

# “Adaptive Hypermedia Technology Based Interactivity Enhancement of E- Learning Platforms”

## Case of Universities in Kenya

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**Abstract:** The purpose of the study was to identify the existing e-learning platforms user’s adaptability issues in institutions of higher learning. The research was conducted at United States International University (USIU) and Dedan Kimathi University of Technology (DeKUT) using blackboard and Moodle e-learning platforms respectively. The study adopted a descriptive survey research design. The target population for the study included all the students and lecturers of the two universities aforementioned. The sample size included 531 respondents who were selected through stratified sampling. Primary data was collected using a questionnaire with both closed and open ended questions. The questionnaires was administered through drop and pick method. Analysis of the data was done using a Statistical Package for Social Sciences (SPSS). Percentages, frequencies and descriptive statistics were used to explain the results. The findings were presented in graphs and tables. The study established that adaptability issues with the existing e-learning platforms included: existing e-learning platforms do not match the learners learning style; learners do not find the content to be orderly and properly presented; learners have issues with navigations information structure and visual and verbal perception of content.

**Keywords:** Adaptivity, Adaptive hypermedia, Moodle, blackboard, Personalization, Virtual Learning Environment

## I. INTRODUCTION

Adaptivity in e-learning refers to the creation of educational experiences that adjust based on various conditions (personal characteristics, pedagogical approach, user interactions, learning outcome) during a certain amount of time in order to improve performance indicators (e-learning efficiency: results, time, costs, user satisfaction), (Granić, 2008). An adaptive system must be capable of managing learning paths adapted to each user, monitoring user activities, interpreting them using specific models, inferring user needs and preferences and exploiting user and domain knowledge to dynamically facilitate the learning process.

The problem is that Learning Management Systems (LMS) does not offer personalized services, presents the same educational resources

to different learners, regardless of different levels of knowledge, interest, motivation and objectives. As Büscher *et al* (2003) stated that just as people differ in many respects thus the ways in which they learn differ”. The learner-centric aspect of E-learning is often neglected. All the learner has to do is to simply follow the prescribed paths through the whole courseware right from pre-assessment to post-assessment, (Cantoni *et al* 2004).

A uniform approach taken by learning environments to deliver materials and resources to students is not appropriate and that personalization of such materials/resources should address users’ differences to provide a customized learning experience, thus enhancing its effectiveness, lowering drop-out rates and maintaining high student motivation (Mukta, 2012). According to Brusilovsky, (2001), the issue of uniform delivering of learning materials which is not appropriate will be addressed by employing an adaptation hypermedia mechanism for personalized computer-based learning. Elvira (2008) also carried out a study on dynamic hypermedia systems for e-learning and established that these learning management systems do not offer personalized services to students. Based on the diverse findings, it is important to carry out a study to establish how interactive hypermedia enhances e-learning among universities in Kenya.

## II. LITERATURE REVIEW

### 2.1 Adaptive Hypermedia Technology and E-Learning Environment

The information pool has become larger hence there is need for new and better techniques to pick the relevant parts. Adaptive software systems approaches have the challenge of proper information provision from different perspectives. First, they take into account that all available information may be too much to be processed and understood by every user (Brusilovsky and Millan, 2007). Secondly, they correctly consider that users are different in various aspects such as interests, backgrounds, knowledge, and their long-term and short-term goals as well as their motives for interacting with the system. Adaptive systems autonomously adapt their appearance, behavior and data representation to the individual user’s requirements and characteristics. These systems need to know specific characteristics about their users in order to draw reliable conclusions. This

information is usually stored in and retrieved from a user model representing the user's knowledge, interests, goals and other attributes, (Brusilovsky and Millan, 2007). E-learning systems incorporate the concept of adaptability through the development of a model of the student (Tzouveli *et al.*, 2008). The model of the student includes information about learning objectives, prior knowledge, pace of learning, behavior, way of interaction and communication (Tzouveli *et al.*, 2008).

**2.1 Hypermedia and the need for Adaptability**

The use of hypermedia is nowadays commonplace in computer-based learning and allows information to be presented in an interactive, non-linear manner whilst accommodating a rich variety of multimedia, enhanced communication and integrated links. However, this kind of powerful yet flexible learning environment is faced by challenges. One such issue the “one-size-fits-all” approach, where a group of learners with potentially high variability across a number of factors that might affect learning are all given the same educational content in a standardized framework (Said and Mahieddine, 2011). Other challenges that users experienced when using hypermedia systems for learning, including disorientation (being “lost in hyperspace”); difficulties in understanding the material; increases in cognitive overhead; problems with accessing different levels of content; and inefficient learning strategies. The consequences of these problems tend to be confusion; frustration; and reduced effectiveness of the learning environment and browsing strategies, in terms of comprehension and construction of knowledge. These tend to affect novices (students who are unfamiliar with the topic) more so than those students who already have some familiarity with the topics being studied (Chen and Ford 2005). There have also been issues with high drop-out rates and lack of engagement by users with the learning environment as observed by Dagger and Conlan (2005).

**2.2 Summary and Research Gap**

There are a number of limitations which exist in current e-learning systems. The main issue is that none of the commercial or open source VLEs provided any kind of adaptation to support the variety in characteristics, such as cognitive preferences or motivation, shown by different users. A number of research teams had recognized the problems of static hypertext in different application areas, and had begun to explore various ways to adapt the output and behavior of hypertext systems to individual users (Jasperson *et al.*, 2005; Chiu and Wang, 2008; Liaw, 2008). Understanding existing system from an adaptability point of view will be critical for purposes of improving e-learning usage and effects.

**III. METHODOLOGY**

The research design was descriptive survey research. This was because it evaluated the current states of phenomenon on the current systems’ usability and interactivity of the e-learning environment in the two universities. According to Mugenda and Mugenda (2003) a descriptive research is a process of collecting data in order to answer questions regarding the current status of the subjects in the study. According to Kothari (2009), descriptive survey describes the present status of a phenomenon, determining the nature of the prevailing conditions, practices, attitudes and seeking accurate descriptions. However, to successfully achieve the goals of the research a combination of a qualitative and quantitative approach is deemed useful in which the quantitative information supports the qualitative.

Stratified random sampling method was used, where the population embraces a number of distinct categories. The frame was organized by these categories into separate “strata” in this case different courses. Each stratum was then be sampled as an independent sub-population, out of which individual elements were randomly selected.

**3.1 Research Findings**

The study had a sample size of 531 respondents comprising of 476 students selected from two universities and 55 lecturers from the two universities. The findings on the response rate are discussed below.

*Table 1: Response rate*

<b>Respondent</b>	<b>Number responded</b>	<b>Not responded</b>	<b>Response rate</b>
Students	330	146	69
Lecturers	50	5	91
<b>Total</b>	<b>380</b>	<b>151</b>	

**Source: Research data**

It is evident from the research findings illustrated in table 1 above that 69% of the students responded while 91% of the lecturers responded. The average response rate was 72% as illustrated in table.1 above. A response rate of 72% was considered sufficient enough to enable the findings of the study to be generalized on the other universities. On the duration the respondents had used interactive hypermedia, it was revealed that 35% of the respondents had used it for less than two years; 28% had used it for 3 to 5 years; another 28% had used it for more than five years whereas 5% of the respondents had not used it at all. The results confirm that most of the respondents have used interactive hypermedia and were able to provide responses based on the experience they have had while using it.

**3.2. User Adaptability Issues**

The study sought to establish the issues users have with regard to adapting to the existing e-learning system. The respondents rated a number of issues and the mean responses and standard deviations were provided.

On the adaptability issues facing the users of the existing e-learning systems, it was established that the users considered four out of the ten issues provided as main adaptability issues. The first adaptability issue considered is the learner’s learning style not matching the system. This adaptability issue has a mean of 2.25 and a standard deviation of 0.943. It implies that most of the respondents strongly agree that the existing system does not match the learners learning style. The second issue that was found to have more weight as an adaptability issue is that of content organization and presentation with a mean of 2.30 and standard deviation of 1.271. This implies that most of the respondents strongly agreed that they find challenges in adapting to the existing e-learning system because the content is not properly organized and presented. Navigation information structure and visual and verbal perception of the content by the users both had a mean of 2.40 and standard deviation of 1.202 and 1.430 respectively. This is a confirmation that most of the respondents strongly agreed that they were issue of adaptation with the existing e-learning systems.

It can be observed from the findings that below adaptability issues: harmonizing system with user characteristics; accommodating user experience; assessment of learning progress and performance; use of animation challenges; abstract concepts and generalizations and manipulation of learning objects all had means of more than 2.60. This is an indication that they are considered as main adaptability issues.

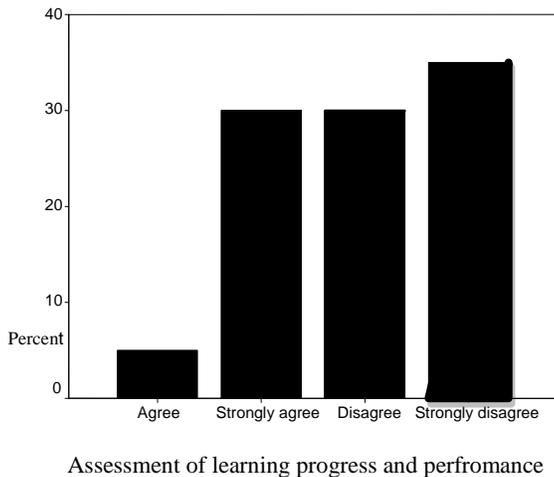
**3.2.1 Accommodating user experience**

On accommodating user experience 30% of the respondents disagreed and another 25% strongly disagreed that it is an adaptability issue. This implies that respondents have no issues with the ability of the system to accommodate user experience.

**3.2.2 Assessment of learning progress and performance**

The findings on assessment of learning progress and performance illustrated above confirm that 35% of the respondents strongly disagreed and 30% disagreed that it is an adaptability issue. This implies that users of the existing e-learning system do not have any adaptability issue concerning assessment of learning progress and performance.

**Figure 1: Assessment of learning progress and performance**

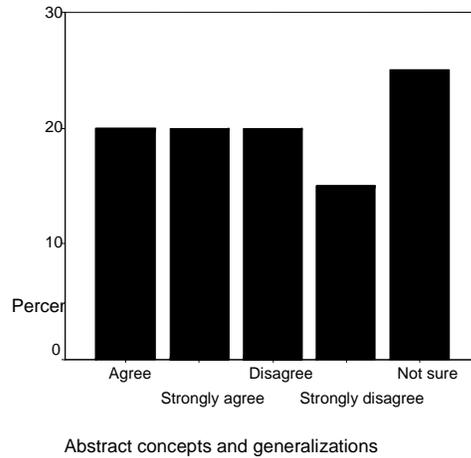


Source: Research data

**3.2.3 Abstract concepts and generalizations**

It was further established from the research findings that abstract concepts and generalizations was not considered an adaptability issue with the current e-learning systems. This implies that the respondents did not perceive any abstract concepts and generalizations in the current e-learning systems.

**Figure 2: Abstract concepts and generalizations**



Source: Research data

**IV. CONCLUSION**

The study revealed that inability of the existing e-learning platforms to offer feedback is the main challenge to the users. The study confirmed that users are not able to get instant feedback from the current e-learning platforms. It was also confirmed that the current e-learning system does not have the capability to encourage learner participation. Learners do not have a chance to actively participate in the existing e-learning system. It was further revealed that the current e-learning system may not be relied upon to provide efficient e-learning services to the users and thus it is considered unreliable. The results also revealed that there is that lack of personalized services from the existing e-learning systems hence users can not access personalized services from the system.

Concerning user adaptability issues with the existing e-learning platforms, it was established that four out of the many issues considered were of great significance to the users. It was evident from the study findings that the existing e-learning platforms do not match the learners learning style. Different learners have different learning styles and the systems do not have the capability to match them. The study further confirmed that learners have adaptability issues with content organization and presentation. Learners do not find the content to be orderly and properly presented and this becomes an adaptability issue. It was also established that navigations information structure and visual and verbal perception of content are also adaptability issues with the existing e-learning systems

The adaptability issues with the existing e-learning platforms include: existing e-learning platforms do not match the learners learning style; learners do not find the content to be orderly and properly presented; learners have issues with navigations information structure and visual and verbal perception of content.

**V. RECOMMENDATIONS**

The study confirmed that there are a number of challenges and adaptability issues facing the existing e-learning systems. It will be important for the universities to look at these challenges with an aim of addressing them in order to make them more efficient and

effective. The universities are advised to come up with models that will be able to address most of the issues that are currently affecting the smooth running of existing systems.

## VI. SUGGESTIONS FOR FURTHER RESEARCH

There is need to conduct a survey that will include all the private and public universities in Kenya to establish the overall position of e-learning systems. This will assist in improving the situation or sharing information on how to enhance the e-learning systems. It will be important for Kenyan universities to carry out comparative studies on e-learning systems with other leading universities across the globe.

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