

Usability Issues and Support Needs for E-learning Important to Ghanaian Learners

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Abstract

This study explored usability challenges, adult learners face in e-learning in the Central Region of Ghana. One hundred and fifty potential adult learners from two districts completed a paper-based questionnaire from June to July 2014. The questionnaire used the five-point Likert scale for responses, ranging from strongly disagree (1) to strongly agree (5). Respondents' report 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 variety of people with different access issues (mean = 4.1). On usability needs for e-learning, adult learners expressed need for mastering technology required for e-learning (mean = 4.5); Learners also wished that, activities would be more entertaining and engaging (mean = 4.3) and make use of real world conventions and scenarios to make the systems more usable (mean = 4.3); Potential adult learners expressed the need that, there should be consistency in treatment of graphical assets, navigation and feedback within the e-learning interface (mean = 4.2) and that e-learning interface should be simple and intuitive (mean = 4.1) among others.

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

Introduction

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

The government of Ghana has adopted Distance Education as a viable complement to the conventional face-to-face education (Mensa & Owusu-Mensah, 2002). This step inspired the goals of the School of Continuing and Distance Education of the University of Ghana to respond appropriately to needs of adult learners in the use of technology for developing essential knowledge, skills, and attitudes for lifelong learning and seek International collaborations to achieve this. To achieve the above goals, the School of Continuing and Distance Education through the University of Ghana has begun piloting Sakai (a learning management system) in the 2014/15 academic year with the intention to roll out its online presence in all of its twelve learning Centres throughout Ghana.

The Cape Coast Learning Centre is one of such Centres to offer online education to adult learners in the Central Region. The Region has a diverse learner population and there have been an urgency to meet growing demand of working adults and others who have difficulties accessing conventional education due to lack of flexibility in course timing and location. This study was motivated by the concern to understand needs the diverse potential adult population in the Central Region of Ghana have to be able to successfully participate in e-learning for academic qualifications. This paper focused on the needs potential adult learners expressed in regards to usability problems to pursue 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 (International Organization for Standardization, 1998; Koohang & Ondracek, 2005; Miller, 2005; cited by Chang, 2011) Nielsen (2000; also cited in Chang, 2011) identifies five ways by which usability is important to the user. These included: Efficiency, whereby the user understands how to use the device and the dexterity with which the user can perform tasks; the number of times the user commits error in using the device and the importance of user errors as well as the ease of correcting those errors; and the level of utility or satisfaction derived from using the device by the user.

Crowther, Keller, & Waddoups, (2004), asserts 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.

Findings from a study carried out to learn about the experiences of college students with learning disabilities as they interacted with a virtual campus, shows that participants were both successful and not successful in task completion within the virtual campus and factors that impacted performance included usability features of the virtual campus and participants' implementation of cognitive and behavioral strategies (Hollins & Foley, 2013).

Babu & Singh, (2013) demonstrates how multi-method evaluation (TUME) technique can be used to identify the unique problems and challenges of specific user types in using Web-based applications and suggests potential solutions. The outcome of their study was an accurate understanding of specific design elements that presented roadblocks and challenges for the user in interacting with the Web-based applications and feasible design modifications to potentially improve the utility of applications for specific user types.

Babu and Singh's study also showed that, the evaluation of web-based applications remained confounded by users' web interaction challenges and there is no clear understanding of the 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, De Marsico, Lanzilotti, Plantamura & Roselli, (2005) states that an e-learning application with inadequate usability hampers learning motivation and poorly designed interface confuses learners, and can hinder learning and information retention.

In spite of these findings, many organisations continue to adopt e-learning, without evaluating the usability of their e-learning applications. Such organizations and their designers ignore 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 behaviours of users. As a result two research questions were explored to give meaning to these studies as follows:

1. What common usability problems prevails in adopting solutions for a start up e-learning intervention?
2. What kinds of usability issues should be taken into account in the design and management of a centre-based e-learning programme for adults?

Literature review

Perspectives, principles and models about usability

Chang, (2011) argues that designers must incorporate usability evaluation throughout the development process of developing e-learning applications, emphasizing design based research (DBR approach) as 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 your organizational or business objectives. The Center focuses primarily on analysis of user requirements analysis, conceptual design of technology products and usability evaluation (Bias, Marty, & Douglas, 2012; “Philosophy - Usability/Accessibility Research and Consulting - Michigan State University,” n.d.).

User Centered Design (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 checking at every step of the way with potential users to be sure 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 Web sites, 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 - Michigan State University,” n.d.).

Most accessibility issues overlap with usability issues (Suwannawut, 2011). Chisholm and 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

With these three core principles came three guidelines namely:

1. Web Content Accessibility Guidelines (WCAG)
2. Authoring Tool Accessibility Guidelines (ATAG) and
3. User Agent Accessibility Guidelines (UAAG)

According to Suwannawut (2011), the web content accessibility guidelines currently have two versions: the WCAG 1.0 (1999) and WCAG 2.0 (2008). Accordingly scholars and researchers over the globe continue to comment on these documents for improvements on its validity, complexity and ambiguity.

The engineering approach Brajnik, (2005) provided the engineering approach as an alternative approach to the debate on accessibility. This approach viewed accessibility as a process, rather than a target, and to explicitly define appropriate corporate policies, corporate guidelines and corporate implementation plans to be used accordingly. Brajnik’s approach also defined 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.

Another alternative approach, the accessibility organization was offered by Urban and Burks, (2006). This approach viewed the enterprise as an organization that will handle and support accessibility issues and ensure enforcement. The enterprise was also to coordinates all of the organization resources and to bring various groups together to discuss accessibility and discover, define, and articulate issues related to accessibility of concern to both the whole enterprise and to its individual parts.

Sloan et al., (2006), proposed the holistic view approach to usability. In this approach, the authors' adopts the inclusive view and promoted the concept of user-centered design through personalization. The approach asserts that, no single universal solution can appropriately address the needs of all user groups. The onus fell on the developer to select relevant guidelines in order to implement a solution which fits into the context of use or usable to the target audience, taking into account any user requirements such as user characteristics and technical requirements.

A relatively new paradigm that 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).

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 takes notes where the product does not follow those principles (Suwannawut, 2011). Robin et al., (1991) reveal that, majority of problems found through heuristic method are rather specific and low-priority, and individual evaluators can identify 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 that may be relevant for any specific dialogue element and are allowed also to provide holistic perspectives, not restricted only to the usability standards or guidelines conformance (Suwannawut, 2011).

Cognitive Theory

Lewis and Rieman, (1993) discusses cognitive walkthrough, as method based on cognitive theory; that is used as formalized way to imagine people's thoughts and actions when they use an interface for the first time without training. They show that four elements are required: the task description, description of who the users will be and what relevant knowledge they possess, description or a prototype of the interface, and the complete correct action sequence (Lewis and Rieman, 1993). The Digital Accessibility Team, (2009), assessing the cognitive walkthrough, contend that the method is time-

consuming, and claimed to detect far more problems than actually exist. They also assert that, potential problems could be overlooked due to its narrow focus of the technique.

Usability Test

Usability testing (or user testing) is a usability evaluation method that provides quantitative and qualitative data 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 with users with disabilities, after 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. The research reporting on usability issues was part of a bigger research carried out in the Central Region from May to August, 2014. This paper reports only on the section of the survey that addressed usability concerns in e-learning. This paper investigated two research questions. The survey questions were measured using a five-point Likert scale. It probed the extent to which adult learners in the Central Region agreed or disagreed with concerns and statements expressed about usability in e-learning.

The study was a cross sectional in that, the relevant data was 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.

Population and Sample Sizes of the study

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 between 500 to 600 adult learners in the two districts. The sample size was 150. Only respondents who claimed to have experienced e-learning at a point in their life were included in the study.

Questionnaire Development

The questionnaire employed Likert scale with five levels ranging from strongly agree (5 points), agree (4 points), uncertain (3 points) disagree (2 points) and strongly disagree (1point) was used.

Validation of Instruments

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

Data Entry and Analysis

Quantitative data resulting from the survey was entered into the Statistical Package for Social Sciences (SPSS). Data entered was analyzed and mean responses were examined. Descriptive Statistics (means, charts and standard deviations) were used to present results.

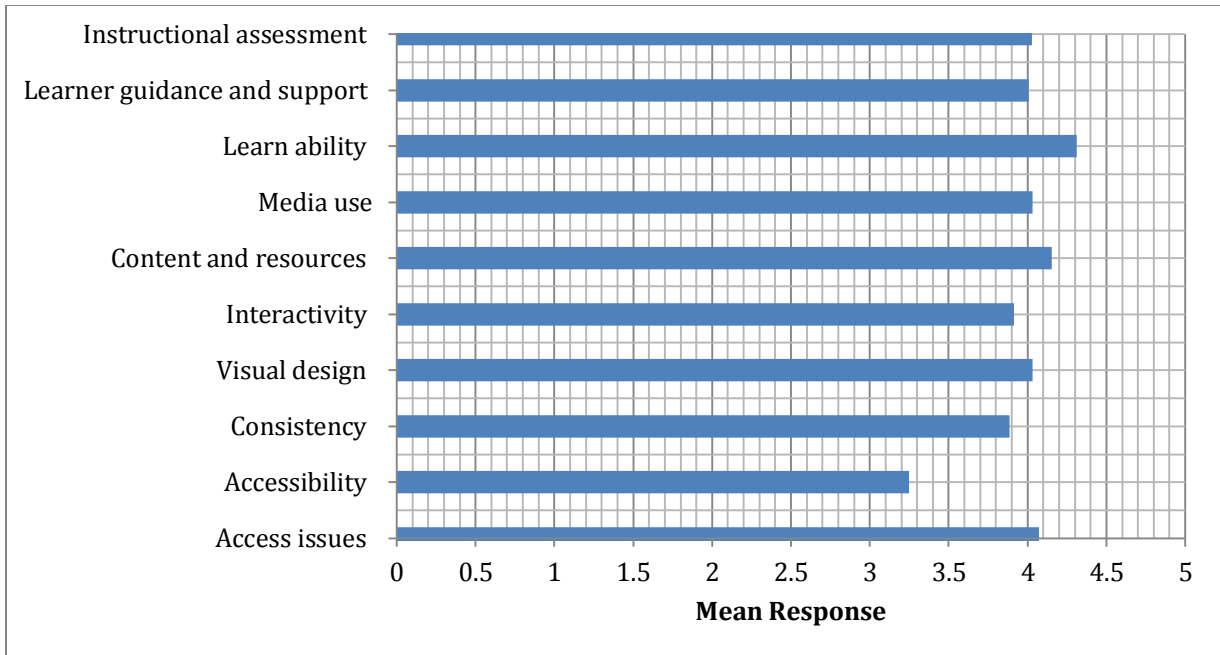
Results

Usability concerns that were found to be essential for effective student engagement and learning were learnability (signifies 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 a piece of artwork, a room, video, photo or other artistic subject is composed and appeals to the human eye in the e-learning system); media use (refers to issues about the effective use of the electronic media); learner guidance and support (support and guidance provided to the learner to be able to successfully learn online); Instructional assessment (assessments presented in formats in which all learners can demonstrate their level of mastery); interactivity (common interactive tools are used effectively to engage learners); consistency (consistent treatment of graphical assets, navigation and feedback with the e-learning interface); access issues (variety of people able to use the e-learning system); accessibility (level of access for the individual of the e-learning system).

Figure 1, shows the mean responses to statements probing them for the extent to which those issues are pressing in their experience with e-learning. It is 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 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 should 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 that about guidance and support provided to the learner for effective online learning also ranked fourth in importance (mean = 4.0).

The effective use of interactive tools to engage learners and concerns about the consistent treatments 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. Usability issues of importance in e-learning



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 the ways that the students need in order to get the value that they were looking for when they signed up. Zaharias (2004) deduced from Feldstein's argument that learners needs must be assessed to have a clear understanding of the learners' needs and preferences and further examine the context in which they live, work, and learn so as to be able to build on learners experiences to improve human factors, systems and instructional design.

The current study assessed usability needs of learners and results from that assessment are presented in Table 1 below. Respondents express that they should be given the opportunity to master technology required for e-learning (mean = 4.5); They express that activities should be more entertaining and engaging and use real world conventions to make the systems more usable (mean = 4.3); They also express the need that lessons should be concise and succinct and that there should be consistency in treatment of graphical assets, navigation and feedback within the e-learning interface (mean = 4.2).

Also that e-learning interface should be simple and intuitive (mean = 4.1); that the content should be relevant and meaningful, cognitive load should be minimized and delivery should be effective and easy to navigate the system (mean = 4.1).

Table 1. Usability needs for adults in e-learning

Needs	N	Mean	Std. Deviation
Interface is simple and intuitive	150	4.1	1.03
Multi-media is 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 have overwhelmingly expressed that mastering technology is a usability need to enable them successfully engage in online learning. This appears to be in line with what other researchers have found. (Hofman, (2014), notes that just because the technology is user-friendly, does not warrant success in itself and shows that when

introducing new learning technologies, different ways of communicating, and a continual access to information can be overwhelming even for learners who are considered technologically competent. As a result, Hofman notes that, the online facilitator must manage the learner's adoption and mastery of new skills so that they do not 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, 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, differing time zones, and so forth) and providing technical checks and orientation to the new environment (Hofman, 2014). Hofman further notes that, there is no way the facilitator can do this except when facilitators have full mastery of the technology being used. The facilitator will know that they have reached mastery level when they're able to provide detailed learner support and technical assistance remotely with enough detail that the learner can follow along easily (Hofman, 2014).

Learnability

In Figure 1, learnability was 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 but also how consistent and how the e-learning materials can be sustained online is 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 would be carried out must be properly thought out and figured.

It would be ideal if strategies put in place to enhance learnability could be reviewed before implementing an e-learning programme. Ensuring these will speed up the quickness with which the learners get 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 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 of “usability”. However, it is fundamental to make the 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 et al, 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 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 e-learning course with the appropriate content and resources should promote that kind of learning where learners are challenged to apply and use knowledge and goes beyond a simple level of comprehension and recall. To ensure that learners apply and use knowledge learned, the learning content and resources employed must be relevant, applicable and engaging.

When a learning content is relevant, it means it is focusing on a topic and has clear objectives and learning outcomes. An applicable content means the content is actionable and not theoretical. When content is engaging, it means that the content 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 take place. Not only the use of visuals assist in the learning process but also proper use of imagery creates a better overall aesthetic and learner experience. Around which learning become situated (Stein, 1998). Effective graphic design creates a seamless experience for learners that enable the content to shine through.

Learning content and resources must therefore be cohesive with design being consistent throughout and must have a focus, where design is not just for design sake but rather emphasizing the content. Above all, there must be a balance. The use of white space should be in such a way that allows the content to become more engaging.

Iterative Design

Smulders (2003), distinguish between “learners” and “ users “and observe that online courses that are designed for “learners” without any thought to “users” invariably results

in frustrated students who can't figure out how to negotiate an online course. He argues that, forms of interactivity, such as discussions and collaborative assignments, are good to be used but if students can't 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, the poor usability of the online course, inhibits students' ability to learn, as they use up most of their precious time seeking help rather than viewing a textbook, a journal article or participating in a discussion tread. Smulders (2003), concludes by saying 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 this study lend support that directions and navigation must be instantly recognizable and, obvious as not to be invisible. The course environment should be easy and the design of instruction, should incorporate challenges, rigor, moments for reflection and other principles of good web design to co-exist in harmony with the course environment for effective student learning. Findings from the current study have supported Smulders assertions.

Conclusion

This study has examined usability issues faced by potential adult learners in the Central Region of Ghana, which has 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, lessons to be short and modular in form, activities to be engaging as well as entertaining and content that is meaningful and relevant to the context, and 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 have the mindset to integrate and incorporate usability agenda into the course during the planning phases. Future Instructors and designers for the Cape Coast Learning Centre should understand that usability issues in e-learning affects both the physical environment of the website and the type and form of the content employed by 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 affirm the suggestion that navigation system must be solid, intuitive and exceptionally easy to use as to require no thought about where learners need to go and how to get there.

2. The use of a language, examples and scenarios that learners are already familiar with was affirmed as essential in enhancing usability. Instructional designers should include words; phrases and concepts they use on a day-to-day basis to make materials presented look and sound more natural and enable learners relate more to them.
3. Respondents affirmed that consistency is important to ensure usability. It follows that rules about the e-learning system should be set and be followed. For example setting a definite color, size and placement for every element on the course will enhance consistency, which in turn improves usability. Navigation buttons should be on the same location throughout 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.
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 the "must know" information to reduce the amount of thinking and cognitive processing learners are subjected to.
5. Keeping the design simple ensures that the user could focus on the main content at hand without being distracted by irrelevant decorative elements. The design must enhance the content not to overshadow it. Buttons should look like buttons, links like links, and so on. It should be too obvious so that users won't waste time looking for the right element and get frustrated.
6. Respondents agreed that an e-learning interface free of noise and distractions will make things easier for learners. Successful instructional designers have had given learners enough room to breathe by using some "white space"
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 on. The use 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.

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