

ACTIVE LEARNING BY INVOLVEMENT IN CLASSROOM

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ABSTRACT

This paper presents a study on the effect of strengthened student involvement in an engineering classroom on their learning. The availability of online lectures has made learning more flexible. However, this can reduce the attendance of students in face to face lectures as students may excessively depend on the recorded lectures. Reduced attendance in lectures can significantly affect the deep and meaningful learning of units which is considered essential in an engineering course. Direct involvement of students in solving of problems was increased in the classroom activities in one part (part A) of a unit. The effect of strengthened student involvement on their learning was evaluated by looking at the attendance of students and their performance in the assessments. It was observed attendance increased and more students attempted questions of part “A” than the other parts of the examination paper. When performances in different parts of the unit were compared, it was found that lectures with strengthened student involvement improved their confidence on the topics. Thus, increased involvement or engagement of students in the classroom helped achieve deeper learning. Therefore, increased student involvement in lectures can help maintain high student attendance in classrooms when web-based lectures are also available for students to access at any time. The benefits of these web-based lecture systems can thus be maximised to promote deeper learning by involving students more in the classroom activities.

INTRODUCTION

With the development of web-based learning and teaching technologies, such as i-Lecture, Blackboard, WebCT and similar other software, lectures have become more flexible than before. With the utilisation of the available software, lectures can be recorded in audio and video modes and made available to students through internet. Students can have access to the recorded lectures through internet and watch at any time and as many times as required. Therefore, these internet-based technologies are very useful for students to revise lectures at home and catch up with the missed lectures. This has become a common practice in Universities at the present time. However, the availability of online lectures may have significant effect on the attendance of students in face to face lectures. This is because

students may excessively depend on the recorded lectures that they are able to watch at any time.

Remaining absent from lectures results in missing the face to face interaction of students with the lecturer and with their peers. As a consequence, students miss the opportunity of acquiring deep and meaningful learning that occurs through the interactions and engagements in a classroom. Deep learning is essential in engineering courses as students after graduation will be involved in design and operation of facilities which are essential for the society and where high risks might be involved. Thus, absence from the face to face lectures and excessive dependence on the recorded lectures may eventually result in more of surface learning than deep learning. Evidence show that involvement of students in various activities in the face to face lectures usually improves the learning experience and thus encourages students to attend in lectures. The effect of strengthened student involvement in classrooms on their learning in an engineering unit at a University is discussed in this paper.

Objectives

Students have mixed perceptions to the implementation of ICT such as the web-based lectures in the learning process. Some students resist the use of ICT if they believe it will reduce the extent of interaction with the lecturer (Sutherland & Badger, 2004). On the other hand, students are likely to accept it if they believe that it improves the learning experience (Dunkin, 1999). However, the excessive dependence on the availability of recorded lectures in the web can have significant effect on student attendance in face to face lectures and their overall learning (Fardon and Ludewig, 2000). The main objective of this study was to find the effect of strengthened student involvement in classrooms. The effect of increased student involvement in problem solving in the classroom on their attendance in lectures and therefore on the overall learning was evaluated.

Significance

It is of paramount importance to ensure that the learning outcomes of a course are achieved. Deep learning in the units of an Engineering course is essential to achieve the learning outcomes of the course. With the development of new technologies, there is increasing demands from learners to provide more flexible instructions (Hezemans and Ritzen, 2002; Hawryskiewicz, 2007). To meet the demands of the changing environment, web-based lecture technologies such as iLecture are increasingly used by Universities to facilitate flexible learning to students. The web-based lecture technologies have several benefits and they are usually welcomed by students because of the flexibility of accessing it at any time (McElroy & Blount, 2006). However, excessive dependence on the web-based lectures can cause drop in student attendance in classrooms. Students not attending lectures will miss the opportunity of interactions, sharing ideas, asking questions and active participation in discussions that happen in a face to face environment. As a result, these students may end up with only surface learning instead of deep learning that can be achieved from the classroom activities. Thus, thoughts should be given on the structure of the lecture delivery to ensure reasons for students to attend lectures (Gosper, McNeill & Woo, 2007). Therefore, it is necessary to reflect on the lecture style and adopt appropriate classroom activities for lectures

in order to maintain high attendance and maximise the learning experience while the benefits of web-based lecture technologies are also utilised. More direct involvement of students was introduced in classrooms in an attempt to improve the higher order learning experience for students. The experience of this change has been presented in this paper.

METHODOLOGY

The study used the engagement-based learning and teaching approach to strengthen student involvement in the face to face lectures in classroom. As it is often quoted “Tell me and I forget, teach me and I may remember, involve me and I learn”, it is generally accepted that engagement or involvement results in meaningful learning that retains longer. The engagement or involvement provides the foundation for developing the overall learning process (Jones, 2008). Therefore, student involvement was strengthened in classrooms in order to foster the higher order learning skills in an engineering unit.

The study was conducted in an engineering unit of a Bachelor degree course in a University. The unit had about 160 students enrolled in a semester and its content was analysis of Civil Engineering structures. The problems were mainly of numerical type. A very clear understanding of the structural analysis theories is required to competently solve the problems. Usually, solution of numerical problems followed the theoretical derivations and discussion in a lecture.

Student involvement in lectures was strengthened to find its effect on the attendance and overall learning in the unit. All students in the classroom were directly involved in solving the exercise problems. Each problem was first divided into a number of steps in order to solve the whole problem. Students were given a certain amount of time to discuss in small groups and try to work out the solution procedure of one step at a time. The answers to the difficulties and questions raised by students were discussed in the whole class at the end of the given time. Solution of that step was then worked by students together with the lecturer. Solution of every step of a numerical problem was completed in this way and thus the whole problem was solved. Thus, all the students were involved in the problem solving procedure instead of the solution being done by the lecturer alone or just going through the worked out solution in a power point presentation. A document camera was used by the lecturer to write on papers as the working progressed with the whole class.

The worked out solution was recorded and made available through iLecture to all students including those who were absent. However, the absent students missed the interaction and direct involvement in the problem solving procedure. The approach was used in one (Part A) of the several parts of the unit. Attendance of the students in the lectures and their performance in the end of semester examinations were observed to evaluate the effectiveness of the increased student involvement. Student feedback for the lecturer collected at the end of semester by using an online survey was analysed to evaluate the effectiveness of the teaching method.

RESULTS AND DISCUSSION

The head-counts showed higher student attendance in the part of the unit when there was more student involvement in the problem solving activities. When compared with the other parts, a high number of students attempted the questions of Part A in the end of semester examination. The performance of the students in part A was better than in the other parts. Therefore, the active involvement of students in solving the problems step by step in lectures instead of just going through the given worked out solution promoted deep and meaningful learning that resulted in high attendance in lectures and better performance in the examination. Most of the students who failed the unit were usually absent from lectures and thought that they would be able to catch up later. However, these students were lagging behind and eventually failed to demonstrate their performance in the unit.

The student feedback for the related lecturer included the following relevant comments:

- I really respect his teaching style. He covers a lot of examples, he's approachable, and he is willing to help and teach. And I love that he 'teaches us,' he doesn't just stand there and give a lecture, he works with us, and he seems to care. It is a difficult subject, I really appreciated his help.
- He is great in his teaching method and the style of using the document camera.
- I like the method he uses when explaining examples. He goes step by step, and does the example with the class.
- He takes good time to walk around in the lecture theatre to answer questions we have while we work on exercises.
- Firstly, thanks for teaching me. I found you were very thorough with your worked example that you worked through in the lectures which I found very helpful. You were well organised and a great character.
- His method of teaching and the speed he teaches are excellent. I lecture notes also help in reconfirming to know exactly what is going on.
- Excellent teaching method of breaking down of the worked out examples and what to look out for in the tricky questions.
- Best aspect is working problems in lectures by hand. He is very approachable and very helpful in feedback. One of the best lecturers at the University.
- Strength is communication, as he does the examples in class which helps students understand the key principles.
- He answers all the questions from students. Anyone could understand what he is teaching.
- Top quality teacher, goes through the examples well, willing and open to help students

It can be seen from the above comments that the direct involvement of students in solving problems in the classroom helped students become more active learners. Students appreciated the lecturer's initiative to introduce their direct involvement in the lectures. Thus, a thoughtful design of the face to face lectures such as strengthening student involvement can help maximise student learning together with the availability of flexible web-based lectures.

CONCLUSIONS

The study has shown that generally student learning improved with the increased student involvement in the classroom. Since students were engaged in the classroom instead of just listening to the lectures, they found it enjoyable and valuable to attend lectures in addition to using the recorded lectures available on the web. The activities in the face to face lectures helped students acquire meaningful learning in the unit and thus achieve better performance in the assessments. Thus, the increased student involvement in classrooms can help achieving the unit's learning outcomes and lead to achievement of the desired outcomes of a whole course.

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