Modalities of Technology for Teaching and Learning

Two publications serve as a basis for this module: chapters on tutorials, drills, simulations and games in the publication of Alessi and Trollip (2001); and certain sections in the publication of Hannafin and Peck (1988). These works have remained classics in the field and it is a pity they have not been updated as yet. The module could benefit from more recent work, educational online games in particular, and, viewed from a theoretical perspective, Kress and Van Leeuwen's (2001) work on multimodal discourse analysis may be of use to students in the dissertation phase.

Assessment Strategies

This is a well-structured generic module that is presented throughout the Faculty of Education. It contains enough statistical theory to accommodate students who do not select the optional statistics module. Nevertheless, in a programme dealing with computers in education the reviewer found that too little attention was given to computer-based testing, specifically multiple-choice testing, including item analysis (difficulty level and discrimination index) and computer-adaptive testing. Inclusion of these elements would be useful for mainstream students too.

Research Methods

This is another institution-wide module. Unfortunately, it is presented in the first year, while the students really need the content—and the guidance that it could provide—when they write their mini-dissertations at the end of the second year. As postgraduate students they will already have been introduced to research methods and proposal

writing at senior undergraduate level. The assessment module also covers quantitative and qualitative methods. Finally, the module only took the students to the level of preparing their proposal and it did not give them support during the difficult phase of managing the project of actually conducting the research. Failure to complete the dissertation remains the major obstacle to programme completion and subsequent graduation.

Instructional Design and Development

The module in instructional design draws heavily on the work of Alessi and Trollip (2001), which is hardly surprising, since Stan Trollip presented an instructional design workshop to the module facilitators in South Africa in 2005. The module has remained more or less unchanged from the one that was presented at all the institutions that participated in versions of the master's programmes that Cronjé has facilitated over the years.

Systems and Aids for Computer-Assisted Education

This module used to cover authoring packages and expert systems, but the content was being replaced with a section on learning management systems such as Moodle, as well as the use of mobile devices for education.

IT in Distance Education

Given that this module carries the same name as the course itself, it is not surprising that it has received high priority. It covers concepts and contexts of distance learning as well as the scope of distance education. It gives much attention to various technologies relevant to distance education, from printed texts to posted CDs and from radio and television broadcasts to the Internet. It further covers course design and development for various media, as well as the roles and responsibilities of instructors and students in distance education. Once again, this is a generic module that is open to all students in the Faculty of Education, and the module is enriched by the presence of both MEd (IT) and Education students as it gives them the opportunity to benefit from interacting with students outside their own group.

Information Technology for Schools

The reviewer found the description of this module confusing. It seemed as if the students were to be taught *both* how to develop software for schools *and* to develop strategies for the implementation and management of computers in schools. The reason for including both these aspects could be traced back to a two-day conference on computers in schools that all the facilitators attended in Khartoum, Sudan in December 2004. The first day of the conference focused on aspects regarding strategies for implementing computers in schools, and the second day focused on operational issues demonstrating software that could be useful in schools. As a result, this specific module was built around the issues considered at the two-day conference on computers in schools.

In addition to the ten modules described above there are two modules that fall outside the scope of this article as they are presented by contractors from other departments. These modules are The Design of Computer Networks for Education, and Programming Languages 2, which comprises Java and PHP. Also on the prospectus are modules in video and hypermedia in the classroom and object-oriented programming, but these modules have not been presented owing to resource constraints.

The Thesis

The theses that the reviewer evaluated were of an international standard. The non-completion of a thesis is the single largest deterrent to completing the master's qualification. A cohort approach could be followed to solve this problem: students could be guided through the various stages of the thesis, from the proposal, literature survey, data collection and analysis to the final writing up.

Another matter that could pose a problem is that the Faculty might not recognise as research the type of research work the students want to do. The paradigm of design research may provide a useful solution. Design research implies that one designs a product of sorts and then researches the various elements involved in that design. A typical research question for this kind of investigation would be, "What problems arise when one designs solution X, and how are they best addressed?"

Pedagogical Adequacy

Interviews with students and staff revealed that the course maintained a good balance between practical work (programming, databases and spreadsheets) and theoretical work. Lecturers mainly presented the theoretical work instead of asking the students to be presenters or to debate topics.

The progress report mentioned that in some modules feedback took a long time. This the students confirmed in the interviews, pointing out that there were a few junior staff members, particularly from service departments, who were clearly not motivated to present the master's course in IT for Education, and who sometimes even did not arrive for the lectures they were supposed to give. This was borne out by some of the senior lecturers and professors on the course.

Enrolment and Graduation Statistics

The programme started in November 2005 after receiving a late approval from the Academic Board of the relevant university. An initial number of 11 students, comprising 10 males and one female, did the full-time component of the programme of 18 months of coursework (three semesters and one year research). For the part-time component, 15 students (14 males and one female) were admitted. The part-time students had to do 24 months of coursework (four semesters) as they took three modules a semester instead of five. Table 1 shows the breakdown of students admitted per year.

Table 1: Distribution of MEd (IT) students, 2005–2015

<i>Year</i>	<i>Full-time</i>		<i>Part-time</i>		<i>Total</i>
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>	
2005/06	10	1	14	1	26
2006/07	11	3	18	2	34
2007/08	6	2	25	4	37
2008/09	17	1	30	0	48
2009/10	16	2	18	1	37
2010/11	8	1	16	4	29
2011/12	-	-	15	3	18
2012/13	13	0	20	2	35
2013/14	10	3	25	5	43
2014/15	16	3	19	3	41
2015/16	4	2	23	3	32
Total	111	18	223	28	380

As indicated in Table 1, out of a total of 380 students enrolled on the programme since 2005, 129 (33.9%) were full-time students whereas 251 (66.1%) were part-time students. The highest number of students (48) enrolled for the 2008/09 academic year whereas the lowest number (18) enrolled for the 2011/12 academic year. The full-time component of the programme was not mounted in 2011/12 due to the low number of applicants. Table 1 shows that most of the students ($n = 334$, 87.9%) enrolled were males and that 46 (12.1%) were females. Though the female enrolment is not encouraging, much is being done to ensure we achieve at least a 30 per cent female enrolment in the next academic year.

Table 2 covers the course's graduation statistics from 2009 to 2015.

Table 2: Graduation statistics

<i>Year</i>	<i>Graduation by coursework</i>	<i>Graduation by research</i>	<i>Total</i>
2009	-	4	4
2010	-	3	3
2011	-	4	4
2012	-	34	34
2013	No graduation		
2014	33	44	77
2015	7	26	33
Total	40	115	155

As indicated in Table 2, the first students on the programme graduated in 2009—there were four students and all of them graduated by research. In 2010 and 2011, the number of students who graduated was three and four respectively, all by research. The number of graduates shot up in 2012 but dropped to zero in 2013. The following year the number of graduates increased to 77 (33 graduating by coursework and 44 by research). In 2015, 33 students graduated (seven by coursework and 26 by research).

Question 2: What were the circumstances that led to these elements’ contribution to the success of the course?

As was mentioned in the introduction, successful implementation rests with the individuals responsible for the course, and the support that the institution gives.

The Individuals Responsible for the Course

The individuals concerned included the management and representatives of the sponsor (UNESCO-IICBA), the facilitators from South Africa, the course co-ordinator at the local university, the support staff and the students. All those involved shared the following characteristics: a clear vision of what was to be achieved and why; the drive and dedication to see it through; knowledge of the field and the specific academic environment; available time to see the programme through; and enough flexibility to deal with the inevitable delays and frustrations that such an enterprise could entail. UNESCO-IICBA and its representatives had already witnessed the successful presentation of the course at the university in Sudan, therefore they knew what aspects they wished to scale up. They also knew that the mode of blended course delivery that had been followed had worked well. Their vision was clear and implementable. They

knew the field of IT in education for developing countries, and they were familiar with the academic structures of the host university. They appointed an academic who had been involved with the process for some time as a consultant to assist with driving the process. This facilitator, having been involved with similar projects before, was able to adapt plans at very short notice to accommodate the various delays and sudden changes of direction that inevitably occurred.

The South African team had successfully presented the course in Sudan, and had developed a relationship with the UNESCO-IICBA staff. The team had proved that they had the vision of how to make a success of the course, and they had the desire to make it happen. All of them had participated in teaching the South African and Sudanese versions of the course and therefore were familiar with the content and the delivery style. Their experience of previous courses both in South Africa and in Sudan allowed them to develop the required flexibility. Existing memoranda of understanding between the various institutions as well as the modular nature of the course ensured that staff had adequate time to do the required work. The block-release model followed for the course meant that when presenters were working on a given block they were dedicated entirely to that activity. For the implementation of the course at the university in Ghana, the course coordinator and support staff members were purposively selected based on their enthusiasm, dedication and seniority. They were familiar with the processes at the university, and they were given a specific time to do the required work. Other staff members were invited to teach on the course within their own fields of speciality. Finally, the students on the course were selected based on their past performance and their career preferences. Furthermore, they shared the view that there was a need for the course, that they had to perform well, and that they would derive value from completing such a course. They were full-time students and thus able to dedicate their time to the course.

Institutional Factors

Three institutions supported the project: the sponsor, the local university and the supervising university. UNESCO-IICBA provided financial and moral support, and their enthusiasm for wanting to see the project succeed was contagious. The local university found that the course was so closely aligned with its own vision and mission as a distance university that its implementation would contribute to the institution's internal capacity building. The supervising university in South Africa had a strong desire to increase its reach into Africa as part of its internationalisation process.

Conclusions and Recommendations

The conclusions and recommendations are discussed in relation to the seven assumptions of Cronjé (2006) mentioned in the section Theoretical Underpinning.

The curriculum should be designed in such a way that it provides relevant experiences from which students can construct their own learning.

The constructivist design of the curriculum of this course allows students to bring their own experiences to the course. The curriculum is not restricted to a particular technology, field of study or educational level. Students are encouraged to raise their practical problems in class and find academic solutions, which are then regarded as part of the course.

In the case of the research methods module, the fact that it is presented in the first year of study and not in the second year when the students will be writing their theses, means that the element of relevance is reduced. Nevertheless, every course module contains some elements relating to research.

Interpretation is personal and the student's point of view must be valued, but not at the expense of primary concepts.

The module Programming Language for Education, demonstrates that a clash can occur between students' learning needs and the institution's need to provide a one-size-fits-all solution.

Generally, however, the combination of course-specific modules and faculty-wide or institution-wide modules allows for a balance between primary concepts and students' points of view.

Active learning tasks should incorporate assessment strategies that determine the extent to which experience has been converted into skills.

Ironically, active learning strategies are built into the course-specific modules, whereas the actual module on assessment is presented as a generic course with very little active learning or authentic assessment.

Multiple collaborative perspectives should focus on primary concepts.

The module on IT for distance education is an example of the incorporation of multiple collaborative perspectives into a generic offering, allowing the students from the MEd (IT) course to interact with students enrolled in other programmes in the Faculty of Education and to obtain multiple perspectives of the primary concepts of distance education.

The curriculum should be adapted "on the fly" if the real-life situation demands it.

In the module on systems and aids for computer-assisted education there is evidence of the adaptation of the curriculum to keep pace with developments: authoring packages and authoring systems are being replaced by the use of Moodle open-source learning

platforms and mobile devices. In a course on technology it is essential that curriculum renewal occurs constantly to embrace technological advances.

Testing should be unobtrusive and focused on determining areas where the student should improve.

In the more practical modules of the course, testing is indeed unobtrusive as it usually involves the assessment of authentic tasks. Furthermore, the use of written assignments assists to keep high-stakes testing to a minimum. Ironically the most obtrusive testing occurs in the module about testing and assessment.

Administrative flexibility should be designed into the system from the outset.

The fact that the university in Ghana incorporated the course into its own structures allowed for administrative flexibility since there was no need to make exceptions.

The use of an experienced course coordinator who knows the processes is a great advantage, as is the use of experienced guest facilitators who know the course and have learnt to be flexible but to accommodate administrative inflexibility where they come across it.

Finally, a dedicated course administrator allows for adequate administrative flexibility.

Recommendations for Other Implementations

The greatest strength of this course and the driver behind its success lie in the high degree of ownership the host institution has accepted. The course was never seen as an add-on to existing courses, nor was it seen as a course imposed from outside. Other institutions wishing to embark on similar developments could consider the following four elements to make their ventures successful:

1. A dedicated, highly motivated local course coordinator, a budget that is sufficient and administrative support;
2. Strong institutional support and the direct involvement of the provost's office from where the project is driven through the institutional bureaucracy;
3. Close collaboration between the financial sponsor, the host institution and the partner institution; and
4. Experienced and flexible staff who are able to innovate on the fly when things go wrong.

References

Abell, T. E., and T. Long. 2010. *eLearning in Africa : Transforming Education through Enabling Technologies*. Johannesburg: Accenture. Accessed June 23, 2015.
http://www.accenture.com/SiteCollectionDocuments/Accenture_Africa_eLearning.pdf.

- Agyei, D. D. 2012. *Preparation of Pre-service Teachers in Ghana to Integrate Information and Communication Technology in Teaching Mathematics*. Enschede: University of Twente.
- Alessi, S. M., and S. R. Trollip. 2001. *Multimedia for Learning: Methods and Development*. Boston, MA: Allyn and Bacon.
- Cooley, W. W., and P. R. Lohnes. 1976. *Evaluation Research in Education*. New York, NY: Halsted.
- Cronjé, J. C. 2006. "Pretoria to Khartoum—How We Taught an Internet-Supported Master's Programme across National, Religious, Cultural and Linguistic Barriers." *Educational Technology and Society* 9 (1): 276–88.
- Hannafin, M. J., and K. L. Peck. 1988. *The Design. Development and Evaluation of Instructional Software*. New York, NY: Macmillan.
- Howie, S. J. 2010. "ICT-Supported Pedagogical Policies and Practices in South Africa and Chile: Emerging Economies and Realities." *Journal of Computer Assisted Learning* 26 (6): 507–22. <https://doi.org/10.1111/j.1365-2729.2010.00377.x>.
- Kirschner, P. A., J. Boon, J. Janssen, F. Prinsen, S. McKenney, L. Kester, S. Stoyanov, W. Westera, M. Specht, M. Laat, M. Kalz, and H. Drachsler. 2015. *New Learning Opportunities in a Networked World: Developing a Research Agenda on Innovative Uses of ICTs for Learning and Teaching*. Heerlen: Open University of the Netherlands, Welten Institute.
- Plomp, T., and N. Niveen. 2013. *Educational Design Research*. Enschede: Netherlands Institute for Curriculum Development.
- Plowright, D. 2011. *Using Mixed Methods: Frameworks for an Integrated Methodology*. Thousand Oaks, CA: Sage.
- Tossy, T. 2014. "Evolutionary Collaborative Partnership Model (ECPM): The East African E-learning Provider's Project-Based Legitimization Strategy." *International Journal of Computing and ICT Research* 8 (1): 37–48.
- Trahar, S. 2009. "Beyond the Story Itself: Narrative Inquiry and Autoethnography in Intercultural Research in Higher Education." *Forum: Qualitative Social Research* 10 (1): 20. <https://doi.org/10.17169/fqs-10.1.1218>.