Usability issues and support needs

What is important to Ghanaian learners?

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Abstract

This study explored usability issues and support needs in respect of e-learning that are important to adult learners in the Central Region of Ghana. One hundred and fifty adult learners were randomly selected from approximately 600 adult learners who had previously completed at least one online course. Respondents came from two districts that were purposively selected from among 21 districts in the Central Region. The respondents completed a paper-based questionnaire from June to August 2014. Respondents were adults aged 25 years and above studying and working in the Central Region. The research instrument used a five-point Likert scale for responses ranging from strongly disagree (1) to strongly agree (5). Respondents reported that learnability was a major usability concern (mean = 4.3). The next major concern for learners was finding and retrieving content and resources for effective e-learning (mean = 4.2). This was followed by the concern that the e-learning interface be usable by a variety of people with different access issues (mean = 4.1). On usability needs for e-learning, adult learners expressed the need for mastering technology required for e-learning (mean = 4.5). Learners also expressed the need for activities to be more entertaining and engaging (mean = 4.3) and to use real-world conventions and scenarios in order to make the systems more usable (mean = 4.3). Adult learners expressed the need for consistency in the treatment of graphical assets, navigation and feedback within the e-learning interface (mean = 4.2) and that the e-learning interface be simple and intuitive (mean = 4.1), among others.

Keywords: usability; e-learning; adult learners; learnability; mastering technology

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Résumé

Cette étude porte sur les problèmes d'utilisabilité et les besoins de soutien en matière d'e-learning qui intéressent les apprenants adultes dans la région centrale du Ghana. Cent cinquante (150) apprenants adultes ont été sélectionnés au hasard parmi environ six cents (600) apprenants adultes qui avaient déjà terminé au moins un cours en ligne. Les répondants venaient de deux districts qui avaient été choisis à dessein parmi 21 districts de la région centrale. Les répondants qui avaient rempli un questionnaire écrit de juin à août 2014 étaient des adultes âgés de vingt-cinq ans et plus ; ils étudiaient et travaillaient dans la région centrale du Ghana. L'échelle de Likert en cinq points est l'instrument de recherche utilisé pour les réponses allant de « Pas du tout d'accord » (1) à « Tout à fait d'accord » (5). Les répondants ont indiqué que la facilité d'apprentissage était une préoccupation majeure en matière d'utilisation (moyenne = 4,3). L'autre grande préoccupation des apprenants était de trouver et de récupérer des contenus et des ressources pour un e-learning efficace (moyenne = 4,2). Il y a eu ensuite le fait que l'interface e-learning soit utilisable par diverses personnes ayant différents problèmes d'accès (moyenne = 4,1). Pour ce qui est des besoins de facilité d'utilisation en matière d'e-learning, les apprenants adultes ont fait part de la nécessité d'une maîtrise de la technologie requise (moyenne = 4,5). Ils ont également souhaité que les activités soient plus divertissantes et plus prenantes (moyenne = 4,3) et utilisent des conventions et des scénarios du monde réel pour rendre les systèmes plus faciles d'utilisation (moyenne = 4,3). Les apprenants ont, en outre, évoqué le besoin d'une plus grande cohérence en matière de traitement des ressources graphiques, de navigation et de rétroaction dans l'interface e-learning (moyenne = 4,2) et indiqué que l'interface e-learning doit être simple et intuitive (moyenne = 4,1), entre autres.

Mots clés : utilisabilité, e-learning, apprenants adultes, facilité d'apprentissage, maitrise de la technologie

Resumo

Este estudo explorou a usabilidade e as necessidades de apoio para e-learning, que são importantes para os estudantes na Região Central do Gana. Cento e cinquenta estudantes adultos foram abordados aleatoriamente entre seiscentos estudantes adultos que concluíram anteriormente pelo menos um curso on-line. Os inquiridos vieram de dois distritos que foram seleccionados propositadamente entre 21 distritos na Região Central. Os inquiridos preencheram um questionário em papel de Junho a Agosto de 2014. Os inquiridos eram adultos de pelo menos vinte e cinco anos, a estudar e a trabalhar na Região Central do Gana. O instrumento de pesquisa utilizado foi a escala de cinco pontos de Likert para respostas que vão de, discordo fortemente (1) a concordo plenamente (5). Os inquiridos responderam que o que pode ser aprendido, era a principal preocupação em termos de usabilidade (média = 4,3). A segunda maior preocupação dos estudantes era encontrar e recuperar o conteúdo e os recursos para um e-learning eficaz (média = 4,2). A isto seguiu-se a preocupação de que a interface de e-learning fosse utilizável por várias pessoas com diferentes problemas de acesso (média = 4,1). Quanto às necessidades de usabilidade para e-learning, os estudantes adultos exprimiram a necessidade de dominar a tecnologia necessária para e-learning (média = 4,5); os estudantes também gostariam que as actividades fossem mais divertidas e atraentes (média = 4,3) e usassem convenções e cenários do mundo real para tornar os sistemas mais utilizáveis (média = 4,3). Os estudantes adultos disseram que devia haver coerência no tratamento de activos gráficos, navegação e feedback dentro da interface de e-learning (média = 4,2) e que a interface de e-learning devia ser simples e intuitiva (média = 4,1), entre outras coisas.

Palavras-chave: usabilidade, e-learning, estudantes adultos, o que se pode aprender, dominar a tecnologia

Introduction

As the School of Continuing and Distance Education, University of Ghana, embarks on expanding its online presence in the provision of formal and non-formal educational programs across Ghana, easy usability for the learner should be one of the important goals to consider by developers regarding e-learning applications.

The government of Ghana has adopted distance education as a viable complement to conventional face-to-face education (Mensah & Owusu-Mensah, 2002). This step inspired the School of Continuing and Distance Education of the University of Ghana to respond appropriately to the needs of adult learners with respect to the use of technology for developing essential knowledge, skills and attitudes for lifelong learning, and to seek international collaboration to achieve this. To realize these goals, the School of Continuing and Distance Education, through the University of Ghana, began piloting Sakai (a learning-management system) in the 2014/2015 academic year with the intention to roll out its online presence in all of its 12 learning centers throughout Ghana.

The Cape Coast Learning Centre is one such center to offer online education to adult learners (i.e. males and females aged 25 years and above who enroll in study programs at the University) in the Central Region. The Region has a diverse learner population and there was an urgent need to meet the growing demand of working adults and others who have difficulties accessing conventional education owing to lack of flexibility in course timing and location. The present study was motivated by a concern to understand the needs of the diverse, potential adult population in the Central Region of Ghana to be able to participate successfully in e-learning for the purpose of acquiring academic qualifications. This paper therefore focuses on the needs potential adult learners expressed regarding usability problems in pursuing e-learning.

Some researchers have defined usability as the extent to which an application is learnable and allows users to accomplish specific goals efficiently and effectively while maintaining high satisfaction (ISO.9241.210, 2010; Koohang & Ondracek, 2005; Miller, 2005, as cited by Chang, 2011). Neilsen (2000, also cited in Chang, 2011) identifies five ways in which usability is important to the user. These include: (a) efficiency (whereby the user understands how to use the device); (b) the dexterity with which the user can perform tasks; (c) the number of times the user commits an error in using the device; (d) the importance of user errors as well as the ease of correcting these errors; and (e) the level of utility or satisfaction which the user derives from using the device.

Crowther, Keller and Waddoups (2004) assert that including usability testing as a part of evaluation improves the quality and effectiveness of computer-mediated instruction. Their paper described the fundamental purpose and functions of usability testing, and also distinguished between different forms of evaluation: accessibility, quality assurance (QA), usability and implementation. Through a detailed case study, they showed that usability testing improved the quality of a computer-based chemistry course and facilitated a clearer analysis of the learning effectiveness of that course.

Babu and Singh (2013) demonstrate how a multi-method evaluation (TUME) technique can be used to identify the unique problems and challenges faced by specific user types in using web-based applications, as well as to suggest potential solutions. Their study led to an understanding of the specific design elements that presented roadblocks and challenges for the user in interacting with the web-based applications and of feasible design modifications to potentially improve the utility of applications for specific user types.

Babu and Singh (2013) also showed that the evaluation of web-based applications remained confounded by users' web interaction challenges and that there is no clear understanding of utility for specific user types. Without appropriate evaluation of users' problems and challenges in using web-based applications, there cannot be a way to solve these problems and challenges. Costabile, Marsico, Lanzilotti, Plantamura & Roselli (2005) state that an e-learning application with inadequate usability hampers learning motivation and that a poorly designed interface confuses learners and can hinder learning and information retention.

In spite of these findings, many organizations continue to adopt e-learning without evaluating the usability of their e-learning applications. Such organizations and their designers ignore the fact, or fail to see, that usability is essential for effective e-learning and hampers users' learning by not adequately considering the actual needs and interactive behavior of users. As a result, the following two research questions were used to explore respondents' perceptions of common usability problems and those important to learners:

1. What common (mostly occurring) usability problems confront learners and/or prevail in an e-learning environment/intervention?
2. Which of these usability problems should be taken into account in the design and management of a center-based e-learning program for adults?

Literature review

Definitions

Usability concerns that have been found to be essential for effective student engagement and learning are:

- **Learnability:** how a new user can begin efficient and error-free interaction with the e-learning system;
- **Content and resources:** how easy it is for learners to find and retrieve important content and use communication resources and tools properly;
- **Visual design:** the way an artwork, a room, a video, a photo or other artistic subject is composed and appeals to the human eye in the e-learning system;
- **Media use:** refers to issues concerning the effective use of electronic media;

- **Learner guidance and support:** support and guidance provided to the learner in order to be able to successfully learn online;
- **Instructional assessment:** assessments presented in formats through which all learners can demonstrate their level of mastery;
- **Interactivity:** common interactive tools used effectively to engage learners;
- **Consistency:** consistent treatment of graphical assets, navigation and feedback with the e-learning interface;
- **Access issues:** the variety of people able to use the e-learning system; and
- **Accessibility:** the level of access for the individual to the e-learning system.

Perspectives, principles and models relating to usability

Chang (2011) argues that designers must incorporate usability evaluation throughout the process of developing e-learning applications, emphasizing design-based research (the DBR approach) as an important precursor of usability in effective e-learning. Other researchers have employed user-centered design (UCD) techniques to evaluate technology products. The ultimate goals of UCD are to develop easy-to-use products that lead to increased user satisfaction and meet organizational or business objectives. The center focuses primarily on user-requirements analysis, the conceptual design of technology products and usability evaluation (Bias, Marty, & Douglas, 2012; Philosophy— Usability/Accessibility Research and Consulting, Michigan State University, n.d.)

UCD is a philosophy that places the user at the center of the design and development process right from the very beginning when the product is still in the conception phase and then checking at every step of the way with potential users to be sure that they will be comfortable with the final design. Usability and accessibility product evaluation are two critical components of the user-centered design process. Usability measures the effectiveness, efficiency and satisfaction with which users achieve specified goals, and accessibility enhances websites, web applications, software, and other products to ensure that they are understandable and navigable for users of all abilities ("Philosophy Usability/Accessibility Research and Consulting," n.d.).

Most accessibility issues overlap with usability issues (Suwannawut, 2011). Chisholm & Henry (2005) identified the three core principles of the Web Accessibility Initiative (WAI) as:

1. Authoring tools and development environments for producing usable interface and content of the web;
2. Browsers, multimedia players and assistive technologies for providing a completely usable and accessible experience;
3. Accessible content.

From these three core principles, three sets of guidelines resulted, namely:

1. Web Content Accessibility Guidelines (WCAG);

2.   Authoring Tool Accessibility Guidelines (ATAG); and
3.   User Agent Accessibility Guidelines (UAAG).

According to Suwannawut (2011), there are currently two versions of the web content accessibility guidelines: WCAG 1.0 (1999) and WCAG 2.0 (2008). Scholars and researchers across the globe continue to comment on these documents with a view to improving their validity and eliminating their complexity and ambiguity.

Brajnik (2005) advocated the engineering approach as an alternative approach to the debate on accessibility. This approach views accessibility as a process rather than a target and is designed to explicitly define appropriate corporate policies, corporate guidelines and corporate implementation plans to be used accordingly. Brajnik's approach also defines accessibility policy together with clear goals and missions, specifying the level of accessibility needed to be achieved, and identifying the categories of users that should benefit most from the implementation of such policy.

Sloan, Dickinson, McIlroy and Gibson (2006) proposed the holistic approach to usability. In this approach, the authors adopt the inclusive view and promote the concept of UCD through personalization. The approach asserts that no single universal solution can appropriately address the needs of all user groups. The onus thus falls on the developer to select relevant guidelines in order to implement a solution which fits into the context of use or is usable to the target audience, taking into account any user requirements such as user characteristics and technical requirements.

A relatively new paradigm emerged from 'barrier-free' or 'accessible design' (Suwannawut, 2011). Seven core principles addressing the key concepts of universal design are: equitable use; flexibility in use; simple and intuitive design; perceptible information; tolerance for error; low physical effort; and size and space appropriate for approach and use. The universal design is based on the philosophy of designing products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Center for Universal Design, 2008).

Feldstein (2002) notes that major purchasers and consumers of e-learning have no way of evaluating the degree to which a course is usable, and argues that a 'usable' course is one that teaches in ways that students need in order to obtain the value that they were looking for when they signed up. Zaharias (2004) deduced from Feldstein's argument that learners, needs must be assessed in order to have a clear understanding of their needs and preferences, and that the context in which they live, work and learn must be further examined so as to be able to build on learner experiences and thus improve human factors, systems and instructional design.

Usability evaluation

Heuristic evaluation is the method in which one or more reviewers check whether each design element conforms to a list of design or usability principles and take note where the product does not adhere to these principles (Suwannawut, 2011). Rubin & Chisnell (2008) indicate that the majority of problems revealed by the heuristic method are rather specific and low-priority, and

that individual evaluators can identify only a relatively small number of overall usability issues. During the review, evaluators are allowed to consider any additional usability principles or results that come to mind which may be relevant for any specific dialogue element, and are further allowed to provide holistic perspectives that are not restricted only to the usability standards or to guidelines conformance (Suwannawut, 2011).

Usability test

Usability testing (or user testing) is a usability-evaluation method that provides quantitative and qualitative data obtained from actual users performing real tasks with a product (Henry & Grossnickle, 2004). The method usually involves three major components: potential users; representative tasks with a prototype; and systematic observation under controlled conditions. Standard protocols for usability testing can be used in the case of users with disabilities, after a few modifications (Henry & Grossnickle, 2004).

Methodology

An exploratory survey was carried out to understand usability issues and needs that are of importance in e-learning for adults in the Central Region of Ghana. This paper reporting on usability issues is extracted from the results of research carried out in the Central Region from May to August 2014. The paper reports only on the section of the survey that addressed usability issues and support needs in e-learning, and two research questions are investigated. The survey questions employed a five-point Likert scale. The study was a cross-sectional one, in that the relevant data were collected only at a point in time when each respondent was asked to complete the questionnaire. The exploratory survey covered two districts in the Central Region, namely the Cape Coast Metropolitan Assembly and the Abura-Asebu-Kwamankese District. These two locations were of strategic importance for the Cape Coast Learning Center in recruiting students.

Population, sample sizes and sampling techniques

The population for the study comprised adult learners within the two districts considered for the study in the Central Region. The study population was estimated to approximate 600 adult learners in the two districts. The study purposefully focused on respondents who had previously completed one or more courses online. In a preliminary survey, research assistants approached adult learners and ascertained whether they had previously completed one or more courses online. Those who responded in the affirmative were noted down and, from among that population of approximately 600 learners, 150 were randomly selected for the final survey. The responses of respondents were not differentiated, meaning that the responses of those participants who had taken more than one online course were not compared with those of participants who had taken only one such course. A future study will explore this.

Questionnaire development

The questionnaires were all paper-based and were physically handed to respondents to complete. The questionnaire employed a Likert scale with five levels ranging from strongly agree (5 points), agree (4 points), uncertain (3 points), disagree (2 points) to strongly disagree (1 point). The entire questionnaire for the complete study had seven parts of which one explored usability issues with e-learning in Ghana. The section with questions on usability problems was made up of two parts, addressing the two research questions posed. Part 1, addressing common usability problems in e-learning, comprised ten questions, and Part 2, addressing design needs for improved usability, contained 11 questions. In addition to the survey questionnaire, the complete study included key informant interviews and two focus-group discussions which were used to provide in-depth and extensive coverage of the topic. Respondents needed 45 minutes to complete the entire questionnaire, but needed ten minutes at most to complete the part on usability problems. Trained research assistants travelled to the locations of the respondents who had been randomly selected and handed them the paper-based questionnaire for completion. Such assistants collected the completed questionnaires and entered the data into the Statistical Package for Social Sciences (SPSS).

Validation of instruments

The instruments for the study were assessed for content and construct validity. Each item of the instrument was carefully analyzed and checked to ensure that it conveyed the necessary message.

Reliability

To ensure that the instrument for the data was reliable such that the results obtained were valid, the questionnaire was pre-tested with some learners at the University of Cape Coast. As part of the pilot study, ten questionnaires were administered to adult learners who had previously completed one or more online courses at some point in their life. The pilot allowed for modification of those items in the questionnaire that were considered unclear and misleading. Thus the pilot study ensured that the instrument was valid and reliable, and hence appropriate for the study.

Data entry and analysis

Quantitative data resulting from the survey were entered into the SPSS. Data entered were then analyzed and mean responses were examined. Descriptive statistics (means, charts and standard deviations) were used to present the results, which are recorded in Figure 1 and Table 1. The assumption is that the findings on 'usability concerns' answer the research question on usability problems, and that the findings on 'usability needs' answer questions on usability issues.

Results

Figure 1 shows the mean responses to statements probing for the extent to which the issues concerned were pressing in learners' experiences with e-learning. It was found that learnability was a major usability concern for respondents (mean = 4.3). This was followed by concerns about finding and retrieving content and resources for effective e-learning (mean = 4.2), and concerns that the e-learning interface be usable by a variety of people with different access issues (mean = 4.1). The appeal of the visual design for e-learning (mean = 4.0) was fourth in importance, together with concerns that assessments be in formats that enable all learners to demonstrate their level of mastery. Concerns about the effective use of the electronic media (mean = 4.0), and about guidance and support provided to the learner for effective online learning also ranked fourth in importance (mean = 4.0).

Concerns about the effective use of interactive tools to engage learners, and about the consistent treatment of graphical assets, navigation and feedback interface were expressed (mean = 3.9). Concerns about the level of accessibility for the individual were less strongly expressed as a usability concern (mean = 3.2).

Figure 1: Common usability issues and support important in e-learning
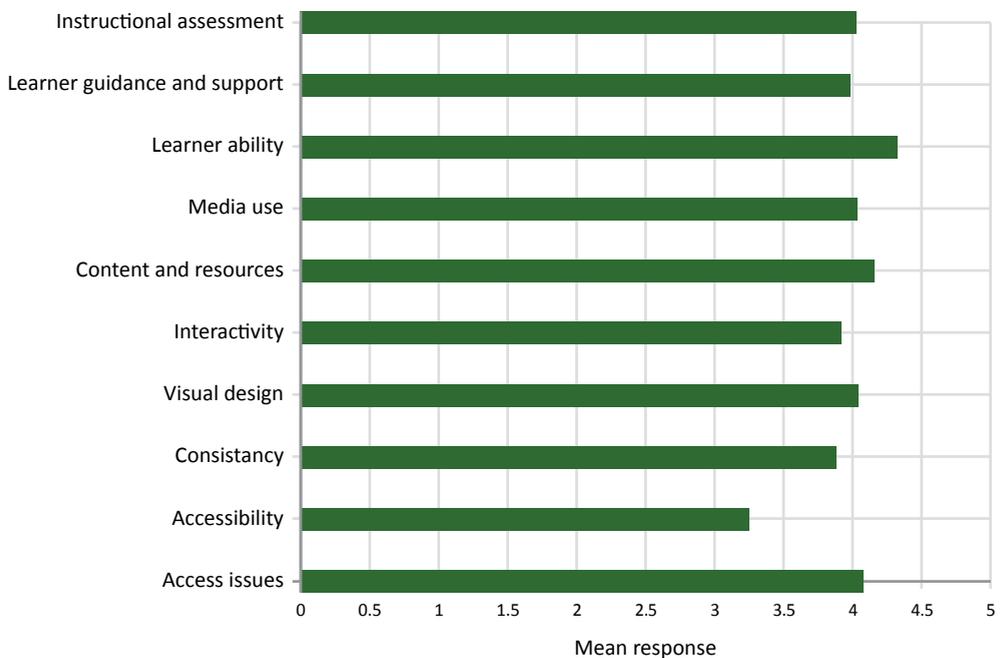
The current study assessed the usability needs of learners and the results from that assessment are presented in Table 1. Respondents indicated: that they should be given the opportunity

to master the technology required for e-learning (mean = 4.5); that activities should be more entertaining and engaging and should use real-world conventions to make the systems more usable (mean = 4.3); and that lessons should be concise and succinct, and that there should be consistency in the treatment of graphical assets, navigation and feedback within the e-learning interface (mean = 4.2). They also stated: that the e-learning interface should be simple and intuitive (mean = 4.1); as well as that the content should be relevant and meaningful, that the cognitive load should be minimized, that delivery should be effective, and that it should be easy to navigate the system (mean = 4.1).

Table 1: Usability needs for adults in e-learning

Needs	N	Mean	Std. deviation
The interface is simple and intuitive	150	4.1	1.03
Multi-media are interactive and use visual cues	150	3.9	.86
Lessons are concise, succinct and brief	150	4.2	.95
Activities are engaging and entertaining	150	4.3	.80
The context is relevant and content is meaningful	150	4.1	.97
Delivery is effective, right in time and to the point	150	4.1	.91
Cognitive load and design are minimized	150	4.1	.99
There is consistency	150	4.2	.22
Navigation is usable and obvious	150	4.1	.93
Real-world conventions are followed	150	4.3	.86
Mastering technology	150	4.5	.76

Discussion

Mastering technology

Respondents in the study overwhelmingly indicated that mastering technology is a usability need which enables them to engage successfully in online learning. This appears to be in line with what other researchers have found. For instance, Hoffman et al., (2014) note that just because the technology is user-friendly does not in itself guarantee success, further stating that, when introducing new learning technologies, different ways of communicating and continual access to information can be overwhelming even for learners who are considered technologically competent. As a result, Hofman indicates that the online facilitator must manage the learner's adoption and mastery of new skills in such a way so as not to disrupt how new learners learn the content. Ways that this could be done include the online facilitator communicating with learners several weeks before classes begin

and addressing technology issues before participants need to focus on new skills and knowledge. Facilitators should develop a communication plan that time-releases information on how to set up the technology, offering support whenever needed (after hours, for different time zones, and so forth) and providing technical checks and orientation to the new environment (Hofman et al., 2014). Hofman et al. further note that there is no way the facilitator can do this except by having fully mastered the technology being used. Facilitators will know that they have reached the required level of mastery when they are able to provide detailed learner support and technical assistance remotely with enough detail that the learner can follow easily (Hofman et al., 2014). Raskin (2004) advised designers of e-learning interfaces to deliberately take advantage of the human trait of habit development and allow users/learners to develop habits that smooth the flow of their work.

Learnability

In Figure 1, learnability is expressed as the most important usability concern in e-learning. 'Learnability' refers to how easy it is for learners to find and retrieve important content and use available resources such as communication tools properly to facilitate their learning. Delivering a successful e-learning strategy to support adult student learning and development goes beyond just dynamic content. Even the way the e-learning interface looks is important. However, level of consistency and how the e-learning materials can be sustained online are equally important. Instructional design, the methods of deployment, staff education, and learners' pre-education and preparation before the e-learning course begins, as well as how assessment of the e-learning modules will be carried out, must be properly thought through.

It would be ideal if strategies put in place to enhance learnability could be reviewed before implementing an e-learning program. Doing this will increase the rate at which learners become familiar with the use of a new product. With high learnability, learners can intuitively learn to use a product without training or manuals. However, it is said that, in the context of e-learning, the definition of learnability includes the ability of learners to effectively learn and retain the skills and knowledge. The degree of effort employed to achieve a level of competence in completing a task is reduced when learnability of the product on offer is high.

A system is considered easy to learn if the competencies required to use it are acquired after only a few repetitions of the task. The term 'learnability' has widely been used in the usability field, sometimes as a synonym for 'usability'. However, it is fundamental to make a distinction between the usability of a product as it is being used for the first time and usability when referring to more or less expert users (Lastrucci, Infante & Pascale, 2009).

Content and resources

'Effective learning content and resources' refers to how easy it is for learners to find and retrieve important content and use available resources such as communication tools properly in order to facilitate their learning. Learning content and resources support competency building. They are high-quality, cost-effective, interactive e-learning and assessment resources featuring scenarios,

images and activities covering a large range of topics. Designing an e-learning course with the appropriate content and resources should promote the kind of learning where learners are challenged to apply and use knowledge which goes beyond a simple level of comprehension and recall. To ensure that learners apply and use knowledge learnt, the learning content and resources employed must be relevant, applicable and engaging.

When learning content is relevant, it means it is focused on a topic, has clear objectives and learning outcomes, and can be linked effectively to the topics under discussion and to the attributes of the learners. Further, 'relevance' can be defined as how useful an item is to a specific learner or group of learners. 'Applicable content' means that the content is actionable and not theoretical. When content is engaging, it means that it is inviting and attention-keeping. The use of adequate amounts of high-quality video, audio and pictures in the content helps to craft out beautiful stories around which learning takes place. Not only does the use of visuals assist in the learning process, but proper use of imagery also creates a better overall aesthetic and learner experience around which learning becomes situated (Stein, 1998). Effective graphic design creates a seamless experience for learners that enables the content to shine through, according to Stein.

Learning content and resources must therefore be cohesive, with design being consistent throughout, and must have a focus in which design is not just for design sake but rather emphasizes the content. Above all, there must be a balance. The use of white space (the portion of the page left blank to remind users or learners that simple design is good design and that one does not need to create a layout filled with text and graphical elements to send a clear message) should be such that it allows the content to become more engaging.

Iterative design

Smulders (2003) distinguishes between 'learners' and 'users' and observes that online courses that are designed for 'learners' without any thought for 'users' invariably result in frustrated students who cannot determine how to negotiate such courses. He argues that forms of interactivity, such as discussions and collaborative assignments, are good, but that if students cannot understand the information architecture of the course in order to move efficiently from one section to another, then the learning activities are in vain.

He also argues that poor usability of an online course inhibits students' ability to learn, as they use up most of their precious time seeking help rather than working through a textbook or journal article, or participating in a discussion thread. Smulders (2003) concludes by stating that online course developers must consider the double persona of the learner–user. On one hand, the web pages need to make sense structurally. Findings from the present study lend support to the view that directions and navigation must be instantly recognizable and obvious, and not invisible. The course environment should be simple and the design of instruction should incorporate challenges, rigor, moments for reflection, and other principles of good web design so as to co-exist in harmony with the course environment for effective student learning. Findings from the current study support Smulders' assertions.

Conclusion

This study has examined usability issues faced by potential adult learners in the Central Region of Ghana, which has a diverse learner population. The study has confirmed several best practices for use by instructional designers, including: the need to make interface design simple and intuitive; the need to make multi-media interactive; the need for lessons to be short and modular in form; the need for activities to be engaging as well as entertaining; the need for content that is meaningful and relevant to the context; and the need for an e-learning system that enhances effective delivery.

It is important for instructional designers and instructors of e-learning courses to be aware of the significance of usability in e-learning and to have the mindset to integrate and incorporate the usability agenda into the course during the planning phases. Future instructors and designers of the Cape Coast Learning Centre should understand that usability issues in e-learning affect both the physical environment of the website and the type and form of the content employed in the course. Seven suggestions are offered here on ways to ensure educationally sound and successful e-learning:

1. The navigation system serves as one of the most important elements in the e-learning course, since it directly affects usability. Findings from the study confirm the suggestion that navigation systems must be solid, obvious, and easy to use, such that they require no thought as to where learners need to go and how to get there (Table 1; Figure 1).

2. The use of a language, examples and scenarios that learners are already familiar with was confirmed as essential in enhancing usability. Instructional designers should include words, phrases and concepts that they use on a day-to-day basis in order to make the materials presented look and sound more natural and to enable learners to relate more to them (Table 1; Figure 1).

3. Respondents confirmed that consistency is important to ensure usability. It follows that rules about the e-learning system should be established and followed. For example, setting a definite color, size and placement for every element of the course will enhance consistency, which, in turn, improves usability. Navigation buttons should be in the same location throughout the e-learning course. A different color and font type should be used to distinguish supporting content, such as sidebar information and section summaries, from the main content (Table 1; Figure 1).

4. Respondents favored simplicity. By constantly editing and deleting unnecessary words, it becomes easier for learners to follow an idea and learn effectively. The instructional designer must provide learners with the 'must know' information so as to reduce the amount of thinking and cognitive processing learners are subjected to (Table 1; Figure 1).

5. Keeping the design simple ensures that the user can focus on the main content at hand without being distracted by irrelevant decorative elements. The design must enhance

the content not overshadow it. Buttons should look like buttons, links like links, and so on. These should be very obvious so that users will not waste time looking for the right element and become frustrated (Table 1; Figure 1).

6.   Respondents agreed that an e-learning interface free of noise and distractions would make things easier for learners (Table 1; Figure 1).

7.   Visual cues such as page or section numbers, headings, navigational bars, and other signposts should be in place to help learners know which part of the course they are dealing with. Navigational aids can also help learners move within the course. They can, at a single click, go back to a specific section or screen and be where they want to be (Table 1).

The above seven points should guide those designing e-learning courses that are helpful to learners.

Limitations of the study

This study may suffer from the limitations associated with using non-probability sampling. The purposive sampling used to select respondents from the two districts, namely the Cape Coast Metropolitan Assembly and the Abura-Asebu-Kwamankese District, is non-probabilistic. The selection criteria employed may therefore have been subjective. The sample population used may not necessarily be entirely the population that the study intended to reach. With non-probability sampling, the general population may not have been sampled correctly, and, because the odds of a good representation of the population are not known, it may be harder to evaluate what has actually been achieved, since purposive sampling can be so subjective. At least in this study, a sample size of 150 randomly selected from a population of approximately 600 respondents was used. That may or may not have represented the population of adult learners in the two districts. But, with purposive sampling of the two districts, it is difficult to know whether the population of users was well represented.

References

Babu, R., & Singh, R. (2013). Enhancing learning management systems utility for blind students: A task-oriented, user-centered, multi-method evaluation technique. *Journal of Information Technology Education*, *12*, 1–32.

Bias, R. G., Marty, P. F., & Douglas, I. (2012). Usability/user-centered design in the iSchools: Justifying a teaching philosophy. *Journal of Education for Library and Information Science*, *53*(4), 274–289.

Brajnik, G. (2005). *Engineering accessibility through corporate policies*. Retrieved December 12, 2014, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.78.7362&rep=rep1&type=pdf.

Center for Universal Design, NCSU. (2008). Homepage. Retrieved December 12, 2014, from http://www.design.ncsu.edu/cud/.

Chang, C. (2011). Usability testing for e-learning material for new employee training: A design-based research approach. *British Journal of Educational Technology*, *42*(6), E125-E130. doi:10.1111/j.1467-8535.2011.01216.x

Chisholm, W.A., & Henry S.L (2005). Proceedings of the 2005 International Cross Disciplinary Workshop on Web Accessibility (W4A), Chiba, Japan, pp. 31–37.

Costabile, M. F., Marsico, M. D., Lanzilotti, R., Plantamura, V. L, & Roselli, T. (2005, January). On the usability evaluation of e-learning applications. In: *HICSS 2005, 38th Hawaii International Conference on System Sciences, January,3–6,* 2005, Big Island, HI, USA. doi.ieeecomputersociety.org/10.1109/HICSS.2005.468

Crowther, M. S., Keller, C. C., & Waddoups, G. L. (2004). Improving the quality and effectiveness of computer-mediated instruction through usability evaluations. *British Journal of Educational Technology*, *35*(3), 289–303. doi:10.1111/j.0007-1013.2004.00390.x

Digital Accessibility Team. (2009). *Cognitive walkthrough*. Retrieved December 12, 2014, from http://www.tiresias.org/tools/cognitive_walkthrough.htm.

Feldstein, M. (2002). What is 'usable' e-learning? *eLearn Magazine*. Retrieved December 11, 2014, from http://elearnmag.acm.org/archive.cfm?aid=581845.

Henry, S. L., & Grossnickle, M. (2004). *Just ask: Accessibility in the user-centered design process*. Georgia Tech Research Corporation. Atlanta, Georgia, USA. Retrieved December 12, 2014, from http://www.uiaccess.com/accessucd/.

Hoffman, R. R., Ward, P., DiBello, L., Feltovich, P. J., Fiore, S. M., & Andrews, D. (2014). *Accelerated expertise: Training for high proficiency in a complex world. Boca Raton*, FL: Taylor and Francis/CRC Press.

Hollins, N., & Foley, A. (2013). The experiences of students with learning disabilities in a higher education virtual campus. *Educational Technology Research & Development*, *61*(4), 607–624. doi:10.1007/s11423-013-9302-9

International Standardization Organization. (2010). *ISO 9241-210:2010 Ergonomics of human system interaction – Part 210: Human-centred design for interactive systems*. Geneva: International Standardization Organization.

Koohang, A., & Ondracek, J. (2005) Users' views about the usability of digital libraries. *Br J Educ Technol*; *36*, 407–423.

Lastrucci, E., Infante, D., & Pascale, A. (2009). *Evaluating usability to improve efficiency in e-learning*. Retrieved December 12, 2014, from: http://www.igi-global.com/chapter/evaluating-usability-improve-efficiency-learning/13374.

Mensah, S. K. E., & Owusu-Mensah, F. (2002). *Priorities and strategies for capacity building in tertiary distance for human resources development in Ghana*. Final Report to the World Bank.

Philosophy — Usability/Accessibility Research and Consulting, Michigan State University. (n.d.). Retrieved December 6, 2014, from http://usability.msu.edu/about/philosophy.

Raskin, J. (2004). *The human interface: New directions for designing interactive systems*. Boston: Addison-Wesley, ACM Press.

Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing: How to plan, design, and conduct effective tests*. New York: Wiley.

Sloan, D., Dickinson, A., McIlroy, N., & Gibson, L. (2006). *Evaluating the usability of online accessibility information*. Retrieved December 12, 2014, from http://www.computing.dundee.ac.uk/staff/dsloan/usableaccessibilityadvice.htm.

Smulders, D. (2003). Designing for learners, designing for users. *eLearn Magazine.* Retrieved December 12, 2014, from: http://elearnmag.acm.org/archive.cfm?aid=2134466.

Stein, D. (1998). *Situated learning in adult education.* Retrieved December 12, 2014, from: http://www.ericdigests.org/1998-3/adult-education.html.

Suwannawut, N. (November, 2011). Integrating accessibility into the design of online learning management systems: Theories and practice. 14th Annual Accessing Higher Ground. School of Library and Information Science, Indiana University, Bloomington.

Zaharias, P. (2004). Usability and e-learning: The road towards integration. *eLearn Magazine.* Retrieved December 11, 2014, from: http://dl.acm.org/citation.cfm?id=998345 Vol 2004, Issue 6, p4.