lecturer-cantered and limits interaction between students and lecturer. On the other hand, MGT Flow reverses the role in T&L where students themselves have first-hand experience of simulating the gas turbine system, and subsequently solving problems using the software. The students can explore the software at their own pace, triggered by the self-generated questions during the process. Further, the use of engineering software can inspire students to develop similar tools to assist in solving problem and design.

References

Cengel, T. A., Boles, M. A., Thermodynamics An Engineering Approach, 7th edition, McGraw-Hill Company, 2011

Lefebvre, A. H., Gas Turbine Combustion, Hemisphere Publishing Corp., 1983

Boyce, M. P., Gas Turbine Engineering Handbook, 2nd edition, Gulf Professional Publishing, 2001

13. THE POTENTIAL OF QR CODE, SCREENCAST AND EDPUZZLE TO PRODUCE ONLINE VIDEO TUTORIAL FOR STATISTICS

Faridah Hanim Yahya, Hafiza Abas,
Ma Hamsiatus Sa'diah Kamaruddin, Zahisham Yusof
Research and Development Institute Of Teacher Education,
International Languages Campus, Kuala Lumpur, Malaysia
fhyzul@yahoo.com

Introduction

Blended Learning is one of the pedagogical approaches for 21st century learning skills that had been highlighted in the Malaysian Higher Learning Institution. It integrates face-to-face with online learning interaction. Hence, this teaching approach is focusing on the degree of technology usage in teaching and learning.However, learning tools and strategies are needed by lecturers to implement this approach in teaching and learning process. They need a learning object (LO) that is suitable for their teaching objectives. In order to do that, they need to consider their target groups who have different levels of cognition. Besides that, lecturers also need to think of activities to be conducted in class that will engage students in learning.

Problem Statement

A basic statistics course is offered once a year in the Department of Cognitive Science, Institute of Teacher Education, and International Languages Campus (ITEILC). Students are compelled to take this course during their foundation year. This course aims to develop skills in basic statistics, to organize, analyze and interpret data accurately. Students also learn about Normal Distribution and computation of measures of central tendency, dispersion and descriptive data. In addition, students could identify the correlation between two variables. ICT skills are also integrated into teaching and learning session.Theory acquisition and practical experience gained during the course could be applied in daily life.

This course is mandatory and contains theory and practice. In the theoretic module, students have to learn basic concepts of statistics. In the practical module, students will learn to use functions in Microsoft Excel and Statistical Package for Social Science (SPSS) software to find values for mode, median, mean, range, variance, standard deviations, quartiles and correlation coefficient.They also need to know how to plot graphs such as histogram, bar chart, pie chart, stem-and-leaf and box plot.

The lecturers were facing problems when teaching this subject. They were given only six hours to teach students to use both the software to plot the graphs and to find the values of statistics stated earlier. They did not have enough time to show to students the features of the software. During the hands-on activities, they also had difficulty in monitoring students' performance as the students had different levels of ICT skill. Furthermore, they had difficulty motivating the weaker students to learn ICT. On the other hand, students are facing problem too when learning to use a new software. For example, they are having difficulty in memorizing the steps in using the software. Furthermore, they prefer a teaching and learning mode where they can learn anywhere and anytime that they want.Therefore, two problems have been identified in teaching statistics are time constraint and lack of interest using the software.

Online Screencast Video Tutorial

The main focus is on the creations of LO for students to apply statistics knowledge using Microsoft Excel and SPSS. A teaching strategy, which is called Flipped Classroom is proposed by the researchers, to assist lecturers to implement Blended Learning in the classroom. Self-paced learning concept is embedded when designing this LO.This LO integrated three main components: screencast technique, quick response (QR) code, and EdPuzzle. The final product is the online screencast video tutorial which is uploaded to the website.

A screencast video is a video tutorial which records the actions taking place on the computer screen using a special software. Students will be engaged with this video because they can visualize all the steps that had been highlighted in a procedure. They can also watch this video at their own pace and select any part of the video if they want to watch a particular procedure. A special software called Camtasia Studio is chosen to produce this video. The screen recorder is a tool to record the screen. During editing, special visual effects (such as callouts, zoom-n-pan and title clips) and recorded audio can be embedded into the video.Hence, this video tutorial is very effective and engaging. Besides that, EdPuzzle is also embedded in the video. This is a freeware software which can embed quizzes in the video and is needed as a part of the assessment.

The QR code is used to overcome problems faced by students such as difficulty in memorizing web addresses for the video clips. They were also having difficulty when using mobile devices which have a small size screen for typing text. When using a mobile device which has a small size screen, they faced problems in editing the text. The students, who are the y-generation, prefer to use their mobile devices for learning. Thus, the QR code is selected to be embedded in this LO. It is a matrix barcode which is capable to encode and decode data at a rapid rate by using mobile devices. It can contain an URL, telephone numbers and text. It can be scanned with a camera and a software (QR code reader) found on most mobile phones. Once the QR code is scanned, website video tutorial would be posted quickly. The QR code is a medium that permits learning to take place inside and outside the classroom. Thus, it facilitates mobile learning (m-learning) environment that is a current learning trend.

Repository for Online Screencast Video Tutorial

The collections of the online screencast videos can be accessed at www.camtasia2u.com. This website is developed by a team of researchers in the year 2013 as a repository of online screencast video. After one year, more tools were added to the website such as creating QR codes for every video that has been uploaded to the website. The total members for this website is about 169,000. Training had been delivered by researchers to lecturers from university and Institute of Teacher Education (ITE). Besides that, training was also given to teachers from primary and secondary schools in Malaysia as well as the trainee teachers in ITE. The team of researchers also produced a book entitled "Mudahnya Camtasia" in 2013, to assist readers in producing the screencast video. Besides that, this screencast technique has been embedded in videos that are used as supporting material for a new subject in primary school in Malaysia since 2014. The subject is called ICT Year 4. One of the researchers had been selected as an author of

the textbook. Finally, the application of EdPuzzle is selected to add quizzes to the video.

Steps In Producing Online Screencast Video Tutorial

There are 11 steps to produce the LO that we had proposed earlier. The first step is to select the content for the video based on the learning objectives. Then, the storyboard for the video is designed. Next, the screen is recorded using Camtasia Studio software. After this has been completed, the video can be edited by adding visual effects. Before producing the video, testing should also be done. After producing the video, quizzes can be added to the video by using EdPuzzle. Before obtaining the embed code, the video must be tested again. The next step is to obtain the embed code from EdPuzzle and insert the code in the website (www.camtasia2u.com). Once the video is produced, the QR code will be generated and can be downloaded. This code can be printed and distributed to the students before they come to class.

The Principles

The underlying principles used as a basis of the innovation are Blended Learning, Flipped Classroom Model and M-learning. Flipped Classroom Model consists of two parts: delivering instruction online outside of the classroom and doing homework in the classroom. In class, students are given a task to test their understanding of the statistics concepts from the video.We had tested a screencast video tutorial to a group of 19 students from ITEILC. The QR code is printed with notes that are given to students as handouts. They should scan the code to get access to the screencast video tutorial. In class, they are given assignments by their lecturer where they have to find the values of statistics using Microsoft Excel or SPSS. They have to present their findings at the end of the class.

The Findings

The researchers received good feedback from lecturers and students. The lecturers agreed that the video tutorial helped the students to learn the new concept or skill. In addition, they agreed that the video tutorial can provide information in a format that is easy to learn and the content of the video tutorial is very useful for the students to learn statistics. Meanwhile, the students commented that they were very interested to learn how to apply statistics in ICT using video tutorials because they could visualize the steps in using the software. They also mentioned that they were able to access the web page for video tutorials via QR code.Therefore, they would like to integrate m-learning in their daily life. Hence, the integration of paper-based and online screencast video through the QR code for basic statistics learners is an effective mode of teaching and learning to facilitate m-learning. This mode of teaching together with the flipped classroom model is a student-centered approach and should be applied in teaching basic statistics.

14. RESPONSIBLE INNOVATION: ENGINEERING ETHICS EDUCATION USING A NEW JAPANESE HYPOTHETICAL CASE

Hidekazu Kanemitsu, Fumihiko Tochinai
Humanities and Social Sciences Program, 7-1 Ohgigaoka, Nonoichi, Ishikawa 921-8501, Japan
kane@neptune.kanazawa-it.ac.jp

Introduction

The authors of this presentation have been engaged in engineering ethics education (E3) at Kanazawa Institute of Technology (KIT), one of the largest private technological universities in Japan since 2004. At KIT, only six professors teach engineering ethics to about 1,800 students every year. To conduct this massive E3 by a small number of faculties, we have developed and introduced innovative methods to our E3 course. This presentation aims to give an overview of the current situation of E3, and to demonstrate how E3 is conducted at KIT.

Today's society is highly dependent on science and technology. Besides that, it should be science and technology that lead us to innovations which tackle great challenges such as global warming. To let innovation be realized, engineering is indispensable. To let innovation be responsible, ethics should play a crucial role. In order for would-be engineers to realize that it is their duty to hold social responsibility, E3 is therefore considered to be an important element in engineering education.

It seems that the notion that E3 is crucial for engineering education is shared by many countries where accreditation authorities of engineering education such as ABET (Accreditation Board for Engineering and Technology [in the USA]) and JABEE (Japan Accreditation Board for Engineering Education) demand engineering education institutions to incorporate engineering ethics in their curricula. For example, JABEE demands engineering education programs to demonstrate that students have "Understanding of the effects and impact of engineering on society and nature, and those of engineer's social responsibility (engineering ethics)." This means that many of them (have to) offer compulsory courses to teach engineering ethics to their students.

Ethics courses in E3 are different from those in the humanities curricula; that is, they are required to be more practical than theoretical. From a practical point of view, the important objectives of E3 are to let engineering students realize that ethical judgment ability is essential in their engineering activities, and to let them acquire skills to act ethically. Ironically, the more recognized the importance of E3 is, the more practical difficulties we faced when we conducted E3. One of the roots of the difficulty is about efficiency: how to conduct a large-scale E3 program with limited manpower. It is often the case that the number of faculty members who are in charge of ethics courses in E3 is quite limited, and/or that they are engineering faculty who are not specialized in ethics. Introduction of innovative educational methods is an answer for us to conduct E3 efficiently with limited manpower.

KIT was founded in 1965 as a private university with a single college. Since it was established, KIT has been continuing educational reforms and is now one of the largest technological universities in Japan with four colleges (College of Engineering, College of Informatics and Human communication, College of Environmental Engineering and Architecture, College of Bioscience and Chemistry), with 7,400 enrolled students, 350 faculties and 300 staff. KIT is well known for her commitment to E3 that is rooted in one of three founding principles, "to create well-rounded citizens with good character" (others are "to be innovative" and "to promote industry-university collaboration").

The course "Science and Engineering Ethics" (SEE) has been offered since 2006. Currently, it is a compulsory two-credit course for junior students. Approximately 1,800 students are divided in about 30 classes; 50-80 students per class, and about 15 classes are offered in one semester. Six professors are in charge of the course, which means that each of them is responsible for about 5 classes or 300 students a year on average. One lecture runs for 90 minutes, and there are 14 lectures, followed by a final examination on the 15th week and one wrap-up on the 16th or the last week of a semester. There are six paper-based assignments, three E-learning assignments, three in-class group discussions and one final examination.

For the first two years, there were more paper-based assignments and no E-learning assignments. It was more time-consuming and less efficient not only for professors but also for students; it was obvious that this situation was not sustainable. Introducing an E-learning tool could be a good solution to alleviate the difficulty to improve educational efficiency. However, E-learning is not a panacea to solve all teaching and learning problems and can sometimes make things even worse. E-learning systems with poor contents such as "video lecture via internet" hardly improves learning efficiency and could even reduce students' motivation. What was required was something that would promote