

Students' and Instructor's Perspective on the use of Blackboard Platform for Delivering an Engineering Course

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Abstract: The use of Information Technology (IT) has been growing over the years in various human endeavours. It has also been adopted in education sector for teaching and learning. Various studies have been conducted to assess the effectiveness and acceptance of e-learning strategy by students. In particular, the current research is an attempt to obtain students' and instructor's perspective on the use of Blackboard software. The technology is a course management system used in a blended learning mode to deliver a third year mechanical engineering course at the University of Botswana (UB). In terms of students' views, the study covered a period of nine years and the questionnaire survey was administered to each succeeding cohort of students. Whereas in terms of the instructor's perspective the motivation and the challenges faced during the years of use of the platform were described. Results indicate that students were generally comfortable with the use of Blackboard as they highly embraced it. Students indicate that their performance improved and communication with instructor was enhanced significantly. The respondents also recommended that Blackboard should be used in other courses in their programme of study. The instructor considered the time factor the most vital challenge related to the use of the platform. However, despite the challenges the application of the learning platform and the development of its material was a positive experience for the instructor and well received by the students.

Keywords: Information Communication Technology, e-learning, Course Management Systems, Students Perspective, Instructor Perspective

1. Introduction

Information Technology (IT) has become part of human activity in social, economic and industrial enterprises, and education is no exception. Information technology significantly impacts learning among university students as they use it in their program courses. Information technology is widely used by engineering professionals, engineering educators and engineering researchers and they use it on a daily basis in their professional practice. As such, there is no technological barrier for engineering lecturers to employ technology for course delivery.

Today, education uses learning management systems (LMS) which are specially designed platforms to facilitate distance learning (Wael and Morsi, 2005). Such platforms are also used for delivery and tracking of blended learning, i.e. a combination of traditional (face-to-face) and on-line resources. E-learning however is not a simple application of IT in education but a case of expanding learning possibilities and a new frontier in education. In order for e-learning courses to promote value, creating processes both for learners and teachers requires enormous effort and commitment (Uziak and Oladiran, 2012). The complexity of learning, as a cognitive and knowledge oriented process, makes the establishment of effective e-learning platform using IT more difficult. Actually, e-learning challenges the way teaching is done. It requires much more effort for equivalent or improved learning outcomes in comparison to traditional learning; it requires joint efforts from lecturers and students.

2. Learning systems

Learning Management Systems (LMS) are an increasingly important part of academic systems in higher education. They are used in many forms of e-learning from courses introducing minimal element of Web facilitation to full online courses.

There are several course management systems, such as Blackboard, Blackboard Vista (formerly WebCT), Desire2Learn, Questionmark Perception, I-Assessor Moodle. All of them promote teaching and learning activities in a 'seamless environment' (Burrell-Ihlow, 2009; Ullman and Rabinowitz, 2004). They combine functions; distribute information to learners; enable communication with the students via discussions, announcements, email, real-time chat sessions, and an interactive whiteboard; enable on-line assessment (evaluation of the students by means of quizzes and assignments); promote student self-evaluation through self-tests and progress tracking; tracking of students' use of the learning materials; and facilitate course administration. These virtual environments enable learners to collaborate on projects and share information (Heo, 2009; Lansari, Tubaishat and Al-Rawi, 2010). They basically provide "all-in-one" software packages which enable several functions apart from providing students with course materials.

Course management systems are also used for delivery and tracking in blended learning, i.e. a combination of traditional (face-to-face) and on-line resources. The aim of those different modes of delivery is to complement each other and create the most efficient and effective learning environment. Bath and Bourke (2010) argue that blended learning achieves better student experiences and outcomes, and more efficient teaching and course management practices.

Despite the type and sophistication of learning platforms used, it is still the instructor who plays the most important role if the students are to learn effectively, retain the knowledge and practice the skills imbibed during the process. The platform must be accepted by students in order for them to feel comfortable in using it and not being threatened by the level of difficulty or complexity.

3. Blackboard

Blackboard is one of the premier on-line LMS. It is a flexible "all-in-one" system, which has been selected as appropriate for student learning for the following reasons (Bradford et al., 2006-2007; Watson and Watson, 2007).

- It is a good medium for communication and exchange of information.
- It provides good peer support and peer coaching – contributes to enhancing peer learning.
- It is used as a tool that facilitates student - centred and student – led learning.
- It promotes lifelong learning and active engagement concepts.
- It exposes students to modern technology and
- It provides additional resources to teaching and learning.

Blackboard has proven to be a successful LMS. Despite occasional statements about instructors' facing difficulties in the system due to low background knowledge in technology (Zaki and El Zawaidy, 2014) it is user friendly and easy to use (Lin, Persada and Nadlifatin, 2014). Blackboard is especially useful in terms of accessibility of unit materials (Heirdsfield et al., 2011). Students also value the connections made with other students although learners indicated that they needed more interactive and communicative functions and activities (Liaw, 2008).

Evident indicates that instructors mainly use Blackboard as a tool for enhancement purposes, rather than an advanced level that requires transformation of teaching and learning methods and tasks (Nkonki and Ntlabathi, 2016). It also supports the view that instructors could use learning management systems more creatively and consistently as part of their pedagogy (Heirdsfield et al., 2011).

Blackboard technology was introduced at the University of Botswana (UB) in 2002. The rationale was to expand access to academic programmes and to enrich the quality of instruction. Originally, WebCT and Blackboard were considered to be the right LMS in the UB context mainly due to its flexibility, and ease of installation and use. The features which were most relevant for selecting Blackboard included the following:

- an easy way to manage and to put course content on-line
- access control (password protection)
- tracking of student progress
- grade maintenance and distribution as a method to keep assessment on-line

4. Context

Data was collected over a period of nine academic years from 2007/08 to 2015/16 from the students registered for a course of Mechanics of Machines offered in Year 3, semester 2 of the BEng Mechanical Engineering programme at the University of Botswana. The course was delivered using a blended mode consisting of the traditional method of lectures, tutorials and labs (with the application of PowerPoint for lecture delivery) as well as Blackboard, which was used for all elements of teaching including provision of teaching material and communication with students. It was also used by the students to submit all (apart from tests) elements of the continuous assessment (assignments, projects, lab reports).

The Blackboard material for students was grouped in topics as per lecture delivered. The material for each lecture included lecture notes, PowerPoint Presentation (in pdf format), summary, examples with solutions, a list of problems (with answers but not solutions) and self-test (in the form of multiple choice questions). In the majority of topics extra material was provided such as video clips from software on performance or behaviour of engineering materials. Access to the lecture material was monitored on a weekly basis. The Blackboard material was constantly developed, updated and improved.

The results presented show students and instructor perspective towards use of LMS as a technology enhancing learning and teaching tool. Data was gathered for a period of 9 years and were concerned with students’ general use of IT, application, comfort and time spent, and learning experience with LMS.

During all 9 years the course was taught by one instructor who started as a complete novice in the use of any LMS. The instructor received less than an hour of training and no assistance in the any element of preparing or placing material on the Blackboard. The instructor perspective demonstrates a personal experience in the application of the technology in terms of meeting general objectives of its application and challenges faced.

The original inspiration to start using the Blackboard was one of curiosity on the part of the instructor and the attempt was treated as an experiment. Although the ‘rumors’ heard on the academic grapevine about the convenience of the platform in administrating a course was also a motivation. There was also a hope that the interaction between the students and the instructor would become more open. At first, the general attitude of the students attending the course was not well received with the students hardly asking any questions or expressing their opinions or wishes. The instructor never considered it as a special problem related to his particular teaching approach or his personality. In general, the students at UB, or at least Faculty of Engineering and Technology, are not very active participants in the classes or even less vigorous in seeking help of the instructor outside of the class.

The original administration of the course involved document and resource delivery to the students. That mainly included the course syllabus, teaching plan and assessment plan. The resources covered the pdf versions of the lectures and tutorial sheets. There was never an intention to replace the face to face delivery mode but rather to augment it with extra resources. The blended method was largely unknown to the instructor at the beginning of the experiment. The course however developed with years gradually covering more features available in the platform (Table 1).

Table 1: Course Development

Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-9
<ul style="list-style-type: none"> • Course Information • Course Material (Lectures & Tutorial Sheets) 	<ul style="list-style-type: none"> • Announcements • Online Calendar • Discussion Forum 	<ul style="list-style-type: none"> • Video Clips • Links to online resources • Mail Communication 	<ul style="list-style-type: none"> • Online Submission of Assessment Elements • Posting of Marks 	<ul style="list-style-type: none"> • Assessment Elements Created using the Platform (Assignments & Essay Questions) 	<ul style="list-style-type: none"> • Self-Assessment Elements (Tests, Quizzes, Question Pools) • Surveys

The first year was used to ask the students opinions on the application of LMS. The students' views were sought regularly through the years and the application of the system gradually went beyond simple administration of the course.

Discussion forums however, never became very popular between the students. They may have exchanged ideas and opinions between themselves using other media but they certainly preferred to use Blackboard mail to communicate with the instructor. That naturally led to the application of Blackboard in providing students with announcements regarding the course. Although, it constitutes the management part of the LMS application, it was not originally used mainly due to the concern of students' access to the system from outside the campus. It proved to be no problem and, together with the online calendar indicating salient dates for the course, the announcement gradually turned out to be one of the fundamental uses of the platform.

The elements of the Blackboard (Table 1), such as course administration (posting the teaching and assessment plans, announcements, and online calendar), course content material (with lectures, tutorial sheets and links to extra online sources including video clips enabling visualization of some difficult topics) and mail direct communication between the students and the instructor were fully operational and developed by the end of the third year of the implementation of the platform.

The development of the course was triggered by problems related to the students' submission of some elements of continuous assessment. Normally, students would submit their project reports, lab reports and assignments by putting hard copies into the instructor's mail box (pigeon hole). That was always a contentious issue due to possible meddling with such submissions as there was free access to instructor's mail box. Some students complained about other students removing and/or copying their submission, and there was always some discussion about keeping the deadline. The submission via Blackboard removed such problems. It also enabled individualized feedback in the form of the comments provided to the students with confidence.

Additional benefit of requesting students to submit their work in the electronic form was the idea that their submission should constitute one file combined of text, figures/photos, graphs, drawings etc. It was noticed that the hard copy submission was most of the time a mélange made by smart photocopying to enclose graphic elements into the text. The electronic submission forced the students to embed graphic elements into the word processed text. The free hand sketches or other hand drawn graphics (such as velocity and acceleration diagrams for instance) had to be scanned and included in the text file. Basically, the submission required student work to look like a professional engineering report.

Although students were encouraged to submit their work in the non-editable form (like a pdf format) some reports were always submitted as text file which allowed to look at the formatting. That was an eye opener in some cases indicating the inability of students to properly edit the text. The use of the spacebar (instead of tab or instead of center the text), end of the line key, end of the page and other fundamental editing functions, in addition to more complex feature like referencing or table of content etc., was in most of the cases unacceptable for engineering students. Although, marking did not include the editing part of the submission, comments were passed to the students.

The marking of electronically submitted elements of continuous assessment naturally extended to actually creating assessment elements in the platform with due dates, late submissions indicator and finally posting marks for the students. Although students appreciated the transparency in which the created assessment requested them to submit the assignments and the reminders associated with them, they expressed reservations with impersonal treatment of the submissions and especially maintaining due dates and, more significantly, cut off dates. The old form of submission via the mail box always created 'natural' flexibility with the deadlines. Technical issues, especially in the first few years of using the Blackboard platform, undeniably created obstacles in smooth use of the system. That was a concern of students especially with the deadlines for submission, however such hindrances were always resolved by the instructor extending the submission period if the system was not functioning properly during the deadline.

Publishing the marks for submitted assessments only unsurprisingly extended to announcing marks for other elements of assessment such as tests and quizzes. That proved to be very popular among students and less enjoyable for the instructor. That was due to a general and fundamental glitch or lack of technical adjustment as the general Academic Students Administration System (ASAS) (and even previously used ITS system) were

not linked to Blackboard. That is a serious problem adding enormous time demand on instructors who wanted to keep students' marks up to date on both systems, as that can only be done manually.

The final step in the developing of the course material was online quizzes which were introduced in the last 4 years. They were intended at students' self-assessment and were never used as actual elements of continuous assessment for the course. Those multiple choice assessment tools became very popular among students despite the fact that multiple choice questions were never used in tests or final exams.

5. Methodology

As mentioned before, the results presented in this paper are based on nine years' surveys carried out on the application of Blackboard technology in one course (Mechanics of Machines) offered in Year 3, semester 2 of BEng Mechanical Engineering programme at the University of Botswana. The questionnaire was administrated at the end of the course in academic years from 2007/08 to 2015/16. In total, 275 students (out of 281 students registered for the course, i.e. response rate of 98%) completed the questionnaire in the years under study. The number of students changed between the minimum of 15 to a maximum of 46 through the years with the average size of the class of 31 students (Table 2).

Table 2: Number of Students Registered for the Course

Year	Academic Year	Number of Students
1	2007/08	40
2	2008/09	39
3	2009/10	22
4	2010/11	15
5	2011/12	23
6	2012/13	23
7	2013/14	24
8	2014/15	43
9	2015/16	46
		Total: 275 & Average: 31

A structured questionnaire with 45 items was designed and administered at the end of each semester. The principal research question was to establish the engineering students' opinions about the use of Blackboard in the learning process. The questionnaire covered issues such as Blackboard as a learning tool, its efficiency and effectiveness, and Blackboard as a tool for interaction between the students themselves and also between students and the instructor. There were also preliminary questions regarding students' general use of IT and its application in learning. Additional questions covered students' preference in course delivery. The questions were converted into statements and the questionnaire was created using Likert items seeking students' evaluation. The whole questionnaire was thoroughly discussed within the research group and also with several colleagues who were asked to make a critical review.

As with any self-reported survey, it is not possible to verify if the students completed the questionnaire honestly and accurately. The honesty issue was not addressed directly but the questionnaire was anonymous hence the responses did not influence the final marks that students obtained in the course. The students were also briefed on the purpose of the survey and how it could improve the use of Blackboard. Pre-testing of the questionnaire was carried out to identify and remove any ambiguities in the statements and also to ensure that respondents understood the purpose of the study.

6. Results

6.1 General use of IT

The first point which the survey tried to clarify was the general use of IT and whether it is used for learning. In that respect the students were asked what type of IT they use in the learning process. As expected, internet dominated the scene, with 90% of the students using it for learning (Figure 1). There was also a very high percentage for e-mail, which, from discussions with the students, was used for communication with fellow students and with instructors. There was a relatively low use of intranet and this did not really increase through the years. That is despite the fact the learning platform and general students' administrative system was available via the University's intranet. The reasonable explanation is that the students did not understand the term intranet. There was not much difference in use of IT throughout the years. However, there was a

surprising dip in all applications during academic years 2013/14 and 2014/15, which cannot be due to technical issues related to availability of the technology for students in the Faculty. The other IT applications used by students included Facebook, Twitter, What's up, etc.

A majority of students used internet for information search related to the learning either 'Very Often' or 'Often' (Figure 2). Although the results varied between years they remained constantly affirmative on the use of internet over time.

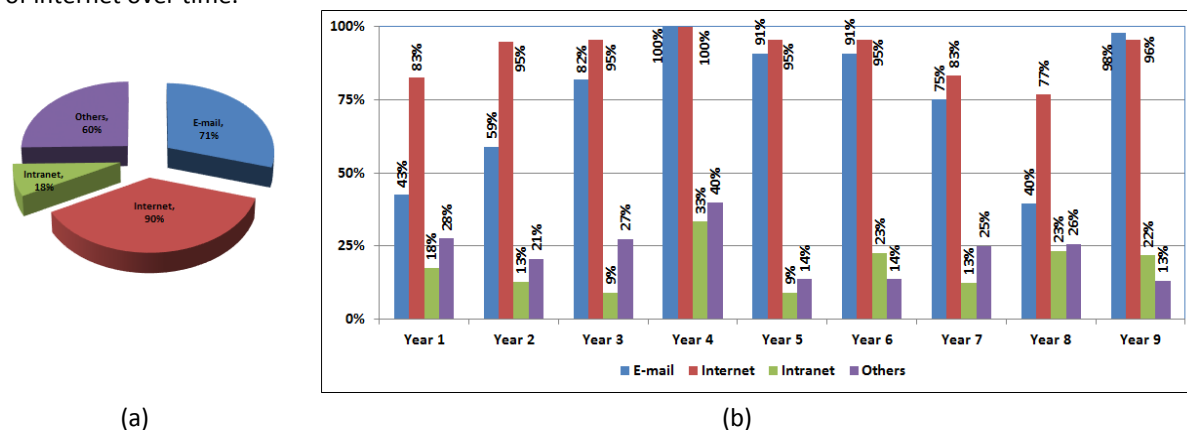


Figure 1: General use of information technology

Students were satisfied with their skills on using the internet; they professed to be skilled (69%), comfortable (74%) and efficient (68%) in searching for information on-line (Figure 3a). Figure 3b shows that the majority of students confirmed that on-line searching helped them to do assignments quickly and efficiently (57%) and that in general it improves their quality of work (59%). However, in both of the above aspects there were also a lot of neutral answers (36% and 32%, respectively).

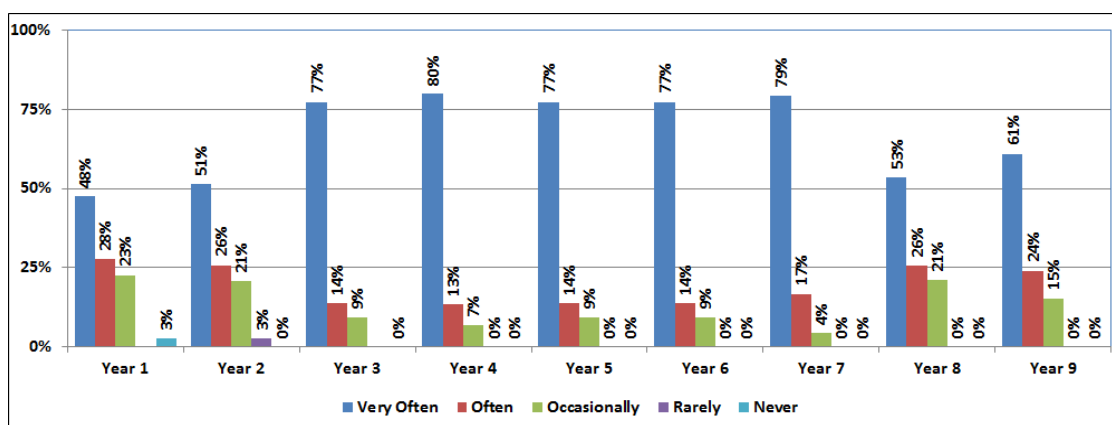


Figure 2: Respondents use of the Internet search for information

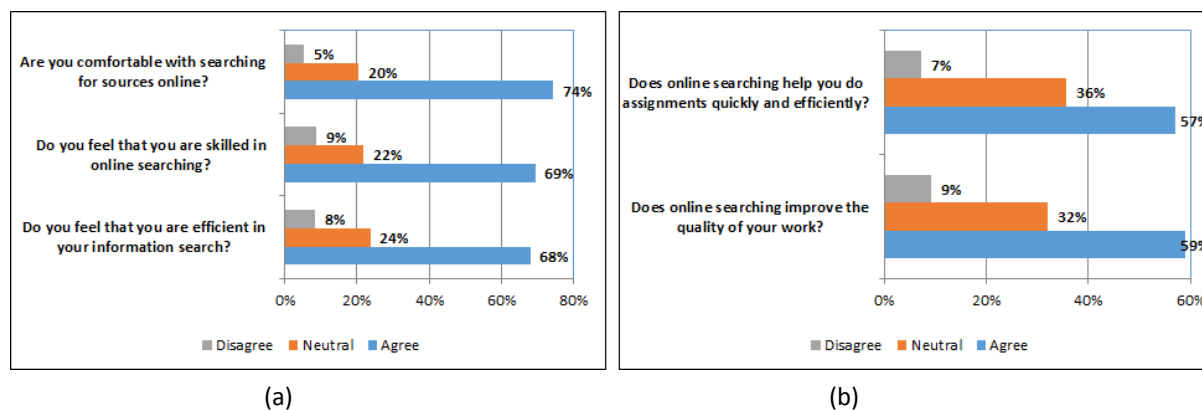


Figure 3: Application and comfort of using the Internet

6.2 Application of Blackboard

Almost immediately after the first few weeks using LMS it became apparent that the communication part of the software was extremely useful. It started to work as a real platform for interaction, mainly between the instructor and the students. Students became more active in asking questions, especially on the open boards where they did not need to post their names. However, even direct communication with the students enhanced. The students started asking particular questions regarding topics covered showing some interest going beyond the prescribed syllabus. That was mainly manifested in request to some internet links, video clips and other material related to the course. Those requests gave the direction for the development of the material to be posted on the Blackboard.

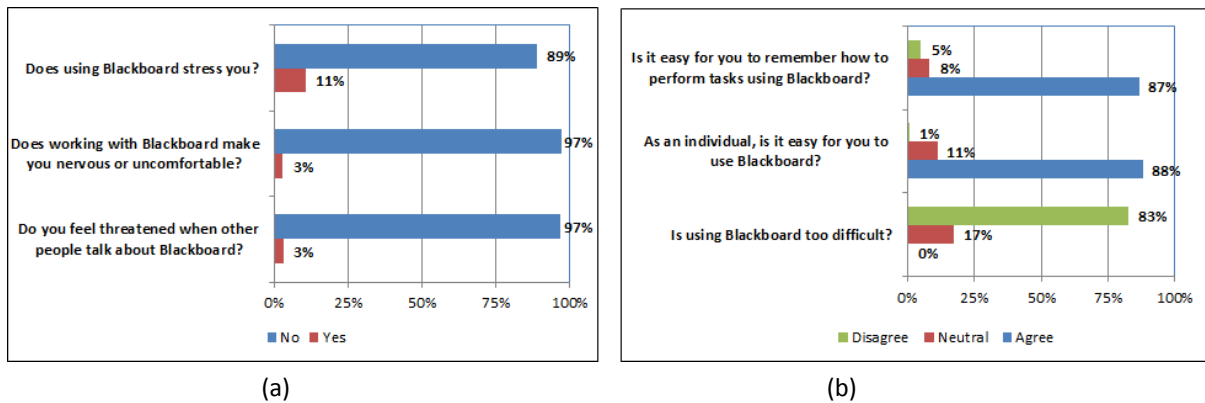


Figure 4: Blackboard application and comfort

As indicated in Figure 4a, students were generally comfortable with Blackboard as a learning tool; they did not feel any stress related to using it (89%), it did not make them nervous (97%) and they did not feel threatened when other people talked about that technology (97%). They were also pleased with the general ease of use of the platform (Figure 4b)

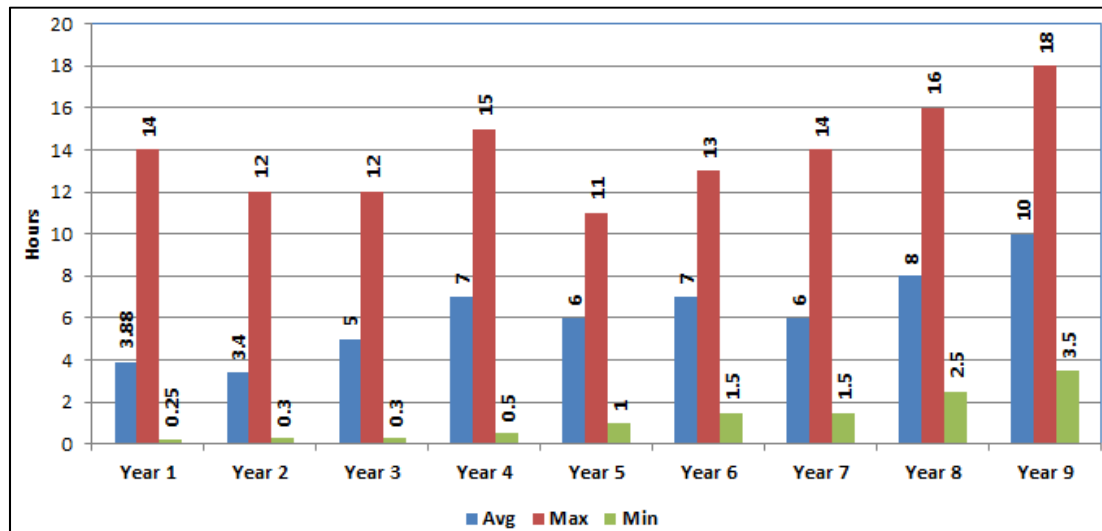


Figure 5: Time spent on using Blackboard

Time which students spent using the Blackboard increased steadily over the last 4 years of the research, reaching an average of 10 hrs/week, and maximum of 18 hrs/week (Figure 5).

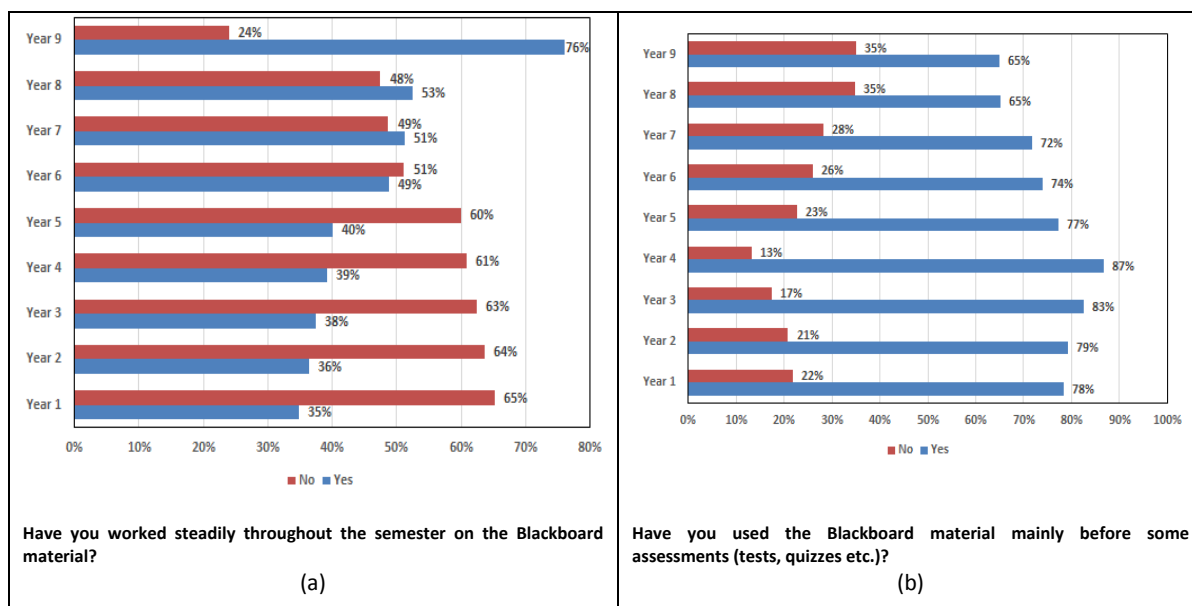


Figure 6: Use of Blackboard

Students admitted that they did not always work through the teaching material regularly throughout the semester but rather before assessment such as tests or quizzes (Figure 6). However, the percentage of students who worked systematically steadily increased from 35% to 76% through the years (Figure 6a). There were a large number of students, who used the material available on Blackboard mainly before assessments (Figure 6b). It is difficult to see any correlation between those changes and the course development (Table 1). The change in working systematically throughout the semester may be attributed to students’ prior experience.

6.3 Blackboard as a learning tool

The students thought that the use of Blackboard provides them with a positive learning experience (76%) giving them a sense of being in charge of their learning (87%) – Figure 7a. Answers also clearly indicated that Blackboard improved students’ quality of studies (81%) and was useful in the learning process (90%). The platform also gave students the ability to organize themselves better (84%), to make best use of their time (65%) and to accomplish assignments quicker and more efficiently (84%) – Figure 7b.

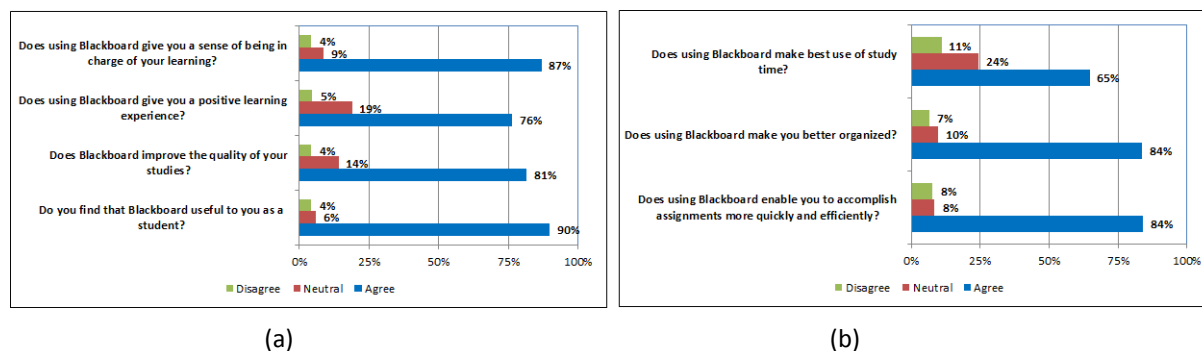


Figure 7: Learning experiences of using Blackboard

Figures 8 show students responses on the effectiveness of using Blackboard. For example, they positively rated it in managing class activities (81%). Blackboard helped to present the course content in an organized way (79%), whereas 87.5% of students appreciated its effectiveness in terms of transferring the information from the syllabus, timetable etc. The platform increased the communication between the students and the lecturer (79%) and; from discussions with students this was mainly due to students receiving individual notification and the possibility of always easily checking the relevant deadlines on the Blackboard.

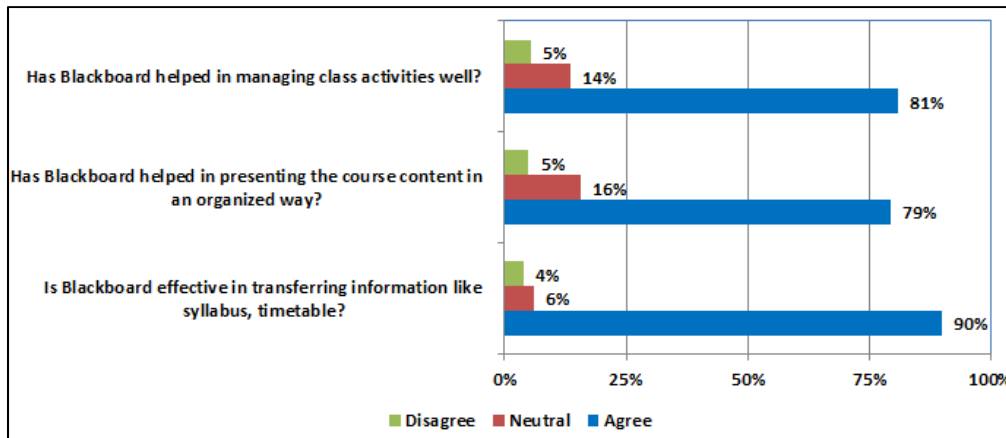


Figure 8: Blackboard as a learning tool

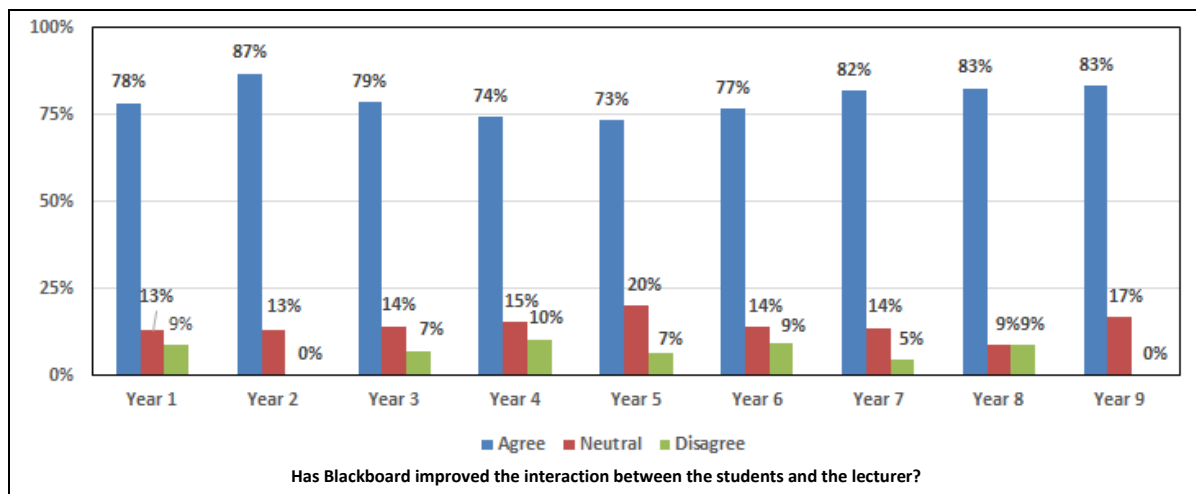


Figure 9: Interaction between students and instructor

One of the questions in the survey requested students to assess whether the learning platform improved the interaction with the instructor. The students' observation on that aspect was always positive (Figure 9), however it is worth noting that the percentage of negative answers reduced in the last two years. The introduction of the mail communication in year three did not have much effect on the students' opinion. However, the use of the online calendar, discussion forum and providing announcements about the course in year 2 made a big impact.

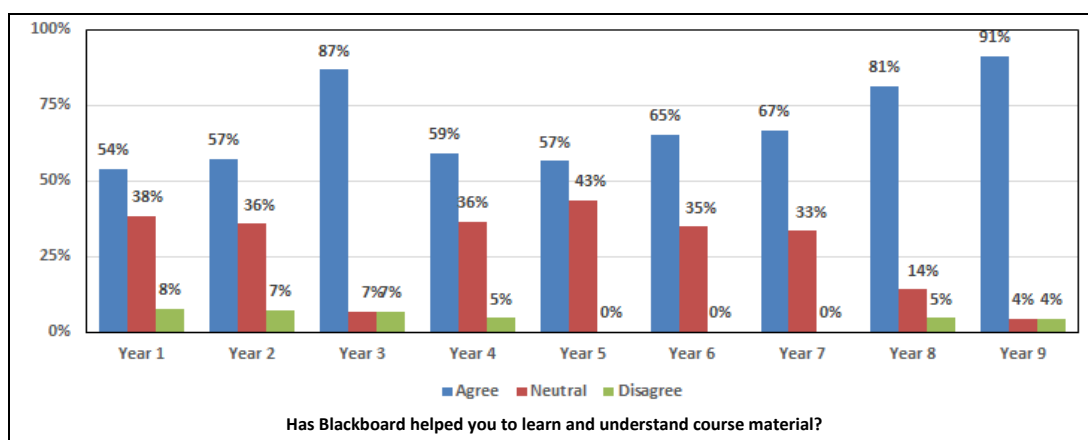


Figure 10: Facilitation of learning and understanding of course material

Blackboard was very useful in facilitating learning and understanding of the course material. The students' assessment increased steadily in the first years of use of the platform taking a substantial dip in the fifth year

and recovering gradually reaching the highest level of 91% in the last year (Figure 10). The sudden decline in the fifth year could be attributed to the introduction of elements of assessment created using the platform (Table 1). Although, not really related to the facilitation, introduction of unusual assessment may have negative impact on students' learning. The introduction of video clips and links to online resources in year three significantly improved students' opinion.

Similar trend, although with smaller decline in the fifth year, was observed in Blackboard as a tool to help in explaining difficult concepts (Figure 11). The students' opinion recovered massively in the last two years. Again, a big improvement in that aspect of the application of the platform was observed in the second year after introduction of video clips and links to online resources.

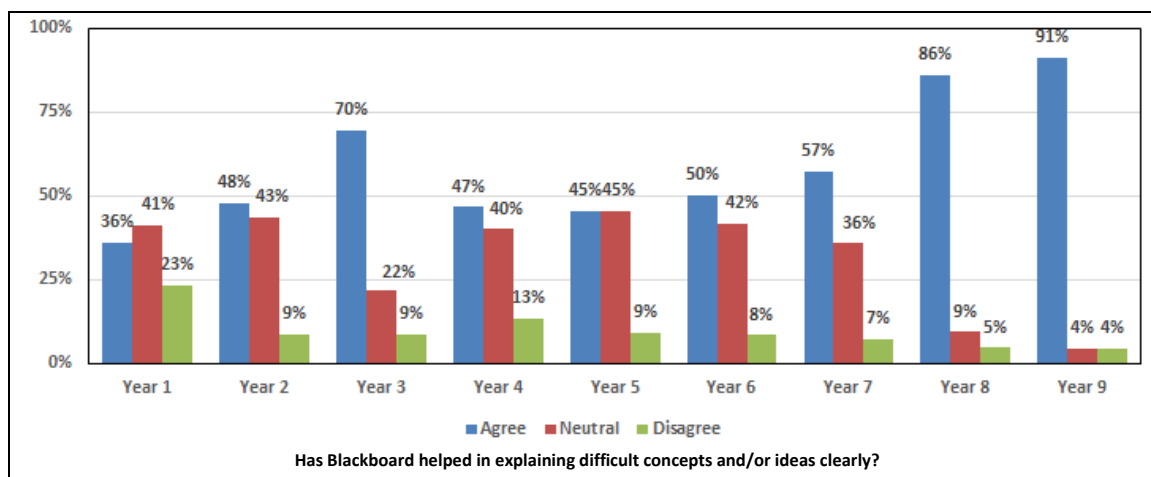


Figure 11: Assistance in explaining difficult concepts

In terms of generating interest in the course, one again the visual aids and information about online resources in year two made an impact on students' views (Figure 12). The fifth year observed again a decline.

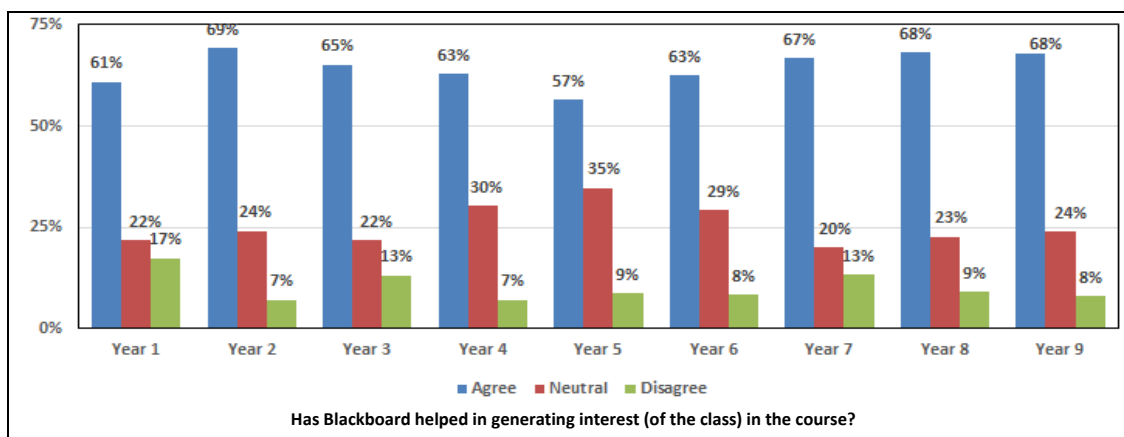


Figure 12: Generating interest in the course

Students considered Blackboard as helpful in supporting delivery of the course material (65%) giving them more than only a lecture (84%) and students wanted more courses to be delivered with the use of the learning platform (84%) – Figure 13a. Students however showed slight confusion in terms of their preferences in the course delivery; as shown in Figure 13b, the same percentage of students wanted the courses to be delivered in blended method and in traditional way (84%).

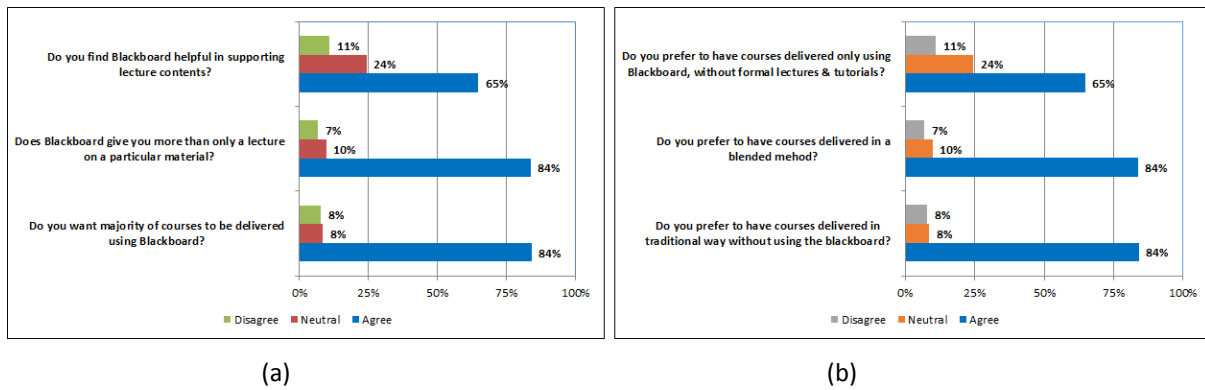


Figure 13: Blackboard as a support for delivery of lectures

Students had no doubt regarding the overall effectiveness of Blackboard; a great majority assess it as high or very high (Excellent – 19%, Good – 28% and Above Average – 40%) – Figure 14a. They viewed it highly in its role as being a new challenge (65%), broadening their horizon (84%) and also, fortunately or not, influencing their class attendance (84%) – Figure 14b.

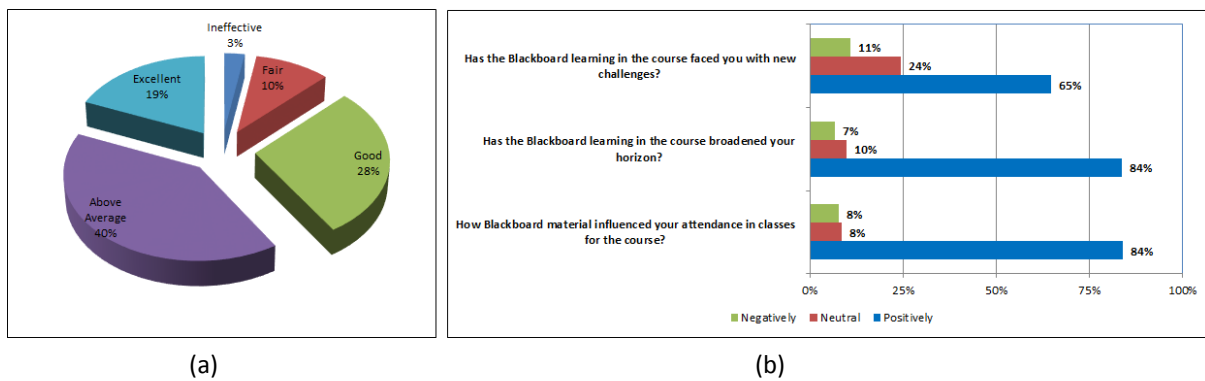


Figure 14: Overall effectiveness of Blackboard

7. Instructor’s Perspective

Despite the general aim to change the university system from teaching to learning, in terms of the preparation of the learning platform, the instructor remains the main actor on the stage. Instructor’s motivation, attitude, acceptance, experience, innovation are the main issues related to the success of the use of the learning platform. Such issues have been studied and reported upon by several authors (Woods, Baker and Hopper, 2004; Almarashdeh, et al., 2011; Alshammari, Ali and Rosli, 2016). The current study extends on the practical experiences of the instructor over the extended period of 9 years when using the learning platform.

7.1 Meeting the Objectives

The sole objective of the introduction of the LMS in the course was to improve the course administration, and improve the communication between the instructor and the students. The results exceeded the expectations. In fact, the communication which was the minor objective gradually became the major one, with great success acknowledged by both students and the instructor.

The use of the platform helped others, typical for such course objectives, for example, imparting students with knowledge about motion and forces, or enable students to apply fundamental principles of mechanics to machines, engines, linkages. However, quite unexpectedly was the objective of improvement in the use of computer technology. It has to be admitted that the computer skills improved were not of the highest level, though still important and useful for engineers.

Although it would be difficult to claim that obtaining feedback on the course is a valid objective, though receiving such feedback from the students is a valid and important element in the process of improving the course and teaching. The feedback obtained was not only anonymous, covering both course content and course delivery, but was also constant and continuous. That allowed the instructor to actually react to the

feedback, more or less, in live time, a feature not necessarily available in typical and loved by administration students' assessment of staff and course, done normally sometime at the end of the semester.

What can be considered as a disappointment in terms of objectives was a failure to improve communication between the students. Student-to-student interaction, apart from the one forced by the instructor by giving groups projects of assignments, was not visibly improved. As far as the instructor can assess there was no community of learners created in the course.

7.2 Challenges Faced

The challenges can be classified depending in a few categories depending on the issues and subjects.

Students' Readiness and Willingness

It appeared from the start of the using the platform that there is no barrier in students' readiness to use the technology. As also reported by students (Figure 4) there was no problem with navigating through the course material or achieving what the students wanted to accomplish. They were also happy to use the platform with several possible reasons. The fundamental reason may be a pragmatic one related to the fact that students had access to all material related to the course in one place. Even if they missed a lecture or tutorial, the material was easily available at any time. Content was prepared as for lectures, that means in portions or segments which were manageable from the time perspective but also showing the natural flow of logical progression in the course material. The content was presented not only in the form of written text but also some visual elements and/or links to external sources and access to latest materials.

Traditional, hard-core engineering courses, normally follow the usual way of delivery with only classroom face-to-face contact. The application of the LMS in the course gave students some extra appeal to keep them attracted to the course and its material.

Instructor's Readiness and Willingness

The course instructor, although originally not familiar with any learning platform, was well conversant with computer technology. He had years of experience in use of old mainframe computers, personal computers and also programming in different languages. It can be probably assumed that he had more than average level of computing skills.

Despite his years of experience in a traditional learning system, the instructor's attitude towards application of technology in teaching was very positive. He wanted to try something new, not only to attract students to the course and its content, but also to improve the general attitude of students who informally, and quite reluctantly, admitted the jealousy towards electrical and computer engineering students always using computers in their classes. The improvement in communication with the students was also a major factor. The interaction with students both inside the classroom as well as outside was not fulfilling the instructor's desire of more interactive style.

Organization Factors

Despite no formal motivators employed by the University of Botswana the organization did provide the students and staff with WebCT/Blackboard platform for general use. The instructors were encouraged to apply the technology which, however, did not translate, at least in the infant stages of the application of the platform, into enough training or support. Despite the 'encouragement' there was no push from the organization to make any changes, adjustments or alignments of the curricula with introduced technology. A missing element in the early stages was lack of instructional design specialists and trained assistants.

Technology Factors

Technology alignment, system quality and service support may be a major hindrance to the employment of any learning technology. Unfortunately, that was also the case, at least originally, with the use of WebCT/Blackboard at UB. The network failures, internet breakdowns, general unreliability of the access to the system, and also the countrywide power failures and interruptions, although may be typical for an African country, were indeed the major problems, both for students and the instructor. Students' complaints were mainly related to the problems with on-time submission of assessment elements. They actually almost never complaint about problems with access to the Blackboard material claiming that could be done anytime. Instructor's frustrations had many sides. The breakdowns in the access to the platform, whatever the reason

may be, was especially painful when happened during the process of adding the material or, even more dramatic, when marking the assignments or entering the marks.

The students' grading system constitutes even now a serious problem still unresolved. Until now, the Blackboard is not linked to the student record system. Both, previously used Integrated Tertiary Software (ITS), and currently used Academic Students Administration System (ASAS), were not linked to the database of Blackboard. That creates a lot of trouble and requires a lot of time consuming actions. It extends not only to the need to double entering of marks (into Blackboard and separately into student record system) but also to simple registering students into the platform. It has to be done, more or less manually, by platform administrators on the basis of a list of registered students for the course which has to be downloaded by the instructor and sent by e-mail. Any change in the registration records is not reflected in the Blackboard and has to be adjusted. With students adding and dropping the courses, late registration (also due to sponsorship problems) lack of automatic synchronization of Blackboard with the ASAS is a vital obstruction.

Time Factor

The potential benefit of using the learning platform in blended delivery of the course is cost-effectiveness, adaptation to changing circumstances, timely content, open-access at any time, and quick feedback from the students. However, for an instructor the so called 'cost-effectiveness' depends mainly on his own time devoted to the preparation of the material, course administration, assessment, and communication with the students. In the organization where it is expected that the course development will be done by the academic staff in its own time with little institutional help or resources, it is only the intrinsic motive and personal need of the staff which may inspire them to use learning platform.

The original idea that the platform would be useful if course administration proved to be the correct one and actually did not require any extra time, once learned how to put files into the system. As mentioned above, the secondary motive of improving communication with the students upheld as well but created a demand on the instructor's time. The demand on the communication with students was 'self-inflicted' and therefore, to some extent, welcomed. Also, several questions and requests from students were similar not really creating a backlog.

However, the time spent on the preparation of the material was seriously challenging. As the course material was to augment the material delivered it normally consisted of the lecture delivered in class plus some extra and at least somewhat different to the one presented in the classroom. The most time consuming element of the course were tests. They were multiple-choice tests introduced for the self-assessment of students. Since such tests were never used in the course they had to be created from scratch, which involved also some pre-testing.

In general, although the instructor did not keep tabs on the time spent it can be said that the time demand on the Blackboard experience was certainly at least triple in comparison to preparation for traditionally delivered class.

Keeping with the pace

One of the fundamental challenges in using the LMS platform for the instructor is keeping up with the pace of the course. The 'course' includes all the demands from students and the demands from the course itself, i.e. the need, create new material, to update the material, to introduce new features to keep students' attention and to make the fabric of the course useful and attractive. The preparation of the on-line tests was not only the most time consuming and demanding elements of the course but it was also the most demanding to keep it at high enough level and at the same time not to discourage the users. The survey administered did not ask about that feature of the platform, as it was introduced as the last one, however from the discussions with students and their on-line input it appears that they highly valued that form of self-testing.

8. Conclusions

The paper presented the students and the instructors' experiences on the application of Blackboard as the learning management system. In terms of students' views, the study surveyed a cohort of third year mechanical engineering students to obtain insight of the general use of information technology for learning

and their perceptions about the use of Blackboard platform, whereas the instructor presented challenges faced during the years of use of the platform.

Students reported high use of general application of IT, 90% used internet for some elements of learning. Over 70% of students also used e-mail as a way of communication with fellow students and also with instructors. There was not much difference in the use of IT throughout the years.

It terms of application of Blackboard, results from the study were consistent with previous research findings for courses other than engineering discipline (Goolkasian, Wallendael and Gaultney, 2003; Warren and Holloman, 2005; Yip, 2004). Therefore, it seems that students in general did indeed possess positive attitudes toward the use of e-learning software like Blackboard. The students in the current study were very open to the new technology. They considered it as a useful but still only additional tool in the delivery of courses. They reported that course material placed on Blackboard was a valuable supplement to traditional classroom lecture approaches.

Positive attitudes towards Blackboard were also demonstrated in students' responses to questions about their general viewpoint toward the new technology. Students highlighted the effectiveness of Blackboard in managing class activities (81%), in terms of transferring the information from the syllabus, timetable etc. (87.5%) and also helped to present the course content in an organized way (79%).

Time spent using the Blackboard increased through the years of study. That increase can be contributed to gradual development of the course in terms on features available for the students. Students were forced to use the platform as the submission of assessment elements and the assessment itself was increasingly moving towards online. The time spent was also more regular, as students increased systematic work on the material through the semester, although they steel admitted to use it more often before assessments.

There was a correlation between students' opinion on some aspects of the use of technology and the development in the course material/features. The learning platform improved the communication between the students and instructor. However, it was not the mail but rather use of online calendar, discussion forum and providing announcements about the course online. Blackboard was also considered by students to be a great help in understanding course material, explaining difficult concepts and generating interest in the course. The introduction of video clips and links to online resources in year three significantly improved students' opinion in the above aspect of application of the technology. However, there was a considerable drop in all of the above aspects in the fifth year of the application. Although, there may have been other reasons for such tendency it can be attributed to the introduction of assessment elements created using the platform. An unusual assessment may have negative impact on students' learning, although the situation improved in the following years reaching the highest values at the end of the period.

Students were well aware of the advantages of using e-learning platform, which provided more material which could be accessed at any time and could be studied at one's own pace. They were of the opinion that blended approach and the use of the learning platform should be adopted in other courses. Surprisingly, students did not express a clear preference on the mode of course delivery.

Overall, it can be concluded that students embraced the use of Blackboard as it provides additional material in course delivery.

The original instructor's motivation for the introduction of the learning platform in administration of the course was discussed showing the gradual development of the course. The platform was not only to help in the course administration but also improve the unsatisfactory communication with the students. It proved that the results exceeded the expectations. In fact, the communication which was the minor objective gradually became the major one, with great success acknowledged by both students and the instructor. However, the communication between the students, as visible by the instructor, was only limited to interactions related to groups' assessments within the course.

There was no problem in terms of both students and instructor readiness and willingness in application of the platform. Students considered it as a welcome novelty and the instructor voluntarily entered the challenge anticipating learning and teaching benefits. There was no technology barrier for any user despite almost no

training in use of the platform. The only challenges in terms of technology were related to frequent network and power failure. The organizational challenges were mainly the lack of instructional design specialists and trained assistants. The major obstacle in terms of technology was lack of the link between the platform and the student record system, which created a lot of trouble with students' lists and recording of their marks.

The instructor considered the time factor the most vital challenge related to the use of the platform. The basic use of the platform for the course administration did not require any extra time. However, the time spent on the preparation of the material was seriously demanding. The further development of the course involved even more time required for the preparation of certain features (for instance on-line tests) and time required to update the material, communicate with students, introduction of more attractive elements to keep students engaged.

Despite the challenges, the application of the learning platform and the development of its material was a positive experience for the instructor and well received by the students.

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