Implementation Of Mobile Based Social And Collaborative Learning In Improving The Level Of Performance Of Students Using Web 2.0 Tools. A Case Of Bindura University Of Science Education.

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ABSTRACT

The mobile phone has gained much popularity as a communication tool. Apart from communication, several uses have been discovered which include learning among other things. Mobile-learning platforms allow users to interact and collaborate with each other in projects and to share work in a social media as creators of user-generated content in a virtual community, in contrast to the current computer based e-learning system where users are limited to the passive viewing of content that was created for them. The need for this research came from the realization that most students now own smart phones which they are using to join and use social networking platforms hence the need to harness the power of mobile phones and use it for learning purposes. A sample of 28 students was used to gather data. Fourteen students used the mobile learning system and other fourteen students used the traditional e-learning system. They both wrote the pre-test (test before exposure to the system) and post test (test after other 14 students have been exposed to the system). The tests written were used to assess the effectiveness of mobile -learning over the current e-learning 1.0 system. Paired-Sample T-Test was used to calculate the difference in mean values for both groups. Interviews and questionnaires were also used to collect data for the results. The results show that there was no difference in the mean values for the pre-test scores. On the other hand, the results show that there was an increase in their post test scores on the side of those who used the mobile platform. There was a significant increase in the mean scores for those who used the mobile system than for those who were not exposed to the system. The overall results showed that there was an increase in the level of performance of students through the use of the system.

KEYWORDS

E-learning, collaborative learning, performance, web 2.0, social learning,

INTRODUCTION

This research is focused on the need for social and collaborative learning which promote feedback functions, social interactions, discussions, cooperation and collaborative knowledge building using mobile phones rather than the current e-learning system which has the major

focus on the interaction between human and computers and has limited access time. Collaborative learning in general is defined as any kind of group learning in which there are some meaningful learning interactions between learners. If educators are able to harness the power of Web 2.0 tools and combine it with the power of smart phones, it could be expected that the amount of participation and classroom discussion would increase. This is out of the realization that much research has been done on collaborative learning with the aid of computers and computer networks and that future studies should focus on the feasibility of the new technology such as group cognition and collaborative knowledge building and the tools that are diverging further from face-to-face learning environments. (Resta, 2007) as cited by (Williams, 2009).

Background

Online learning has become a widespread method for providing education at the graduate and undergraduate level. Although it is an extension of distance learning, the medium requires new modes of presentation and interaction. Review indicates that, although there has been extensive work to conceptualize and understand the social interactions and constructs entailed by online education, there has been little work that connects these concepts to subject-specific interactions and learning using mobile platforms especially in Zimbabwe and Africa as a whole to use this development in their e-learning system. Furthermore, the current e-learning system does not support additional needs of students like feedback and participatory information sharing in which the information is checked for correctness by the subject coordinator. This then fails to prove or disprove Albert Bandura's notion that individual's behavior is influenced by the environment and characteristics of the person,

Problem statement

The problem is that the current e-learning system (Moodle) at Bindura University is posing the following short-comings that are posing a negative impact in the learning process.

- Limited communication: There is limited communication with all group members, within small groups, one-to-one, with the instructor to collaborate in projects, to share work etc. The approach is mainly resource based, providing "traditional documents" in the Web with the major focus on the interaction between human and computers which is called Web 1.0. This is the concept of Web-as-information-source unlike Web 2.0 which is the

concept of Web-as-participation-platform. However, Learners face limited communication among themselves when using the current e-learning system especially with their spaced location after school.

- Accessibility: The system is difficult to access using computers as it is hosted in India and with the persistent network failures at college, the system is difficult to access yet the phones are the most available tool to students which use reliable network service providers.

Research Objectives

- To design, and implement a mobile E-learning 2.0 learning platform, which will allow users to interact and collaborate with each other in projects and to share work in a social media dialogue as creators of user-generated content in a virtual community, in contrast to the current e-learning system where users are limited to the passive viewing of content that was created for them.

- To assess the effectiveness of mobile e-learning 2.0 over the current e-learning 1.0 system.

Research questions

- Does mobile e-learning 2.0 offer excellent feedback functions and communication among all system users in their learning progress?

- Does mobile e-learning 2.0 improve the performance of students especially in the level of understanding?

Hypothesis

In this research it is hypothesized that:

H_0 : mobile E-learning 2.0 is not effective in improving the level of performance of students.

H_1 : mobile E-learning 2.0 is effective in improving the level of performance of students

Justification/significance of the Research

This research is essential because learning in tertiary education is not a matter of passive reception of ideas from single authority, but of sharing, cooperation and interaction between

students. This will improve student to be proactive in their approaches to study rather than relying much on sequential models of learning.

Collaborative learning enables students to work together to interpret texts, author articles and essays, share ideas, and improve their research and communication skills collectively. This provides the opportunity for students to reflect and comment on either their work or others. This means that students, in a Web 2.0 classroom, are expected to collaborate with their peers. With the ubiquity of mobile phones, learning should not be restricted to classrooms only, but should be taken everywhere for as long as there is network connectivity. This then supports collaborative knowledge building by peers.

Scope of research/Delimitations

The research is going to be concentrated on the boundaries of Zimbabwe and will be focused on Bindura University Of Science Education. It will also make reference to other African countries which have taken the initiative of e-learning and how they are managing.

Definition of terms

Collaborative learning: It is as any kind of group learning in which there are some meaningful learning interactions between learners.

Web 1.0 - According to Berners-Lee as cited by (Evans, 2006), web 1.0 is considered as the read-only web. In other words, web 1.0 allowed us to search for information and read it. There is very little in the way of user interaction or content contribution.

Web 2.0 - The term web 2.0 is associated with web applications that facilitate participatory information sharing, interoperability, user-centred design, and collaboration on the World Wide Web .It basically refers to the transition from static HTML Web pages to a more dynamic Web that is more organised and is based on serving Web applications to users. A group of technologies which have become deeply associated with the term are blogs, wikis, podcasts, and RSS feeds etc., which facilitate a more socially connected Web where everyone is able to add to and edit the information space. (ITBusinessEdge, 2013)

E-learning 1.0 – Is the currently used e-learning system which is used to create, design, and manage courses, as well as supporting content delivery. The focus of the system is on content and learning objects, with less consideration for the learning process. There is not much scope

for communication and collaboration. Even though tools for collaboration are available, their application in learning is negligible.

Mobile learning 2.0 - We can talk of e-learning 2.0 applications if users apply Web 2.0 media, i.e. social software, such as wikis, weblogs or RSS in collaborative learning activities for autonomously producing their own learning contents and use them for their own learning objectives using mobile phones. (kineo)

BLOG - Derived from the term web log. A blog is an interactive website or web page where entries are made journal style and displayed in the order of the last person to leave a message or "post". Blogs typically have many members who sign up through a user account and communicate frequently on a variety of topics.

LITERATURE REVIEW

Introduction

The purpose of this section is to analyse the changes taking place when learning moves from a transmissive learning model to a collaborative one and reflective learning model. This outlines relevant research in the field of e-learning to outline the differences between e-learning 1.0 and mobile e-learning 2.0 and amalgamates it with a series of previously published works. This will take into account the brief history of e-learning 1.0 and its benefits, and how the negative effects of the learning system have resulted into the need for further research in design and implementation of mobile e-learning 2.0 platforms.

(Wang F and Burton, 2010) cites (Johnson, 1996) who define collaborative as the instructional use of small groups so that students work together to maximize their own and each other's learning .Under this definition , collaborative learning was defined and adopted differently by researchers based on their specific perspectives (Resta and Laferriere, 2007). Various variables have been used to differentiate collaborative learning such as time.

Definition of e-learning

E-learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic applications and processes. The applications include Web-based learning, computer-

based learning, virtual classrooms and digital collaboration. Content is delivered via the internet, intranet/extranet, audio or video tape. (ITBusinessEdge, e-learning, 2013)

Definition of m-learning

(Deciphering m-learning, 2010) defines m-learning as the intersection of mobile computing and e-learning accessible wherever one is, having strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment.They go on to cite Keegan 2003 when they say existing initiatives are already demonstrating the viability of m-learning in developing countries.

Advantages and disadvantages of m-learning

There are numerous advantages and disadvantages of mobile learning which we are not going to fully exhaust in this survey. However, there are a few advantages and disadvantages according to (Hajim, 2012) which we are going to explore.

Advantages

Educational Support

Using smart phones and tablet computers, students have easy access to knowledge. They use their devices as supportive educational tools. They have access to diagrams, articles, essays and other academic information which can improve student performance in the classroom

Interaction

With mobile learning, communication between student and teacher is easy. It cans even encourager shy students to communicate more openly when they are in class. Teachers can also use mobile devices to interact with students that require special attention.

Management

Since no two students are the same, several educators note that each student requires different pedagogies for learning. Through mobile learning, students are able to learn in their own way.

Wider Access

Students have access to industry experts and can read reviews and blogs by field experts.They can also follow conferences and "webinars". Using these gadgets, they can overcome distance and expences too.

Special Education

More gadgets are being designed to help students with learning disabilities. With developments of applications that cater for those with learning disabilities and physical impairments, learning-challenged students can have an equal chance with those who are normal.

Disadvantages

Cost

Some students cannot afford mobile devices hence; m-learning excludes others because of cost. Moreover, technology changes very fast and students need to constantly upgrade their devices frequently. Again, internet comes at a cost from the Internet Service provider. This may be expensive for students if they have massive download.

Size of Device

Small gadgets have limitations, especially on screen size and as a result, eyes can be strained due to prolonged use. With the screen size, limited amount of information can be displayed.

Battery Life

Most gadgets have limited battery life. Once the battery runs out, the student will have to plug the device for recharging. This then limits mobility.

Technology

Most gadgets have limited storage capabilities despite the fact that technology is changing everyday. The issue of storage limits the number of files stored. To store more information, a student has to buy another device for storage and this may be expensive for a student.

Usability

Mobile devices are difficult to use because of the small buttons.

Collaborative learning

This is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product .(Gerlach, 1994) He also goes on to say there are many approaches to collaborative learning and a set of assumptions about the learning process.

The need for collaborative learning.

(Pinola, 2012) says Mobile collaboration and community technologies are critical to the success of many virtual teams, including mobile professionals and telecommuters. She cites Woodill F.D who says humans as social beings are naturally attracted to being part of a community and

therefore mobile technology networking allows the development of many connections among people regardless of physical location. She also cites Mary Chayko (2008) in Portable Communities: The Social Dynamics of Online and Mobile Connectedness who says that we can now take our social relationships with us wherever we go.Chayko is also quoted as saying members of online communities "think in tandem" and share "cognitive connectedness"

One of the most powerful ways cited to learn is through collaboration with others which in the past generally meant being in the same room with co-workers in order to work together on projects. (Pinola, 2012) goes on to say collaboration using mobile devices can take place at several different levels. At the lowest level, collaboration simply means being able to access e-mail or instant messages from colleagues and send replies. Often, this requires software to coordinate a company's servers with the various mobile devices that employees take with them when they are mobile.

The second level of collaboration using mobile technologies is to enable people to meet while some or all of the participants are on the road. The easiest way to achieve this is through a conference call involving all participants.

A third level is to use online meeting software that is specifically designed to include mobile devices.

(Pinola, 2012) sites a motivator for mobile collaboration being a shared sense of social purpose. Another type of mobile collaboration involves asking individuals to make small contributions to a larger collective project. Known as "crowd sourcing," this movement harnesses volunteers and paid workers to solve problems that are difficult for an individual or small group to solve on their own. Mobile collaboration is a relatively new phenomenon that will develop new methods and new technologies in the near future.

(be social and make collaborative, 2009) says Marc Prensky, an American writer and speaker on learning and education was once quoted in his essay titled "Digital Immigrants, Digital Natives" saying students have radically changed and that they are no longer the people their education system was designed to teach.

It goes on to say that his words meant that the ways students interact, form relationships, make decisions and accomplish work is changing, and with it comes the need for education tools that cater to the workforce of tomorrow — tools that allow collaborative learning and encourage students to explore, engage, and interact in a manner that they are used to in their regular lives.

(be social and make collaborative, 2009) goes on to say effective collaborative learning embodies a culture characterised by sharing, transparency, innovation and improved learning. Such a culture enables deeper relationships with all stakeholders in the academic ecosystem, and builds a better participatory environment. Students become content producers and not just receivers.

A successful and effective collaborative platform would include:

Networks, Social and real-time collaboration, Mobility and Integration.

Collaboration theory, suggested as a system of analysis for computer-supported collaborative learning (CSCL) by Gerry Stahl in 2004, postulates that knowledge is constructed in social interactions such as discourse. The theory suggests that learning is not a matter of accepting fixed facts, but is the dynamic, on-going, and evolving result of complex interactions primarily taking place within communities of people.

Collaborative learning in general is defined as any kind of group learning in which there are some meaningful learning interactions between learners. The main advantage of this platform is that it creates nearness and social presence. Some recent approaches on the e-learning market are taking into account these open questions and disadvantages of today's learning platforms, concentrating on the need for collaborative learning and its advantages in traditional sessions. These approaches try to focus on social and individual aspects of learning as well as on providing learning content in a way that makes sense.

In addition to these basic needs, successful learning communities must support additional needs of students and tutors like resources, guidance, feedback and enjoyment (Preece, 2000).

The advantages of collaborative learning are as follows:

1. Resources: To communicate with all group members, within small groups, one-to-one, with the instructor; to access resources in the WWW and to search the Web, to collaborate in projects, to share work etc.

2. Guidance: Teachers/Professors have to guide students effectively, to challenge them to use the internet creatively and ensure that they are rewarded for their efforts. This

includes to filter information and prove the correctness and to view communication flows.

3. Feedback: Feedback can be given in several forms in the learning process. It can come from the tutor, from peers or from both. Also automatically feedback functions can be implemented in the system.

4. High achievement: social & personal development: Collaborative Learning promotes high achievement as well as personal and social development. (Li, 2002) came to this conclusion after surveying more than 1,000 research studies investigating the relative effects of collaboration, competition and individualistic interdependence.

5. Motivation: Collaborative Learning increases the understanding of content and
Provides greater motivation to stay on task.

6. Independent learners – team learners: Collaborative Learning helps trainees actively construct content, take responsibility for their work and resolve group conflicts. It is especially important in the context of developing team work skills.

7. Critical thinking: collaborative learning enhances critical thinking as it allows students to discuss, clarify and evaluate ideas. Collaborative learning fosters the development of critical thinking through discussion, clarification of ideas, and evaluation of others' ideas. According to Johnson and Johnson (1988), there is persuasive evidence that cooperative teams achieve higher levels of thought and retain information longer than those who work quietly as individuals.

8. Higher order thinking: Collaborative groups are characterized by shared leadership, shared responsibility for each other, individual accountability, positive interdependence, trainer observation and intervention, direct teaching of social skills and groups monitoring their own effectiveness. If the purpose of instruction is to enhance critical–thinking and problem–solving skills, then collaborative learning is beneficial.

9. Enjoyment: Learning is more meaningful when it is fun. Features that encourage sharing, empathy, trust, support and collaboration, as well as discourage aggression, self-centred behaviour etc. help to make learning enjoyable.

Advantages of collaborative learning

(JC dos Reis, 2009) says by using mobile devices, informal education can be developed through collaborative interactions at any time or location. They go on to present a prototype and also discuss about the impacts of the approach on informal education.

(Reynold) says online learning helps an instructor regain lost concentration in students as it ensures the collaboration encourages enthusiasm among themselves in what you teach.He goes on to say through social networking websites, you can request suggestions, conduct polls, exchange ideas, and post questions asked in the class to get answers instantly from your online peers.

Disadvantages

(Attwell, 2009) gives some arguments against allowing mobile phones for learning or social purposes some of which are

- Distraction and interruption
- Taking photos of tests and passing them to classmates
- Texting answers of tests to classmates
- Recording instructors and pupils in the classroom
- Privacy issues with instructors having personal phone numbers of students and vice versa

Examples

(Sanchez, 2012) examines ways in which instructors can use wikis for collaborative learning. She speaks on the importance of instructors embedding widgets into wikis to enable to use the sites in a similar fashion to social networking platforms.

(UNESCO, 2012) says the number of mobile phone accounts worldwide is approaching six billion and for every individual who goes online from a computer, two more do so from a mobile device. Even where schools and computers are scarce, people still have mobile phones. It goes on to say Africa alone will account for some 735 million subscriptions by late 2012 and a majority of Africans have individual access to an interactive information and communication technology for the first time in history.

Reasons for allowing mobile devices in learning

(Attwell, 2009) identifies, among other advantages, the following

- Is cost effective for colleges

- Reduces the need for all students to have access to computers in classroom

- Need less equipment like digital cameras, camcorders, mics etc

- If pupils are going to have them in colleges anyway, irrespective of whether it is officially allowed, they may as well be exploited for learning. Overcomes some of the problems of 'distraction' etc.

- Uses cheap and familiar technology

- They are a good vehicle for teaching about 'use-and-abuse' issues such as digital identities, protocols, bullying, net safety etc

- Can be used as data collection and recording devices – audio, pics and video – for recording experiments, field work, voice memos etc

- Can be used as creative tool – making pod casts, picture blogs, twittering etc

- Can use the phone itself as learning aid – creating ringtones, wallpaper etc (more on this later)

- Students can ask questions of the instructor they may be too embarrassed to ask publicly.

- Encourages engagement e.g. SMS polling can ensure every pupils voice is heard.

- SMS polling (e.g. using Wiffiti or Poll Everywhere) can be used for formative assessment

- Can be used for collaborative learning and communication

- Students are encouraged to use general reference books so why not phones – as dictionary, spell checker, thesaurus, encyclopaedia etc

- As specific research tool via web access

Evolution to E-learning 2.0

Like the web migrated from version web 1.0 to web 2.0 with the movement of 2.0 tools such as blogs and wikis, the E-Learning will also migrate to the E-learning 2.0. It stems from the blending of classic E-Learning with the Web 2.0 tools and services which allow the emergence of a new model of learning as shown in the following figure:
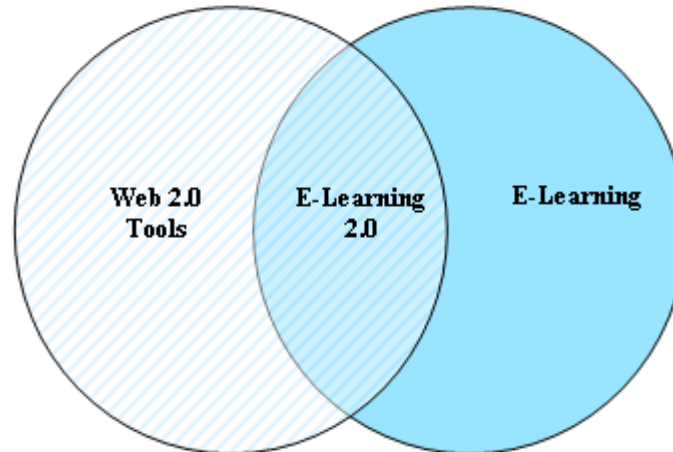
Figure 1. Origin of the E-Learning 2.0

Web 1.0

The first implementation of the web represents the Web 1.0. According to Berners-Lee, web 1.0 is considered as the read-only web. In other words, the early web allowed us to search for information, read and download it. There was very little in the way of user interaction or content contribution.

Web 2.0

The development of the term 'Web 2.0' is usually ascribed to the American media company O'Reilly Media Inc. It was used by the company and its founder Tim O'Reilly to identify common features of a set of innovative Internet companies and their business characteristics, rather than describe a group of technologies. However, the term has come to be associated with social software and user generated content, which share some of the features identified by O'Reilly, such as participation, the user as contributor, harnessing the power of the crowd, and rich user experiences (Anderson, 2007). Berners-Lee described web 2.0 as the read-write web. The recently-introduced ability to contribute content and interact with other web users has dramatically changed the landscape of the web in a short time. It has even more potential that we have yet to see. The Web 2.0 appears to be a welcome response to a demand by web users that they would be more involved in what information is available to them.

Web 2.0 encompasses a variety of different meanings that include an increased emphasis on:

- user generated content

- data and content sharing

- collaboration

- the use of various kinds of social software

The best way to define Web 2.0 is to make a reference to a group of technologies which have become deeply associated with the term: blogs, wikis, etc., which facilitate a more socially connected Web where everyone is able to add to and edit the information space" (Anderson, 2007). Figure 2 below shows the Web 2.0 Map.
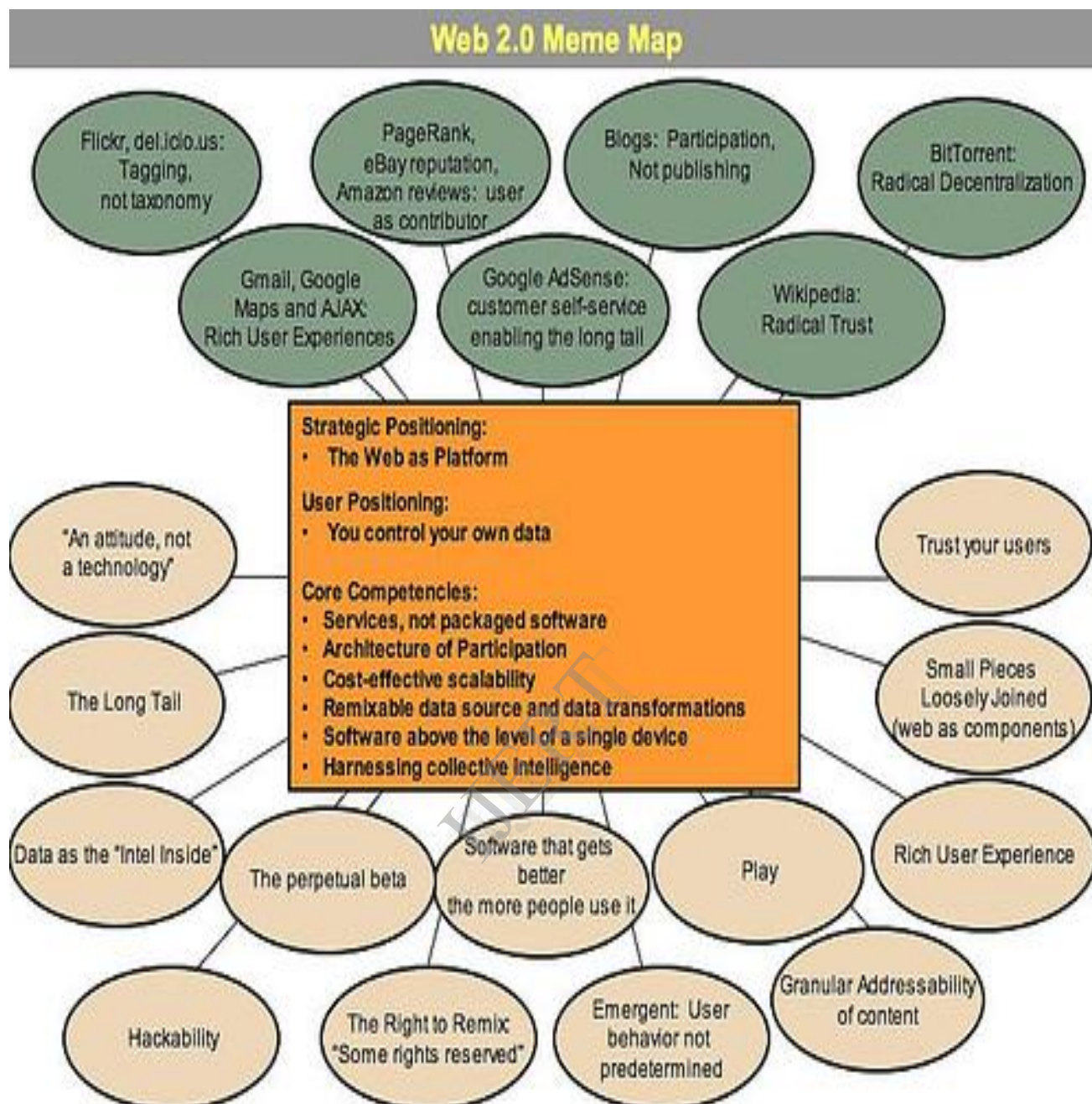
Figure 2: *Group of web 2.0 tools (O'Reilly, 2005)*

E-learning 2.0 is closer to a social network and a community of practice articulated around a field of interest, where members interact and learn together. This is a new mode of learning based on Web 2.0 which allows restoring power to the user and creates the dynamic horizontal community (learner-learner or lecturer to lecturer) and vertical community (lecturer-learner), thus migrating from transmissive unidirectional media to a collaborative learning.

Definition of m-learning 2.0

E-Learning 2.0 is a new environment for E-learning that places the learner at the centre of the training through the tools of Web 2.0 using mobile devices. It does allow passing from transmission to collaboration.

Communication in the learning system

In this context, learners have more freedom, more responsibility and take control of their training while creating their learning environment. They will be able to communicate with other learners and experts outside the boundaries of classrooms. They can work remotely through a shared whiteboard, evaluate and comment on the learning contents collectively, publish using blogs, produce a collaborative document through wikis.

Improvements in the learning 2.0

Review indicates that, although there has been extensive work to conceptualize and understand the social interactions and constructs entailed by online education, there has been little work that connects these concepts to subject-specific interactions and learning. Although e-learning provides 24 hours and 7 days of unlimited access, this may not be advantageous to some individuals. (Deepak, 2012) cites Dringus 2003 who said "being 24/7 is a good marketing scheme, but online learners and professors burn-out easily". She explained that learners can post any questions in the forum or send e-mails whenever they are free (even during weekends).

It is also more time-consuming to guide online students, as academicians need to respond to each student's queries individually in writing. (Kathawala, Abdou & Elmulti, 2002) and Schifter 2004) as cited by (Wong) mentioned that academicians are not well compensated for their e-learning involvement. These e-learning instructors have heavy workloads and this may undermine their performance and even reduce their chances to grow with the environment according to Dringus, 2003. This will affect their performance in teaching or facilitating students, thus learners may only receive sub-standard services.

Declan Butler in 2005, conducted interviews with researchers working across science disciplines and concluded that social software applications are not being used as widely as they should in research, and that too many researchers see the formal publication of journal and other papers as

the main means of communication with each other. Past and present e-learning technologies are mainly resource based with the major focus on the interaction between human and computers. The approach is on the one hand to provide media rich resources, on the other hand to bring traditional documents in the Web. Thus mainly individual learning is supported today. In general present e-learning solutions are lacking peer contact and interaction, cohesion and flexible tutorial support. Studies of (Evan & Hasse (2001), O'Regan (2003) and Rovai & Jordan (2004) as cited by (Wong) found out that learners face limited physical interactions among themselves in e-learning. Most students need the help and mediation of a teacher to make sense of complex subject matter (Erlwanger, 1973; Leinhardt, 1994; Bransford *etal.*, 1999) as cited by (Gilmour, 2009). Traditional classrooms allow students to do assignments and when they are completed, they are just that, finished. However, Web 2.0 shows students that education is a constantly evolving entity. No matter how well presented or represented, many subjects are difficult to learn on one's own without discussion, feedback, encouragement, or explanation from or with a knowledgeable other. Some views of cognition suggest that learning is also enhanced by engagement in a community in which learners help each other to make sense of information and ideas, with the teacher acting as a mediator to focus and guide discussion (Brown *et al.*, 1989; Brown & Campione, 1994) as cited by (McGilly, 1995).

Conclusion

In one study by (Tunison, 2001); autonomy/freedom has been listed as the most common student response to the question of benefits of a virtual school course. Although, most students identified the teacher as the ultimate source of information, many students enjoyed the opportunity to work on their own and to figure out things for themselves without having to wait for their lecturer to tell them what to do. Students at Bindura University will able to work at various places but within the campus, to get extra credits that did not fit into the regular classroom. The advantages can be summarised as flexibility, accessibility, convenience, cross-platform capabilities, and just-in-time, personal, adaptive and user-centric. The next section will look at the methodology that was followed in the design of the experimental research.

METHODOLOGY

Introduction

The study was done to find out the usability and the learning system that might improve the level of understanding of students. The approach focused on both social and learning aspects of the student experience and was piloted with the conventional students studying introduction to computer science at Bindura University. This section describes the methodology aspects of the study. Included in these descriptions are discussions on the study's variables, sample size, instrumentation, data collection and data analysis procedure.

System Architecture

In this section we present on how learners interact in e-learning 2.0 system and tools used to support their learning progress. This also allows us to identify different components of the system and their functionalities.

Roles of stakeholders of m-learning 2.0 platforms

The approach was based on a process consisting of four iterative steps which are: grouping, collaborating, validating and publishing content. The lecturer would distribute the course parts on learners as blog topics on class blog in the e-learning 2.0 system. Learners used the collaborative aspect to prepare the course by discussing and leaving comments on the class blog. The lecturer would regroup all parts of the course and validate them, publishing on the wiki the content of the course validated

System functionality

The users had to first create an account before using the system as shown in figure 3 below. The account would be pending for approval by the site administrator (trusted chosen student/ lecturer) to prevent a user from creating multiple accounts. After the account had been activated by the system administrator a welcome message with further instructions was sent to the user's e-mail address which he/she used when creating an account. The user would now be able to login and user the system.
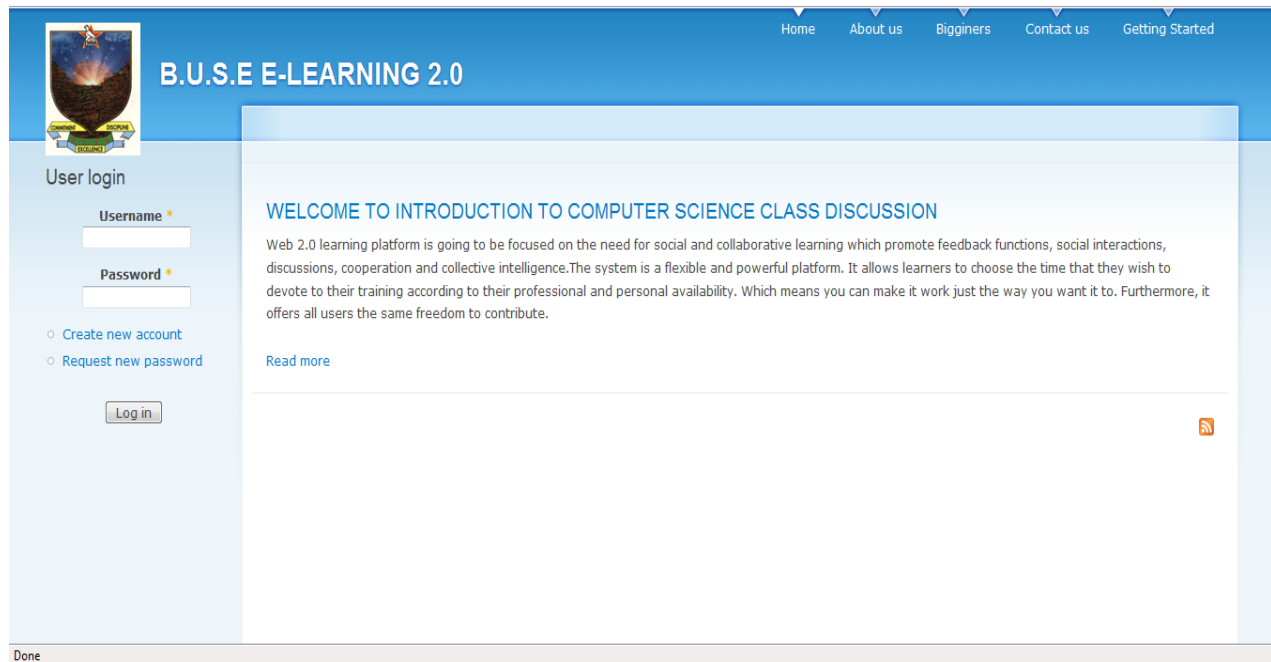
Figure 3: *E-learning 2.0 default page*

Web 2.0 tools used in the system

Blogs, wikis, etc. were created to surround the course with an expanded set of learner resources. A reminder, Wikis and blogs are not e-Learning. They are resources. E-Learning needs structure and instructional design to be effective. These technologies are used and combined to create new services.

Using Blogs in the Classroom

A blog (sometimes referred to as a weblog) is a Web publishing tool that allows authors to quickly and easily self-publish text, artwork, links and a whole array of other content. Jorn Barger in 2010 defined a blog as a simple webpage consisting of brief paragraphs of opinion, information, personal diary entries, or links, called *posts*, arranged chronologically with the most recent first, in the style of an online journal

Lecturer would put the blog to work in the classroom. The learning blog is a powerful and effective technology tool for students and lectures. In the screen shot shown below, any registered user could add a blog topic on which students can share information while trying to answer a given question in the blog topic.

Figure 4: *Class Discussion page*

In this context, learners were the creators of the content of course in a virtual meeting through leaving comments on the class blog. This posting and commenting process contributed to the nature of blogging (as an exchange of views). Each post was tagged with a keyword or two, allowing the subject of the post to be categorised within the system (in the Recent Comments on right side bar) so that when the post became old it could be filed into a standard, theme-based menu. Clicking on a post's description, or tag would take you to a list of other posts by the same author on the blogging software's system that use the same tag.

Figure 5: *Blog section*

The contact among learners took place through commenting (leaving comments at the end of an article), sharing (swapping or sharing favourite links, articles, pictures or videos), message boards (traditional forums for discussions), and other such practices. Web 2.0 tools which put the learner at the centre of the learning, and would be based on his/her participation to animate and feed the contents of the courses in a context of collaborative learning. The service improved when the number of users increased and the users of Web 2.0 had unique data and difficult to recreate. The resources of the web increased with the increase in the number of users participating to create a collective intelligence. Social interaction and sharing of files on the web will be the responsibility of social networks. However, Web 2.0 does not offer a specific tool for E-learning similar to those used for bookmarks' sharing, multimedia's files sharing and collaborative tools.

Using wiki in classroom

A wiki is a webpage or set of WebPages that can be easily edited by anyone who is allowed access.

Because of their simple features, wikis can be appropriate for students and lecturers at all levels.

The lecturer could use a wiki in classroom several different ways.

a) Could use it to lecturer on content areas that students are learning.

b) Could create a wiki on the content area and allow students to visit it or use it to teach by using a Smart board.

c) After a lecture, students could visit the discussion board (blog) to communicate with each other or ask questions and the information discussed would validated and published on wiki.

d) Wiki would be a great resource for the classroom. The lecturer could make a wiki for

different units and provide information to students using the wiki. It allows many resources and great technology input.

The lecturer will be responsible for the coaching and final validation. Figure 6 below shows a Wiki

Figure 6: *Wiki section*

The lecturer was responsible for final publication. He or she would be a guide and a publisher of valid contents.

Information Gathering Methodology

a) The researcher used Part 1 students studying introduction to computer science (CS101).

b) Sample size is 28 students participated in the research.

c) 14 students were given access to the social and collaborative Platform to use it for their group discussion on CS101 questions.

d) The other 14 had no access to the system but used e-learning system

e) The two groups were then given a pre-test and post test

Interviews

In conducting the interviews the researcher first selected the essential interviewees, designed the interview questions and then conducted the interview. The interview questions were designed in a way that would allow one to get as much information as possible from the interviewee (open ended questions). Probing questions were also asked to get some of the technicalities of procedures and processes that are involved in the department.

Physical Observation

A lot of knowledge about the current system was gained just by observing and analyzing the processes and procedures as they are carried out. This allowed the researcher to get a greater insight on the procedures in the current system. The methodology allows the observer to see the current system as it operates in the actual environment.

Findings from observations

a) The system is a one way communication. There is no feedback from students to the lecturer; students have to accept fixed facts, no room for discussions and queries in the system.

b) There is no communication with all group members, within small groups, one-to-one, with the instructor to collaborate in projects, to share work etc. The approach is mainly resource based, providing traditional documents in the Web with the major focus on the interaction between human and computers

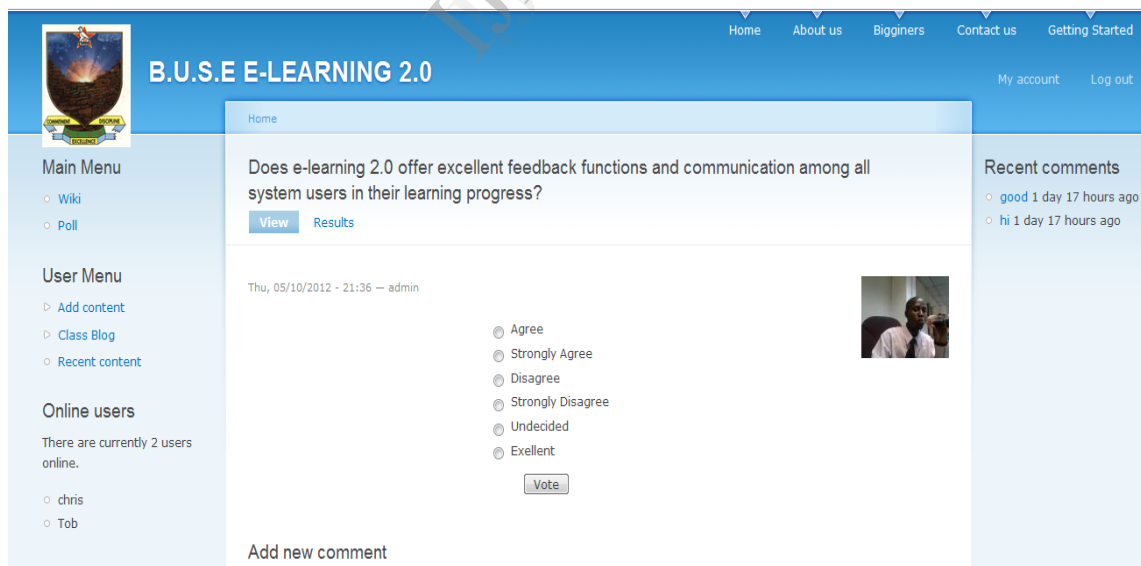c) When network is down, the system is also down as it is hosted in India.

QUESTIONNAIRES

The researcher circulated a number of different questionnaires to all stakeholders in the current system. A questionnaire-based survey reveals interesting facts regarding the success of the practical implementation of the Web 2.0 arrangement with respect to the motivation and learning outcome of students. The survey was supplemented with some non-formalized feedback in a concluding discussion. With these results in mind this paper finally provides some remarks on the potential of the learning environment in broader educational contexts.

The questionnaires were given to students to understand what changes they would like to see happening in their learning system and how the system is suppose to help improve this

POLL

The system users were given a chance to give their opinions about the system and make their own suggestions and recommendations. There is a poll below the Main Menu in the system which offers the opportunity to system users to evaluate the system and leaving comments about their expectations on the system. See figure 7 below.

Figure 7: *Poll section*

Tools Used

To develop a Web based learning platform, there must be heavy usage of CSS, traditional HTML, PHP, and Ajax so as to create flexible interfaces. CSS, which stands for Cascading Style Sheets, is an old style sheet language that has taken on an incredible amount of importance in Web 2.0. It allows a developer to code a site through a style sheet, which defines spacing, colors, link and text size, margins, and much more. Ajax, the other major player in Web 2.0, stands for Asynchronous JavaScript and XML, and aims to facilitate web page usage through exchanging small amounts of data with the server to dynamically load content in that web page, without the need to reload the page. Finally, mobile plug-ins is required for compatibility with mobile phones.

ANALYSIS OF RESULTS

Introduction

This section will analyze the results obtained from performing various statistical operations. The figures obtained from Questionnaires, Sample Paired Test and ANOVA in SPSS was used to assess the effectiveness of e-learning 2.0 systems versus the currently used e-learning 1.0 system.

The CS101 students were given pre-test (test before exposure to the system) and post-test (after exposure to the system) to see there was an improvement in the level of performance of students.

Descriptive statistics

This figure 8 shows the descriptive results after performing pre-test and post test.

Group Statistics

	Learning modality	N	Mean	Std. Deviation	Std. Error Mean
Test before exposure	E-learning	14	17.60	7.933	3.163
	Social and collaborative learning	14	15.40	7.167	4.011

Figure 8: Descriptive Statistics

The diagram below shows the descriptive statistics of mean values defined in Figure 8.
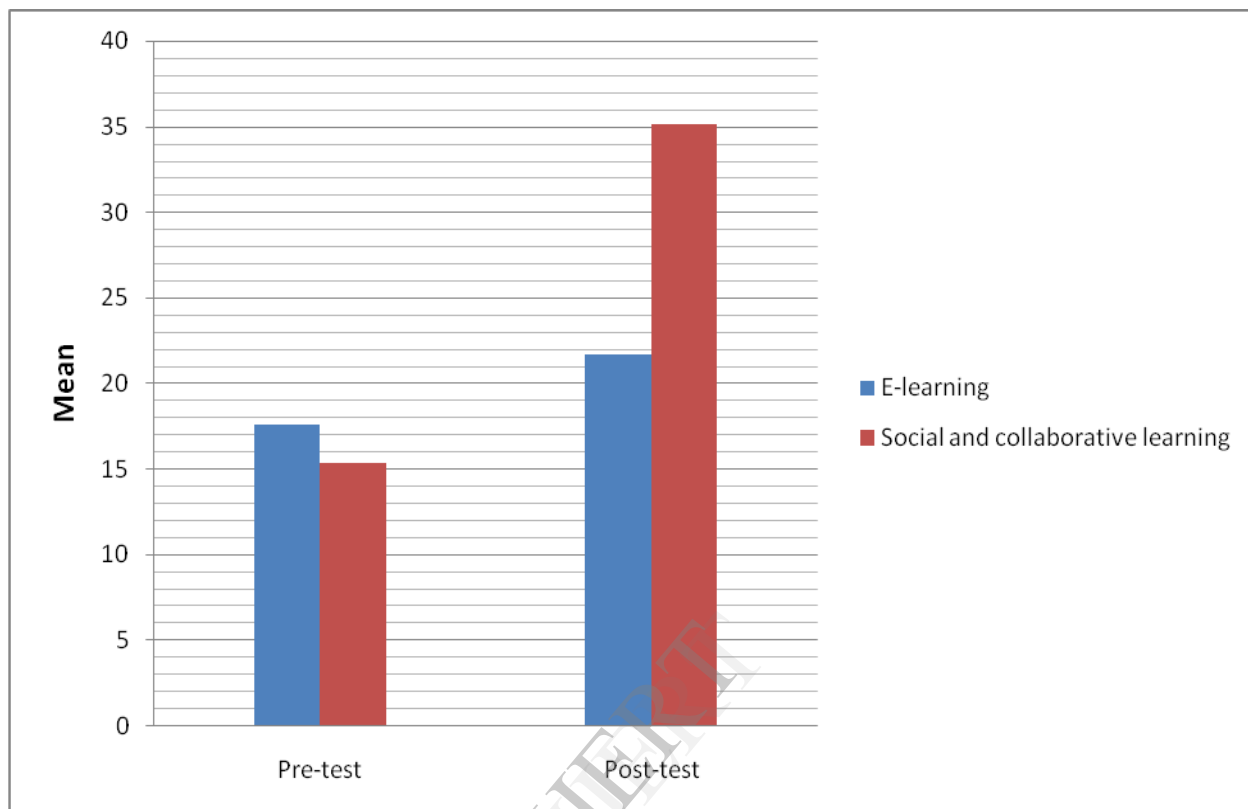
Figure 9: **Graphical Description of Figure 8**

Sample Questionnaire

The data was gathered using questionnaires distributed to 14 students in different departments. The questionnaire was divided into three main sections: (1) learning experience using technology; (2) user's perception on usefulness of technology; (3) additional comments and suggestions. The respondents were those who used the system. This study focused primarily on students studying introduction to computer science at Bindura University.

Questionnaire results

Does mobile e-learning 2.0 offer excellent feedback functions and communication among all system users in their learning progress?
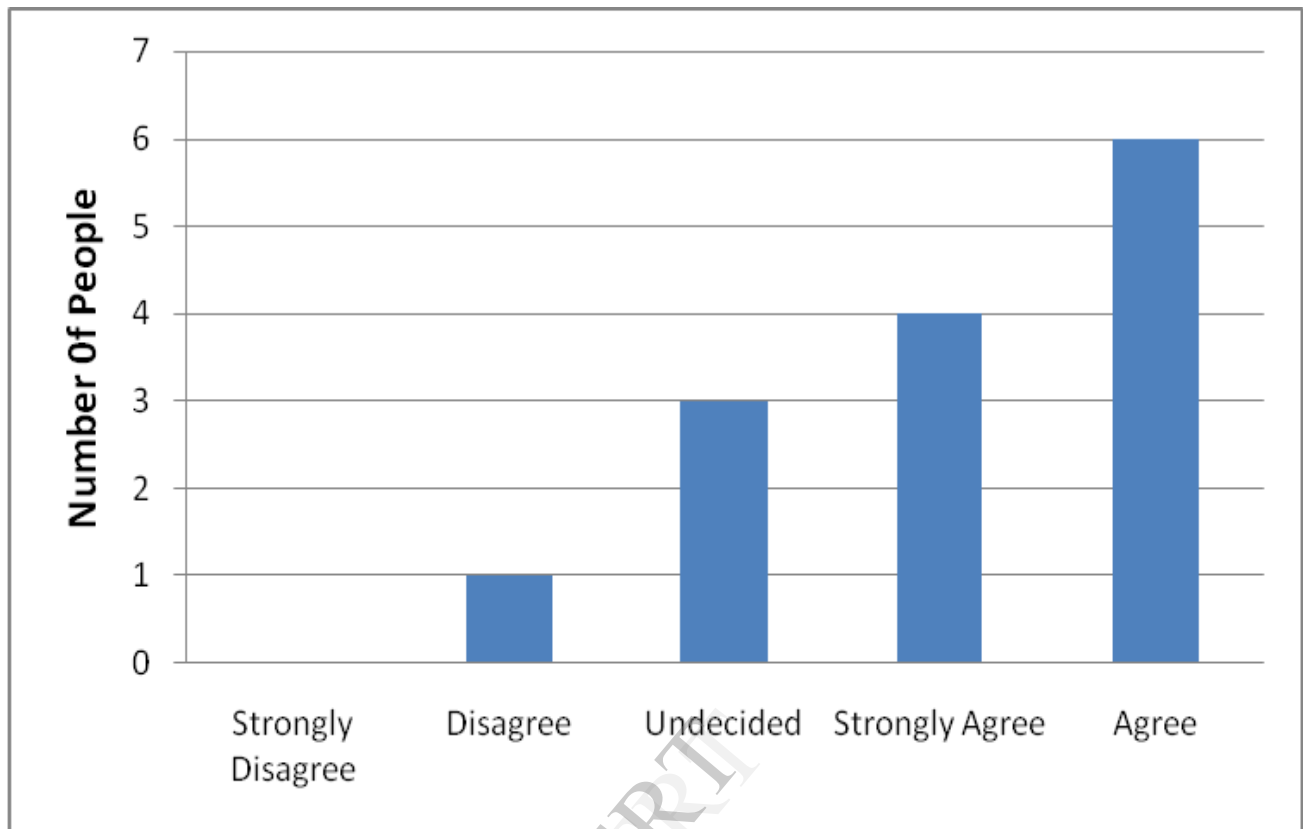
Figure 10: **Questionnaire Results**

Performing Paired-Sample T-Test in SPSS

Paired-Sample T-Test is also known as dependent T-Test, repeated-measures T-test or within-subjects T-test. A Paired-sample t-test is used to analyse paired scores of students who used mobile e-learning 2.0 and those who did not, specifically, we want to see if there is difference between paired scores.

Each student's level of understanding was measured by considering the test scores before (pre-test) and after (post-test) the implementation of mobile e-learning 2.0 system to see if the fitness program is effective in improving the test scores (level of performance of students).

Pre- test results for both groups

The control group is the group that never used the mobile e-learning 2.0 system. Treatment group is the group of those students who used the mobile e-learning 2.0 system but in this case

they had not yet used the system. However they are all at the same level since they all used the currently used e-learning system at BUSE.

Assumption:

Both groups are normally distributed.

Hypothesis:

H_0: There is no significant difference between the means of the two variables(control group and treatment   group).

H_1: There is a significant difference between the means of the two variables.

Significance Level   a = 0.05

SPSS Output:

Following is sample output of a paired samples T test. We compared the mean test scores before (pre-test) the implementation of the e-learning 2.0. We want to see if there is significant difference between two sample groups in their mean scores.

First, we see the descriptive statistics for both variables.

Table 1 : Pre-test mean scores

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Control_Group	13.86	14	7.461	1.994
Experimental_Group	13.07	14	10.209	2.728

As above in Table 1, pre-test mean scores are relatively the same, there is no much difference.They are in the thirteen range.

Under Paired Differences below, we see the descriptive statistics for the difference between the two variables.

Table 2 : Pre-test mean differences and significance value

	Paired Differences							
			Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Mean	Std. Deviation		Lower	Upper			
Pair 1 Control_Group - Experimental_Group	.385	3.990	1.107	-2.027	2.796	.348	13	.712

To the right of the Paired Differences, we see the T, degrees of freedom, and significance.

The T value = 0.348 and we have 13 degrees of freedom

Our significance is 0.712

If the significance value is less than .05, there is a significant difference. If the significance value is greater than. 05, there is no significant difference.

Here, we see that the significance value .712 is greater than .05 significance.

Conclusion

Since the p - value = $Sig.$(2 - $tailed$) = 0.712, we shall accept the null hypothesis. However, at the a = 0.05 level of significance, there exists enough evidence to conclude that there is no difference between the pre-test scores of the two groups (control group and treatment group).

Post- test results for both groups

Each student's level of understanding was measured by considering the test scores after the implementation of e-learning 2.0 system to see if the fitness program is effective in improving the test scores.

Assumption:

Both groups are normally distributed.

Hypothesis:

H_0: The null hypothesis is that mobile e-learning 2.0 is not effective in improving the level of understanding of students. That is, there is no significant difference between the post-tests of the two groups of students(control group and the treatment group). H_1: The alternate hypothesis is that mobile-learning 2.0 is effective in improving the level of understanding of students. That is, there is a significant difference between the post-tests of the control group and the treatment group.

Significance Level

$a = 0.05$

SPSS Output:

Following is sample output of a paired samples T test. We will compare the mean test scores after (post-test) the implementation of the mobile e-learning 2.0. We want to see if there is significant difference between two sample groups in their mean test scores.

First, we see the descriptive statistics for both variables.

Table 3 : Post –test mean scores

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Control_Group	15.02	14	9.129	1.994
Experimental_Group	21.11	14	21.221	3.728

The post-test mean scores are higher than pre-test scores.

Table 4 : **Post-test mean differences**

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Control_Group - Experimental_Group	-9.214	12.818	3.426	-16.616	-1.813	-2.689	13	.000

To the right of the Paired Differences, we see the T, degrees of freedom, and significance.

The T value = -2.689

We have 13 degrees of freedom and our significance is 0.000

If the significance value is less than .05, there is a significant difference. If the significance value is greater than. 05, there is no significant difference.

Here, we see that the significance value .000 is less than .05 significance.

Conclusion

Since the p - value = $Sig.(2 - tailed)$ = 0.000, we shall reject the null hypothesis. At the a = 0.05 level of significance, there exists enough evidence to conclude that there is a significant difference between the post-test scores of the two groups (control group and treatment group).

However we can conclude that the implementation of mobile e-learning 2.0 improved the level of understanding of students since there is a significant increase in post-test scores of the students who used the system as compared to the post test scores of students who did not used the system.

One way ANOVA

One way ANOVA was also used inorder to try and analyse variance that existed. Below are results from one way anova.

Table 5 : ONE WAY ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Test before exposure	Between Groups	225.311	1	7.200	.068	.711
	Within Groups	1234.142	12	105.489		
	Total	1459.453	13			
Test during exposure	Between Groups	234.480	1	884.450	10.562	.002
	Within Groups	1632.177	12	83.739		
	Total	1866.558	13			

The table by itself is a clear testimony of the differences that exist between the pre-test and the post-test. This shows that post test had more changes meaning that after implementation and use of the mobile e-learning platform to do their collaborative work, students had an improvement in their performance than before using the platform

SUMMARY OF RESULTS

This section provides an analysis of the mobile e-learning 2.0 system over the currently used e-learning 1.0 system. To find the difference between the control group and the experimental group a paired samples t-test was conducted. Results obtained indicated that there were no significant differences on the pre-test. Performance changed for both groups in the post-test, with a difference noted in means. The experimental group showed more significant difference in performance than the control group.

However, basing on the mean differences findings from paired sample T test and one way ANOVAs this research will reject H_0 and accept H_1 which shows that mobile e-learning 2.0 is effective in improving the level of performance of students.

CONCLUSIONS AND RECOMMENDATIONS

Introduction

In this section we seek to evaluate our findings and look at how they impact the current trends in the learning. We seek to look at how our mobile e-learning 2.0 implementation resulted in improving the level of performance of students.

Conclusions

Collaborative learning allows students to learn from one another – both in terms of viewing each other's content and also seeing the quality of other students' work. In currently used e-learning system, a student post an assignment, the lecturer grades it and in a classroom, a student writes a paper, the lecturer grades it, and then returns it to the student. Other students rarely have the opportunity to see and therefore learn from the information in that assignment. Seeing other students' work on a continuous basis can cause a student to evaluate his or her own work and see how it compares in quality. The comparison will cause the student to raise his or her work to a higher level.

Recommendations

We recommend that the above proposed mobile e-learning 2.0 system be fully implemented at Bindura University. We could not manage to fully implement the system due to limited resources and technical knowledge.

Today's learning platform need to be able to support these learning approaches:

- Formal and informal
- Personal and social

But there are drawbacks with most existing tools and system.

- Currently used e-learning support (non-social) formal learning.
- E-learning 2.0 support formal social learning

However, we also recommend further work on improving the system by encompassing personal and (social) informal learning.

We also recommend future work in Web 3.0 technologies. Web 2.0 technologies haven't been fully integrated into most e-learning platforms so it is logical to assume that it will take a while for Web 3.0 to be used in e-learning. Web 3.0 is the next generation of the web, representing an evolutional shift in how users and the web interact with each other. The semantic Web involves sophisticated technologies that understand natural language and the meaning of data, resulting in customized information based on the individual user. The immersive web involves 3D environments, augmented reality, and virtual worlds. Studies indicate that these components can be incorporated into a learning program, resulting in an increase in both learning and performance. In the next few years, it is expected that e-learning will increasingly use immersive technologies like virtual worlds and 3D multiplayer gaming. One of the main components of Web 3.0 involves an increasingly mobile Web experience.

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