International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2022, Vol. 18, Issue 2, pp. 80-110

Assessing the Validity and Reliability of Quality Design Criterion Rubric to Evaluate Online Courses: A Case of Three Entrepreneurial Online Short Courses

Fatima Makda & Reuben Dlamini
University of the Witwatersrand, South Africa

ABSTRACT

With the development of instructional design literature and the potential of online courses to support learning, there exists a gap between theoretical knowledge (theory) and practice (reality). The objective of this study is to determine the effectiveness of the design of online courses for teaching and learning, and what designers and instructors in online learning environments should collectively consider in terms of the quality of the design for online courses. A quantitative design methodology was used to measure the validity and reliability of a rubric used as an evaluation tool in three online short courses at a university level. Scores were measured and analysed using simple descriptive statistics, and qualitative aspects of the online course analysis were integrated to ascertain a summative conclusion of the three online courses and whether the rubric, as a design framework, needed further improvement or not. The rubric offered a framework to determine what components contribute towards quality design in online courses.

Keywords: *Online Learning; Online Course Design; Quality Design Criteria; Valid and Reliable Rubric*

INTRODUCTION

The objective of the current study is to determine the effectiveness of the design of online courses for teaching and learning, and what designers of online learning environments and online courses should collectively consider in terms of the quality design of the courses. This research started with a review of the literature to determine a best practice evaluation criterion and the development of a framework to evaluate and measure the effectiveness of the design of online courses for teaching and learning. A criterion for: (1) course information, course structure and course organisation, (2) interaction and communication, (3) multimedia design, (4) assessment and feedback, and (5) effective use of technology in online courses was developed into a framework to compare and evaluate the design quality of online courses. With the advent of COVID-19 pandemic, educators as classroom frontline workers needed to shift to online environments and that meant application of new pedagogical approaches (Dlamini and Ndzinisa, 2020; McQuirter, 2020; Kundu and Bej, 2021). The study coincided with the COVID-19 pandemic, a period when educators were facing a daunting challenge to abruptly shift to online instructional activities.

The research examines various components that ensure the effective design of online courses. Although there exists a substantial amount of research for various design components of online courses, there is a limited amount of literature on the evaluation and quality assurance of online courses. While completing the literature review, an incomplete and unbalanced body of knowledge around comprehensive evaluation frameworks of online courses was evident. This resulted in a tool known as a rubric, with a set of best practice criterion that can be useful for online course development, benchmarking, and evaluation. In doing so, a new level of quality could be established in the online learning environment, and this has the potential to contribute to an effective educational experience and the design of quality online courses for teaching and learning.

Context of the Study

Information and Communication Technologies (ICTs) have developed over the decades and the effective integration of these technologies in education has positive effects on how and what students learn (Harvey, 2003). Distance learning is an economical and feasible development that extends access to various courses to people across different locations (Asunka, 2008). Online learning is one of the forms of distance learning (Carliner, 2004). With the growth of technology, online learning has become a popular tool used to teach and learn and online courses are becoming more popular because they provide flexible access to a variety of quality course content in higher education at any given time from any location (Davis, Sauber & Edwards, 2011). In addition to this, online learning provides opportunities for the average working professional to continue studying and for students to gain knowledge and skill without the clashing of their time (Dahalan, Hasan, Hassan, Zakaria & Noor, 2013). Clark and Mayer (2016) define e-learning in the context of delivery of instruction via a digital device (such as a desktop computer, laptop computer, tablet, or smartphone) to support learning. In online environments, students access the course content via electronic devices. The content of online courses can be presented as text, audio, pictures, pre-recorded videos, online assessments, or even a combination of these (Carliner, 2004; Clark & Mayer, 2016).

The review that follows focuses on what constitutes quality design of online courses while simultaneously developing the first draft of the research instrument (rubric) for the current study. Information on various design considerations was used to construct new or improved statements of criterion on the quality of online courses, rather than just taking a set of existing questions and hypothesis and testing it (Kothari, 2004), when completing the first draft of the rubric. In addition to the literature review, a search was conducted using search terms such as *quality online course design rubric*, *best practices for instructional design*, *online course design checklist* and *instructional design quality* to investigate existing course evaluation instruments. Several results were found but had to meet the following criteria to be included as part of the design of the rubric in the current study: (1) evaluate the actual design of online courses, (2) not be part of a blog, and (3) be of an empirical research base. The researcher made notes of the various components within each study and existing evaluation tools and analysed these to identify the components that recur in previous studies and the ones that contributed most significantly and successfully to quality online course design. This analysis was used to design our own dimensions, components, and criterion for the rubric.

Notable design quality of online courses needed to be guaranteed so that courses offered in higher education are valuable. The more well designed and well implemented online courses allow students to learn more effectively (Clark & Mayer, 2016). The earlier literature showed that many institutions were developing or updating previously developed practices to provide high-quality online learning (Davis et al., 2011). Some factors that influenced the quality of courses are learning material of the course, course content, course structure, and the virtual environment, communication and interactivity, student assessment, support for student and instructors, course staff qualifications and experience (Daukilas, Kaciniene, Vaisnoriene & Vascila, 2008). The rubric was originally designed for peer review; however, the rubric is being used as a guide for online design, a checklist for design elements, and a faculty development tool (Ralston-Berg & Nath, 2008).

Swan, Day, Bogle & Matthews (2014) noted that Quality Matters (QM) provides some standards for the design of online courses. QM stimulates the development of alignment between the course design and learning objectives and is a tool that allows for quality assurance using a rubric; hence distance education institutions apply it to easily review the setup and design of online courses (Little, 2009). It enables instructional designers to select better resources, schedule course activities and ascertain different types of assessment (Bento & White, 2010) and encourages easier navigation and accessibility to important information for students (Bento & White, 2010). However,

there are some limitations that exist with QM. While evaluating massive open online courses (MOOCs), Lowenthal & Hodges (2015) noted that a simple designed course can pass as a quality course, thus implying that the QM model might focus too much on the basics and not sufficiently on the instructional design and methods. Table 1 below provides a brief description of Quality Matters (QM) Dimensions.

Table 1: *Brief Description of Quality Matters Dimensions*

Dimension	Description
Course Overview and Introduction	The course overview proposes ideas for the initial course overview and introduction to welcome students to the online course environment. Online design should include clear and detailed instructions on course structure and accessing course content.
Learning Objectives (Competencies)	Learning objectives or competencies should describe measurable outcomes. Objectives should be written from the perception of students, so the students know what they can measurably achieve.
Assessment and Measurement	The assessment and measurement are aligned with the learning objectives. Thus, providing multiple opportunities for students to complete self-assessment and gather feedback.
Instructional Materials	Course and instructional material need to support the course learning objectives. Resources should help students make meaningful connections with the objectives that they can achieve.
Course Activities and Learner Interaction	Investigating the course activities and the way in which learners can interact provides recommendations on the strategies for student engagement in an online environment. The design and development of the course's activities need to support the course and module objectives. These activities assist in the development of an online learning community and assist students in becoming active students.
Course Technology	Course technology determines the selection and integration of technology in the online course. The technology used should be up to date and support the course objectives. Instructions on the use and access of the technology need to be provided.
Learner Support	Learner support involves providing students with examples, resources, and support such as library information, technical support, writing centre, career centre etc.
Accessibility and Usability	Accessibility and usability demonstrate practices in course design that sees to the various needs of students e.g., design for impaired hearing or vision.

The QM model addresses the concept of design effectively, however, lacks in addressing the issues of course delivery (Little, 2009). Therefore, QM allows distance education institutions to easily review the setup and design of online courses but does not address the effectiveness of the delivery of the course to students using various pedagogical methods (Little, 2009). Online courses and their learning objectives within each module of the course should align with four key elements, namely, assessments, instructional materials, course activities and learner interaction (Quality Matters, 2014). These elements collectively work to assist students in meeting their intended learning outcomes. Therefore, it is imperative that all learning objectives be clearly stated. Although not in an online context, Biggs & Tang (2007) introduced a concept known as '*constructive alignment*' based on the theory of constructivism and alignment to the design of teaching and assessment. Accordingly, in an online environment, constructive alignment relates to the instructor specifying the learning outcomes for the students and then aligning them with teaching and assessment. This aids the instructor in aligning and selecting relevant content of the course and plan accordingly all appropriate activities.

Stella & Woodhouse (2011) argued that with the limitations and the lack of cultural sensitivity in the existing models and frameworks "higher education institutions in developing countries could be at a disadvantage…to participate effectively in the global trading system" (p. 12). The Online Learning Consortium (OLC) Quality Scorecard resulted from extensive research, user studies and feedback (OLC, 2014). The OLC (previously known as the Sloan Consortium or Sloan-C) introduced the Quality Scorecard to guide online course development for higher education. Earlier, Sloan-C introduced the Five Pillars of Quality Distance Learning model which consisted of five dimensions: (1) learning effectiveness, (2) access, (3) student satisfaction, (4) faculty satisfaction, and (5) cost-effectiveness (Moore, 2005). The Sloan-C model provided guidance for the design of online programs (Wang, 2008), which facilitated interpretation of the five dimensions at the discretion of educational institutions to determine their level of educational quality.

The Rubric

Among the various quality design elements for online courses discussed in the literature, there is leaning toward (1) course information, course structure and course organisation, (2) interaction and communication, (3) multimedia design, (4) assessment and feedback, and (5) effective use of technology in online courses. These dimensions indicate the most critical success factors and pedagogical approaches to the quality design of online courses within the literature and the evaluation tools. Though the well-established criterion includes the use of technology in online courses, there is a dearth of information on the new and emerging digital technologies and their many affordances. Accordingly, our rubric contains a five-point Likert scale and along each component of a dimension with a description of what constitutes the selection of a score [criteria per score and per component]. The five-point Likert scale and criterion is intended to overcome the limitation discussed earlier regarding the QM model as well as measure the degree of the presence of the quality indicator rather than its mere existence. This helps to avoid potential bias of passing any online course as a quality online course. Additionally, beyond simple access and use of digital technologies, the new rubric has the potential to advance netiquette in online interactions to ensure presence [teacher presence, social presence, and cognitive presence

The importance of presence: social, teacher and cognitive is well documented in the literature and its importance for effective and satisfying online learning experiences (Garrison, 2007; Law, Geng & Li, 2019). To embed the different types of presence, there is a need for professional development opportunities among educators to develop the requisite skills, particularly with synchronous interactive tools to provide cognitive and social support. This will impact the development of learning communities and support active learning. However, validation of the rubric elements and learning outcomes is needed given the availability of sophisticated emerging technologies. The approach in our rubric is consistent with the constructivist approach and technology-enhanced learning environments. The hybrid approach to education through digital technologies and learning platforms has become embedded in the primary, secondary and tertiary education system. It is important to note that context is still central to the discourse and debates on digital education and online learning. The new rubric has been developed in a developing economy context and grounds those entering these unknown and complex territories to deliver inclusive online courses.

RESEARCH DESIGN AND METHODOLOGY

The initial objective of the study was to develop a conceptual framework and establish best practice criteria for the evaluation of the design of online courses. This led to the development of a valid and reliable evaluation instrument that enables the actual evaluation of the design quality for the three online courses in this study. A quantitative approach was used as it involved measuring by scoring various criterion on the *rubric* developed by the researcher. These scores were measured and then analysed using simple descriptive statistics. Both the quantitative and qualitative aspects of the online course analysis were integrated to ascertain a summative conclusion of the three online courses and whether the rubric, as a design framework, needed further improvement or not.

Components were identified across a variety of studies and then grouped within a dimension. Each component has a list of criteria across each of the five levels on the Likert scale. Therefore, in the study, a dimension can be described as a concept that was identified in the literature as an important contributor to the quality of online course design. Components are constructs that identify the trait or features which need to be measured and exist within each dimension. The criteria are the explicit descriptions of the performance of the online course and depict how the score is derived and what quality is expected in the online course. The descriptors are the criterion that describes each level of performance for each component and describe the performance at a point on the Likert scale. It allows for the measurement of components. For example, a dimension is *Course Information, Structure and Organisation* and examples of components that exist within this dimension are *Course Administration*, *Events*, *Contact and Instructor Information*, *Course Overview Information*, and *Key Components*. Within the component *Course Administration*, criteria on a scoring of five on the Likert scale may read "Course information for all aspects of the course are provided." and criteria on a scoring of one on the Likert scale may read "Limited course information is provided." This example is illustrated in Appendix A.

Each component and point on the Likert scale has a description of what criteria should be met for the component to score in the point of the Likert scale. Each component was an attempt to establish the degree of involvement each dimension contributes towards the quality of online courses. The concepts of validity and reliability are the two most used criteria to determine if the instrument is usable (Kember & Leung, 2008). The current study makes use of a rubric to evaluate the design quality of online courses. The question that arises is, '*does the rubric have the capability to achieve its intended purpose of providing useful and consistent information in relation to its intended purpose*?' In other words, is it standardised – if an individual uses the rubric to evaluate a course, will the result be consistent with another individual's evaluation of the same course? These questions are important and led to considering the validity and reliability of the rubric within this study.

Validity of the Instrument

Validity is used to measure whether the instrument measures what it is intended to measure. The rubric made use of scale development through a five-point Likert scale. One of the main objectives of scale development is creating a valid measure of a construct (Clark & Watson, 1995). Cronbach & Meehl (1955), argued that there are three steps when looking at construct validity: the theoretical concepts and their relationship with each other; identifying methods to measure proposed constructs; and empirically testing these proposed constructs and their perceptions. Regarding the rubric, the main construct is to measure the design quality of the online course. To ensure that the rubric satisfies construct validity (the degree to which a test measures what it intends to) and content validity (how well a test measures what it intends to), the scale measurements within the rubric has been derived, modified, and adapted from prior research.

Once the first draft of the rubric was developed it was validated by a subject matter expert at an Institution of Higher Education in South Africa. Subsequently, the rubric was subjected to a pre-test on an open-source online course and a pilot test on one of the University's online short courses. This contributed to an assessment of adequate content validity. The results of the pre-test and the pilot tests influenced changes and a final version of the rubric was created. Additionally, this test helped improve the face validity (wording of the items refers to what is being measured) of the rubric.

Reliability of the Instrument

Reliability is used as a measure of quality to determine if, on separate occasions, a measure will yield the same results under the assumption that the measure is unchanged (Scott & Morrison, 2005). In the process of instrument development, postgraduate colleagues were requested to

complete the rubric while evaluating the same course. The scores were then compared to determine the similarity between the two scores. This assisted in satisfying the reliability and construct validity of the criteria within the rubric to determine if it is measuring what it is supposed to. Moskal & Leydens (2000) posit that when a rubric is used to guide an evaluation then the rubric should contain criteria that address the process and the product. The rubric contains a five-point Likert scale and along each component of a dimension, there is a description of what constitutes the selection of a score – criteria per score and per component. A snippet of the rubric can be seen in Appendix A.

Procedure for Data Collection

The first part of the study focused on collecting data through conceptual research to develop a valid and reliable rubric that contains criteria to evaluate the quality of online courses. The rubric was then used to complete an in-depth evaluation of the design of three online short courses. Data were collected from the results of the rubric review that reflected and assisted in determining the degree of quality of the University's short courses. Additionally, possible gaps that exist in the design of the online short courses were identified.

Data Analysis

To describe and explain the degree of presence of the various dimensions and components of quality design in online courses, simple descriptive analysis was used. Loeb, Dynarski, McFarland, Morris, Reardon & Reber (2017, p 39) posit that "Descriptive analysis characterizes the world or a phenomenon – identifying patterns in the data to answer questions about who, what, where, when, and to what extent." The use of descriptive analysis assisted in the following: describing the reality (Loeb et al., 2017); identifying the dimensions that held the most value; which components needed to be further investigated by the University short courses team; which dimension scored the most; identifying the rationale behind why certain dimensions were invested in more and others were not; and why other dimensions were excluded. Each dimension and component were allocated a score using a Likert scale. The scores were used to calculate the totals and aggregates per dimension and a summative score (the overall average of all the dimensions) for the courses. The statistical data were analysed to identify different instances and provide qualitative descriptive evaluations drawn from the evaluation process to make summative conclusions and assist in providing feedback on the actual design of the three online short courses. In addition, the analysis assisted with determining whether the rubric, as a design framework, needed further improvement or not. The Microsoft Excel statistical tool was used in the analysis and the development of graphical representations of the results.

FINDINGS

The three short courses evaluated are *Finance for Non-Financial Managers*, *Principles of Management* and *Business Communication Skills*.

The *Finance for Non-Financial Managers* course aims to assist students in mastering their financial management skills, build their ability to manage funds with an appropriate strategy, learn about financial statements, complete financial activities such as a budget or break-even analysis, and overall to allow the participants of the course to become more financially confident. The *Principles of Management* course aims to empower its participants to be good leaders, to learn about the different leadership styles, to upskill themselves with capabilities to lead others effectively, improve their project management, and overall to allow participants to learn to adapt to their environment to guide their team to greater productivity and profitability. The *Business Communication Skills* course aims to equip its participants with the proper tools to communicate effectively across the various business channels such as meetings, interpersonal communication and using digital channels. Participants of this course are also exposed to compiling business plans, proposals, tenders, and executive summaries. Table 2 contains summarised information on the results of the rubric

analysis. The total score, the score percentage per dimension and the average total score for each of the three courses are shown below.

Table 1: *Summary of Scores per Dimension for Each Course*

	Finance for Non-Financial Managers		Principles of Management		Business Communication Skills	
Dimensions	**Score Total**	**Score %**	**Score Total**	**Score %**	**Score Total**	**Score %**
Course Information, Structure and Organisation	93	89%	93	89%	93	89%
Interaction and Communication	38	63%	38	63%	39	65%
Multimedia Design	45	75%	45	75%	45	75%
Assessment and Feedback	47	78%	44	73%	45	75%
Effective Use of Technology	39	78%	40	80%	43	86%
Course Average		***77%***		***76%***		***78%***

The *Finance for Non-Financial Managers* course scored an average score of 77%. The dimension "Course Information, Structure and Organisation" scored the highest. The dimension that scored the lowest is "Interaction and Communication."

The *Principles of Management* course scored an average score of 76%. The dimensions "Course Information, Structure and Organisation" and "Effective Use of Technology" scored the highest. The dimension with the lowest score is "Interaction and Communication."

The *Business Communication Skills* course scored an average score of 78%. The dimensions "Course Information, Structure and Organisation" and "Effective Use of Technology" scored the highest. The dimension with the lowest score is "Interaction and Communication."

These overall averages indicate that the strength of the design for the three online courses lies in the general course information, structure, and organisation. The data suggest that interaction and communication in the three online courses need to be developed further.

As shown in Table 3 below, the "Course Information, Structure and Organisation" dimension scored the highest in all three of the online courses. Across all three courses, most of the components of this dimension scored 100%. The score indicates that the components that need to be addressed in this dimension are the introduction of explicit netiquette guidelines and legal and acceptable use policies.

Table 2: *Course Information, Structure and Organisation Components Scores*

	Finance for Non-Financial Managers		Principles of Management		Business Communication Skills	
	Score Total	**Score %**	**Score Total**	**Score %**	**Score Total**	**Score %**
Course Information, Structure and Organisation	**93**	**89%**	**93**	**89%**	**93**	**89%**
Course Administration	5	100%	5	100%	5	100%
Events	5	100%	5	100%	5	100%
Course Materials	5	100%	5	100%	5	100%
Hardware Specifications	4	80%	4	80%	4	80%
Software Specifications	4	80%	4	80%	4	80%
Prerequisite Technology Skills	3	60%	3	60%	3	60%
School Information	5	100%	5	100%	5	100%
Instructor Information	5	100%	5	100%	5	100%
Instructor Contact Methods	5	100%	5	100%	5	100%
Objectives	4	80%	4	80%	4	80%
Key Components Access	5	100%	5	100%	5	100%
Chunking	5	100%	5	100%	5	100%
Sequencing	5	100%	5	100%	5	100%
Unit Overviews	5	100%	5	100%	5	100%
Navigation Through the Course	5	100%	5	100%	5	100%
Content Map	3	60%	3	60%	3	60%
Consistency	5	100%	5	100%	5	100%
Requirements for Successful Completion	5	100%	5	100%	5	100%
Academic Support and Resources	5	100%	5	100%	5	100%
Legal and Acceptable Use Policies	3	60%	3	60%	3	60%
Netiquette	2	40%	2	40%	2	40%

The “Interaction and Communication” dimension scored the lowest across all three online courses and as shown in Table 4 below, less than 50% of the components of this dimension scored 100%. The components that need to be addressed in this dimension are the introduction of more student-to-student interactions, other collaborative activities, synchronous interactions and providing examples of what an appropriate answer is for the activities.

The introduction of more collaborative tools, student-to-student opportunities, and synchronous interaction will impact the development of a learning community and the active learning and participation of students.

Table 3: *Interaction and Communication Component Scores*

	Finance for Non-Financial Managers		Principles of Management		Business Communication Skills	
	Score Total	Score %	Score Total	Score %	Score Total	Score %
Interaction and Communication	**38**	**63%**	**38**	**63%**	**39**	**65%**
Student-to-Student Opportunities	2	40%	2	40%	2	40%
Instructor-to-Student Communication	5	100%	5	100%	5	100%
Instructor-to-Student Participation	5	100%	5	100%	5	100%
Collaboration Tools	2	40%	2	40%	2	40%
Development of Learning Community	3	60%	3	60%	3	60%
Active learning and Participation	3	60%	3	60%	3	60%
Aesthetic Design	5	100%	5	100%	5	100%
Overall Content	5	100%	5	100%	5	100%
Content Alignment	5	100%	5	100%	5	100%
Appropriate Answers	0	0%	0	0%	1	20%
Synchronous Interaction	0	0%	0	0%	0	0%
Asynchronous Interaction	3	60%	3	60%	3	60%

Table 4: *Multimedia Design Component Scores*

	Finance for Non-Financial Managers		Principles of Management		Business Communication Skills	
	Score Total	Score %	Score Total	Score %	Score Total	Score %
Multimedia Design	**45**	**75%**	**45**	**75%**	**45**	**75%**
Graphics	4	80%	4	80%	3	60%
Animations	5	100%	5	100%	5	100%
Audio Aids	0	0%	0	0%	0	0%
Video Aids	5	100%	5	100%	5	100%
Coherence Principle - Extraneous Material	5	100%	5	100%	5	100%
Signalling Principle - Complexity	5	100%	4	80%	5	100%
Contiguity Principle - Graphics & Text	4	80%	4	80%	4	80%
Contiguity Principle - Feedback Display	4	80%	4	80%	4	80%
Contiguity Principle - Instruction Display	3	60%	4	80%	4	80%
Contiguity Principle - Instruction	5	100%	5	100%	5	100%
Contiguity Principle - Timing	5	100%	5	100%	5	100%
Modality Principle - Audio Narration	0	0%	0	0%	0	0%

The "Multimedia Design" dimension scores were in the middle of all the other dimensions for the three courses. As shown in Table 5 above, approximately 50% of the components of this dimension scored 100% across the three courses. The components that need to be addressed in this dimension are the introduction of audio aids and audio narration to the course.

The "Assessment and Feedback" dimension is on average the third highest dimension on which the three courses have scored. As shown in Table 6, approximately 50% of the components of this dimension scored 100% across all the three courses. The components that need to be addressed in this dimension are the introduction of descriptive criteria for assignments where there are essay type questions, an increase in the variety of types for formative assessments and the overall faculty feedback.

Table 5: *Assessment and Feedback Component Scores*

	Finance for Non-Financial Managers		**Principles of Management**		**Business Communication Skills**	
	Score Total	**Score %**	**Score Total**	**Score %**	**Score Total**	**Score %**
Assessment and Feedback	**47**	**78%**	**44**	**73%**	**45**	**75%**
Alignment of Learning Objectives and Assessment	4	80%	4	80%	4	80%
Assessment Instruction	5	100%	2	40%	2	40%
Descriptive Criteria	0	0%	0	0%	1	20%
Formative Assessment Types	2	40%	2	40%	2	40%
Formative Assessments Frequency	5	100%	5	100%	5	100%
Summative Assessment	5	100%	5	100%	5	100%
Student Feedback Quality	5	100%	5	100%	5	100%
Student Feedback Frequency	5	100%	5	100%	5	100%
Assessment Authenticity	4	80%	4	80%	4	80%
Assessment Design	4	80%	4	80%	4	80%
Learner Progress	5	100%	5	100%	5	100%
Faculty and Course Feedback	3	60%	3	60%	3	60%

The "Effective Use of Technology" dimension scored the second lowest across the three courses. As shown in Table 7, 50% of the components of this dimension scored 100% across all three courses. The components that need to be addressed in this dimension are the use of more third-party applications, introduction to a variety of web 2.0 and web 3.0 tools, and an overall variety of course tools to promote active and collaborative learning for the students.

Table 6: *Effective Use of Technology Component Scores*

	Finance for Non-Financial Managers		Principles of Management		Business Communication Skills	
	Score Total	**Score %**	**Score Total**	**Score %**	**Score Total**	**Score %**
Effective Use of Technology	**39**	**78%**	**40**	**80%**	**43**	**86%**
Current Technology	4	80%	4	80%	4	80%
Application Use	1	20%	1	20%	4	80%
Web Tools	2	40%	2	40%	2	40%
Technology Orientation	4	80%	4	80%	4	80%
Technology Support	5	100%	5	100%	5	100%
Technical Support	5	100%	5	100%	5	100%
Technical Support Turn Around Time	5	100%	5	100%	5	100%
Mobility	5	100%	5	100%	5	100%
Course Tools	3	60%	4	80%	4	80%
Data Privacy and Security	5	100%	5	100%	5	100%

DISCUSSION

Course Information, Structure & Organization

The dashboard and the general structure of all pages across all the three short courses follow the same structure, look, and feel. This is good as a student who is enrolled for multiple courses in the same period will be comfortable with the structure and navigation of the courses. Young and Norgard (2006) found that students found it helpful to have a consistent structure across the various online courses.

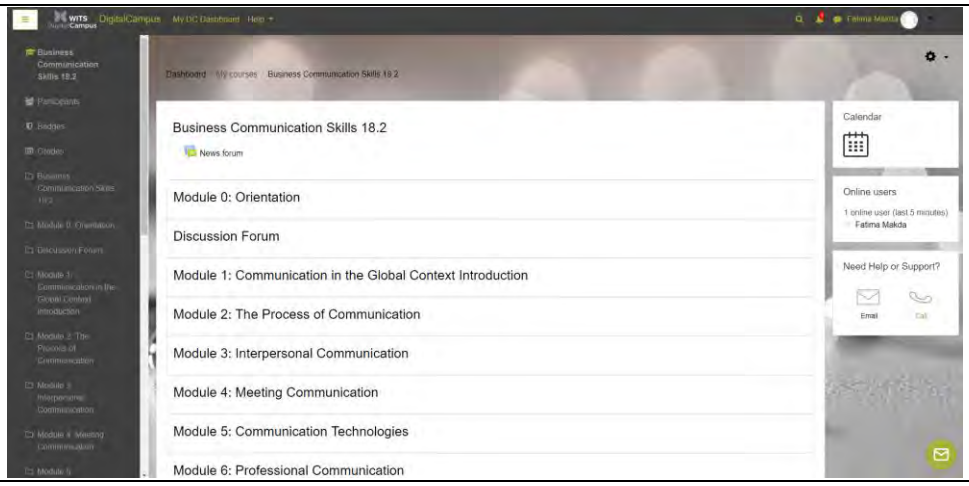


Figure 1: Course Dashboard

As shown in Figure 1, the dashboards contain a navigation draw (nav draw) on the left side of the screen which allows for quick access between the various modules, participants of the course, badges, and the gradebook. The right side of the screen contains blocks for quick access and views

to components such as the calendar, latest announcements, the current users that are online and quick access to support. The centre of the screen is where the actual content is displayed. A summary of the key modules and high-level content are shown on the dashboard. The other pages, contain the content of the topic within the module. Well thought out course information, structure, and organisation in an online course can strengthen the quality of the course. Thus, allowing the online learning experience to be useful, efficient, and desirable. Course information should include the course schedule, syllabus, outline, scope, grading policy including grading scale and weights, the procedure for submission of assignments, preferred modes of communication, and types of assessments that will need to be completed (Ausburn, 2004; Gray & DiLoreto, 2016). All three online short courses were allocated a score of 5 for the component *course administration* as course information for all aspects of the course are provided. The three online courses contain an entire orientation module (module 0), that comprises of course administrative information such as the outline, scope, grading policy, and assignment submissions. There are videos that provide a walkthrough of the introduction, help, and support those students can receive. Orientation videos are favourable as they are seen by students as informative and helpful (Taylor, Dunn & Winn, 2015). A PDF document containing all the course information discussed in module 0 can also be accessed through the site. This PDF document concept is applied throughout all the modules and allowed students to download a PDF document that contains all the content, main concepts, and activities of that module.

A course calendar is one of the more important components of an online course system (Farin, Rahman, Mansoor & Hossain, 2016). All three online short courses were allocated a score of 5 for the component course *events* as calendar dates for all course events throughout the year are provided. Each of the three courses contains a course calendar with all the events of the course. Events on the calendar contain dates for module release, deadlines for discussion activities, deadlines for assignments and examinations. Completion reminders and notifications of release dates were also sent by the course coordinator. This allowed the students to schedule their study time accordingly so that they can complete all learning tasks on time. Gray & DiLoreto (2016) noted the importance students placed on reminders from the instructors.

All three online short courses were allocated a score of 5 for the component *course materials*. All course materials are provided through the online environment by the weekly module release. This occurs across all three online short courses. This was explicitly stated in the documentation of the introductory module (module 0). Students were also provided with the opportunity to explore additional links and resources for further reading and to deepen their understanding of the content of each module There was no hardware specifications list in any of the three courses within the online learning environment. However, there was a statement made within the examination section of the course overview stating that a webcam is required for examination purposes, which the learning journey manager confirmed as the only hardware requirement needed by the students. However, hardware specifications should be part of the online course as well as emailed to the students prior to their first-time access to the online course. All three online short courses were allocated a score of 4 for the component *hardware specifications.*

Software specifications existed in all three courses, however, the information had to be accessed through various sources instead of being contained within module 0. All three online short courses were allocated a score of 4 for the component *software specifications* as the software requirements of the course were specified. All three online short courses were allocated a score of 3 for *prerequisite technology skills* as a list of key prerequisite skills in the use of technology are specified when needed. However, it would be better if they were explicitly stated at the beginning of the course. All three online short courses were allocated a score of 5 for the component *school information* as all contact information for the school was provided. Students having access to the contact information and the option to log queries allows them to contact the faculty at any point. One of the seven principles for undergraduate teaching is to encourage faculty-to-learner interaction (Chickering & Gamson, 1987). All three online short courses were allocated a score of

5 for the component *instructor information* as all the necessary instructor information was provided. Providing students with some of their instructor's personal information such as their background, interests, experience, and skills, allows students to get to know their instructors better and build some confidence in their instructor's brand.

All three online short courses were allocated a score of 5 for the component *instructor contact methods* as there is detailed information on contact methods. Students could contact the course co-ordinator via chat, email, phone and by posting a discussion board query. This was an option within all three of the online courses. Student-to-instructor contact is important for online learning (Palloff & Pratt, 2010). The variety of contact methods allow students to use different platforms to contact their instructor depending on the type of query and the expected response time. Should students require urgent assistance they can call or use the chat function, and should they not require urgent assistance they can send an email and give the instructor an opportunity to provide a well thought out response.

Noticeable across the three short courses, there was no page or section containing the course objectives explicitly. It would be better for the online courses to include the overall objectives of the course too as clear course objectives allow students to have a feel of what to expect and what they need to do (Hew, 2016). All three online short courses were allocated a score of 4 for the component *objectives* as the learning objectives are clearly stated in the course modules but there were no overall course objectives. Providing students with aims, overall objectives, expectations, and key questions gives students the opportunity to understand what is expected of them resulting in them monitoring their progress and taking more control of their learning.

All three online short courses were allocated a score of 5 for the component *key components access* as there is comprehensive instruction provided on accessing all key components of the course. The navigation help screen was displayed in all three online courses and shows access to key components of the various parts for the course. Further, information on the various elements of a typical web page such as the nav draw, the blocks like the calendar on the sides of the pages were shown and explained within the introductory documentation in module 0. This is illustrated in Figure 2 below.

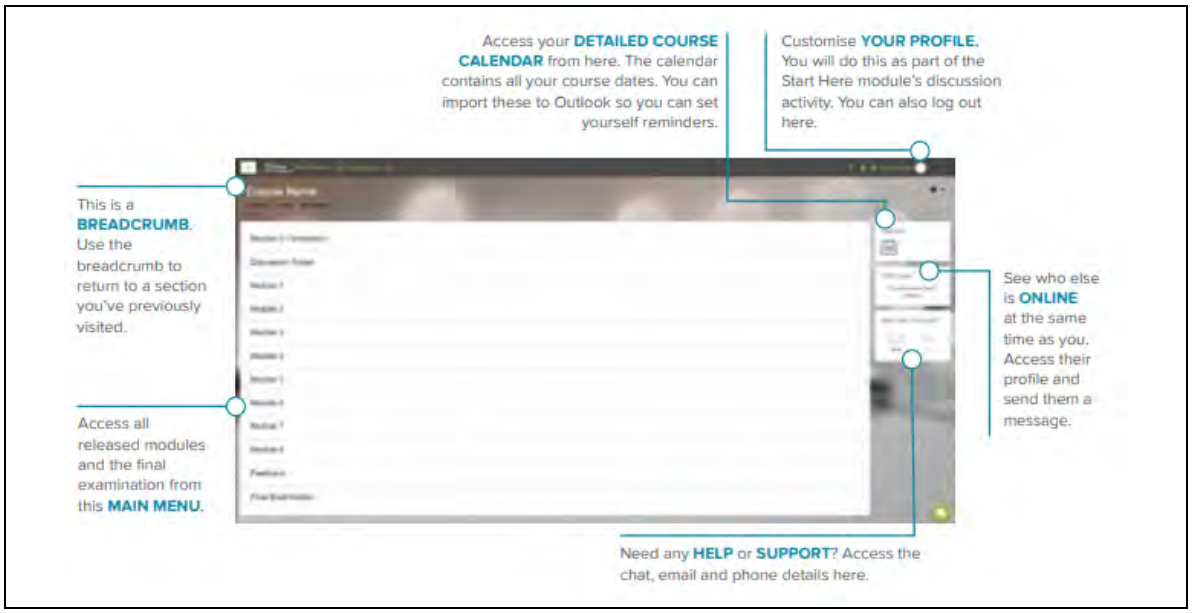


Figure 2: Main Features of the Dashboard

Providing learners with navigation documentation allows them to explore the different components of the online course and become comfortable with where they can locate the various parts of the online course. This can assist in increasing their productivity as they can focus on learning the content of the course rather than spending time looking for sections or information in the course. Taylor *et al*. (2015) found that students need to adapt and become familiar with the online environment to reach success, as the more familiar the students are with the course tools and navigation the easier it is for the students to complete the course.

All three online short courses were allocated a score of 5 for the component *chunking* as all the course content is chunked appropriately into manageable segments. Chunking assists students in increasing their understanding and retention rate, allows students to explore and learn more content, and comprehend the course material better (Smith, 2014). All three online short courses were allocated a score of 5 for the component *sequencing*. Across all three online short courses there exists logical sequencing of all the course content that allows for the best learning pathways. The modules across all three courses followed the same structure format. This includes: a module overview video; the module learning objectives; course content outline; video lectures containing the main learning points; progress checks after each learning topic; Q&A forum at the end of each topic; other links and resources for further reading; a discussion activity; and a module assignment to test competency. The sequence of content, summary and concept check is good as the summary cannot be done before the students understand the content.

In the *Finance for Non-Financial Managers* course, the content itself was also sequenced well as it builds from the basic concepts to the more complicated concepts. As the subject of finance and accounting is cumulative in nature, the content was developed in a foundational building block structured manner that allowed for learners to see the various connections that exist between the various concepts and topics/modules.

In the *Principles of Management* course, the content was also well sequenced with a flow of topics and concepts appropriately preceding each other. There was also a case study contained within the videos across the modules, developing the scenarios and reiterating concepts as students' progressed through the course.

In the *Business Communication Skills* course, the topics were sequenced suitably. This allowed for gradual learning so that participants can store, process, and retrieve information when needed as some concepts shape others.

All three online short courses were allocated a score of 5 for the component *unit overviews* as they contained clear unit overviews that describe all the relevant information. This page comprises of the expectation for completion of the topic, the key questions students should be able to answer and a quick quiz at the end of the topic to allow students to complete quick self-assessments.

All three online short courses were allocated a score of 5 for the component *navigation through the course* as the entire course was easy to navigate. All three courses included a navigation help screen. The navigation help screen has numbers associated with the main components and allows students to click on these numbers and pop-up with a brief explanation, as seen in Figure 3.

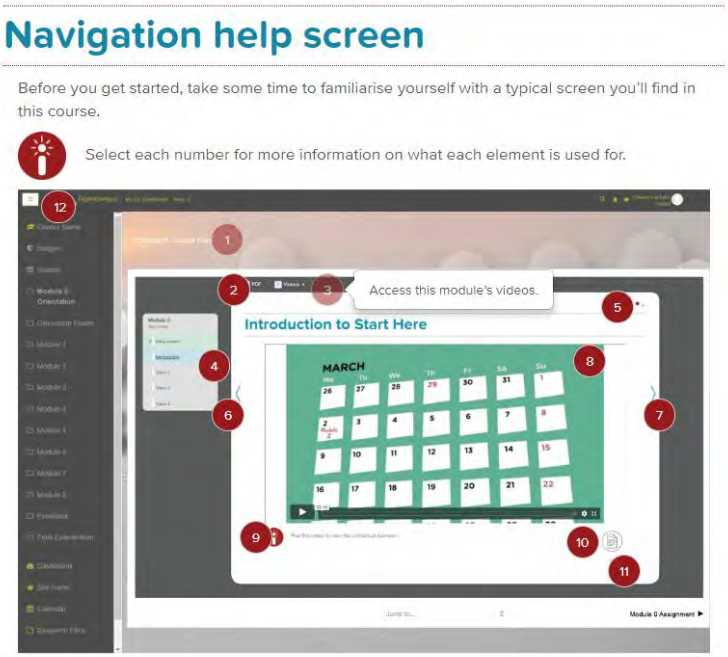


Figure 3: Navigation Help Screen

This method provides learners with the learner support and resources required for finding their way around the online course. Other ways that can be used to provide learner support include course manuals and overviews of the course, also on a module level.

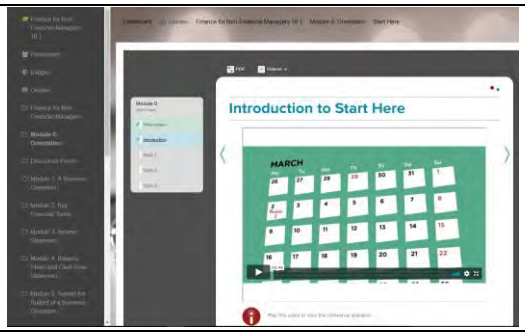


Figure 4: Screen to Display the Various Navigation Components

As shown in Figure 4, within all three courses, there are navigation arrows, navigation indicators, and a breadcrumb link with each screen location. The nav draw shows the course modules entirely and highlights the current module that the student is working within, and on the top right-hand corner of the white screen there are two dots which show the current page within the topic. The documentation of the course provides a brief view of the navigation of the dashboard as discussed in the *Key Component Access* section earlier.

All three online short courses were allocated a score of 5 for the component *consistency* as all web pages are both visually and functionally consistent. The visual presentation of the online

environment impresses upon first sight. All web pages across all three online courses were visually and functionally consistent. Consistency exists with the layout of the pages, the grammar, usage of words and language, fonts and formats, headings, alignment, colours of backgrounds and text, icons, and buttons. All three online short courses were allocated a score of 5 for the component *requirements for successful completion* as there is detailed information provided relating to the successful completion of the course. Assessments should also have clear grading policies aligned with them (Palloff & Pratt, 2009). There is brief yet explicit information relating to the successful completion of the three online courses. The information provided states the sub-minimum for the examination and the minimum final grade. It also provides a breakdown of the different percentage weightings assigned to the various tasks (such as discussion contribution, assignment, and examination).

The Quality Matters model encourages learner support. All three online short courses were allocated a score of 5 for the component *academic support and resources,* as extensive information for academic support existed within the online courses. All three online courses contained an explore further links and resources section for further reading and deeper understating within each module. A PDF version of the online content of the different topics was also within each module. One of the academic supports that exist in the current course is contacting the instructor and/or tutor. There are also external links provided and topics containing appendices at the end and some topics containing a glossary at the end of the PDF document.

There are some policies stated for the three courses. All three online short courses were allocated a score of 3 for the component *legal and acceptable use policies*. With sufficient policy statements that exist in the University, key policies such as a plagiarism policy were lacking. However, statements regarding privacy, personal information, intellectual property, usage were discussed in the "Terms and Conditions" section of the website. Within the online course environment itself, there is mention around the policy of the qualification for supplementary examinations. These policies assist learners in understanding their responsibilities and the consequences of their actions should they not abide by the rules. It also provides the University with the necessary protection regarding possible legal action. An important policy that needs to be included is one on plagiarism, which gives the institute the opportunity to set standards of academic conduct and promote academic integrity.

All three online short courses were allocated a score of 2 for the component *netiquette* as the netiquette expectations are inconclusive. There are hints of netiquette guidelines in the "Terms and Conditions" section of the website. The target participants of the course were professional adults. However, netiquette guidelines should be explicitly stated in module 0 within the online environment, especially with the existence of issues such as cyberbullying. Netiquette guidelines should include rules of conduct during discussions, rules of conduct for emails, speaking styles, the appropriate use of language and tone, respect and consideration for other students, issues of privacy and information sharing outside of the online course.

Interaction and Communication

Moore (1989) described three types of interaction: learner-instructor interaction; learner-content interaction and learner-learner interaction. Online learning environments need to include strategies that afford meaningful interactions amongst students, instructors, and the content. This promotes engaged learning in the online environment. All three online short courses were allocated a score of 2 for the component *student-to-student opportunities* as there were limited opportunities for student-to-student interaction within the course. The interaction for students in the three online courses was limited to the discussion forum and chat. The discussion forum allowed the students to discuss with their instructor and fellow peers the various concepts learnt within the module and answer questions posted by the instructor. Although through this discussion forum each module's concepts were discussed it would be better to see more frequent use of other methods for students

to interact. The other opportunity is the chat function which allows synchronous communication about anything with instructors and peers.

More interaction opportunities could be introduced to promote active student learning. Other interactive opportunities that can be included are wikis, blogs, forums, activities with peer review and any other activities that promote active and collaborative learning that reinforce the course content and learning outcomes. All three online short courses were allocated a score of 5 for the component *instructor-to-student* communication as thorough communication existed between instructor and students. The instructor communicated to the students when providing reminders for course events, providing, or updating announcements and providing frequent feedback on course content within the discussion boards. These assisted students in being able to schedule and plan their time for interacting with the course. The feedback helps learners to track their progress while still maintaining the end goal.

All three online short courses were allocated a score of 5 for the component *instructor-to-student participation* as the instructor always guided the students in their activities. There was a discussion board in each of the three online courses. Here the instructor participated by facilitating and asking the students questions by which they respond, and all participants and the instructor could have a discussion. Instructors interacting with students create motivation for their learners. The interaction allows instructors to reach out to struggling students, allows instructors to provide simultaneous feedback, gives instructors the opportunity to facilitate in-depth learning through online discussion and allows instructors to guide the students in their path to learning the content.

All three online short courses were allocated a score of 2 for the component *collaboration tools*. These courses were limited in the types of interactions amongst students as they only had a discussion forum and chat function. The discussion board is used for course content discussion as well as a communication tool for the course coordinators. In an earlier study Teras & Herrington (2014) found that the use of discussion forums for informal communication and interaction improved collaboration. The courses can include, *inter alia*, group assignments, research assignments whereby peers act as a resource, case studies required to be completed in groups, shared facilitations, activity forums, real-time discussions of course content and discussion questions and work posted by students that require feedback from peers. Collaborative tools do require a social presence and participants may find it difficult to manage time, however the use of collaborative tools creates a sense of shared responsibility in meeting an end goal.

All three online short courses were allocated a score of 3 for the component *development of a learning community*. The collaboration and group interaction in all three courses were limited to a discussion forum whereby students discuss the different concepts of each module. They use this platform exhaustively and encouragement was given to students to interact and build relationships of trust, demonstrate effective facilitation skills, support, and encourage independence and creativity. Collaborative interaction has been noted as is key in an online learning environment as it can help students to create a learning community, allowing students to work together towards something (Kim, Kim, Khera & Getman, 2014).

All three online short courses were allocated a score of 3 for the component *active learning and participation* as there are sufficient strategies that allow students to actively engage in the learning process. The courses did not only consist of passive lectures but also included a discussion board that students use to participate and discuss the module with each other and assignments that students can do at the end of each module. The assignments themselves were quite comprehensive and allow students to actively interact with the content and concepts of the module. The videos of the modules were quite enticing and interesting which could lead to learning and remembering just by watching them.

All three online short courses were allocated a score of 5 for the component *aesthetic design*. The aesthetic design in all three online courses was spectacular. There was a great use of structure for the various components of the course. Each section was separated by a consistent style of headings. The colours used for the background, text, links, and borders all complemented each other. Underlining was used to identify links. There was a balanced amount of colour and text, and they did not overpower the user or create distractions. The text on the different pages was consistent in font, size, colour and were most definitely readable. The different components of the three courses were well aligned. Numbers were right aligned, and text left aligned. Images were used as support to content, and spelling and grammar was accurate. The content of the three courses is well organised and the finest navigation systems are in place that allows the students to easily navigate through the course and access the different components and content.

The content of the three courses was well structured with the use of well thought out learning pathways. It is free from spelling and grammar errors. The content was cohesive and appropriate to the topic at hand. The different modules and topics were detailed yet simple enough to ensure learning was taking place while avoiding boredom and/or confusion for the participants of the three courses. All three online short courses were allocated a score of 5 for the component *overall content*.

Multimedia Design

Well-designed and well-structured multimedia consists of a variety and combination of pictures, audio, video, and text to allow for deeper student learning.

The *Finance for Non-Financial Managers* and *Principles of Management* online short courses were allocated a score of 4 and the *Business Communication Skills* course was allocated a score of 3 for the component *graphics*. The three courses do not make use of all six types of graphics: decorative graphics, representational graphics, relational graphics, organisational graphics, transformational graphics, and interpretive graphics (Clark & Mayer, 2016). However, with the type of graphics that the courses make use of, this sufficiently done in a manner that aids the students learning. Some of the graphics used outside of the videos were representational graphics, organisational graphics, and relational graphics. In the *Finance for Non-Financial Managers* course, representational graphics were used when showing images of the different financial statements. Organisational graphics were used by the progress check, icon for instruction and the summary page. Relational graphics were used when explaining concepts that relate to each other.

The *Business Communication Skills* course graphics were not always clear. This can be distracting and strenuous on the eyes. Images need to be clear as they bring the content to life and promote the engagement of students. The use of graphics is powerful as human beings are visual creatures and visual representation of information is a direct way of assisting students in acquiring knowledge (He, Watanabe & Ono, 2018). Graphics create engagement, impacts, and leaves impressions, helps in telling a story, makes things simple by closing the gap between the text students read and their interpretation of it, and the brain processes pictures better than words. More representational graphics, relational graphics, organisational graphics, transformational graphics, and interpretive graphics can be used within the courses, outside of the videos, to illustrate concepts being explained within the text of the content.

All three online short courses were allocated a score of 5 for the component *animations*. The videos contain animation across the different modules of the three courses as seen in Figure 5. These animations function as a video supporting tool and as a narrative to students while the instructor is explaining concepts. The animations were not too busy as to cause a distraction but engaged students with an entertaining and useful experience.

Figure 5: Use of Animations within Videos

Animations are also used in videos for reinforcements. The use of icons in the design of interfaces are great, as research done on visual representation has shown that icons provide more efficient and effective communication (Shen, Prior, Chen & You, 2007). All three online short courses were allocated a score of 0 for the component *audio aids*. The courses do not make use of audio aids; however, adequate use of video is used within the course. Upon discussion with the learning journey manager, it was said that the use of audio is being introduced to future developed courses and training will also be provided. All three online short courses were allocated a score of 5 for the component *video aids* as there was comprehensive use of video across all three courses. The videos in all three courses were appropriate and used for introductions, the explanation of concepts and illustration of examples.

The video quality was clear, and the length adequate; an average of between three to four minutes to meet the goals of the task, without additional and unnecessary information that increases the mental load of the learners. The video allowed students to pause and replay, should they require more time to assimilate the course content. This allowed students to modify the delivery of the lecture to their learning pace. There are audio and appropriate video visuals that complement each other within the video – appropriate use of audio-visual tools. Additionally, there were also transcripts of the videos that students could access.

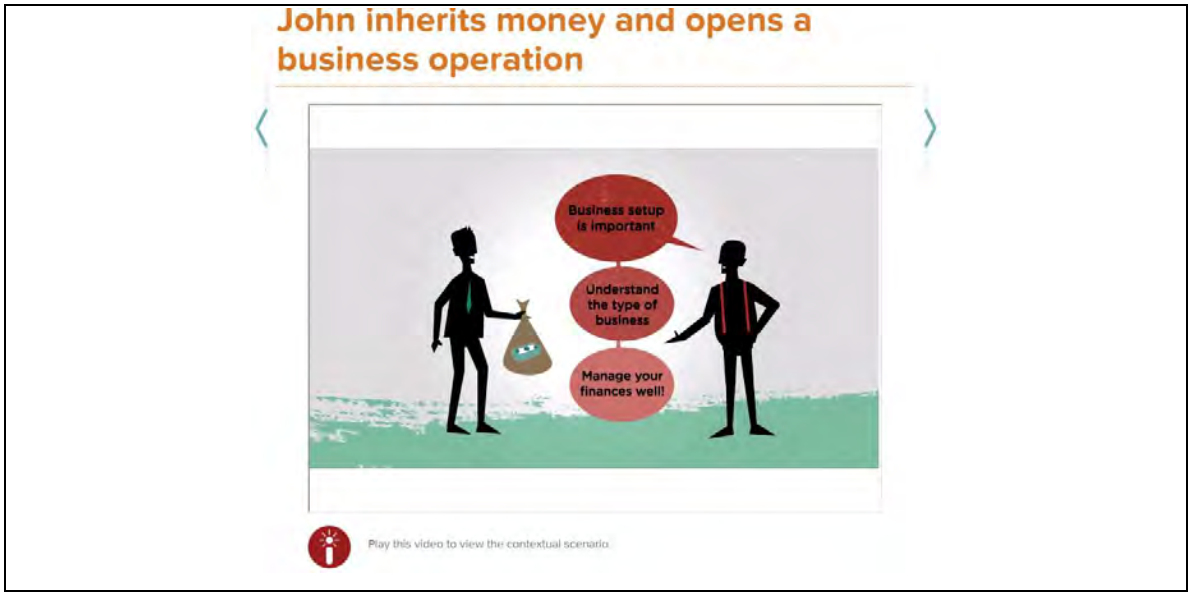


Figure 6: Example1 of Scenarios Provided by Videos

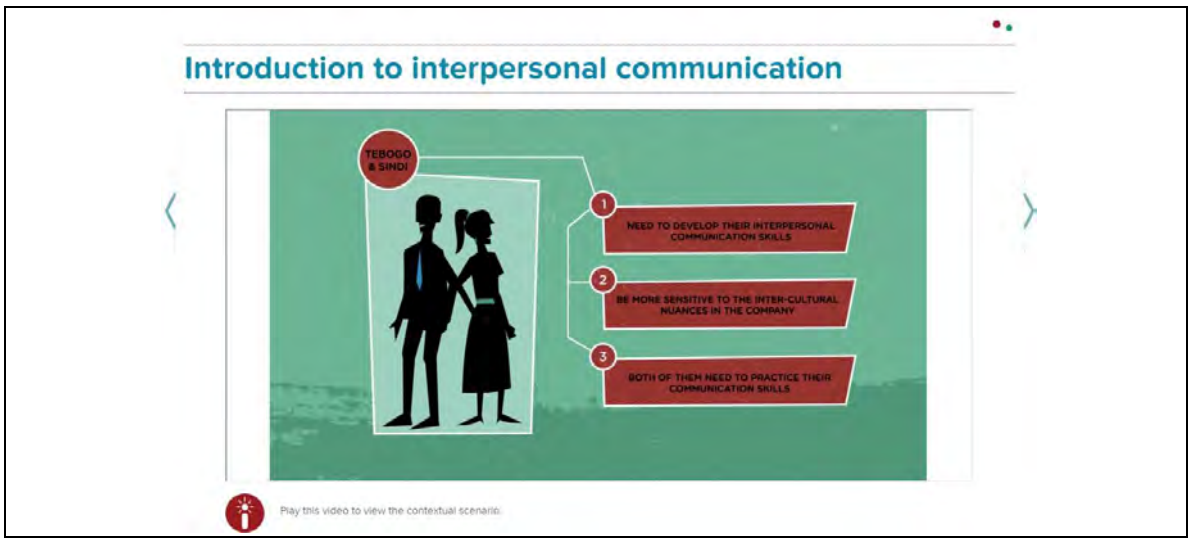


Figure 7: Example2 of Scenarios Provided by Videos

The videos contained within the courses make use of the multimedia principle well. The videos do not only consist of passive lectures but are designed with graphics and animations allowing students to learn better with the use of words and graphics rather than words alone. A snippet of two videos can be seen in Figures 6 and 7.

Assessment and Feedback

Oldfield, Broadfoot, Sutherland & Timmis (2012) posited that assessments could be viewed as part of a very important and powerful educational experience. Assessment forms an integral part of the online course as it provides for the observable indication that learning has taken place. It also shows learner progress and their understanding of the various concepts and content of the course. All three courses did not have overall course objectives, however, there are key questions per topic

and an assessment to be completed at the end of each topic. Therefore, the comparison was done with the topic's key questions and the assessment. All three online short courses were allocated a score of 4 for the component *alignment of learning objectives and assessment*. Most of the questions on the assessment aligned with the key questions. It allowed for students to be assessed on the concepts described in the topics key question area. This is in line with the Biggs & Tang (2007) concept of *constructive alignment*.

The *Finance for Non-Financial Managers* course was allocated a score of 5 whilst the *Principles of Management* and *Business Communications Skills* courses were allocated a score of 2 for the component *assessment instruction*. Each assignment in the *Finance for Non-Financial Managers* course has a general assignment instruction as illustrated in Figure 8. However, the *Principles of Management* and *Business Communications Skills* course does not have a general assignment instruction page. Within each assignment of the three courses, there were instructions provided for each question type. Some questions did not have instructions, but the activity was quite self-explanatory. Although activities were self-explanatory, instructions always need to be provided so that students have clear and understandable instruction that guides them to prepare and participate in the learning experience of the online course. Earlier studies have shown that students require unambiguous descriptions and instruction of the assessment and assessment criteria (Ascough, 2011), and that assessments should also have clear instructions and grading policies aligned with them (Palloff & Pratt, 2009).

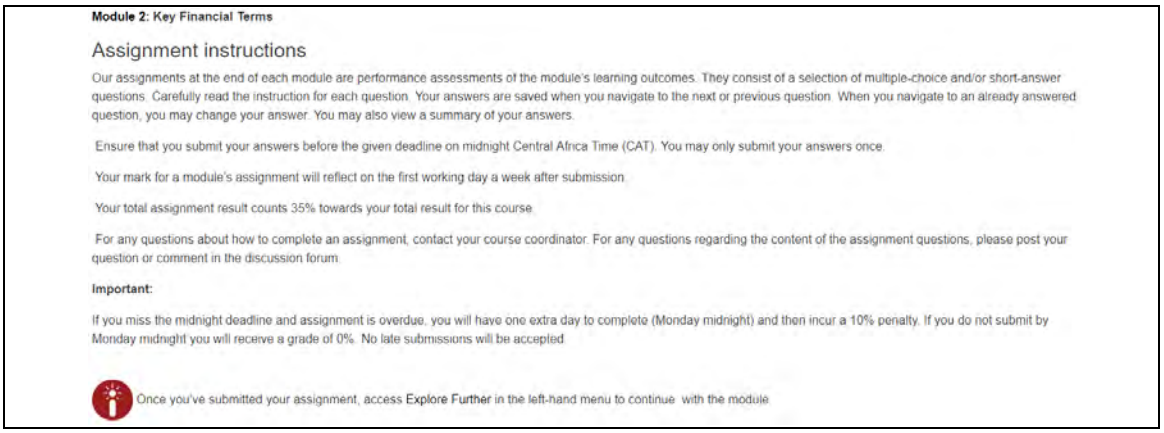


Figure 6: General Assessment Instruction Home Page

All three online short courses were allocated a score of 2 for the component *formative assessment types* as they lack variety in the formative assessments used throughout the courses. The formative assignment at the end of each module allowed students to continuously evaluate themselves throughout the course. It allowed for student development during a learning process and therefore promoted learning. It also facilitated the evaluation of the various areas of the course in terms of content, skill, and progress of learning, an outcome noted in an earlier study (Perera-Diltz & Moe, 2014).

The third formative assessment is the discussion activity completed through the discussion board. This is an activity that empowers learners as it allows them to collaborate in the forum where their peers can add comments to what they have shared. Therefore, this allows participants to collaborate, establish and maintain a learning community.

All three online short courses were allocated a score of 5 for the component *summative assessment* as all the sections of the summative assessment measures student learning. As noted in Perera-Diltz & Moe (2014), summative assessments assist in measuring the end product, and in our study

a summative assessment existed within all three courses in the form of a test to assess the main concepts from the course content, as well as requiring students to apply what they have learnt to answer some questions. The summative assessments were accurate, cohesive, and aligned with the course learning outcomes to evaluate student learning, knowledge, proficiency, and skill.

Effective Use of Technology

Effective use of technology refers to the successful integration of technology into the online course and its use in a variety of forms that help students to achieve the course goals and objectives. All three online short courses were allocated a score of 4 for the component *current technology* as the courses are up to date with emerging technologies. The documents used in the three courses such as the PDF document were recent versions of Adobe. Videos used in the course were also of the latest version of its type. The *Business Communication Skills* course used images of the Microsoft Word ribbon which was also the latest version. The courses themselves were designed and developed on the latest version of the learning management system that the university uses.

The *Finance for Non-Financial Managers* and *Principles of Management* courses were allocated a score of 1 whilst the *Business Communications Skills* course was allocated a score of 4 for the component *application use*. There was limited use of external applications for the *Finance for Non-Financial Managers* and *Principles of Management* courses. However, the use of certain elements that were contained within the external applications was well incorporated into the content of these two courses. However, activities can be introduced that make use of Microsoft Excel, thus, reinforcing the use of the concepts and these external applications. The *Finance for Non-Financial Managers* final exam made use of Microsoft Excel, more so consistent use throughout the online course and not just for activities such as the final exam.

The *Business Communications Skills* course made adequate use of some external applications such as Microsoft Word, Microsoft PowerPoint, Microsoft Excel, and email. The use of Microsoft Word was encouraged when completing a report. For example, the course shows students how to use Microsoft Word to write a report and use Microsoft Word's built-in functionalities such as the generation of a table of contents or formatting. Another example is the use of email and the built-in functionality of email signatures. All three online short courses were allocated a score of 2 for the component *web tools*. There is limited use of web tools across the three online courses. While a variety of web 1.0 tools were used such as email for reminders or notifications, web 2.0 tools and web 3.0 tools were not used as much as they could be. Some tools that can be introduced into the three courses include blogs, wikis, online journals, podcasts and videocasts, and instant messaging. Cloud-based applications such as Google Drive or OneDrive or any other applications can also be appropriately used to ensure collaboration and effective learning.

All three online short courses were allocated a score of 4 for the component *technology orientation*. The technologies that were used in the three courses create student centred instruction and were not limited to instructors only using technologies to replicate the traditional face-to-face instruction, making students recipients of content only. The courses consist of more than recorded videos of someone writing on a board and explaining concepts. A variety of multimedia tools were integrated in the courses. For example, there are videos with the instructor recorded to teach concepts with a variety of graphics and animations to complement the content being explained.

Students engaged in an interactive method that promoted a more learner centred approach, enabling them to be more hands-on and involved rather than just absorbing information. All three online short courses were allocated a score of 5 for the component *technology support* as technology support was comprehensively provided. There are orientation videos and manuals provided in the introductory module (module 0) of the three courses. The Quality Matters model encourages the provision of learner support (Quality Matters, 2014). All three online short courses were allocated a score of 5 for the component *technical support* as in-depth technical support was provided as shown in Figure 9.

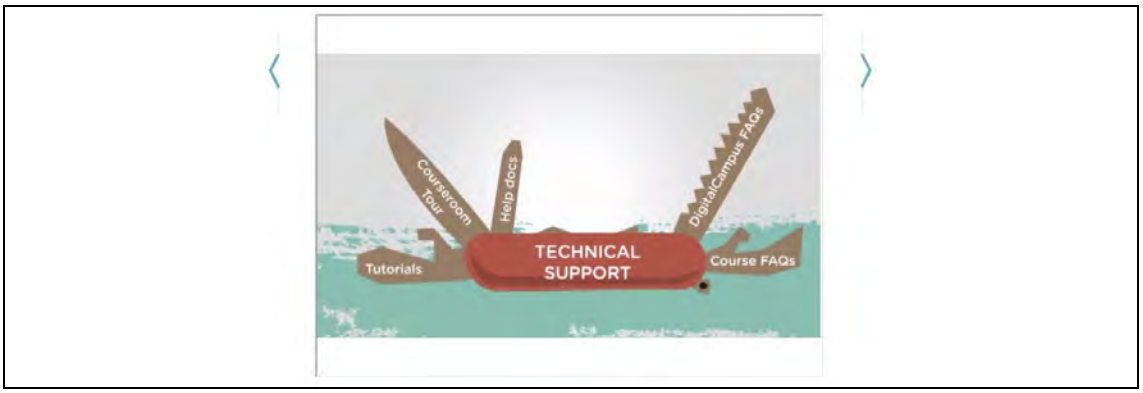


Figure 7: Technical Support Mechanisms

Students can access several technical support mechanisms within all three online courses. These include the digital campus course room tour, tutorials, help documentation, FAQs that are related to the course and FAQs that cover general queries. All three online short courses were allocated a score of 5 for the component *technical support turnaround time* as assistance with technical support is given to students immediately or within 12 hours of the query. As soon as students log onto any of the three course sites, they receive a notification and immediate response to handle queries by students. The platform that these courses were designed and developed on allows for a variety of tools to be integrated. Some of the tools included in this course are the use of a calendar, event lists, feedback functionality, forums, gradebook, quiz, workshop tool, wikis, Turnitin for essay type questions, reports, live chat, assignment, glossary, blogs and the SCORM package.

All three online short courses were allocated a score of 5 for the component *data privacy* as there were thorough systems in place to ensure students data privacy and security. Raitman, Ngo, Augar & Zhou (2005) stated that basic security pertaining to integrity and confidentiality needs to be assured in an online course. Only students with credentials could access the online course they were registered for and enrolled in. Individual student data is not available between students but only the instructor. As students have their own credentials, that is, username and password, they can only see their own profile. The security measure in place prior to accessing the final examination was an exam pin. This is shown in Figure 10 below. This is one method of security to prevent students from accessing the examination prior to its scheduled time.

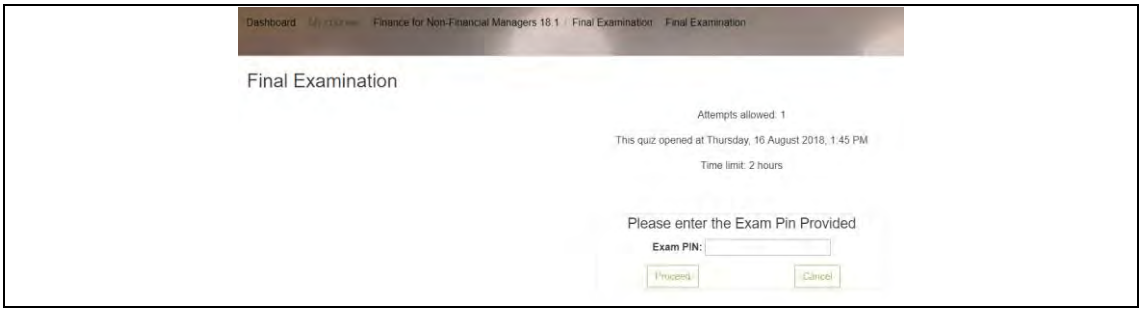


Figure 8: Final Examination Home Screen

The online exam is monitored via the webcam. Students are watched students for the full duration of the exam and random pictures are taken of the students during the duration of the exam. The

online examination technology switches off other programs running on the student's computer, locking them into an online examination portal.

CONCLUSION

The technique of double loop learning (Argyris, 2002) was used to confirm the suggested findings and to further determine the validity and reliability of the rubric developed. The results were convergent as the scores of the evaluation were high. Overall, there exists congruency between the literature on the quality design of online courses and the research findings for most of the components that were incorporated into the design of the rubric. This reaffirms the validity and reliability of the rubric. However, while conducting the evaluations and analysis of the three online short courses there were a minority of points that were found relating to the online environment that were not well integrated into the design of the rubric. The following adjustments could be made to the rubric to improve the validity and reliability further:

1. Removal of components: *Hardware Specifications*, *Software Specifications*, *Prerequisite Technology Skills*, *Audio Aids*, *Modality Principle - Audio Narration*; and
2. Modification of components: *Synchronous Interaction*, *Descriptive Criteria*, *Appropriate Answers,* and *Content Alignment*.

The components *Hardware Specifications*, *Software Specifications,* and *Prerequisite Technology Skills* could be removed from the rubric, assuming that these lists are sent to participants, as part to of the course documentation prior to their access of the online course. The components *Audio Aids* and *Modality Principle - Audio Narration* could be removed from the rubric as there may not always be standalone audio aids within a course, as most recordings are done through video. The inclusion of the component *Synchronous Interaction* in an evaluation process using the rubric, is dependent on whether the course is offered across multiple time zones. There might be an absence of synchronous interactions in the design of online courses as it can be difficult to find a common time that is convenient for all participants. If the course is offered in one time zone, then the component should be included.

The evaluation of the *Descriptive Criteria* and *Appropriate Answers* components is dependent on whether there are long question types present within the assessments of the course being evaluated. If there are long question types present, then these two components should be included in the evaluation process. The *Content Alignment* component is dependent on the course objectives; however, during the evaluation and analysis of the three online short courses, it was found that there were only module objectives and no course objectives. Therefore, depending on whether course objectives or module objectives are present within an online course, would determine what the content and assessment of the course are aligned and compared to. Analysis of the three online courses led to testing and improving the quality design framework, in other words, it improved the validity and reliability of the rubric.

The use of well-established quality design theories and evaluation tools, the pre-test, the pilot test, and the analysis of the three online courses led to developing, testing, and improving the quality design framework, and the revised components are shown in Figure 11 below.

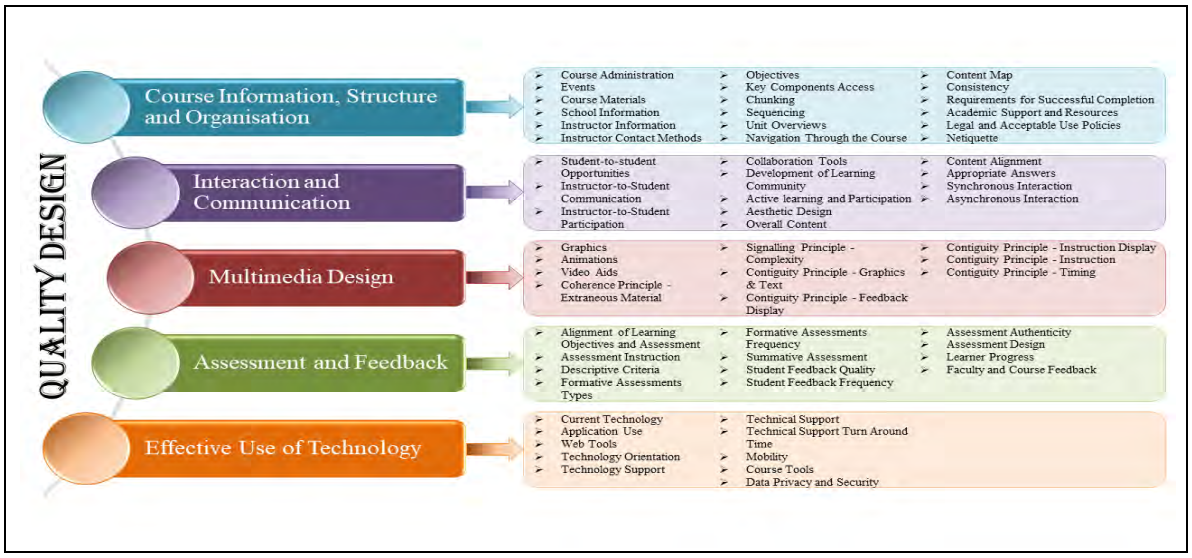


Figure 9: Summary of dimensions and revised components of what constitutes quality design of online courses

LIMITATIONS

One of the limitations of the research was that the rubric has not been validated statistically. Although the rubric itself used a quantitative method to evaluate courses, the validation of the rubric itself was primarily qualitative. There is a potential to validate the rubric statistically using Cronbach's alpha (Cronbach, 1951). This will further improve the reliability of the rubric.

REFERENCES

Argyris, C., (2002). Double-loop learning, teaching, and research. *Academy of management learning & education*, vol. 1, no. 2, pp.206-218.

Ascough, R.S., (2011). Learning (About) Outcomes: How the Focus on Assessment Can Help Overall Course Design. *Canadian Journal of Higher Education*, vol. 41, no. 2, pp.44-61.

Asunka, S., (2008). Online learning in higher education in Sub-Saharan Africa: Ghanaian University students' experiences and perceptions. *International Review of Research in Open and Distributed Learning*, vol. 9, no. 3, pp.1-23.

Ausburn, L.J., (2004). Course design elements most valued by adult learners in blended online education environments: An American perspective. *Educational Media International*, vol. 41, no. 4, pp.327-337.

Bento, R.F. and White, L.F., (2010). Quality measures that matter. *Issues in Informing Science and Information Technology*, vol. 7, pp.61-72.

Biggs, J. and Tang, C., (2011). *Teaching for quality learning at university*. McGraw-hill education (UK).

Biggs, J., and Tang, C. (2007). Teaching for quality learning at university (society for research into higher education). *Open University Press*.

Carliner, S. (2004). An overview of online learning (2nd ed.). Armherst, MA: Human Resource Development Press.

Chickering, A.W. and Gamson, Z.F., (1987). Seven principles for good practice in undergraduate education. *AAHE bulletin*, vol. *3*, pp.7.

Clark, R.C. and Mayer, R.E., (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. John Wiley & sons.

Clark, L.A. and Watson, D., (1995). Constructing validity: Basic issues in objective scale development. *Psychological assessment*, vol. 7, no. 3, pp. 309.

Cronbach, L.J., (1951). Coefficient alpha and the internal structure of tests. *psychometrika*, vol. 16, no. 3, pp.297-334.

Cronbach, L. J., and Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological bulletin*, vol. 52, no. 4, pp. 281-302.

Dahalan, N., Hasan, H., Hassan, F., Zakaria, Z. and Wan Mohd Noor, W.A., (2013). Engaging Students On-Line: Does Gender Matter in Adoption of Learning Material Design?. *World Journal on Educational Technology*, vol. 5, no. 3, pp.413-419.

Daukilas, S., Kaciniene, I., Vaisnoriene, D. and Vascila, V., (2008). Factors that Impact Quality of E-Teaching/Learning Technologies in Higher Education. *Quality of Higher Education*, vol. 5, pp.132-151.

Davis, J.F., Sauber, M.H. and Edwards, E.A., (2011). Managing quality in online education: a conceptual model for program development and improvement. *International Journal of Management in Education*, vol. 5, no. 1, pp.93-108.

Dlamini, R., & Ndzinisa, N. (2020). Universities trailing behind: unquestioned epistemological foundations constraining the transition to online instructional delivery and learning. *South African Journal of Higher Education*, vol. 34, no. 6, pp. 52-64.

Farin, N.J., Rahman, A., Mansoor, N. and Hossain, S., (2016). Wotcoms: A novel cross-layered web-of-things based framework for course management system. In *Proceedings of the First International Conference on Advanced Information and Communication Technology (ICAICT-16)*.

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, vol. 11, no. 1, pp. 61-72.

Gray, J.A. and DiLoreto, M., (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, vol. 11, no. 1, pp.1.

Harvey, B. (2003). Investing in technology: *The impact in student learning. ERIC Digest.* ERIC Clearinghouse on Information & Technology. ERIC Document No: ED479843. http://www.ericdigests.org/2005-2/technology.html. [Accessed 27 March 2018].

He, X., Watanabe, M. and Ono, K., (2018). Intention-oriented classification of the visual representation of numerical data. *Journal of the Science of Design*, vol. 2, no. 1, pp.1_1-1_6.

Hew, K.F., (2016). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS. *British Journal of Educational Technology*, vol. 47, no. 2, pp.320-341.

Kember, D. and Leung, D.Y., (2008). Establishing the validity and reliability of course evaluation questionnaires. *Assessment & Evaluation in Higher Education*, vol. 33, no. 4, pp.341-353.

Kim, M.K., Kim, S.M., Khera, O. and Getman, J., (2014). The experience of three flipped classrooms in an urban university: an exploration of design principles. *The Internet and Higher Education*, vol. *22*, pp.37-50.

Kothari, C.R., (2004). *Research methodology: Methods and techniques*. New Age International.

Kundu, A. and Bej, T. (2021), COVID-19 response: students' readiness for shifting classes online, Corporate Governance, *The International Journal of Business in Society*, vol. 21 No. 6, pp. 1250-1270.

Law, K. M., Geng, S., and Li, T. (2019). Student enrollment, motivation and learning performance in a blended learning environment: The mediating effects of social, teaching, and cognitive presence. *Computers & Education*, vol. 136, 1-12.

Little, B.B., (2009). The use of standards for peer review of online nursing courses: A pilot study. *Journal of nursing education*, vol. 48, no. 7, pp.411-415.

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S. and Reber, S., (2017). Descriptive Analysis in Education: A Guide for Researchers. NCEE 2017-4023. *National Center for Education Evaluation and Regional Assistance*.

Lowenthal, P.R. and Hodges, C.B., (2015). In search of quality: Using quality matters to analyze the quality of massive, open, online courses (MOOCs). *International Review of Research in Open and Distributed Learning*, vol. 16, no. 5, pp.83-101

.

McQuirter, R. (2020). Lessons on Change: Shifting to online learning during COVID-19. Brock Education: *A Journal of Educational Research and Practice*, vol. 29, no. 2, pp. 47-51.

Moore, J.C., (2005). The Sloan Consortium quality framework and the five pillars. *The Sloan Consortium*, pp.1-9.

Moore, M.G., (1989). Three types of interaction. *The American Journal of Distance Education*, vol. 3, no. 2, pp.1-7.

Moskal, B.M. and Leydens, J.A., (2000). Scoring rubric development: Validity and reliability. *Practical assessment, research, and evaluation*, vol. 7, no. 1, pp.10.

Oldfield, A., Broadfoot, P., Sutherland, R. and Timmis, S., (2012). Assessment in a Digital Age: A Research Review. *Bristol: University of Bristol.*

Online Learning Consortium (OLC), (2014). Retrieved from http://onlinelearningconsortium.org/

Palloff, R.M. and Pratt, K., (2010). *Collaborating online: Learning together in community* (Vol. 32). John Wiley & Sons.

Palloff, R.M. and Pratt, K., (2009). *Assessing the online learner: Resources and strategies for faculty* (Vol. 7). John Wiley & Sons.

Perera-Diltz, D.M. and Moe, J.L., (2014). Formative and summative assessment in online education. *Journal of research in innovative teaching*, vol. 7, no. 1.

Quality Matters, (2014). Quality Matters rubric standards. *Retrieved from Quality Matters:* https://www.qualitymatters.org/rubric. [Accessed 20 April 2018].

Raitman, R., Ngo, L., Augar, N. and Zhou, W., (2005), July. Security in the online e-learning environment. In *Fifth IEEE International Conference on Advanced Learning Technologies (ICALT'05)* (pp. 702-706). IEEE.

Ralston-Berg, P. and Nath, L., (2008), August. What makes a quality online course? The student perspective. In *Proceedings of the 24th annual conference on distance teaching and learning*.

Scott, D. and Morrison, M., (2005). *Key ideas in educational research*. A&C Black.

Shen, S.T., Prior, S.D., Chen, K.M. and You, M.L., (2007), July. Chinese web browser design utilising cultural icons. In *International Conference on Usability and Internationalization* (pp. 249-258). Springer, Berlin, Heidelberg.

Smith, R.M., (2014). *Conquering the content: A blueprint for online course design and development*. John Wiley & Sons.

Stella, A., & Woodhouse, D 2011, 'Evolving Dimensions of Transnational Education', in A Stella & S Bhushan (eds), *Quality Assurance of Transnational Higher Education - The Experience of Australia and India*, National University of Educational Planning and Administration at M/S Anil Offset & Packaging, India, pp. 3 -17

Swan, K., Day, S.L., Bogle, L.R. and Matthews, D.B., (2014). A collaborative, design-based approach to improving an online program. *The Internet and Higher Education*, vol. 21, pp.74-81.

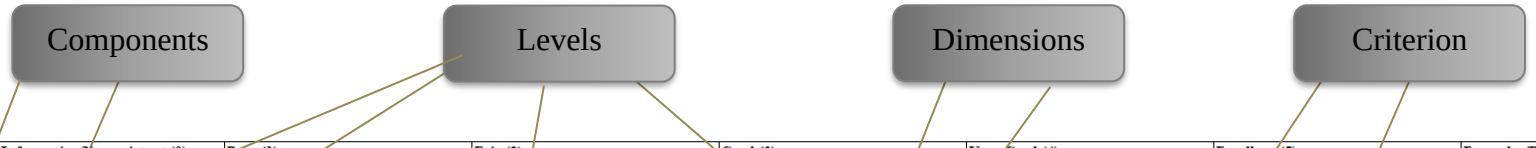
Taylor, J.M., Dunn, M. and Winn, S.K., (2015). Innovative orientation leads to improved success in online courses. *Online Learning*, vol. 19, no. 4, p.n4.

Teräs, H. and Herrington, J., (2014). Neither the frying pan nor the fire: In search of a balanced authentic e-learning design through an educational design research process. *The international review of research in open and distributed learning*, vol. 15, no. 2.

Wang, H., (2008). Benchmarks and Quality Assurance for Online Course Development in Higher Education. *Online Submission*, vol. 5, no. 3, pp.31-34.

Young, A. and Norgard, C., (2006). Assessing the quality of online courses from the students' perspective. *The Internet and Higher Education*, vol. 9, no. 2, pp.107-115.

Appendix A – The Research Instrument: The Rubric



	No Information/Non-existent (0)	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Examples/Descriptions	Score Total
Course Information, Structure and Organization								xxx
Course information entails a clear description and overview of the online course. Online courses should encompass clear instruction, clear course objectives and outcomes, a list of requirements and policies, course schedule, important dates, list of assignments with deadlines and the required hours – this allows students to have a feel of what to expect and what they need to do. Course structure and organisation refers to elements of instructional design in an online course which includes the structure, instructional strategies, and the overall course set-up.								
Course Administration	No course information is provided.	Limited course information is provided.	Course information for some aspects of the course are provided.	Course information for all key aspects of the course are provided.	Course information for most aspects of the course are provided.	Course information for all aspects of the course are provided.	Course information should include the course schedule, syllabus, outline, scope, grading policy including grading scale and weights, procedure for submission of assignments, preferred modes of communication, types of assessments that will need to be completed.	
Events	No information of calendar due dates for events are provided.	Little information of calendar due dates for events are provided.	Calendar dates for some course events throughout the year are provided.	Calendar dates for all major course events throughout the year are provided.	Calendar dates for most course events are provided.	Calendar dates for all course events throughout the year are provided.	Events such as online sessions, task, activities, assignments and due dates, group projects and exams should be provided.	
Comment:								
Interaction and Communication								xxx
Interaction and Collaboration refers to the extent to which there is student-instructor, student-student, and student-content interaction. Interaction denotes communication between and among students and instructors, synchronously or asynchronously. Collaboration is a subset of interaction and refers specifically to those activities in which groups are working interdependently toward a shared result. Interaction and communication addresses how the course design, content, assignments, and technology effectively encourage exchanges amongst the instructor, students, and content.								
Interaction Opportunities	No opportunities of interaction are provided within the course for student-to-student.	Limited opportunities of student-to-student interaction exist within the course.	Some opportunities of student-to-student interaction exist within the course.	Sufficient opportunities of student-to-student interaction exist within the course.	Adequate opportunities of student-to-student interaction exist within the course.	Ample opportunities of student-to-student interaction exist within the course.	Student-to-student opportunities need to exist in order to promote learning.	
Interaction Amongst Students	None of the activities designed require group interaction amongst students.	Instructors design of activities hardly encourage group interaction.	Instructor designs some of the activities to encourage group interaction.	Instructor designs a sufficient number of the activities to encourage group interaction.	Instructor designs most of the activities to encourage group interaction.	Instructor designs all of the activities to encourage group interaction.	Activities such as wikis, blogs, forums and any activity that promotes active and collaborative learning that reinforce the course content and learning outcomes.	
Comment:								

Example – Data Privacy & Security

	No Information/Non-existent (0)	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Examples/Descriptions	Score Total	Score Percentage
Data Privacy and Security	There is no consideration of data privacy and security.	There are limited systems in place to ensure students data privacy and security.	There are enough systems in place to ensure students data privacy and security.	There are sufficient systems in place to ensure students data privacy and security.	There are adequate systems in place to ensure students data privacy and security.	There are thorough systems in place to ensure students data privacy and security.	Anonymity and confidentiality for individual feedback, assignments, tests and exam integrity.		0%
Comment:									

Level of Measurement

Level of Measurement	Qualifier Quantity
No Information (0)	0%
Poor (1)	≥ 1% < 20%
Fair (2)	≥ 20% < 40%
Good (3)	≥ 40% < 60%
Very Good (4)	≥ 60% < 80%
Excellent (5)	≥ 80% ≤ 100%

Please Note:
Where a criterion contains descriptions that relate to a quantity, then the level of measurement needs to correlate with the provided Qualifier Quantity. E.g. if a criterion reads "Some hardware requirements are specified.", and this criterion is contained within the level of measurement fair, then the quantity qualifier will be ≥ 20% < 40%. This means that when one looks at the aspect of some hardware being specified then they need to see that between 20% to 40% of the requirements for hardware is identified.

Score Summary Per Dimension

	Score Total	Score Percentage
Course Information, Structure and Organisation		
Interaction and Communication		
Multimedia Design		
Assessment and Feedback		
Effective Use of Technology		