Computers in Human Behavior 26 (2010) 1795–1805

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

A proposed model for evaluating the success of WebCT course content management system

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ARTICLE INFO

Article history:
Available online 11 August 2010

Keywords:
E-learning
WebCT
Course content management system
Information system success
Information communication technology (ICT)
Botswana

ABSTRACT

WebCT is an online course management system which is accessed through the portal. It has a wide range of tools which support teaching and learning and enable online delivery of lecture notes, representations, surveys and quizzes, coursework, discussion boards and much more. Evaluation of WebCT systems success or effectiveness is a fundamental challenge to education institutions. A review of previous e-learning research suggests a focused evaluation approach, thus offering limited discussion of comprehensive views of WebCT systems success or systematic and practical guidance to its evaluations. Based on a prevalent information systems success model, this paper proposes and describes a revised model for evaluating WebCT systems success in educational settings. The study findings suggest that content quality, system quality, support service quality, teaching and learning quality, self-regulated learning, intention to use/use, user satisfaction and net benefits are important factors for evaluating the success of WebCT CCMS. Implications of the proposed model for theory and practice were illustrated. In addition, future research directions that extend the reported study are also preferred.

1. Introduction

The use and adoption of WebCT is gaining popularity in higher education the world over (Al-Ayyat et al., 2004).

WebCT course content management system is a class of information system that manages teaching and learning. It is a system developed to support and enhance the organizational processes of content creation, storage and retrieval, transfer, delivery and application. It is an integrated, user–machine system for providing information or content to support teaching and learning operations, management, analysis and decision-making. Based on these actions, it is thus clear that WebCT is similar to early information system ideas as defined by Delone and Mclean (1992, 2003), Davis and Olson, 1985). These authors posit that, "information system collects, transmits, processes, and stores data on an organization's resources, programmes, and accomplishments. The system makes possible the conversion of these data into management of information for use by decision makers within the organization and thereby produces information that supports the management functions of an organization" (Davis & Olson, 1985, p. 30). WebCT evaluation is recognized as one of the problematic issues that can be interpreted in many different ways. However, it is generally accepted that the evaluation of information systems is complex. In essence, multiple, interrelated success dimensions from both a stakeholder and technical perspective are more likely to capture changes in performance than one single item or even a set of financial measures (Segars & Grover, 1998).

Ferguson, Hilder, and Kelly (2005) have pointed out that one hardly needs to labour the point that information systems evaluation is a critical activity. Given the overwhelming scope and emergence of course content management system in the e-learning environment, it is important for information system professionals to develop the means to evaluate this new service and delivery system. As observed by Ferguson et al. (2005), there has been considerable research into the evaluation of information systems. The considerable financial investment by organizations in information systems underlines the importance of evaluation by IS researchers and practitioners (Saarinen, 1996, p. 103). Evaluation occurs twice in the traditional structural systems analysis and design approach: first, in the feasibility phase in which an attempt is made to establish the likely impact and cost, and, second, in the form of a post-implementation evaluation, which is an attempt to measure the impact the system has actually had (Serafeimidis, 2002, p. 172; Smithson & Hirschheim, 1998, pp. 160–163). This second approach focuses on issues of whether the project was delivered on time, whether the budget was enough and whether it met the specifications (Smithson & Hirschheim, 1998, p. 162). The second approach to evaluation of information systems indicated above is chosen for this study. This is because it is an attempt to measure the benefits of WebCT course content management system after

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doi:10.1016/j.chb.2010.07.007

implementation to determine its success in terms of its actual benefits on the primary consumers who are the students.

Studies on course management systems or e-learning in general have largely focused on online course content creation; proportion of students using online content, online content development, securing content, the quality of content online, the management of students marks and course materials (Educause Center for Applied Research, 2003; Eyitayo, 2005; Leem & Lim, 2007; Lowe & Kaplan, 2007; Morgan, 2003). Despite the increasing use of course content management systems for teaching and learning, little attention has been given to examining issues of its evaluation, which are central to e-learning implementation (Drury, 1998; Gatian, 1994). A limited number of studies have evaluated course content management systems in e-learning environments. The evaluation of course content management systems deserves special attention because it might be regarded as a contemporary information system whose evaluation has not been sufficiently reported in the literature (Zacharias, Vasslopoulou, & Poulymenakou, 2002). Seddon (1997) observes that limited studies have attempted to use a high profile IS model such as the Delone and Mclean IS success model as a lens to evaluate the success of e-learning-course content management systems. Most of the information system success models that have been used to determine information system success are borrowed from Delone and Mclean success model; but the number of studies addressing evaluation or success of e-learning systems are relatively small (Quinn, Alem, & Eklund, 2005; Squires & Preece, 1999).

The key issues that arise which are part of what this study addressed include limited studies that have used Delone and Mclean IS success model to evaluate e-learning course content management success. Generally, the focus has been on other information system success and not WebCT course content management system success. Moreover, previous studies have focused more on the output of information system and not on the output of course content management system.

As pointed out by Wang, Wang, and Shee (2007), the success of e-learning system in general and WebCT in particular cannot be evaluated using a single proxy construct (e.g., user satisfaction) or a single-item scale (e.g., overall success). In the light of this, an empirically tested model that identifies the dimensions of a WebCT system success construct can be of great value to the researchers, educational stakeholders, e-learning administrators and practitioners. The proposed WebCT system success model can enable researchers to identify various aspects of WebCT system success and investigate the causality between the success of the WebCT and it drivers. Practioners can employ it in the post-implementation phase as an evaluation mechanism to assess whether the objectives behind WebCT implementation are achieved.

The IS success model by Delone and Mclean (2003) has emerged to be a dominant framework for system evaluation research. Based on this particular model, this paper proposes a model for evaluating WebCT course content management systems success in educational setting.

2. Literature review and research motivation

WebCT is an interactive tool that instructors often use to deliver course information and material online. It is frequently used for online classes but other types of classes (e.g., televised of tape-purchase) often include online components that use these tools (University of Houston, 2003). Instructor may rely on WebCT to communicate with students, deliver course materials, administer examination or hold group sessions online and to create stand alone website.

Morgan (2003) observed that course content management systems (CCMS) are hard to define in part because they are evolving so rapidly that it is difficult to pin down what they are. Course content organization and management are facilitated through the use of course content management system (CCMS). E-learning is an overarching concept that covers among other things course content management systems, organization of learners, teachers 'interaction with learners, content design and development. E-learning has attracted attention of stakeholders (researchers, practitioners, educational institutions and corporate institutions) for many years. Many universities have published their white papers and action plans to foster ICT supported learning in traditional learning situation, in distance learning or the combination of both (Salmon, 2000). The University of Botswana defines e-learning as the appropriate organization of information and communication technologies for advancing student-oriented, active, open, collaborative and life-long learning process (UBel, 2002). There are previous relevant studies on e-learning system success in general, though these are limited. Wang et al. (2007) measured e-learning system success in an organisational context with a scale development and validation. They presented evidence of the scales factors including structure, reliability, content validity on the basis of analyzing data from a sample of 206 respondents. They empirically revealed and emphasized the importance of a system quality variable as a determinant of the success of an e-learning system. Based on the results of their study (Wang et al., 2007) encouraged e-learning managers to include the measure of system quality in their evaluation techniques of e-learning system success. Theoretical and managerial implications of the results of the study were discussed.

Wang (2003) perceives current models for measuring user satisfaction and students evaluation of teaching effectiveness as inapplicable as they target primarily either organization information systems or classroom education environment. In the light of this, they developed a comprehensive model and instrument for measuring learners' satisfaction with asynchronous e-learning systems. The procedure used in conceptualizing the survey, generating items, collecting data, and validating the multiple item scale were described. They examined evidence of the reliability, content, criterion, convergent, discriminant and nomological validities by analyzing data from a sample of 116 researchers. The norms of the instrument were then developed and the potential applications for practitioners and researchers were explored. Pituch and Lee (2006) conducted a study on the influence of system characteristics on e-learning use and tested alternative models that seek to explain students' intention to use course management system when used as a supplementary learning tool within a traditional class or a stand-alone distance education environment. Participants in the study consisted of postsecondary students who had completed basic computer literacy classes at a college in Taiwan and were currently enrolled in another computer course. The models integrated determinants from the well established technology acceptance model as well as system and participant characteristics cited in the research literature (e.g., Davis, 1989; Delone & Mclean, 2003; Rogers, 1995; Seddon, 1997). Following a demonstration and the use phase of the e-learning system, data were collected from 259 college students. A structural equation modelling provided better support for a model that hypothesized stronger effects of system characteristics on e-learning system use. The implications for both researchers and practitioners include the fact that the perception of users on ease of using an e-learning might determine their intention to use such a system.

The implication of these findings on this study is that the users' intention to use WebCT system can enhance the use of the system. In this regard, the intention to use is considered as one of the variables to determine the success of WebCT system in this study. Benson and Palaskas (2006) conducted a WebCT Vista pilot study

which involved a small structured trial of the training, support, administrative and technical service in the first Semester in 2004. The study involved 15 units of study made up of 1600 students, primarily studying on campus, at four out of the six University's Victorian campuses in Australia. An expanded trial in the second Semester involving 80 units across nine faculties with approximately 5500 students across all campuses (including Malaysia and South Africa) studying on campus, off campus or offshore were also involved. The study draws on two cycles of evaluation as *WebCT Vista* was introduced and piloted, highlighting the key issues that emerged from the evaluation. These issues are considered in the context of a selected model for examining the adoption and diffusion of information and communication technologies (ICTs) in higher education, with a view to analyzing the outcomes of the initiative and guiding future planning. The findings indicate that the use of WebCT is increasing among both staff and students and many academic staff are now delivering their course via WebCT. The theoretical and methodological implications of these findings to the present study are that a model was advocated for examining the adoption and diffusion of information communication technology in higher education and to analyse the outcomes of the initiative; just like there is need for a model for the evaluation of WebCT CCMS success. This study was a response to this advocacy by adapting and modifying aspects of IS success model by Delone and Mclean (2003) so as to propose a model to evaluate WebCT CCM system.

The literature reviewed has shown that little research has been carried out to address the evaluation of the success of WebCT system within organizations, particularly in education (e.g., Kerrey & Isakson, 2000; Zhang & Nunamaker, 2003) using Delone and Mclean model. And those that exist have been undertaken largely in the context of the developed world, particularly among corporate organizations.

3. Overview of Delone and Mclean information system success model

Delone and Mclean's IS success model (Delone & Mclean, 1992) (see Fig. 1) has received much attention among IS researchers, as it provides a foundation for research in the CCMS domain. This model identifies six interrelated dimensions of IS success. It suggests that the success can be represented by the system quality, the output of information quality, consumption (use) of the output, the user's response (user satisfaction), the effect of the IS on the behavior of the user (individual impact), and the effect of the IS on organizational performance (organizational impact). This model provides a scheme for classifying the multitude of IS success measures and suggests the temporal and causal interdependencies between the six dimensions. There is no doubt about the fact that Delone and Mclean's original IS model has contributed a lot to the evaluation of information system in IS research. However, some weaknesses of the model have been noticed by researcher. For instance, Seddon (1997) argues that Delone and Mclean have "attempted to combine both process and causal explanations of IS success in their model. Seddon proceeds further to say that after working with this model for some years, it has become apparent that the inclusion of both variance and process interpretations in their model leads to so many potentially confusing meanings" (Seddon, 1997, p. 240). He argues for the removal of "systems use as a success variable in the causal success model", claiming that "use is a behavior, appropriate for inclusion in a process model but not in a causal model". Moreover, use must *precede* impacts and benefits, but it does not *cause* them. Because of these criticism, Delone and Mclean came up with a modified version in 2003 (see Fig. 2). The categories of the updated model are system, information, and service quality, intention to use, use, user satisfaction, and net benefits (Delone & Mclean, 2004). Delone and Mclean added service quality (e.g., IS support) as one important dimension. In addition, they added intention to use as an alternative measure of "use because an attitude is worthwhile to measure in some context. Finally, they combined Individual and Organizational Impact into one dimension, named net benefits; to broaden the impacts of IS to cover groups, industries and nations, depending on the context.

Several researchers have made attempts to extend or modify the D&M model. For example, Livari (2005) tested the IS success model by using a field study of a mandatory information system with Oulu City Council in Finland. The council was working on the adoption of a new information system and trying to accomplish its organizational acceptance. The study concluded that the perceived quality of the system and perceived information quality were significant predictors of user satisfaction with the system, but they did not matter to the user of the system. User satisfaction was a strong predictor of individual impact. Bryd, Thrasher, Lang, and Davidson (2006) examined the influence of lower-level intangible IS and information technology (IT) benefits on higher-level financial measures. They also introduced an IS quality plan as an antecedent to the models input variables. They supported a process-oriented view of the benefits from IS and showed how the effects of IS along a path that can lead to a better organizational performance, in their case, lower overall costs.

Lai, Yang, and Tang (2006) attempted to extend the Delone–Mclean model by adding a new concept, dependability. To test their new concept, they conducted a questionnaire survey in internationalized companies in Taiwan. In their study, Lai et al. had questions that were related to information quality (IQ), system quality (SQ), dependability (DEP), perceived usefulness (PU), user satisfaction (US) and intention to use (IU). They found that SQ had the largest total effect on DEP, PU and IU. Their findings imply that when dealing with enterprise applications, system quality can help to build users' beliefs regarding dependability, satisfaction, and intention to use. From efforts to extend D&M model, empirical and theoretical literature suggest that different

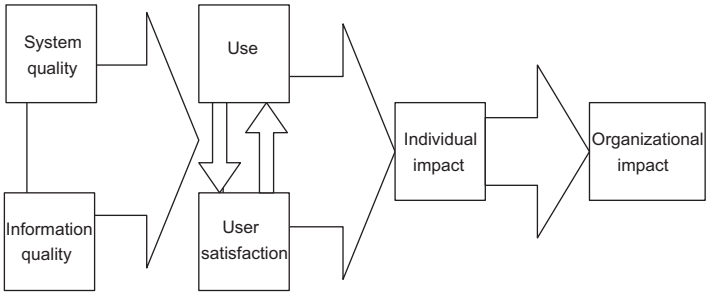

Fig. 1. The original information system success model by Delone and Mclean (1992:87).

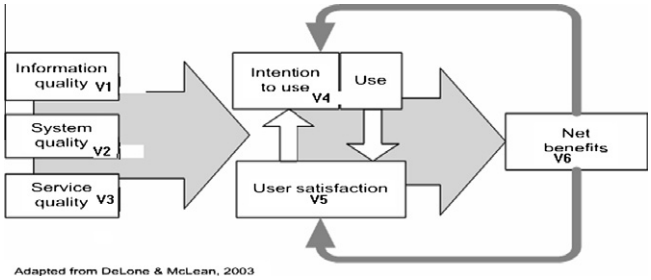

Fig. 2. The updated information system success model by Delone and Mclean (2003:24).

variables and factors influence the success of various information systems including system quality, information quality, services quality, user satisfaction, use/intention to use, individual and organization impact. This study adapted the generic framework of the updated Delone and Mclean information system success model, and customized it to the context of WebCT systems. On this note, the next section discusses the proposed research model for this study and shows how variables are adapted and modified and how the reviewed Delone and Mclean updated information system success model is used in this study.

4. Proposed research model for this study

Research on assessing the evaluation of information systems has been ongoing for nearly three decades (Hussein, Abdu-Karim, Mohamed, & Ahlan, 2007). However, the scope and approach of these IS evaluation studies has varied greatly, with little consensus on measures of IS success, thus complicating the comparison of results across studies and confounding the establishment of a cumulative research tradition (Gable, Sedera, & Chan, 2003). This study adapted and extended further the updated Delone and Mclean IS success model. The study focused on the evaluation of WebCT course content management systems at the University of Botswana within the context of information systems research. The study was done in the light of the need to search for the appropriate model to evaluate the success of course content management systems. As has been demonstrated, many studies have attempted to extend the Delone and Mclean original IS success model, to overcome the shortcomings of the use construct while, others have done so to suit the context in which their studies have been conducted. The current study attempts to adapt and extend the updated Delone and Mclean IS success model to evaluate the WebCT course content management systems at the University of Botswana. This kind of studies find support in Wu and Wang (2006) who argues that, although Delone and Mclean proposed an updated conceptual IS success model, it clearly needed further validation before it could serve as a basis for the selection of appropriate IS measures. In this study, success measures (e.g., teaching and learning quality and learners" self-regulation) have been added to the updated Delone and Mclean model to capture the phenomenon under study in an education setting/context. Teaching and learning quality is added to the constructs based on the fact that researches have proved over the years that technology enhances and improves teaching and learning (ECAR, 2003; Morgan, 2003; US Department of Education, 2007) This study therefore intended to find out if the quality of teaching and learning in an e-learning environment could determine the success of WebCT course content management system at the University of Botswana. Besides, students self-regulated learning is added, based on the observation that students utilise applications to construct more complicated meanings (Niederhauser and Stoddart (2001). Based on the foregoing and the

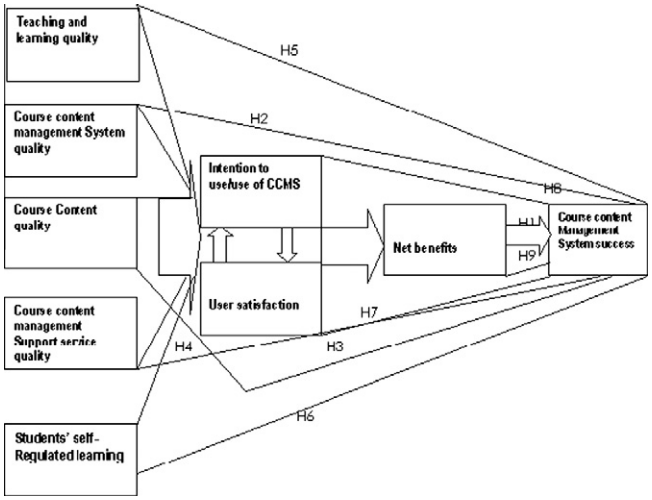

Fig. 3. The proposed WebCT course content management system success model.

updated Delone and Mclean's (2003) IS success model, a research model for this study is developed as shown in Fig. 3.

The independent variables are CCM system quality, Course content quality, CCM support service quality, teaching and learning quality, student self-regulated learning, intention to use/use, user satisfaction, and net benefits. The dependent variable, on the other hand, is course content management system success. Each of the variables in the research model is discussed as follows:

4.1. System quality (V1, modified variable)

This variable is taken directly from Delone and Mclean (2003) and refers to an overall quality of hardware and software of WebCT CCMS and to the elements of a system that affect the end user in the way they interact and use a system. A system quality in this study refers to the elements of course content management system that affect students at the University of Botswana in the way they interact and use course content management system. The quality of course content management system was determined by the degree of the availability of the system on request; reliability; how CCMS is error free; response time; and the time taken to respond to the user's request (e.g., download time)

4.2. Course content quality (V2 modified variable)

The course content quality is defined as the judgment by (the students) of the degree to which course content management systems are provided with valuable content, with regard to the defined needs of the students. The quality of course content is measured by its timeliness, relevance of course content to students' needs, usefulness to students, accuracy, importance, availability, and completeness. In this study; content quality is used because the output of course content management system is the content it produces. Therefore, content is used instead of information.

4.3. Service quality (V3, modified variable)

Service quality is considered as the overall support delivered by the CCMS service provider or support rendered to the students in the CCMS environment or platform. It applies regardless of whether this support is delivered by the IS department, CCMS support team, a new organizational unit, or outsourced to an Internet service provider (ISP).

4.4. Learning and teaching quality (V4, added variable)

This variable is concerned with an improved quality of teaching and learning as perceived by the students. This is because the core business of course content management system is learning and teaching. In this study the teaching and learning quality was used to mean the improvement in the way courses are delivered, through CCMS platform and the quality of tutors' interaction with the students on the platform. This will be measured by the perception of users (students) in terms of learning and teaching improvement on a five points scale.

4.5. Learners' self-regulated learning (V5, added variable)

Schunk and Zimmerman (1994) defined self-regulated learning as "the process whereby students activated and sustained cognitions that are systematically oriented toward an attainment of their goals". Cognitive self-regulation can be taught to students (Hwang & Liu, 1994). In self-regulated learning, students are guided in order to play an active role in learning, become self-organized, independent, and actively participate in the learning process to construct their knowledge (Vovides, Sanchez-Alonso, & Nickmans, 2007). In the context of this study, self-regulated learning is defined in as the way learners actively participate and take decisions regarding their learning. Students' self-regulated learning is considered as one of the CCMS success factors because it is critical for measuring success of a system in educational context.

4.6. Intention to use/use of course content management system (V6, modified variable)

This construct is concerned with issues such as the amount of hours spent on using the course content management system by students. The use of course content management system was examined using both objective and subjective measurements. Objective measurements concentrated on the behavioral aspect of the system. Besides, attitudinal measurements related to technology acceptance such as perceived system usefulness, ease of use, ease of learning, convenience of access, and user support were also considered. The intention to use is known to be a strong predictor of information system use in IS research (Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003) high intention to use is more likely to lead to high CCMS use, and then in turn increase net benefits and eventually success of CCMS. This variable was assessed using indicators such as motivation for use, nature of use (voluntary and mandatory), frequency of use, access and availability.

4.7. Users satisfaction (V7)

This construct is concerned with perceptions of satisfaction by the students in terms of individual outcomes on a pleasant-unpleasant continuum (Naylor, Prichard, & Ilgen, 1980). User satisfaction in this study refers to the degree to which an individual user is satisfied with his or her overall use of the course content management system under consideration. Collective findings from prior IS research has suggested that user satisfaction is a strong and critical manifestation of a system's success (Delone & Mclean, 1992, 2003).

In this study, user satisfaction was measured using the modified user satisfaction scale where users (students) indicated how satisfied they were using CCMS at the University of Botswana upon a five point scale. Indicators that were used to measure satisfaction included relevance, dependability, accuracy, usefulness, adequacy and effectiveness.

4.8. Net benefits (V8)

This variable is an idealized comprehensive measure of the sum of all past and expected future benefits (Wu & Wang, 2006). It is the valuation of the benefits of course content management systems to the students. To measure Net Benefits, we adopted some stakeholders' (students) points of view about what is valuable and what is not about course content management system as suggested by (Seddon, 1997). Net benefits in this study was measured by the perception of users on how valuable the course content management system to them was. This was measured using a modified net benefit sub-scale used by Wang et al. (2007). Net benefits included the increased performance of individual student's learning or individual academic staff's teaching activities.

4.9. WebCT course content management system success (V9) dependent variable)

In this study, course content management system's success refers to the degree to which the person evaluating the system believes that the stakeholder (students) in whose interest the evaluation is being made is better off. The success of the course content management system in this study was determined by the success construct in the research model developed for this study.

4.10. Hypotheses and relationships between dependent and independent variables

According to Delone and Mclean's IS success model, both the quality of the system and information quality influence use and users' satisfaction, which in turn shape the impact of the system on individual users and the organization. This study therefore sought to test the following hypotheses:

H1: Course content management system constructs (system quality, course content quality, service quality, teaching and learning quality, student self-regulated learning, content management system use, user satisfaction and net benefits) would not significantly determine the success of course content management systems.
H2: The course content management system quality would not significantly determine course content management system success.
H3: Course content quality would not determine the success of course content management system.
H4. Support service quality would not significantly determine the success of course content management system.
H5: The quality of teaching and learning would not significantly determine course content management system.
H6: Students' self-regulated learning would not significantly influence course content management system success.
H7: Intention to use course content management system would not determine course content management system success.
H8: User satisfaction would not determine the success of course content management system.
H9: Perceived net benefits of CCMS would not significantly determine course management system success.

5. Methodology

A combination of positivist approach (associated with quantitative studies) and interpretive approach (associated with qualitative studies) was used in this study. Quantitative paradigm was applied as dominant approach using survey design. Qualitative paradigm was used as a less dominant approach to compliment

the quantitative data. Besides, the use of the two methods was supported by the argument that in spite of the mutually exclusive nature of the two methods, aspects from different paradigms can be combined in one research design (Wildermuth, 1993). This study used the information system success model (ISSM) as a lens to evaluate the success of WebCT course content management systems at the University of Botswana. Quantitative paradigm was applied using *students at the University of Botswana* as the unit of analysis with a survey research design. The target population consisted of undergraduate students and lecturers at the University of Botswana using course content management systems. The University of Botswana has 16,238 number of students distributed in 7 faculties and 42 departments. Among these, 8000 students were using CCMS across all faculties; and about 258 faculty/lecturers delivered their course via CCMS.

A simple random probability sampling was used to select sample from the students' population. Generally, the sample size was determined from the total number of students 8000 who were users of CCMS at the University of Botswana (UB WebCT Report, 2007). Sample selection was based on Israel (2003) model. The model posits that given a total population of N, if ±5% is taken for precision levels where confidence level is 95% and $P = .5$, the sample (n) should = X (Israel, 2003). By applying the Israel Model on a population of 8000, if ±5% (e) was taken for precision levels where the confidence level was 95% and $P = .5$, a sample of (n) = 381 was reached. The sampling frame was a register containing WebCT courses and number of student users per faculty at UB (UB WebCT Report, 2007).

5.1. Sample selection procedure

The study applied a census to select all faculties. Within each faculty, a core course was chosen at each year of study (core courses are compulsory foundation courses which all students must take and pass before graduation). This means that four core courses were chosen from each faculty. The total number of students taking each of the core courses was identified and added to give a total for each faculty. From this total, ±10% was taken for precision. This represented the sample for each faculty. Data was collected from the students through the survey questionnaire. The aim of the questionnaire was to ascertain how students perceive the success of CCMS. The questionnaire was self-administered by the researchers in respective faculties during a core course lesson. Instructions on how to respond to the items in the questionnaire were provided by the researcher. Out of the 600 questionnaires administered to the students, 503 were returned giving 84% response rate. On the other hand, of the 22 lecturers in charge of the courses delivered on WebCT, only 20 accepted to be interviewed giving 91% response rate. The two response rates of 84% and 91% achieved were considered good in survey research (Babbie, 2004, p. 261). The high response rate was largely attributed to the clear instructions and informed consent of the respondents that was sought before collecting data. The items in the questionnaire were adapted from various previous IS success measures. The design of the questionnaire was informed by literature review, previous survey questionnaires used in similar studies, the statement of problems, research problems. A four point likert scale was used for all the closed ended items ranging from Strongly Agree – SA; Agree – A; Disagree – D and Strongly Disagree – SD. NS – Not Sure/Indifferent was excluded from the response choice to overcome the neutral and do not know responses and moreover to avoid distortion of results. The questionnaire was hand distributed to the participants after being pre-tested on sub-part of the envisaged population to ascertain the validity and reliability of its items. It was assumed that since most questions were based on previous empirical studies, they had already been validated. As already pointed out, interview was used to gather detailed and in-depth information from academic staff on how the WebCT CCM system has affected quality of learning and teaching, its benefits and challenges to the teaching and learning at the University of Botswana. Interview questions were also pilot tested to ascertain the validity and reliability and how the data can adequately compliment the quantitative data. Respondents' permission was sought for tape-record their responses. The permission was granted by some of the respondents while others resented. Some of the respondents who did not allow their responses to be recorded assisted the researcher to summarise their responses to all the interview questions. Furthermore, the researchers wrote the responses of some respondents as they were being interviewed. This was later transcribed. Validity of instruments was undertaken.

To ensure the validity of the questionnaire used, two experts in e-learning who have consistently used WebCT CCMS at the University of Botswana were requested to review the questionnaire. Through their input, the instrument was modified based on the advice and suggestions of the experts. In addition, the questionnaire included four criterion measures of overall success of the course content management system. These include: impact of course content management system on my institution has been positive; impact of course content management system on me has been positive, performance of course management system at UB is beneficial; and course content management system at UB is successful.

Moreover, the criterion-related validity was assessed by the correlation between the total scores on the instrument (sum of the 36 items) and the measures of valid criterion (sum of the four criterion items). Usually, a positive relationship between the total score and the valid criterion of the instrument implies the capability of the instrument to measure the CCMS success construct. A higher correlation (e.g., 0.65–0.99; at a significant level of 0.000) represents an acceptable criterion-related validity of the questionnaire (Campbell & Fiske, 1959; Hussein et al., 2007). In this study, the 40 items on the questionnaire had a criterion-related validity of 0.71 at significant level of 0.01, which represents acceptable criterion validity.

To achieve the construct validity of the instrument used in this study, a factor analysis was performed using a principal component method of analysis. The results were similar to those obtained by the items of each similar construct of the original instruments where the items were adapted. Reliability was evaluated for internal consistency of the items representing each factor using Cronbach Alpha. The 40 item questionnaire had a reliability of 0.91, exceeding the minimum standard of 0.80 suggested for basic research (Wang & Tang, 2003). The result indicated that nearly all the sections of the items in this study were reliable.

6. Data analysis

Since this study employed a positivist paradigm; quantitative methods of analyzing data were employed. Data collected was subjected to a descriptive analysis involving mean, standard deviation and frequency count. Data collected was coded using the Statistical Package for Social Science (SPSS) version 16.0 for windows. Inferential statistical analysis such as ANOVA, stepwise multiple regression and Beta were also undertaken to determine the success determinant/predictive capability of each of the WebCT CCMS construct as shown in table 1.

Hypothesis 1. The first hypothesis states that "Course content management system success constructs (system quality, course content quality, service quality, teaching and learning quality, student self-regulated learning, content management system use, user satisfaction, and net benefits) does not significantly determine course content management systems success". To test this hypothesis, a stepwise multiple regression analysis was conducted. The result is presented in Table 2.

Table 1
Research hypothesis and how each was measured.

No.	Research hypotheses	Variables	Strategy	Methods of statistical analysis
1	H1: Success constructs (system quality, content quality, support service quality, teaching and learning quality, student self-regulated learning, system use, user satisfaction and net benefits will not determine course content management system success	Success constructs and CCMS success	Questionnaire	Pearson multiple correlation and stepwise multiple regression
2	H2: Course content management System quality Will not determine CCMS success	CCMS quality and CCMS success	Questionnaire	Pearson product moment correlation
3	H3: Course content quality will not determine course content management system success	Course content quality and CCMS success	Questionnaire	Pearson product moment correlation
4	H4: Support service quality will not significantly determine course management system success	Service quality and CMS success	Questionnaire	Pearson product moment correlation
5	H5: Quality of teaching and learning will not significantly determine course content management system success	Quality of teaching and learning and CMS success	Questionnaire and interview	Pearson product moment correlation
6	H6: Students' self-regulated learning will not significantly determine course content management success	Students' self-regulated learning and CCMS success	Questionnaire	Pearson product moment correlation
7	H7: Intention to use/CCMS use will not determine CCMS success	Intention to use/CCMS use and CCMS success	Questionnaire	Pearson product moment correlation
8	H8: User satisfaction will not determine course content management System success	User satisfaction and CCMS success	Questionnaire	Pearson product moment correlation
9	H9: Perceived net benefits of course content management system will not significantly determine course content management system success	Net benefits: values of CMS systems to users and CMS success	Questionnaire interview	Pearson product moment correlation

The result reveals that correlation exists between the overall evaluation score of WebCT and other factors/measures of evaluation. The data indicate that user satisfaction had the highest correlation ($r = 0.62$) with WebCT CCMS system success evaluation. This is followed by students' self-regulated learning ($r = 0.51$) and net benefits ($r = 0.50$). A correlation of other factors with WebCT evaluation reveals that content quality and teaching and learning quality as having ($r = 0.49$), Intention to use/usage ($r = 0.48$), system quality ($r = 0.46$) while service quality had the lowest correlation with ($r = 0.37$). This indicates that all these factors are good determinant of the success of WebCT course content management system. The next analysis focused on the factors which cause change on the dependent variable.

6.1. Summary of multiple regression analysis on the combine causes/effect WebCT success evaluation (dependent variable) by the eight evaluation measures/factors (Independent variables) (N = 503)

The findings in table 3 show that R square = 0.50, R value adjusted = 0.48, and the overall correlation of all the evaluation measures to WebCT evaluation yielded an $R = 70$, while the standard error of the estimate yielded 15.78. In the second step, the analysis of variance performed on multiple regression yielded an F-ratio value of 42.04. This was found to be significant at 0.05 levels. These results suggest that all the WebCT success evaluation measures together made 48% of WebCT success evaluation. This implies that all the success evaluation factors jointly influence the success of the WebCT system evaluation.

6.2. Relative contribution of the factors that determine the success of WebCT evaluation (N = 503)

Results in Table 4 show that each of the independent variables (measures/factors) made a significant contribution to the prediction of WebCT success evaluation. In terms of the magnitude of contribution, user satisfaction made the most significant contribution ($\beta = 0.214$, $t = 4.21$) of WebCT success evaluation. In the light of this result, the next determinant value was exerted by net benefits ($\beta = 0.15$, $t = 3.402$. This was followed by students' self-regulated learning ($\beta = 0.13$, $t = 3.01$). The other factors made a significant contribution in the following order: content quality ($\beta = 0.13$, $t = 2.73$); teaching and learning quality followed with ($\beta = 0.10$; $t = 2.31$); intention to use/usage ($\beta = 0.85$; $t = 2.08$); system quality ($\beta = 0.90$; $t = 2.02$) while service quality made the least contribution with ($\beta = 0.07$; $t = 1.90$). This suggest that all the measures/factors, system quality, content quality, service quality, teaching and learning quality, students self-regulated learning, intention to use/usage, user satisfaction and net benefits are good measures for WebCT evaluation (see Table 5).

7. Summary of results for hypotheses 2–9

7.1. Qualitative findings on hypotheses 2–9

During the interview, it was pointed out that the core business of e-learning is teaching and learning. It was in the light of this that lecturers who teach via WebCT were asked questions about the benefits of WebCT CCMS to teaching and learning at the University of Botswana. It is assumed that this data would complement the benefits identified by the students. On assessment, it was emphasized that the system leads to the highest level of engagement in discussion between students and teachers on course related topics. For instance, through bulletin board, teaching is more facilitated and through online discussion, students have the opportunity of expressing themselves. The results also revealed that the system

Table 2
Descriptive statistics and inter-correlation matrix between the factors ($N = 503$)

	Mean	Std. deviation	N	Ev. sc.	S. qual.	C. qual.	Ser. qual.	T and learn. qual.	S.R. learn.	ITU	U. sat.	Net bene.
Ev. Sc.	102.4314	23.987	503	1.000								
S. qual.	14.874	2.874	503	.464	1.000							
C. qual.	11.169	2.315	503	.497	.588	1.000						
Service qual.	7. 411	2.694	503	.367	.336	.418	1.000					
T and L qual.	7.986	2.067	503	.497	.506	.525	.393	1.000				
S.R. learn.	10.451	2.472	503	.511	.331	.421	.342	.485	1.000			
ITU	13.161	2.551	503	.482	.356	.368	.273	.436	.424	1.000		
U sat.	16.041	3.904	503	.615	.571	.553	.389	.567	.515	.535	1.000	
N. bene.	13.456	3.389	503	.500	.296	.343	.242	.393	.511	.423	.551	1.000

Table 3
Summary of multiple regression analysis on the combine causes/effect WebCT success evaluation (dependent variable) by the eight evaluation measures/factors (independent variables) ($N = 503$).

Model	R	R square	Adjusted square	Standard error of the estimate		
Model summary						
1	.699	0.50	.480	15.77644		
Model		Sums of squares	df	Mean square	F	Sig.
ANOVA						
1	Regression	109154.767	8	13644.346	42.040	.000
	Residual	114243.352	495	324.555		
	Total	223398.119	503			

facilitates monitoring of students' participation as regards what they have done and what they are doing. It was also pointed out that putting announcements and course notes across to the students becomes easier for the lecturers. On access, the system makes provision for students to access course materials even outside class and these can be accessed at their own convenient time.

Respondents further emphasised that WebCT CCMS also leaves room for tracking students' engagement which helps learners and teachers in the learning process. Another benefit identified is the mode of communication at different times and places thus increasing the opportunity of learning in an accessible and customizable manner to individual learners. In other words, the results revealed that the system facilitates effective communication. Furthermore, it was found that the system allows teaching a course repeatedly and keeps the record of the course taught. This tracking of teaching and learning was emphasized as leading to accountability, and facilitated the keeping of students' marks not by the teacher but by WebCT CCMS itself. One respondent emphasized that "students cannot claim that they submitted an assignment if they did not because WebCT keeps very good records". The feature of the system that gives students an opportunity to compare activities of the lecturers and their own in a particular course was also emphasized. Overall, the results revealed that the system improves service delivery to the students. One respondent emphasized that "the assessment tool reduces the time spent on marking since the students' work can be marked automatically". Related to this, another respondent pointed out that the assessment tool reduces problems with assignment since both the students and lecturers can confirm if the assignment was submitted. Deadlines are also easy to implement and individual feedback is also easy to provide.

The results further revealed that the system brings flexibility in learning. It allows students to work at their own pace. One respondent had this to say "students need not come to your office, they can email and have concepts clarified and students are able to do group discussion without having to meet". Another respondent explained that "there is too much work and information to learn. It is not easy for the students to write everything in class. They are able to print the handouts before the class. I teach the class using their handouts where I expand them by explaining more and they add more information to the handouts". Similarly, another respondent maintained: "it improves collaboration and interactivity and is less intimidating for students contact with lecturer". The fact that the system increases interactivity was also emphasized. Many students usually participate in the interactive class activities like online discussions, chats, etc. Another very important finding was the fact that WebCT contributes to learning performance. Learning through WebCT also enhanced students' performance. Students' participation in the discussion exercise and group discussion contributes to the students' performance. It was explained that the students are usually more excited when they are learning through WebCT than in a face-to-face classroom. It was pointed out by a respondent that this does not pertain to all students but only to those students who participate in class discussion and those who access the material uploaded on the WebCT. One respondent explained that the self-test feature increases students' performance.

There is also evidence that WebCT CCMS system saves time and cost. One respondent explained that "electronic version of documents saves money for buying printing papers". Another respondent explained that "I can move faster in my lectures as I only need to explain the notes to the students most of the time. I still

Table 4
Relative contribution of the factors that determine the success of WebCT evaluation ($N = 503$).

Model		Unstandardised coefficients		Standardised coefficients	t	Sig.
		B	Std. error	β		
1	(Constant)	14.081	5.012		2.809	.005
	System quality	.689	.342	.090	2.017	.004
	Content quality	1.191	.436	.125	2.734	.007
	Service quality	.582	.306	.072	1.900	.058
	Teaching learning quality	1.089	.476	.104	2.308	.021
	Self-regulated learning	1.171	.388	.130	3.014	.003
	Intention to use/usage	.750	.360	.085	2.081	.038
	User satisfaction	1.220	.290	.214	4.212	.000
	Net benefits	.942	.277	.145	3.402	.001

Table 5
Correlation between WebCT course content management system evaluation factors ($N = 503$).

Hypothesis	Results of Pearson correlation
Hypothesis 2 – System quality and WebCT success	$r = .46$
Hypothesis 3 – Content quality and WebCT success	$r = .50$
Hypothesis 4 – Service quality and WebCT success	r=.37
Hypothesis 5 – Teaching and learning quality and WebCT success	$r = .50$
Hypothesis 6 – Students self-regulated learning and WebCT success	$r = .51$
Hypothesis 7 – Intention to use and WebCT success	$r = .48$
Hypothesis 8 – User satisfaction and WebCT success	$r = .62$
Hypothesis 9 – Net benefits and WebCT success	$r = .50$

have to do work example of problems in class. It has also saved me and the department the agony and cost of having to photocopy hundreds of pages of some handouts and assignments. Occasionally, problems with handwriting are also saved". Besides, the fact that WebCT improves teaching and learning, the quality of teaching and instructional delivery has also improved. Most of the respondents explained the flexibility of delivery of instruction through the platform has helped them to use more time in preparing course notes and materials uploaded on WebCT compared to the face-to face method where they have to struggle to write notes, struggle to explain in class.

8. Implication for practice

This study has several implications for the success of e-learning and its effectiveness. The empirical results emphasized the importance of assuming a multi-dimensional approach. Therefore, it is important for educational institutions implementing e-learning to put emphasis on various system levels. As indicated by Delone and Mclean (2003) the quality of information, system quality, service quality, system use, user satisfaction, and net benefit determine the effectiveness of the system. Designing strategies to improve only one variable is incomplete if the effects of the others are not considered. The results of this study will encourage WebCT managers/administrators to include the measures of content quality, system quality, service quality, teaching and learning quality, self-regulated learning, intention to use/use, user satisfaction and net benefits into their evaluation techniques of whatever e-learning system they use notwithstanding the overall evaluation. The WebCT evaluation questionnaire developed for this study can be used to compare the success of an e-learning system with specific factors (i.e. content quality, system quality, support service quality, teaching and learning quality, self-regulated learning, user satisfaction and net benefits). If any tertiary institution implementing e-learning finds itself lacking in any of these dimensions, then it can do a more detailed analysis and take the necessary corrective actions. The WebCT CCMS evaluation questionnaire was designed to be applicable across a broad spectrum of e-learning systems, and to provide a common framework for a comparative analysis. This framework (Fig. 3) can be adapted, modified or supplemented to suit specific practical needs of a particular e-learning environment. It is observed that apart from the quality of teaching and learning which reflects the core business of e-learning, there are still other relevant variables that can be added. These two variables are expected to help future researchers come up with other variables that reflect this core business of e-learning.

To ensure the success of e-learning system in tertiary institutions, e-learning policy makers can borrow ideas from the results of this study. This could contribute to the success of their e-learning systems. This study has brought about new measures and evaluation models required to measure success with contemporary IS as suggested by Ishman (1996), Sedera, Gable, and Chan (2003). In this regard, instead of relying on instruments and measures that were validated with what are now outdated information systems (Jurison, 1996, pp. 75–159; Saarinen, 1996), information system researchers can now make use of contemporary IS measures validated in this study to determine the success of their IS success. Moreover, this study has extended the bridge of our knowledge into CCMS success evaluations. The study has responded to the call made by researchers (e.g., Wang et al., 2007) for more studies to investigate other aspects of e-learning. Hence, this study has adapted and modified the dimensions of success in the updated Delone and Mclean IS success model to determine the success of WebCT course content management system at the University of Botswana.

9. Implications for theory

Many factors have been employed as measures of IS success and most of these have been measured in some previous studies. However, in previous IS literature, the success of information systems as a multi-dimensional construct has been measured only through user satisfaction or system use. This study has conceptualized the construct of WebCT CCMS success, provided a validated construct and its underlying dimensionality, and developed a questionnaire instrument with psychometric properties for measuring WebCT course content management system success. Theoretically, this study contributes significantly to the identification of learning factors such as teaching and learning quality, students' self-regulated learning that may lead to WebCT course content management system being modified and the model pioneered and revised by Delone and Mclean (2003). In addition, the evidence should assist e-learning support team and WebCT administrators in universities and other educational institutions, public or private to improve the existing systems. To ensure e-learning/WebCT course content management system is successful, educational institutions should make sure CCMS objectives are aligned, administrators are trained and equipped with IT knowledge, top administrative staff are involved in all activities pertaining to IT/WebCT system use, and resources such as time, money and manpower are sufficiently allocated.

Furthermore, the factors examined provide a strong basis for the understanding of the success of WebCT CCMS. The study has also bridged the gap of limited evaluation of success of IS which is very rare in an educational setting. It has also contributed to the body of research on the course content management system although much of the literature exists in Europe, North America and Asia. As it has been shown in this study, the modified Delone and Mclean (2003) information system success model was adapted to develop a model for the evaluation of WebCT course content management system success at the University of Botswana. The original Delone and Mclean (1992) IS model consisted of system quality, information quality, use, user satisfaction, and the individual and organizational impact. The other variables like service quality and the synthesis of individual and organizational operations impact as net benefits.

It should be noted that there is no model developed for the evaluation of e-learning system particularly in an educational setting. This is why researchers who have worked in this area have made use of available relevant IS models. The same thing was done in this study by making use of the Delone and Mclean IS model. This was done by way of modifying the model to suit the purpose and setting in which the study was conducted. This adaptation led to the introduction of educational variables, to reflect an educational setting. As a result, "the model" now has system quality, content quality, support service quality, teaching and learning quality

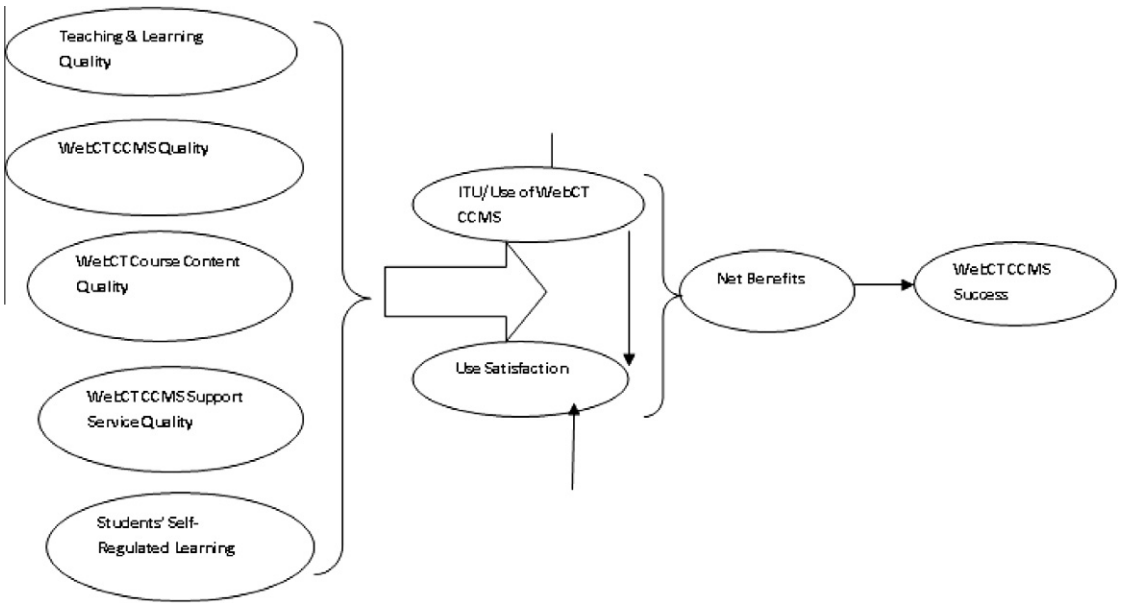

Fig. 4. The New Model for Evaluating WebCT Course Content Management System Success (Tella, 2009).

and students' self-regulated learning. Other variables are intention to use/use, user satisfaction and net benefits, thereby increasing the variables in the model from six by the original author to nine as in this study (see Fig. 4).

9.1. Limitations and further research

This study has endeavoured to establish a research model for the successful evaluation of WebCT course content management system at the University of Botswana. However, the study has some limitations that can be addressed in future research. First, this study approached the evaluation of WebCT course content management system from the students' perspective and faculty. However, the system can be evaluated from several perspectives. For instance, the system can be evaluated from administrative, and technical staff perspective. Therefore, similar studies can focus on these perspectives from which WebCT CCMS success can be evaluated.

In terms of scope, this study is confined to the University of Botswana. Future research could include more tertiary educational institutions in Botswana that are implementing the course management system. The Delone and Mclean's modified IS success model was used as a benchmark to develop the research model on this study which helped to design the WebCT evaluation questionnaire. However, by evaluating WebCT CCMS, this study did not examine the causal relationships between the eight WebCT CCMS success factors. The Delone and Mclean (2003) model emphasized that IS success is multi-dimensional with interdependent constructs. It is therefore necessary to study the inter-relationships among those dimensions. Based on an updated IS model proposed by Delone and Mclean (2003) and the research model developed in this study, future research efforts could explore and test the causal relationships among content quality, system quality, support service quality, teaching and learning quality, intention to use user satisfaction, net benefits and other identifiable or justifiable WebCT/e-learning success constructs. Findings from such an effort could provide more information on how to implement e-learning/WebCT CCM systems within tertiary institutions. Methodologically, this study does not allow for an elaborative understanding of the WebCT CCMS as a case study should. Therefore, further research should focus on how the University of Botswana achieves the WebCT CCMS success in order to be helpful to the providers of the future WebCT CCMS/e-learning projects.

It is evident that e-learning is beneficial to educational and corporate organizations. However, not many organizations use it or have plans to implement its use. In the light of this, there is need for studies to find out why this is so. Is it because they do not have the resources for implementation, or the workers do not have the skills? There is a need to find out the users attitude towards the implementation of e-learning in an educational setting.

10. Conclusion

This study proposed a WebCT CCMS success model and empirically tested the relationships between variables. In brief, the study discovered that content quality, system quality, support service quality, teaching and learning quality, self-regulated learning, intention to use/use, user satisfaction and net benefits are important factors for evaluating the success of WebCT CCMS. Generally, WebCT CCMS benefits, self-regulated learning and content quality play more roles than other factors in terms of determining WebCT CCMS success evaluation. The study has shown that there is room for the reevaluation of the Delone and Mclean (2003) model by addressing the problems that hinder a successful implementation and to test the factors that contribute to success in different environments.

Acknowledgments

This paper is an excerpt from Tella Ph.D. thesis.

My sincere gratitude goes to the Commonwealth, which through the University of Botswana gave me a scholarship to pursue a Ph.D. degree in Library and Information Studies. I also acknowledge the Council for the Development of Social Science Research in Africa, CODESRIA for the award of small grant for thesis writing which I won in 2007 to support the conduct of this study. Similarly, I appreciate the support of my lead supervisor, Prof. S. Mutula. May God bless you all, Amen.

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