Title: **The use of wikis as alternatives to Learning Content Management Systems**

Author: **Paul Laughton**

Affiliation: **University of Johannesburg, Department of Information and Knowledge Management**

Abstract:

Purpose: The purpose of the research is to identify whether a wiki could be used as an alternative to a popular Learning Content Management System (LCMS) in an e-learning environment. The research attempts to identify what value each of these e-learning components added to the students learning experience.

Methodology: A quantitative approach in the form a survey was used. The survey was conducted amongst a group of undergraduate students who were using both a LCMS and a wiki in their academic course, along with the attendance of lectures.

Findings: From the response of the students, the wiki used could be considered as a useful alternative to a LCMS. The LCMS was favoured over the wiki on a number of aspects but features of the wiki made it ideal to enhance collaboration amongst learners. This makes it an ideal tool to support Minimal Invasive Education (MIE), where learners get an opportunity to learn from their peers.

Research Limitations: The comparison used between the wiki and the LCMS was not ideal in all aspects, as the wiki was used for a particular role in the course and did not have the same features and functionalities of the LCMS.

Originality and Value: This research seeks for valuable alternative to conventional LCMS in the form of a wiki, in an attempt to improve the learning experience of the students.

Keywords: **wikis, e-learning, Learning Content Management Systems (LCMS)**

1   Introduction

Continuous software development has contributed to the discovery of new possibilities for computer use. This has also been assisted with supporting hardware refinement and development. This has created opportunity in the economy while highly profitable companies are involved with Internet software development, making it an extremely competitive industry. Recent developments in Internet applications have seen the birth of a new kind of user generated content on the Internet and World Wide Web (WWW). This user generated content is at the heart of Web 2.0, changing the way we use and interact with the Internet. The incorporation of Web 2.0 into e-learning has led to new possibilities.

Advancement in teaching techniques has discovered a new role of peer interaction to improve learning through social networking. Learning no longer is viewed as an internal or individualistic process, but rather it has emerged as a social process (Lave & Wenger, 1991; Levine & Moreland, 1991). This minimal invasive education (MIE) concept can now more effectively be incorporated into the e-learning environment, with the goal of improving the learning experience.

As part of this MIE and other teaching methods, new resources have been incorporated into education to co-inside with teaching practices. Learning Content Management Systems (LCMS) form part of these new resources popularly used in education. Successful LCMS need to work off interoperable standards allowing content to be shared, along with possessing the ability to cater for learners' specific needs and preferences (Watson & Ahmed, 2004:11). LCMS cannot be static in their approach, and need to incorporate new technology and utilities that can enhance the learning experience. O'Hear (2006) mentions that an e-learning approach is often driven by the needs of an organisation and not the needs of the individual learner, reducing their effectiveness. A number of new applications are available on the Internet which can be used to improve LCMS and enhance the learning experience. The objective of this research is to determine whether wikis can be used as an alternative to conventional LCMS, such as Blackboard.

2   E-learning

Electronic learning or e-learning is not a new concept, but often used to describe many different scenarios. The predecessor to e-learning was online learning. Online learning was widely talked about in the late 1990's and consisted of using network technology to design, deliver, select, administer and extend learning (Cross, 2004:104). At one end of the spectrum e-learning is used to describe the complete process from initial sign-in to the final certification, this implies little or no interaction from a host institution or university. On the other side of the spectrum is content free e-learning where learners are encouraged to interact, investigate and improve mutual learning. While somewhere between these two systems lies hybrid system that uses face to face physical interaction along with electronic content delivery and online administration (Akeroyd, 2005:157).

For the focus of this research e-learning is used to describe a hybrid system as mention by Akeroyd (2005), e-learning was used in conjunction with theory and practical lectures for the course offered relating to the research. This approach maintains a human element which can help encouraging learners to be more open, and increase the level of trust amongst those responsible for teaching and learning.

3   Learning Content Management Systems (LCMS)

At the heart of e-learning lies a LCMS, offering a technological platform for e-learning. There are many commercial and free LCMS such as WebCT/ Blackboard, Moodle and aTutor. LCMS have been adopted for a range of education institutions from primary education all the way to tertiary (higher) education (Hazaris, North & Moreland, 2009:187). LCMS rely on a database for storage of the systems

information. This information includes user profiles, course content, links to resources, student grades, messages boards, progress reports and much more.

Mason (1998) highlights three different approaches to LCMS design:
- Content and support: traditional model where static content is used along side conventional offline teaching. This format is commonly used in universities and other educational institutions.
- Wrap around: uses higher levels of interaction in which the content itself becomes more dynamic and the e-learning process becomes more involving.
- Integrated: this is a community of learning approach where content is dynamic, collaboration and mutual support are key to this process, leading to the possibility of changed roles where a student becomes a fellow teacher aid in the quest for understanding and creation of new knowledge. This is a desired state in terms of MIE and is growing in popularity.

LCMS can be defined as two concepts, virtual learning environments (VLEs) and learning management systems (LMS). The concept VLE is more acceptable in the UK while LMS is predominately used in the USA. Both of these online learning environments were designed to aid education, improving the experience for both the learners and the educators. Features of these LCMS are similar and the concepts are interlinked.

VLEs are software packages that work together with hardware, designed to support education and are characterised by a combination of features (Bostock, 2000):
- Computer mediated communication: features such as email and bulletin boards, while some support real-time messages between the online users.
- Publishing: lecture slides, module outlines, case studies and assessment materials.
- Computer assisted assessment: multiple choice questions and other short answers.
- Course management facilities: controlling of access to the course, assessment submissions and tracking of the students.

LMS have been designed as software tools to offer a virtual (online) training environment (El Alami, Casel & Zampuniers, 2008:318). A basic LMS is a Web application where a learner can log on and access the course (Watson & Ahmed, 2004:5). Watson and Ahmend (2004) go on further to define features of a LMS which include:
- Delivery of course content.
- An administrative tool that allows for tracking of learners performance.
- Management of online learning (course and learner administration).
- Provision of tools for student collaboration.

Many LCMS are criticized for being too static and do not take into account the diverse learning needs of the students. It is possible in a traditional learning environment to obtain feedback from learners and use this information to improve or adapt teaching methods to suite the students. However this feedback is lacking in the electronic learning environment. More adaptive and intelligent LCMS are needed to improve the quality of education being offered to students (Gu, Zhu, Zhoa & Zhang, 2007).

With the explosion and acceptance of the Internet in everyday life, Internet based technology seems to be ubiquitous in education and training (Gu et al, 2007:133). The use of computer and Internet technology to deliver course content has evolved some what with the advancement in Internet applications, processing power and data storage. LCMS today offer a range of new features which in the past may not have been possible.

In recent times the proliferation of Web 2.0 has populated a range of new application which can be incorporated into an LCMS. The use of Web 2.0 tools is increasing in academia, due to their interactive nature that is conducive to certain teaching methods (Hazari et al, 2009:187). Applications such as

forums, blogs, wikis, stock photos websites (flickr) and delicious, have unleashed new potential in conventional LCMS and have the ability to increased participation and interaction amongst learners.

While Web 2.0 is becoming more popular in education, the advent of Web 3.0 (semantic Web technologies) has further sparked efforts to improve LCMS. For this specific reason Brusilovsky and Peylo (2003) created the concept of Adaptive Intelligent Web-based Educational Systems (AIWEBS), which created an alternative to traditional static methods where content is distributed on the Internet or Web through generic educational courseware. These AIWEBS contain an array of semantic Web technology adapting the LCMS to suit the students, creating a more favourable learning environment.

Over recent years there has been a vast acceleration of computing technologies, computers have become better connected, easier and more intuitive to use. Computers are now considered as valuable tools in education and e-learning through the facilitation in communication, collaboration and creative development. Educators are constantly challenged with ways of incorporating these new technologies to use their full potential (Gates, 2003). New Internet applications have unleashed potential in facilitating better interaction amongst learners and teachers. Web 2.0 has popularised a range of applications such as wikis, blogs, forums and Real Simple Syndication (RSS), which strongly support collaboration.

4   Wikis

The word *'wiki'* originates from a Hawaiian term meaning quick. The founder and inventor of the wiki was Ward Cunningham, who in 1995 set out with a design objective of creating the simplest database that would work. This lead to the creation of WikiWikiWeb, a modern day benchmark of wiki design (Arreguin, 2004).

Desilets, Raquet & Vinson (2005) defines wikis as simple to use asynchronous, web based collaborative hypertext authoring systems. Wikis are web pages that people can directly edit, update, modify or delete (Vossen & Hagemann, 2007:49). Wikis can be likened to a collaborative word processing document allowing multiple users from different locations to collaborate in real-time (Mirk, Burkiewicz & Komperda, 2010:73). Wikis allow us to create collaborative knowledge spaces that harbour learning practices that extend beyond the boundaries of traditional formal education (Guth, 2007).

Wikis contain a number of common features, making them easy to identify and classify. Some of the features have been highlighted by Williams and Goodwin (2007:33-35):
- Page or article: main feature of a wiki, this usually covers a specific topic.
- Link creation: links to other Web pages.
- Text mark-up: most wikis use a simple syntax for the formatting of content.
- Permission structure: these permission structures vary in the degree of granularity and control, allowing for edit permissions to be assigned at the level of a specific editor or page.
- Recent changes: automatically lists changes allowing visitors and contributors to view the changes being made.
- Search function: most wikis include a simple keyword search, some support more advanced features such as Boolean logic or phrase searching.

Different types of wikis exist and can be classified into the following: fully Web hosted, open source and enterprise wiki. Fully Web hosted wikis require no installation, may be charged a monthly or yearly fee to use (free for some educators) and are easy for beginners to use. Some examples of these are pbwiki, Wetpaint and Wikispaces. Open source wikis require local installation and cost nothing to the users, this type are often preferred by advanced users. Some examples of these wikis are Media wiki, MoinMoin, and Twiki. Enterprise wikis are geared towards organisation users and are characterized by

fixed license agreements; they require some installation and are generally locally hosted. Some examples of these wikis are Clearspace, Confluence and Socialtext (Mader 2008). Wikis have many different uses in a range of applications due to their ability to be easily customised (Sheely, 2008:58)

4.1   Wikis in education

Wikis create a unique situation where learners are not writing to communicate with their teacher like in a traditional learning environment but students are rather writing to communicate with their peers. This collective authoring is part and parcel of peer reviewing. This environment teaches learners, the art of constructive criticism and they become less reliant on the teacher for feedback and guidance (Guth, 2007). The collaborative features of a wiki allow for multiple contributions per user and allows for no particular person to be in-charge, depending on the way the software is configured (Sheely, 2008:58).

Guth (2007) identifies a number of advantages of using wikis in e-learning. Students and learners who use wikis feel more responsible for their content they publish. This then creates a sense of collective ownership through their contribution, to the course. While at the same time a greater sense of knowledge sharing is achieved and a community is developed, improving communications amongst the users of the wiki.

There are a number of benefits of using wikis in e-learning, not much is needed to participate in wikis usage, only an Internet connection in most cases. Learners using the wiki appreciate the freedom it grants them and in return content published remains current, no "vandalism" was experienced. Most importantly wikis do not restrict the workflow of ideas, leading to an increase in the creation of new ideas and greater creative input from the learners. The responsible use of a wiki helps shift the responsibility from the teacher to the learner (Leading, 2010:12). This shift has the potential to make learning more student orientated and self directed, while changing the role of the teacher. Wikis also potentially offer those who are not comfortable with speaking infront of the class an opportunity to participate and voice their opinions online (Mirk et al, 2010: 76).

While wiki use is a growing tool in the education sector and currently is adopted for many different educational purposes, there are a number of constraining requirements that need to be taken into consideration. Computer infrastructure (server and network connections) is need for those looking to locally host a wiki. A certain level of ICT skills are necessary for the development and use of a wiki. While not all wikis use a "What You See Is What You Get" (WYSIWYG) editors, this makes it more difficult to develop and maintain for those not familiar with basic programming languages. Wiki use in education is still in its early stages of refinement and wikis have not yet developed the administration tools that certain LCMS contain (Honegger, 2005).

For the purpose of the research a wiki was created for the Information Management 2B course at the University of Johannesburg to test the student's responses to using alternative means to deliver course content and stimulate interaction. The wiki product used was Wetpaint, which is freely available and hosted on the Internet. The wiki was appropriately named the Infoman2b wiki and is available via the Web at the following URL: http://infoman2b.wetpaint.com.

The Infoman2b wiki and Blackboard Vista Enterprise Licence were both used for content delivery for the course, a range of course material was available on both. Blackboard has always traditionally been used within the Department of Information and Knowledge Management at the University of Johannesburg to assist in administration, communication and content delivery for the courses offered. Students were instructed to use the Infoman2b wiki to participate in a discussion topic which changed every fortnight. To assist the lecturer, the class was broken into three different groups according to surnames so that the participation of the students could be monitored in a class of over 200 students.

5   Methodology

The research instrument for this quantitative analysis was a survey. The rationale of the study was to gauge the effectiveness of using the Infoman2b wiki as an e-learning tool and to assess the contribution that the Infoman2b wiki made to the understanding of the course material in comparison to Blackboard. The survey undertaken allowed for the identification of possible strengths and weaknesses of using a wiki for e-learning.

The focus group for the survey was the 2008 Information Management 2B under graduate students from the University of Johannesburg, around 250 students were registered for this course. A total of 212 students completed the survey. The survey was conducted in a single session and the average completion time was 10 minutes.

The survey conducted was broken into six different sections: demographics, accessibility, ease of use, feature usage, interaction/collaboration and perceived value. The same questions were asked in the survey for both the Blackboard and the Infoman2b wiki, under the sections mentioned above. This allowed for a direct comparison between the two different approaches used for Blackboard and the Infoman2b wiki, for content delivery and interaction between students and the lecturer. The survey consisted of 39 closed ended questions.

6   Findings

A total of 212 students completed the survey. Most of the students (64%) were between the ages of 20 to 22. An ideal almost even split between female and male respondents was achieved, with 48% females and 52% males.

In terms of accessibility the Infoman2b wiki was not used as much as Blackboard, 43% indicating that they used the Infoman2b wiki once a week and 39% indicating hardly ever. Blackboard was used more often with the majority (32%) of respondents indicating use of Blackboard three times a week, 30% two or more times a day and 25% once a day. This did not come as a surprise as more features relating to the course were available on Blackboard. Another access problem for the Infoman2b wiki was encountered, due to the fact it was host externally on the Internet, this complicated access issues as not all computer laboratories at the University of Johannesburg had Internet access. Locally hosted content on the Intranet such as Blackboard was accessible from all the computer laboratories. Due to this 73% of respondents indicated that the amount of times they access the Infoman2b wiki would increase if they could access it from all of the computer laboratories at the university. Another interesting fact was discovered from the survey that only 82% of respondents were accounts holders of the Infoman2b wiki, this was surprising as the participation in the wiki was compulsory and even though no marks were allocated for participation, the topics in the wiki were used for the students' final assessment. A possible fact to consider, is that those students who indicated that they were not account holders of the Infoman2b wiki were not required to complete the second half of the survey.

The ease of use was measured using two key factors, ease of navigation and perceived user friendliness. To access both these, an ordinal scale was used where 1 was least effective and 5 was optimal. Students responded to the ease of navigation with a majority scoring both the Infoman2b wiki and Blackboard around 3 and 4, however a noticeable amount of students (24%) did rate Blackboard as 5 (optimal) and the same could not be said for the Infoman2b wiki (14%). User friendliness of Blackboard was ranked slightly higher with 42% selecting 4 and 22% selecting 5 on the scale. The response to user friendliness regarding the Infoman2b wiki, 36% selected 4 and 14% selected 5 on the scale. Blackboard did seem to be the more favoured of the two with in terms of ease of use, this could be accredited to the fact that the students had used Blackboard the year before and that there were

other departments that used Blackboard in their courses. Infoman2b wiki was the only academic wiki that the students had been exposed to, creating a sense of less familiarity.

To identify feature usage, a range of questions were asked in the survey. Students were asked whether they had used either Blackboard or the Infoman2b wiki to download course material or study guides, 93% of respondents had used Blackboard for this purpose, while only 21% of respondents had used the Infoman2b wiki to download such material. The respondents were then asked to identify what tools they would like to be added to Blackboard and the Infoman2b wiki (see figure 1), the respondents were asked to rank the tools in order of preference from the provided list: blogs, YouTube, Real Simple Syndication (RSS), Delicious and lastly flickr. It was interesting to note that students were more interested (higher combined ranking) in the use of blogs as opposed to other popular tools such as YouTube.
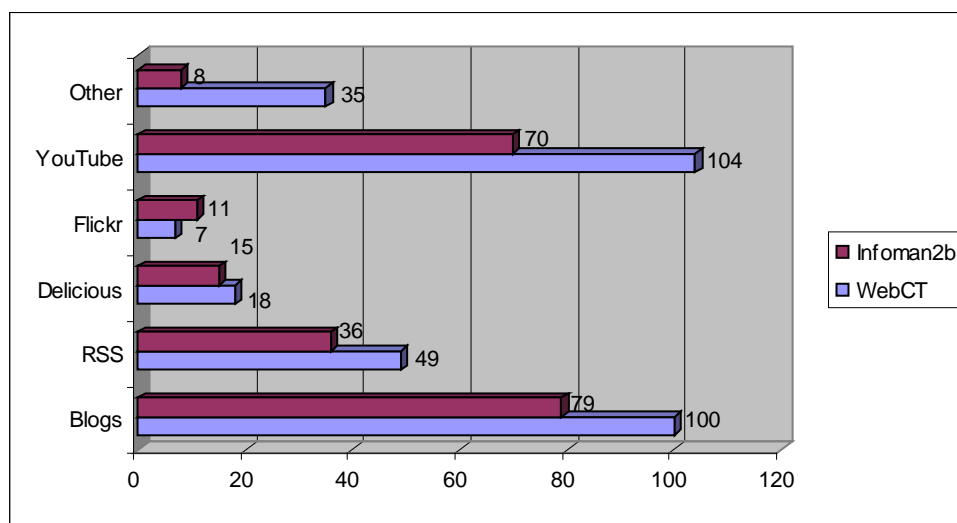
Figure 1: Incorporation of other tools and applications

Interaction and collaboration was dealt with in the survey by identifying time spent on Blackboard and the Infoman2b wiki by identifying the degree of involvement of the respondents with regard to topic discussions and inter communication. Respondents spent more time on Blackboard with 27% averaging 10 minutes in a single session, 35% 20 minutes and 22% indicated 30 minutes or more in a single session. While the Infoman2b wiki responses recorded 24% with less than 5 minutes in a single session, 36% with 10 minutes, 22% with 20 minutes and only 4% indicated they spent on average more than 30 minutes in a single session. More students read discussion topics on the Infoman2b wiki (82%) than and Blackboard (76%). Respondents were asked if they used the Infoman2b wiki and Blackboard purely for academic purposes, 9% responded "No" for the Infoman2b wiki and 12% responded "No" for Blackboard. A slightly higher responses to this question was expected as the wiki encourages communication and openness amongst the students, which could lead to a greater sharing of knowledge.

The final area of interest addressed in the survey was the perceived value that the Infoman2b wiki and Blackboard added to the Information Management 2B course. Students were asked to rate the contribution of understanding (see figure 2), on an ordinal scale where 1 was least useful and 5 was most useful. Majority of respondents (39%) rated the contribution of Blackboard to their understanding as 4 and 20% as 5, while 34% of respondents rated the contribution of the Infoman2b wiki as 3, 24% as 4 and only 15% as 5. This was to be expected as Blackboard had more content and more utilities which lead to respondents rating it higher for the contribution to their understanding of the course.
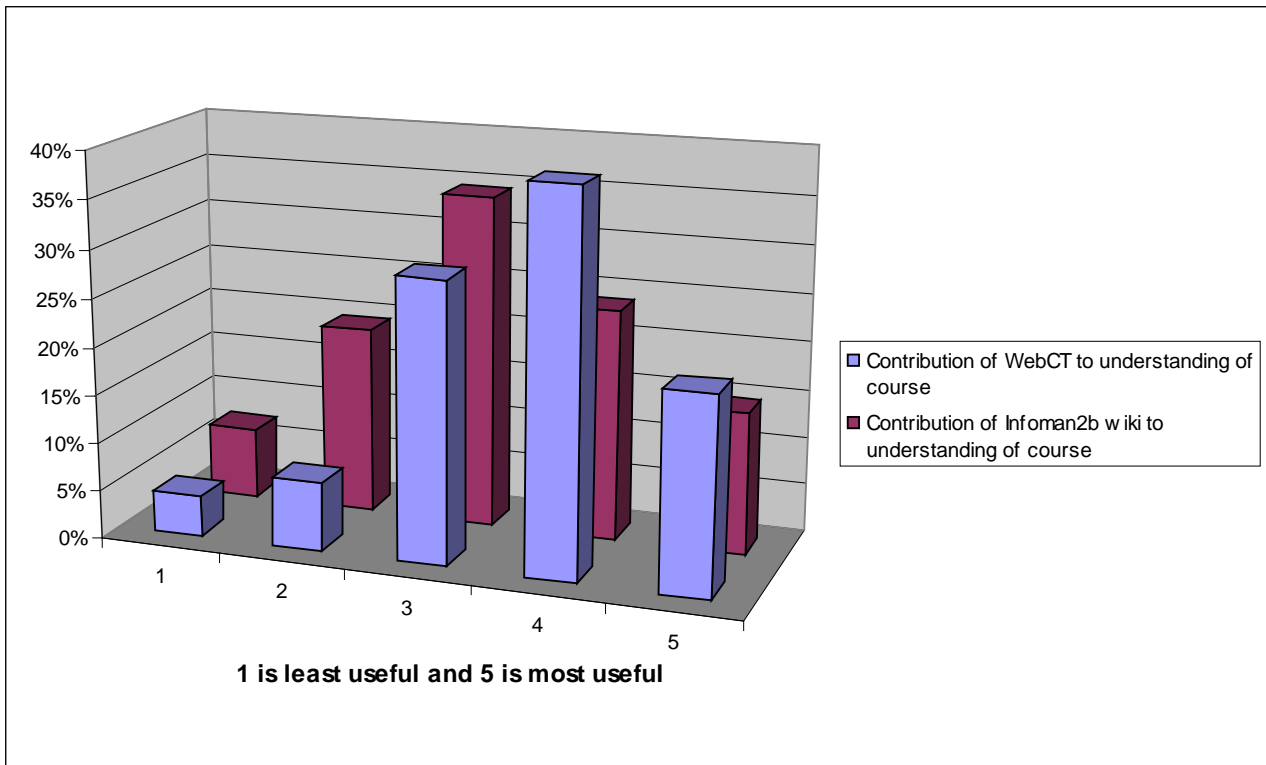
Figure 2: Contribution of understanding to course

7   Summary of findings

The Infoman2b wiki did not have the range of utilities and features like that of Blackboard, there were however other components that can be incorporated into the wiki to improve the functionality. This is one of the advantages of the wiki which makes it quite flexible and customisable. The Infoman2b wiki in comparison to Blackboard was very successful in some aspects while in others it may have fallen short. The Infoman2b wiki was easy to use as indicated by the respondents, it excelled at encouraging the students to contribute to online discussions and participate by replying to posts made by other students. Under the area of perceived value the Infoman2b wiki received a similar response and contribution to understanding was very similar to that of Blackboard.

8   Limitations of the research

Due to the format of the survey carried out, a direct comparison was made between the Infoman2b wiki and Blackboard, this approach may have not revealed precisely the strengths and weaknesses of the Infoman2b wiki. The Infoman2b wiki was used for a different task in the presentation of the course work. As an e-learning tool it was mainly utilised to stimulate discussion around selected topics, other features on the Infoman2b wiki such as course notes, and study guides were merely a duplication of what was available to the students on Blackboard. The data collected only measured the response of the students and the views of those responsible for lecturing and delivering course material were not included in this study.

However the research undertaken did reveal some potential topics for educators to consider when identifying an e-learning application or tool. Depending on the objective for choosing a specific e-learning tool or application, there are many options to consider. Some of these options may be freely available such as the Wetpaint wiki used for this research. Day to day Internet applications such as wikis, blogs and RSS are becoming more customisable and uses can be found in a vast number of fields.

9   Conclusion

MIE is a fairly recent concept in education, which is proving a vital component in education and personal development of individuals. Humans are social creatures who learn from their experiences and from the experience of others. Wikis prove to have an edge over conventional LCMS, as they strongly encourage interaction and communication amongst learners. The Infoman2b wiki was very successful at creating a virtual networking space for the Information Management 2B students. What makes this even more attractive, was the fact that no costs or licenses were involved, making this kind of facility accessible to those who have the computer infrastructure. If more time was spent on the development of the Infoman2b wiki (incorporation of other Web 2.0 applications), it may be considered as an effective alternative to other LCMS products offered.

One problematic area which the Infoman2b wiki fell short was the lack of administrative tools which are incorporated in the Blackboard product used at the University of Johannesburg. This aspect only affects the lecturers and those involved in the administration of the course. However from the student's perspective, this was unimportant. The views of the lecturers and those involved in the administration of the course were not recorded as the research focused on the student's perspective. Well constructed wikis do pose a possible alternative to other LCMS, as they are more flexible and easier to customise. The further development of wikis could see wikis as popular customisable tools in e-learning.

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