THE RE-DESIGN PROCESS OF AN INSTRUMENT
TO EVALUATE USABILITY IN ONLINE COURSES

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ABSTRACT

Usability in e-learning has been measured in order to improve students' satisfaction (Nasreen & Alawi, 2011; Davids, Chikte, & Halperin, 2014). In order to measure courses' usability in higher education online courses, the E-Learning Usability Evaluation Questionnaire developed by Zaharias (2009) is the closest instrument available. However, this instrument was originally designed for corporate settings and an adaptation was required to use it in higher education online courses. The adaptation process, including re-wording of the questions and experts' input to obtain the adapted version of the questionnaire is described in this article. Results of the adaptation process are described, as well as validity and reliability of the redesigned instrument. Some recommendations for the use of the new version of the questionnaire are discussed.

Keywords: Usability, Usability Assessment Instrument, Online Courses, Higher Education, E-Learning.

INTRODUCTION

Usability has played an important role in web design. As technology and web design have evolved, researchers have created and compiled rules and heuristics to enhance web design usability's attributes, such as navigation, accessibility, efficiency, and design. According to Mazumder and Das (2014), these rules "give the direction to the designer to produce usable systems (p. 80)." Usability rules have been also applied in e-learning to evaluate online courses' usability.

Researchers have been evaluating usability in e-learning using different evaluation methods, such as heuristics, checklists, and think aloud protocols (Khan, Israr, & Hassan, 2010; Davids, Chikte, & Halperin, 2014). In most research studies, the usability evaluation results have helped in the improvement of the e-learning settings. However, most of the studies found are focused only on the web design of the online e-learning settings. Some researchers have considered including pedagogical aspects when conducting usability evaluations in e-learning (Granić & Ćukušić, 2011; Dringus & Cohen, 2005; Nyang'or, De Villiers, & Ssemugabi, 2013; Zaharias & Koutsabasis, 2012). In order to evaluate usability in online higher education courses, a few instruments were found which include web design and pedagogical elements (Zaharias, 2009; Hu, 2008).

The *E-learning Usability Evaluation Questionnaire* developed by Zaharias (2009) was the closest instrument to evaluate usability in higher education online courses. However, it was designed to measure e-learning usability in corporate settings. Therefore, an adaptation of this instrument was required in order to have an option of a non-proprietary instrument available for measuring usability in higher education courses.

In this study, the *E-learning Usability Evaluation Questionnaire* (Zaharias, 2009) was adapted for higher education educational environments. Faculty teaching online and online course designers could benefit from having access to an e-learning usability instrument to aid in the design and evaluation of fully online university courses based on users' perceptions. The instrument could assist them in examining to what degree they have incorporated usability principles to the designed courses. The results of the usability evaluation will help stakeholders in the improvement of the design of the courses and as a consequence, the overall experience of the users.

LITERATURE REVIEW

Usability in e-learning has been measured and studied by researchers (Nyang'or, Ssemugabi, & De Villiers, 2013; Feldstein & Neal, 2006; Aziz, Isa, & Nordin, 2010; Davids, Chikte, & Halperin, 2014). Research includes studies on usability of e-learning settings, such as e-learning platforms, web 2.0 applications, and offline e-learning tutorials (Stergioulas, et. al., 2014; Orehovacki & Hrustek, 2013; Nyang'or, De Villiers, & Ssemugabi, 2013), and also usability of online courses (Aziz, Isa, & Nordin, 2010; Ballard, 2010; Fisher & Wright, 2010; Dringus & Cohen, 2005). Usability is defined by the International Organization for Standardization (ISO) as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (as cited in Jokela, Iivari, Matero, & Karukka, 2003, p. 53). Considering software as the *context of use* for e-learning, Bevan, Kirakowski, and Maissel (1991) argued that usability in software development can be measured from different views: the product-oriented view, the user-oriented view, and the user-performance view. Most usability guidelines suggested in the literature are user-performance oriented, which include evaluating the ease-of-use and acceptability of the software or webpage (Bevan, Kirakowsky, & Maissel, 1991). These guidelines "give the direction to the designer to produce usable systems" (Mazumder & Das, 2014, p. 80).

In order to produce usable systems, three usability attributes can be measured based on the abovementioned usability definition: (1) *effectiveness*, (2) *efficiency*, and (3) *satisfaction*. These usability attributes are found in some well-known usability models, such as Nielsen's usability heuristics (Nielsen, 1995a) and Shneiderman's Eight Golden Rules (Shneiderman & Plaisant, 2010). These models offer criteria to help produce usable interfaces (Mazumder & Das, 2014), including guidelines that are based on the usability attributes along with new attributes, such as learnability and flexibility, which are related to website usability (Abran, Khelifi, Suryn, & Seffah, 2003).

According to Shackel (2009), there are three principal usability evaluation procedures: (1) expert review, (2) simulation trials, and (3) user performance tests. Based on this, usability guidelines can be used in e-learning in different ways, for example, as a checklist for designers that includes all the basic elements to create a usable course, or as a checklist where experts can evaluate a course's usability. Also, these guidelines can be used to measure a course's usability based on the user's performance and perception about the course.

Some well-known guidelines, such as Nielsen's heuristic evaluation (Nielsen, 1995b), have been used in research to measure usability in e-learning (Aziz, Isa, & Nordin, 2010; Ballard, 2010; David & Glore, 2010; Davids, Chikte & Halperin, 2014), while some other researchers have created their own set of guidelines to measure usability in their specific settings (Nyang'or, Ssemugabi, & De Villiers, 2013; Dringus & Cohen, 2005; Zaharias, 2009). Most of the e-learning usability studies found are focused on the web-design aspects of the courses.

According to research (Heidig, Müller, & Reichelt, 2015; Malamed, 2015; Plass, Heidig, Hayward, Homer, & Um, 2013) e-learning course design plays an important role in preventing online learner frustration, thereby impacting student satisfaction. However, since the purpose of e-learning is not only to provide an interface for an online learning environment, but also to support the acquisition of knowledge through it, the traditional usability instruments are not sufficient (Nyang'or, Ssemugabi, & De Villiers, 2013). Zaharias and Koutsabasis (2012) state, "usability of e-learning systems and applications is directed toward optimizing the learner experience along the two main axes: technical (or web) usability and pedagogical usability (p. 47)." Based on this, a usability measurement of a fully online course should consider not only the web interface design, but also pedagogical components, such as communication and learning tools, content, and tasks included in the learning environment (Silius, Tervakari, & Pohjolainen, 2003). As a result, researchers have considered additional pedagogical components when conducting usability evaluations of e-learning environments (Hu, 2008; Dringus & Cohen, 2005; Zaharias, 2009; Nokelainen, 2006) and new heuristic checklists have been developed. While there is limited research where the overall usability, including pedagogical components, is tested in online courses (Zaharias, 2009; Hu, 2008), there are several instruments available, but many, such as Quality Matters, are proprietary. This makes them very costly, both in the financial cost to access it, and the training time and certifications required for users.

The E-learning Usability Evaluation Questionnaire

Of all of the usability instruments reviewed, the *E-learning Usability Evaluation Questionnaire* created by Zaharias (2009) was the most appropriate to measure usability in online higher education courses because it was the first free and readily available instrument found to measure usability specifically for e-learning environments. Zaharias (2009) proposed a questionnaire-based usability evaluation method for e-learning, considering cognitive and affective factors which may have an effect in e-learning usability. The eight proposed criteria in Zaharias' (2009) *E-learning Usability Evaluation Questionnaire* are: (1) content, (2) learning and support, (3) visual design, (4) navigation, (5) accessibility, (6) interactivity, (7) self-assessment and learnability, and (8) motivation to learn. This can be considered the closest instrument to measure usability in e-learning because many factors related to online university courses are included. However, this questionnaire is not adequate for educational settings, since it was created for corporate training settings.

Given the lack of an affordable, easily accessible instrument to measure usability in online university courses, for this study, the *E-learning Usability Evaluation Questionnaire* (Zaharias, 2009) was adapted to educational settings. This will help fill the need for an instrument that allows university faculty and stakeholders a valid and reliable way to analyze and improve usability in fully online higher education courses. During the adaptation process, which is presented in the Methodology section below, two additional criteria were added to the redesigned version of the questionnaire. These criteria are *Assessment* and *Instructor Presence*.

Assessment in Online Courses

As argued by Swan, Shen, and Hiltz (2006), instructors usually assess the skills and behaviors that are considered most important and valuable to a course. This way, the instructors are able to give feedback and guide the students through their learning process. Course assessment is considered one of the most important parts in an online course because "it has a strong impact on learning and is an indicator of the quality of learning occurring in a class" (Arend, 2007, p. 3).

Researchers (Gaytan & McEwen, 2007; Arend, 2007; Swan, Shen & Hiltz, 2006; Rochester Institute of Technology, n.d) have reported assessment methods that can be used in online courses. These methods include but not are limited to: (1) threaded discussions, (2) final/midterm examinations, (3) quizzes, (4) individual projects, (5) collaborative projects, (6) peer evaluations, (7) portfolios, (8) papers/essays, among others. By using a variety of assessment methods, online students are able to demonstrate in different ways their performance development. Gaytan and McEwen (2007) have identified flexibility, immediate feedback, and reflective thinking as the advantages of online assessments.

Because online assessment methods can be diverse, researchers recommend the use of grading rubrics to provide detailed expectations about students' performance (Swan, Shen & Hiltz, 2006; Arend, 2007; Rochester Institute of Technology, n. d.; Gaytan & McEwen, 2007; Poe & Stassen, n. d.). With clear and available rubrics and instructions, students can use their time effectively completing graded assignments without waiting for the instructor to respond a question. Therefore, it is important to consider the usability of assessment methods in an online course, in order to offer clear and available instructions for all the required activities.

Instructor Presence in Online Courses

Teaching presence is the "design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (as cited in Jones, 2011, p. 78)." Based on this, instructor's interaction in online courses plays an important role in facilitating and guiding students' learning acquisition in a course. According to Baker (2010), instructor's presence is a significant predictor of student affective learning, cognition, and motivation in the online environment. In order to create a learning community and increase interaction, the instructor uses a variety of technological tools, such as discussion boards, emails, chats, and messages, to reduce physical distance and increase communication among course participants and instructor.

One of the instructor's roles is to be the course facilitator. Therefore, it is important to be actively present throughout the course duration. The instructor can create an accepting climate for learning, keep students on track, and give feedback to reinforce or confirm students' understanding (Shea, Li, & Pickett, 2006; Shea, Li, Swan, & Pickett, 2005). As Tu and McIsaac (2002) argue, response time is a critical issue to the online interaction between instructor and students, particularly in courses with asynchronous communication. Students need on-time responses to the questions and issues they might have when taking an online course, in order to complete assignments and continue with the course flow. As Jones (2011) argues, "if the online course design includes multiple methods giving students notice of key course items and encouraging faculty-student interaction (p. 99)," then teaching presence can be achieved.

Given that teacher presence is a significant component in an online course, it is important to consider the usability of instructor presence. Students taking online courses need to have continuous communication with the instructor to overcome issues and answer questions that could interrupt their learning process.

METHODOLOGY

The *E-learning Usability Evaluation Questionnaire* developed by Zaharias (2009), was originally designed to measure e-learning usability in corporate trainings. The purpose of this study was to redesign the instrument so it can be used to measure usability in fully online higher education courses. In order to conduct this study, the original questionnaire by Zaharias (2009), was redesigned by adapting the wording and focus of some questions to evaluate usability in online higher education courses, as well as adding two sets of new questions in the areas of instructor presence and assessment. The redesign process of the original instrument is described below.

The Redesign Process

Since the original usability instrument by Zaharias (2009) was designed for corporate settings, numerous questions, e-learning technologies, and learning strategies did not apply to online courses in higher education. In addition, because it was developed over 5 years ago, many e-learning technologies have changed. Therefore, the original questionnaire by Zaharias (2009) was adapted in order to be used with fully online university courses. To validate the rewording of the original questions in the survey, experts were invited to conduct a pilot study. The adaptation process of the original questionnaire was conducted in three phases. The three adaptation phases are explained below.

Phase 1: Initial Questionnaire Adaptation

In the first phase of the questionnaire adaptation process, Zaharias' (2009) original questionnaire was reviewed and adapted by the researcher to rephrase the questions, keeping a similar meaning for each, but integrating criteria, technologies, and pedagogies used in e-learning specifically in online university courses. An excerpt of the original and the adapted questions in this Phase are shown in Table 1. From Zaharias' (2009) original questionnaire, ten items related to the criteria *motivation to learn* were removed. Zaharias (2009) researched the relationship between motivation to learn and usability in e-learning. The questions on *motivation to learn* were beyond the scope of the present study because its purpose was to redesign the instrument to measure usability in online higher education courses. The final questionnaire from this phase had a total of 29 questions, and 14 questions were kept as the original questions.

Table 1. Excerpts of Phase 1 Adaptation Process

Original Question	Adapted Question
Abstract concepts (principles, formulas, rules, etc.) are illustrated with concrete, specific examples.	Difficult concepts are illustrated or explained using examples.
Learners can choose (easily) what part of the course to access, the order and pace of studying.	Learners can follow in a logical order the part of the course that is intended for a specific week or module.
The course is easy to install, uninstall, and launch.	The course is easy to find and access.

Phase 2: Experts' Review and Adaptation

In the second phase, the adapted version of the *E-Learning Usability Evaluation Questionnaire* that resulted from Phase 1 was reviewed by a team of two different experts in the field. These experts were selected, using purposive sampling, because both are academic experts in e-learning, having more than 16 years of experience each, teaching and designing fully online synchronous and asynchronous courses. At the time of their participation in this study, both experts were teaching online courses at a higher education institution. In this phase, the experts provided feedback on the adapted version from Phase 1. Their suggestions and comments were analyzed to revise the questionnaire. Some of the revised questions are shown in Table 2.

Table 2. Excerpts of Revised Questions

Reviewed Question	Revised Question
Media are used appropriately so as to assist in highlighting and learning critical concepts rather than merely entertaining or possibly distracting learners.	Media highlight concepts rather than distract or merely entertain learners.
The course provides meaningful interactions (for example embedded quizzes, tests, etc.) when there are long sections of text.	The course provides meaningful interactions (i.e. self-check embedded quizzes, reflection activities) when there are long sections of text.
The course provides support for learner activities to allow working within existing competence while encountering meaningful chunks of knowledge.	The course provides support to allow students to build on prior knowledge and skills to complete activities.

Experts' comments were analyzed and incorporated into the questionnaire. As a result of this phase, a total of 7 questions were added. One question was added to the existing section on *navigation*; 3 for a new section regarding the usability of course assessments; and 3 for another new section on instructor presence, resulting in a newly adapted version of the questionnaire with 36 questions. At this point, no additional questions were eliminated. The sections and questions added to the questionnaire are shown in Table 3 below.

Table 3. Sections and Questions Added to the Instrument

Sections	Items Added
Navigation	All course resources are easily accessible through a minimum number of clicks.
Course Assessments	Course assessments (i.e. projects, tests) and grading resources for each assessment (i.e. rubrics, study guides) are available and easy to find.
	Graded course assignments have clear instructions.
	The resources needed to complete graded course assignments are included (or linked) on the same page where the instructions are.
Instructor Presence	Responses and feedback are received in a reasonable period of time.
	Instructor's contact information (email, phone number) is easy to find and available in different parts of the course.
	Students are continuously encouraged to contact the instructor if they have a question.

Phase 3: Experts' Review and Final Questionnaire

In the third phase, three additional experts reviewed the questionnaire that resulted as a product of Phase 2. These experts were selected using purposive sampling, because they are professional and academic experts in e-learning, having more than 20 years combined experience teaching, designing, and evaluating fully online higher education courses. They were asked to evaluate if each item was: appropriate to measure usability in online courses, easy to

understand, relevant to the e-learning field, as well as to provide an overall evaluation of the questionnaire. All the experts provided feedback and agreed that some questions were redundant and needed to be deleted. Some of their comments are presented in Table 4. Their comments and suggestions were also analyzed by the researcher and incorporated into the questionnaire, thus obtaining the version that was used in this study.

Table 4. Sample of Phase 3 Experts' Comments and Suggestions

Item Reviewed	Experts' Comments
The course provides opportunities for self-assessments (post-tests and other assessments) that advance learners' achievements according to the learning objectives.	"The second part of this sentence might not make sense to the learners. Don't complicate the questions as it will have an adverse impact on the quality of the responses. The second half is very meaningful to the person interpreting the results of the survey."
Media highlight concepts rather than distract or merely entertain learners.	"In terms of surveys this is a biased question. You might remove the bias by rewording "Throughout the course the media (illustrations, graphics, and video) aid in the understanding of concepts."
The course has interactive learning tasks to engage learners.	"Seems like this one has already been asked a couple of times. The survey is very long and anything you can do to shorten it would be helpful. As long as you can still get all of the data you desire."
Content is organized in an appropriate sequence and in small parts for flexible learning.	"This concerns me for a couple of reasons. First, it has two criteria: sequence and small parts. What are you trying to measure with this question? If the leaner feels that the content is not in a proper sequence OR is not in small parts, then the survey implies that the content is not organized."
Overall Comments	
"This is a very long survey and the learners might have survey fatigue near the end of the survey. If you keep the survey this long, ask the important questions early as they will tend to have more validity in the quality of the learners' responses. Review the survey and find any way to shorten it. Professionals might answer a long survey with highly technical questions. Students will not."	
"In general, it wasn't clear at times if the learner taking the survey was rating their own view of various elements, or how they thought those elements looked from a general review of the course (not personal feelings). Using "learners" (plural) seemed to be asking for more general feedback for the whole of the course instead of personal feedback and opinions. Either direction would be interesting research, or maybe you want both in survey. I would recommend, when sending the survey out, to directly refer to the learner when you want them to give you their personal feelings/feedback: "The course allows you to leave whenever desired...". Or, if you want them to give a more broader, less personal account of how well the course was designed for all learners, to make it more specific: "The course design allowed learners to leave whenever desired...""	

Testing the Final Questionnaire

The final version contains 32 questions divided into the following 9 categories: (1) content, (2) learning and support, (3) visual design, (4) navigation, (5) accessibility, (6) interactivity, (7) self-assessment and learnability, (8) course assessments, and (9) instructor presence. The final version that resulted from Phase 3 was tested with real participants to determine its validity and reliability. Participants were students enrolled in one or more fully online courses from January to May 2016 in a South Texas university. A convenience sample was drawn from the students who responded, becoming part of the final sample. Although a convenience sample is not considered a rigorous sample technique (Marshall, 1996), it was an appropriate sampling method because, since participation was anonymous and voluntary, from the target population, only participants willing to be part of the research study were considered part of the final sample.

The questionnaire was administered at the beginning of the semester. The items in the questionnaire were answered using a 7-point Likert scale, ranging from: 1-*Strongly Disagree*, 2-*Disagree*, 3-*Somewhat Disagree*, 4-*Neither Agree or Disagree*, 5-*Somewhat Agree*, 6-*Agree*, and 7-*Strongly Agree*. The answers also included a "*Not Applicable*" option, for those questions that were not applicable for a participant. A total of 520 responses were collected. An Exploratory Factor Analysis (EFA) was then performed.

RESULTS

From the Exploratory Factor Analysis performed, a total of four factors were extracted. The factor loadings of each of the 32 items were analyzed. Based on the results, 27 questions were considered appropriate to be included in the questionnaire. The factor loadings of the 5 remaining items did not clearly load into any of the four factors. Therefore, these 5 items were removed from the questionnaire. From the removed questions, 2 were from the *course assessment* criteria, 2 were from the *navigation* criteria, and 1 was from the *learning and support* criteria. The following table (Table 5) exhibits the questions that were not suitable to be included in the new questionnaire.

Table 5. Removed Questions

Removed Question	Criteria Related
There are opportunities for me to learn through interaction with others (discussion or other collaborative activities).	Learning and Support
The course design allows me to stop and leave whenever I want, and easily return to the point where I was.	Navigation
It is clear what I should do if I get stuck or have questions.	Navigation
Course assessments (projects, tests, etc.) and grading resources for each assessment (rubrics, study guides, etc.) are available and easy to find.	Course Assessments
The resources needed to complete graded course assignments are included (or linked) on the same page as the instructions.	Course Assessments

Based on the EFA results for the new questionnaire, Factor 1 was formed by 9 questions related to *content, self-assessment and learnability, learning and support,* and *course assessment* criteria. Factor 2 was formed by 6 questions related to *interactivity, self-assessment and learnability,* and *learning and support* criteria. Factor 3 was formed by 3 questions related to *instructor presence* criteria. Finally, Factor 4 was composed by 9 questions related to *navigation, visual design*, *self-assessment and learnability,* and *accessibility* criteria. Names were given to the four factors based on the items they contained. The factors were named as follows: Factor 1 – *Content*, Factor 2 – *Interactivity*, Factor 3 – *Instructor Presence*, and Factor 4 – *Course Design*. These factors became the new criteria for the redesigned questionnaire. Table 6 presents a summary of the items and the criteria to which they were related before and after the EFA, the number of questions, and the names given to the new factors. For this study, the final version of the questionnaire is composed of 27 items to measure usability in online higher education courses.

Table 6. Factors Extracted for the Redesigned Questionnaire

Criteria Originally Related	Item Name	Number of items per Criteria
Content	Q01	6
Content	Q02	6
Content	Q03	6
Content	Q04	6
Content	Q05	6
Content	Q06	6
Learning and Support	Q07	3
Learning and Support	Q08	3
Learning and Support	Q09	3
Visual Design	Q10	3
Visual Design	Q11	3
Visual Design	Q12	3
Navigation	Q13	4
Navigation	Q14	4
Navigation	Q15	4
Navigation	Q16	4
Accessibility	Q17	2
Accessibility	Q18	2
Interactivity	Q19	4
Interactivity	Q20	4
Interactivity	Q21	4
Interactivity	Q22	4
Self-Assessment and Learnability	Q23	4
Self-Assessment and Learnability	Q24	4
Self-Assessment and Learnability	Q25	4
Self-Assessment and Learnability	Q26	4
Course Assessments	Q27	3
Course Assessments	Q28	3
Course Assessments	Q29	3
Instructor Presence	Q30	3
Instructor Presence	Q31	3
Instructor Presence	Q32	3
Total		**32**

	New Criteria Related	Item Arrangement after EFA	Number of items per Criteria
New Factors' Names	Content	Q01	9
New Factors' Names	Content	Q02	9
New Factors' Names	Content	Q03	9
New Factors' Names	Content	Q04	9
New Factors' Names	Content	Q05	9
New Factors' Names	Content	Q06	9
New Factors' Names	Content	Q07	9
New Factors' Names	Content	Q25	9
New Factors' Names	Content	Q28	9
New Factors' Names	Interactivity	Q08	6
New Factors' Names	Interactivity	Q19	6
New Factors' Names	Interactivity	Q20	6
New Factors' Names	Interactivity	Q21	6
New Factors' Names	Interactivity	Q22	6
New Factors' Names	Interactivity	Q26	6
New Factors' Names	Instructor Presence	Q30	3
New Factors' Names	Instructor Presence	Q31	3
New Factors' Names	Instructor Presence	Q32	3
New Factors' Names	Course Design	Q10	9
New Factors' Names	Course Design	Q11	9
New Factors' Names	Course Design	Q12	9
New Factors' Names	Course Design	Q13	9
New Factors' Names	Course Design	Q16	9
New Factors' Names	Course Design	Q17	9
New Factors' Names	Course Design	Q18	9
New Factors' Names	Course Design	Q23	9
New Factors' Names	Course Design	Q24	9
	Total		**27**

This questionnaire was validated using content validity, which looks at the appropriateness of content. Content validity is measured giving each question to a panel of subject matter experts, who "give their opinion about whether the question is essential, useful or irrelevant to measuring the construct under study" (Shuttleworth, 2009, para. 7). Since each item in the adapted questionnaire was revised based on subject matter experts' input, the final version was considered valid. Overall, the internal consistency reliability of each factor on the questionnaire is higher than the recommended value of 0.80. Therefore, at this point the questionnaire is considered valid and reliable, and can be used to measure usability in online higher education courses.

CONCLUSIONS

According to Melis, Weber, and Andrès (2003), "the usability of an e-learning system is a key feature for its success (para. 1)." Therefore, the measurement of the usability perception of an online course is important to determine if a course is considered successful. Students taking online courses should not struggle with a course because of its usability, which could affect their grades and/or learning, or even cause them to drop the course. If a course is well-designed, students do not get confused and their energy and efforts are used in their own learning process. Based on the above, measuring online courses usability allows faculty and course designers to find courses' weaknesses in order to improve them, offering a good course-experience to students.

The purpose of this study was to redesign an instrument, originally created to measure usability in corporate settings, to be used to measure usability in fully online higher education courses. The redesign process, which was conducted in 3 phases, was presented in this article. Some items from the original questionnaire developed by Zaharias (2009) for corporate settings, were adapted by the researcher to educational settings in Phase 1. In Phase 2 and Phase 3, subject matter experts reviewed the questionnaire and their suggestions on each item were analyzed and incorporated. The final version of the questionnaire was pilot tested and the results were analyzed. As a result of the analysis, the redesigned questionnaire is considered valid and reliable, and it can be used to measure usability in online higher education courses.

The redesigned questionnaire collects students' perceptions about an online course's usability. Based on the questionnaire's results, usability weaknesses can be improved in order to offer a better course experience to the students. Although the questionnaire was designed to collect students' usability perceptions taking an already designed online higher education course, this questionnaire can also be used at the design stage of online courses. During the course development process, course designers can consider each item in the questionnaire and apply them to the online courses being designed. Since online higher education courses are delivered in many different ways and use different Learning Management Systems (LMS), the items included in the redesigned questionnaire were designed to apply to courses with diverse characteristics.

Online course designs, tools, and even online students' characteristics are constantly changing as technology evolves. Therefore, usability can be constantly measured in order to detect course's weaknesses and improve them as the courses are requiring it. As future research on this study, the redesigned questionnaire can be applied in different higher education institutions, with students with different course levels and characteristics, and different course designs in order to find improvement areas and the differences between one course's characteristics and another's. Also, the outcomes of the application of the questionnaire at diverse points of the course (including the designing stage) could be further studied.

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