

## **Students' perspective on the use of the Blackboard platform for delivering an engineering course**

**Jacek Uziak†, M. Tunde Oladiran‡, Edmund Lorencowicz\* & Marian Gizejowski\*\***

University of Botswana, Gaborone, Botswana†  
Botswana International University of Science & Technology, Palapye, Botswana‡  
University of Life Sciences, Lublin, Poland\*  
Warsaw University of Technology, Warsaw, Poland\*\*

**ABSTRACT:** The use of information and communications technology (ICT) has been growing over the years in various human endeavours. It has also been adopted in the 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' perspective on the use of Blackboard software. The technology is a course management system (CMS) used in a blended learning mode to deliver a third year mechanical engineering course at the University of Botswana (UB). The study covered a period of nine years and the questionnaire survey was administered to each succeeding cohort of students. Results indicate that students were generally comfortable with the use of Blackboard as they highly embraced it. Students indicate that their performance improved and that communication with both fellow students and the instructor was enhanced significantly. The respondents also recommended that Blackboard should be used in other courses in their programme of study.

### INTRODUCTION

Information technology (IT) has gradually invaded every human activity, such as social, economic and industrial enterprises, and sometimes without any resistance or hesitation. Education is no exception. The world of learning is not lagging behind in the application and adoption of technology. In particular, information technology impacts on learning significantly among university students.

Educational technology has been evolving and applied well before the discovery of personal computers (PCs) and the Internet. However, the advent of both PCs and the Internet, which gave rise to information technology, provided the spark for massive international development and cooperation. In particular, the rise of the Internet, and its widespread access, adds a completely new dimension to teaching and learning by providing potentially unlimited scope for amount of content. The above scenario creates new demands for instructors. They need not only to constantly locate and assess content related to their teaching area, but also design and follow learning activities suitable for the students. Those activities are related to both synchronous and asynchronous on-line learning used for distance education.

On-line education uses learning management systems (LMS), which are specially designed platforms to facilitate distance learning [1]. 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. The aim of those different modes of delivery is to complement each other, and to create the most efficient and effective learning environment. Bath and Bourke argue that blended learning achieves better student experiences and outcomes, and more efficient teaching and course management practices [2].

Information technology is widely recognised by engineering professionals and engineering researchers. They use it on a daily basis in their professional practice. Therefore, there is no technological barrier for engineering lecturers to employ technology for course delivery. It should also be a priority requirement for universities as they face issues of competitive pressures in maintaining students' numbers and high teaching quality. Hence, engineering colleges should be especially adaptable and adequately resourced for Web facilitated or blended (hybrid) education.

There are a number of benefits of using e-learning mode of instruction, including just-in-time learning and easy access from different places within the university, and from different geographical locations [3]. It is also cost-effective, learner-centred, contemporary and interactive; and there is uniformity of content, which can be rapidly updated by the instructor. The system can offer logical solutions for education and training objectives at the university. It allows students to have 24-hr access to the information from almost anywhere in the world and to work at individual pace without intimidation or coercion. Since most of the students are usually computer literate and the special platforms are normally very user friendly, learners should not encounter major problems on how to operate and work with the e-learning software environment.

E-learning, however, is not a simple application of ICT in education, but a case of expanding learning options and a new frontier in education. In order for e-learning lecture-based courses to promote value-creating processes both for learners and teachers, enormous effort and commitment is required [4].

The complexity of learning, as a cognitive and knowledge oriented process, makes the establishment of an effective e-learning platform using ICT 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.

## LEARNING SYSTEMS

Learning platforms, also called course management systems (CMS), are an increasingly important part of academic systems in higher education. They are used in any form of e-learning starting with courses introducing minimal elements of Web facilitation to full on-line courses.

There are several course management systems, such as Blackboard, Blackboard Vista (formerly WebCT), Desire2Learn, Questionmark Perception, and I-Assessor Moodle. All of them promote teaching and learning activities in a *seamless environment* [5][6]. They combine functions; distribute information to learners; communicate with the students via discussions, announcements, email, real-time chat sessions and an interactive whiteboard; provide for on-line assessment (evaluation of students by means of quizzes and assignments); allow for student self-evaluation through self-tests and progress tracking; track students' use of the learning materials; and facilitate course administration. These virtual environments enable learners to collaborate on projects and share information [7][8]. They basically provide *all-in-one* software packages, which enable several functions on top of providing students with course materials.

Despite the type and sophistication of learning platforms used, it is still the instructor who plays the most important role if students are to learn effectively, retain the knowledge and practice the skills imbibed during the process. The platform has also to 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.

## BLACKBOARD

Blackboard is an on-line CMS. It is a flexible *all-in-one* system, which has been selected as being appropriate for student learning for the following reasons:

- 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;
- It provides additional resources to teaching and learning.

Within the Blackboard system, the on-line discussion formats, such as those of synchronous discussion boards offer a number of advantages over real time sharing. These include allowing learners to respond at a time that best suits them and allowing time to reflect and further research on the topic before contributing to discussions. This creates a more open learning environment allowing even shy students equal participation. This inquiry-type of process contributes to individual learning, which is then shared with peers. Using the bulletin board, students can engage in peer-coaching and learning, as well as gradually becoming more self-directed learners.

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 later 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.

Blackboard is commercial software and the cost of maintaining it can become prohibitive for sustainability. The Department of Computer Science of the University uses Moodle, which is an open source LMS as an additional learning platform.

## METHODOLOGY

The results presented in this article 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 the BEng mechanical engineering

programme at the University. The data collected cover nine academic years from 2007/08 to 2015/16. The course was delivered using a blended mode consisting of the traditional method of lectures, tutorials and laboratories (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 elements of the continuous assessment (assignments, projects, laboratory reports), apart from tests.

The Blackboard material for students was grouped in topics as per lecture delivered. The material for each lecture included lecture notes, PowerPoint presentation (in the pdf format), a summary, examples with solutions, a list of problems (with answers, but not solutions) and a self-test (in the form of multiple choice questions). In the majority of topics, additional material was also 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 questionnaire was administered at the end of the course in each academic year. *In toto*, 275 students, out of 281 students registered for the course, completed the questionnaire in the years under study (i.e. a response rate of 98%).

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 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 questionnaire used a Likert scale to assess responses from the survey. Each question or Likert item, as well as 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.

## RESULTS AND DISCUSSION

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, the 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 the Intranet and this did not really increase through the years. This is despite the fact that 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 the 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 the students included Facebook, Twitter, What's up, etc.

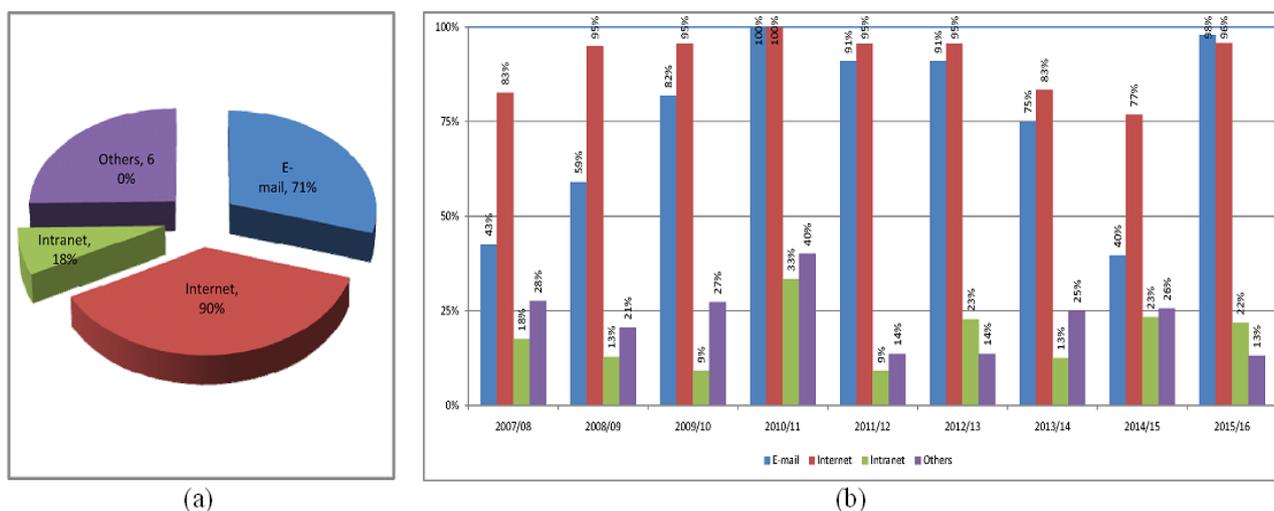


Figure 1: General use of information technology.

The majority of students used the Internet for information search related to the learning either *very often* or *often* (Figure 2).

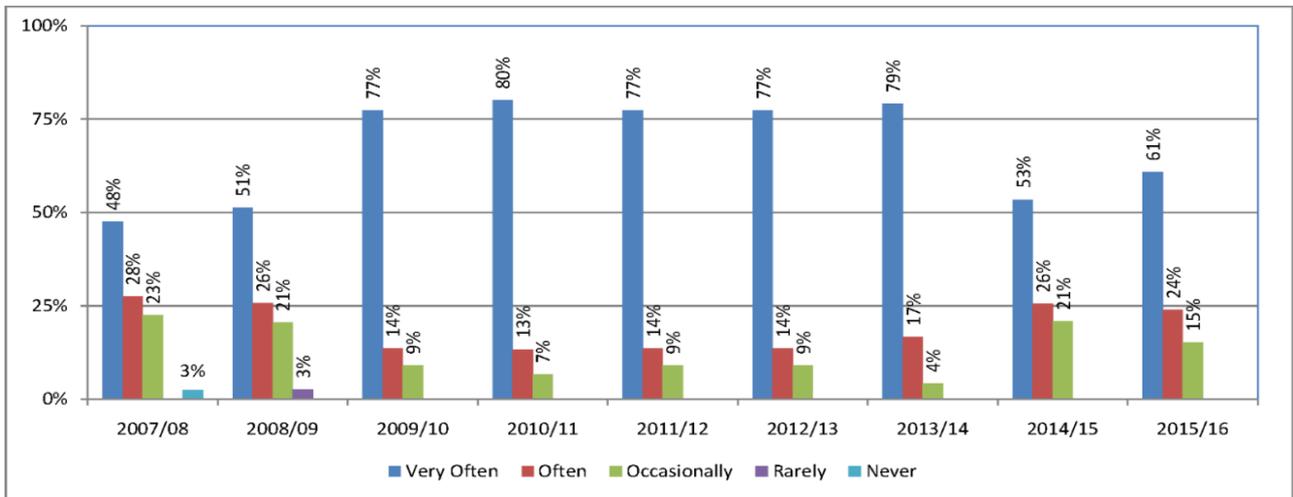
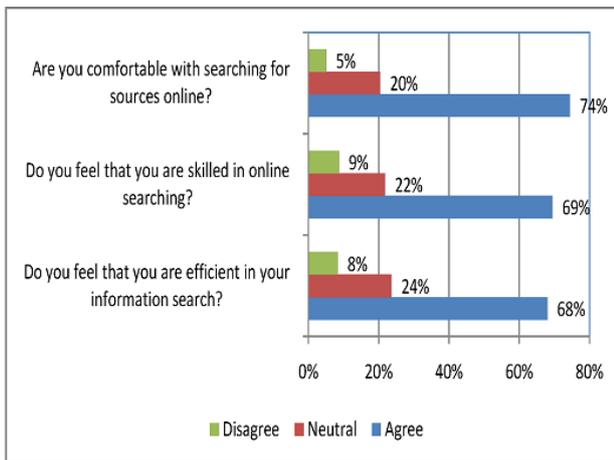
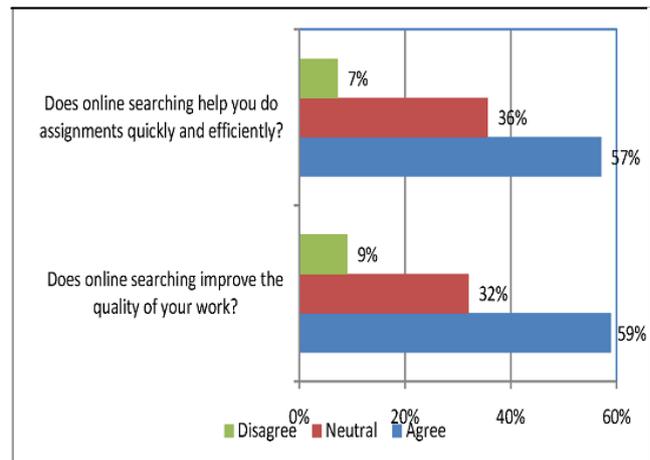


Figure 2: Respondents' use of the Internet search for information.

The students were satisfied with their skills in 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).



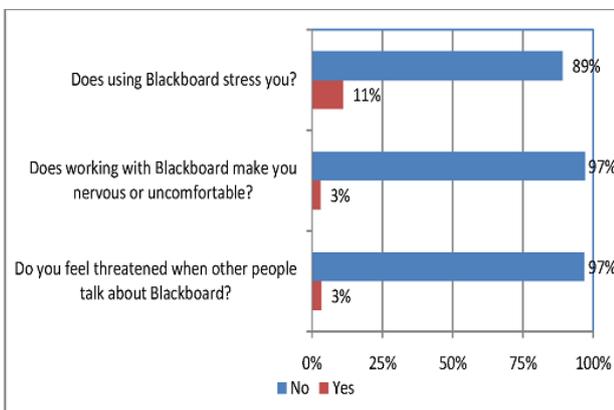
(a)



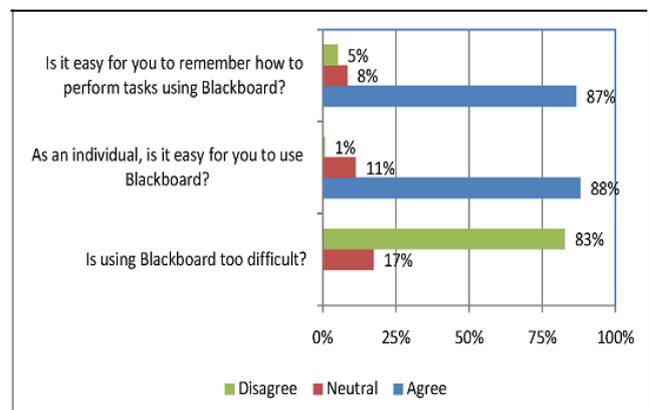
(b)

Figure 3: Application and comfort of using the Internet.

#### APPLICATION OF BLACKBOARD



(a)



(b)

Figure 4: Blackboard application and comfort.

The 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%) - Figure 4a.

The time which the students spent using the Blackboard increased steadily over the last four years of the research, reaching an average of 10 hrs/week, and a maximum of 18 hrs/week (Figure 5). However, the students admitted that they did not work through the teaching material regularly throughout the semester, but rather before assessment, such as tests or quizzes (Figure 6).

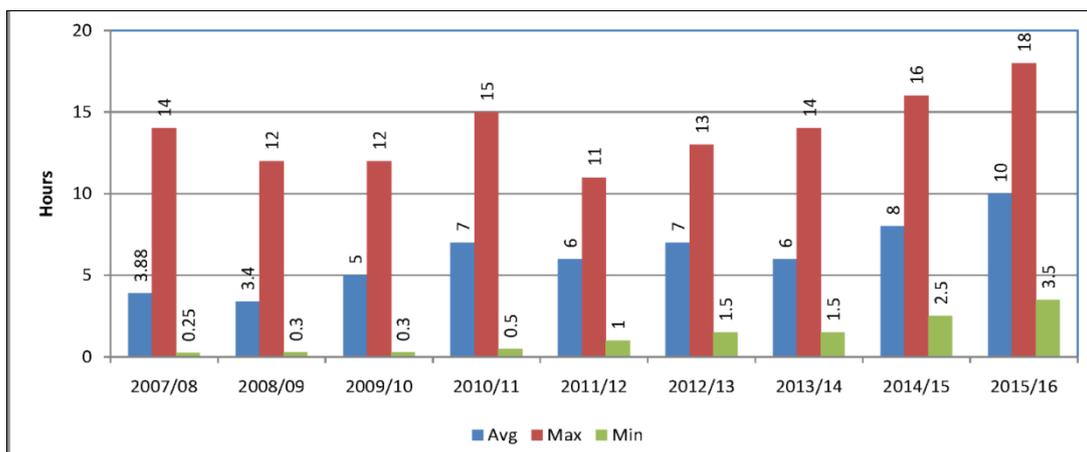


Figure 5: Time spent using Blackboard.

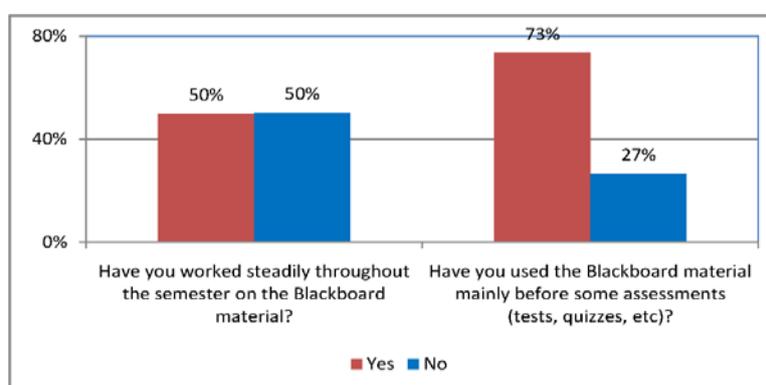


Figure 6: Use of Blackboard.

## BLACKBOARD AS A LEARNING TOOL

The students had a feeling 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 the students' quality of studies (81%) and was useful in the learning process (90%). The platform also gave the students the ability to organise themselves better (84%), to make best use of their time (65%) and to accomplish assignments quicker and more efficiently (84%) - Figure 7b.

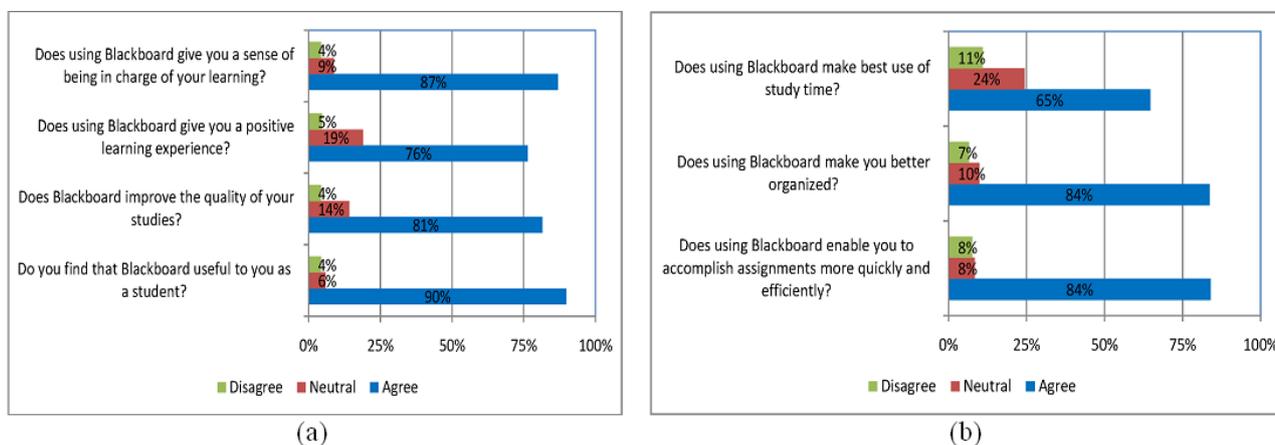


Figure 7: Learning experiences of using Blackboard.

Figures 8a and 8b show students' responses on the effectiveness of using Blackboard. For example, they positively rated it in managing class activities (81%) - Figure 8a. Blackboard helped to present the course content in an organised way (79%), whereas 87.5% of the 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 the students this was mainly due to the students receiving individual notification and the possibility of always easily checking the relevant deadlines on the Blackboard.

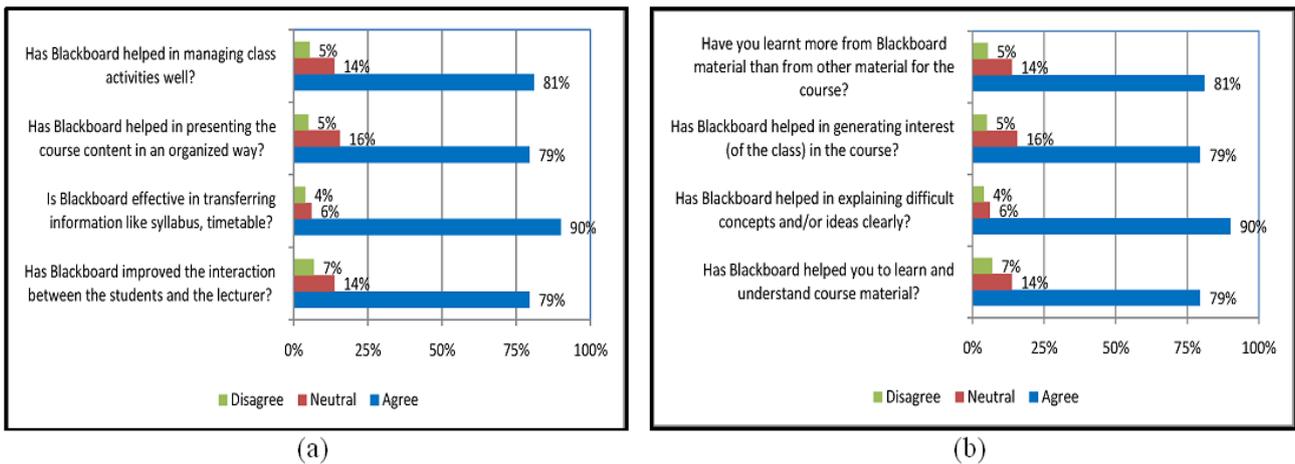


Figure 8: Blackboard as a learning tool.

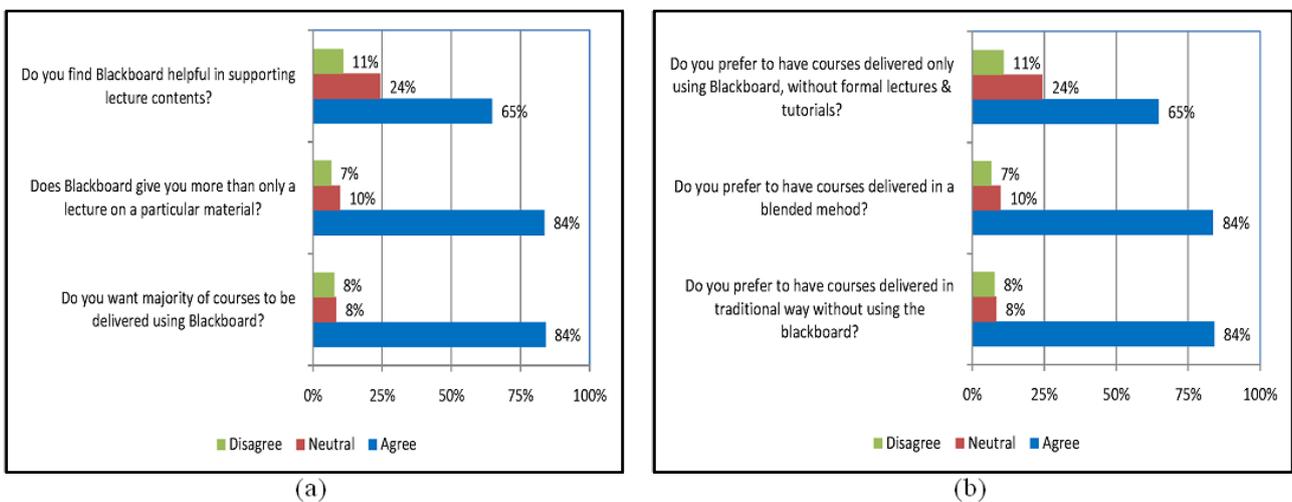


Figure 9: Blackboard as a support for delivery of lectures.

The students considered Blackboard to be helpful in supporting the delivery of the course material (65%) giving them more than only a lecture (84%) and they wanted more courses to be delivered with the use of the learning platform (84%) - Figure 9a. The students, however, showed slight confusion in terms of their preferences in the course delivery; as shown in Figure 9b, the same percentage of students wanted the courses to be delivered in a blended method and in traditional way (84%).

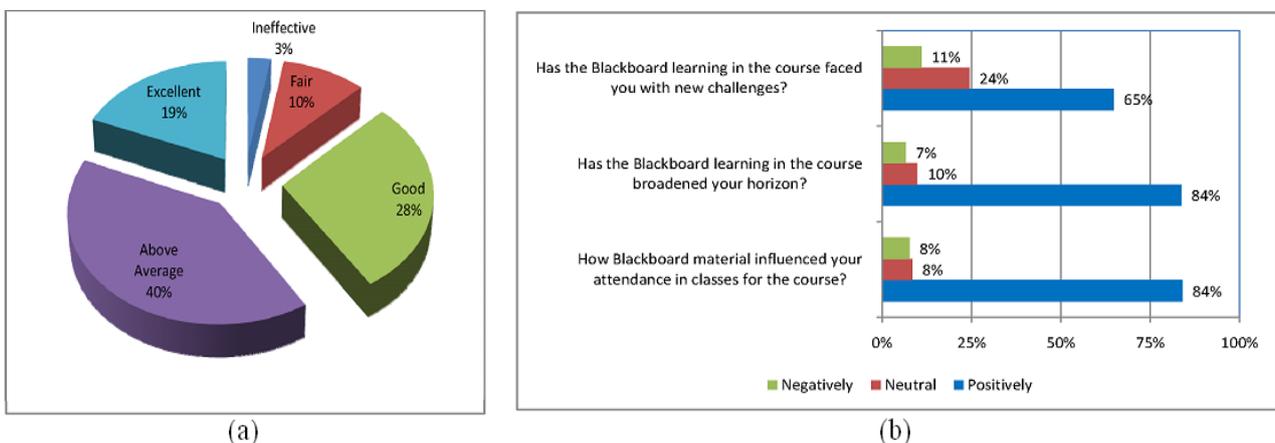


Figure 10: Overall effectiveness of Blackboard.

The 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%). 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 10.

## CONCLUSIONS

The study surveyed a cohort of third year mechanical engineering students to obtain insights concerning the general use of information technology for learning and their perceptions about the use of Blackboard platform.

In terms of general application of IT, 90% used the Internet for some elements of learning. A high percentage of the students also used e-mail as a way to communicate with fellow students and also with instructors. There was not much difference in the use of IT throughout the years.

In terms of the application of Blackboard, results from the study were consistent with previous research findings for courses other than the engineering discipline [9-11]. 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 to be 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. For example, the 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 organised way (79%). The students were of the opinion that such an approach should be adopted in other courses (84%). Surprisingly, the students did not express a clear preference on the mode of course delivery.

The students were well aware of the advantages of using an e-learning platform, which provided more material that could be accessed at any time and could be studied at one's own pace.

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

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