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Ansah Michael Nii Sanka (Ghana), Amoah Paul Atta (Ghana)

Tomsk Polytechnic University, Tomsk

Scientific supervisor: Stepanov Boris Pavlovich, Associate Professor

THE DEVELOPMENT OF TEACHING AIDS FOR NUCLEAR POWER PLANT COURSE INTEGRATING BLENDED LEARNING FORMAT

Abstract

Teaching Aids assist instructors facilitate the process of teaching and learning. Instructors are now adopting different ways of delivering the course

to fit the learning styles and expectations of the students. Blended learning as a model is being integrated into our teaching and learning as the world seeks for more effective ways of educating people. This paper presents a designed course planner and an overview course syllabus for Nuclear power plants. Challenges faced in adopting blended learning and conclusions were discussed on using blended learning for teaching nuclear power plants as a course.

Introduction

Blended learning refers to a combination of traditional methods of teaching and such as face-to-face classroom and online learning strategies in a perfect synchronization with each other to enhance teaching and learning process [1]. The online teaching activities may include online quizzes and online discussions. Other forms of Out-of-class activities that supports blended learning are field trips; community engagement projects; individual and group projects; hands on activities in an organization or in a community.

The main focus of the blended learning model is to give learners freedom to adapt to a more comfortable way of learning. The blended learning model approach accommodates students who learn very fast and the slow learners. The students who are not able to grasp what is being taught in class will have the chance to further study at home or at their own free time and the fast learners may want to read ahead of the class. Students can gain the desire to develop new ideas which can lead to innovations in science and all aspect of life using blended learning since students get to spend more time on the course materials. Therefore, the teaching aids designed with blended learning format are expected to cohere with the educational content, the learning process, the goals and objective of teaching and learning nuclear power plants.

Teaching Aids for are basically materials used to assist an instructor to facilitate teaching and learning [2]. Readding materials, charts and pictures have been used as teaching aids for nuclear power plant course but as education continues to develop, many improved forms of teaching aids have come into play. Development of teaching aids make the instructor come out with good content, setting appropriate and achievable goals, plan appropriate methods of training delivery and evaluation of learners. The use of teaching aids enhances learning by making use of a variety of senses and it makes students active while learning because it serves as motivation for students. An important reason for developing teaching aids is that, it also allows students to continuously learn on their own after class. This is achievable by introducing blended learning as part of developed teaching aids.

Blended learning for science and engineering

In blended learning the instructor makes available all the materials outside of class time. This is to make students go through the materials on their

own pace and build in-class discussions and assignments on activities done before the class, online or in independent studies [3]. The instructor is able to monitor activities such as individual assignments and group works which is done in class making the instructor serve more as a guide or a coach.

Teaching aids such videos, pictures or field trips are popular in blended learning and to help economize the time in class [4]. Blended learning as well can make the students get more involved in learning process since a lot of activities is put in place.

Setting achievable and measurable learning objectives for nuclear power plant course put the teaching and learning process into a structure format when both students and instructors get to know what they are striving for. Instructors will be guided on what to teach and what strategies to use when planning for the class. This gives the opportunity for the instructor to develop adequate and efficient assessment measures and make-up plan whether the objectives are achieved or not since it must be aligned to the set objectives. [5]

Nuclear power plant course overview with blended learning

The course is designed to include blended learning models for nuclear engineering master degree program. A course planner can play a major role when developing a course syllabus to visualize what objectives, goals and assessments are necessary for the course. The course planner on nuclear power plants was designed to help student understand and apply nuclear technologies for the development of nations through energy generation. The course planner below was designed to include the goals, outcomes, different forms of assessment and learning activities for nuclear power plants course [6].

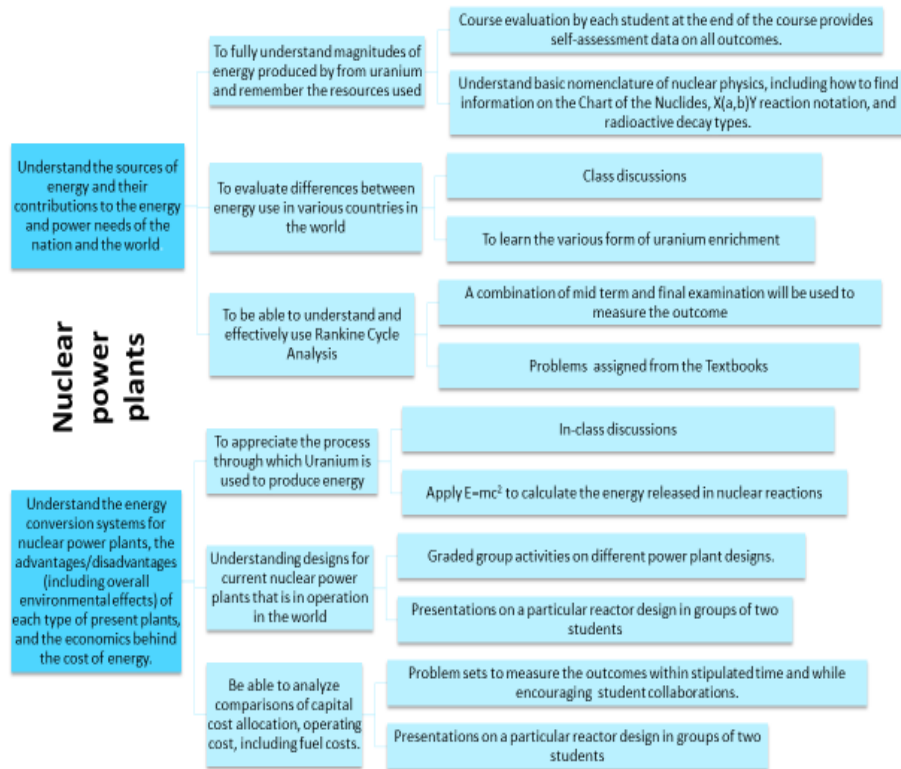


Figure 1. The course planner for nuclear power plant course with different formats of assessment

A didactic approach from a pedagogical course taught in Tomsk Polytechnic University was employed to design an overview course syllabus for Nuclear power plants because its mechanism integrates blended learning into the traditional class room activities.

Name of the course	NUCLEAR POWER PLANTS (MSc)
Course outline: number of teaching hours	Lectures 32 hours; Practical 24 hours; Laboratory classes 24 hours; Self-study 84 hours;
How many topics would you like to consider for BL integration within this training course?	The topics to be taught for the course: Introduction to Nuclear power Plants (NPP); Plant economics; Coolant and fluid properties; Steam Turbines; Condenser; Deaeration fundamentals; Deaerator; Feedwater system; Pumps and compressors; Overall heat balance diagram; Pressurizing system; site plant arrangements
Topics to be considered for BL integration within this training course	Heat efficiency properties; Heat flow diagrams; Steam properties optimization in moisture separator; Valves and Pipelines
My course has:	Teaching and learning formats: seminars, labs, lectures and practical session. Instructional methods: discussions, presentations; quizzes, etc. Assessment activities: formative, midterm, summative. Self-studies and an excursion to a thermal power plant at the end of the semester.
Course instructional methods and learning formats	Lectures are conducted in face-to-face (f-2-f) format in lecture rooms equipped with computers and display units. Practical sessions are done in rooms with computers and internet. Special gadgets may be supplied to student in order to have access to licensed software for the practical sessions. Laboratory works are carried out in the well-defined labs of the university. Students are made to use online forums to discuss the lab work to exchange ideas.
Teaching activities that can be converted to BL format	Laboratory works instructions and safety rules are to be studied by students as home task and students would have to answer questions to prove their preparedness before taking the actual laboratory work.
Assessment activities including online assessments.	Quizzes and face-to-face defense. Assessment of their laboratory reports can be moved online and the teacher get the opportunity to make comments on the reports submitted by students.
How in principle will you make sure your students' progress in your course if it is fully (partially) online?	Regular testing conducted with students will make the lecturer to access the strength of the students.

Figure 2. general overview of designed nuclear power plants course with blended learning

The figure 2 above describes the compiled general overview of the course based on the pedagogical course in Tomsk Polytechnic University [7].

Challenges in using blended learning in nuclear power plants

Blended learning may require sources which may not be readily available due to cost involved thus, the need for such resources to be made affordable, reliable and easy to use for both students and instructors [8]. All students need to be carefully monitored since not all student may be able to adapt easily to such an environment especially when it comes to the field of nuclear power plants.

Conclusion

Blended learning supports students to have visual perspective of what they are taught and also learn from comments made by experienced people with regards to nuclear power plants. It helps to increase social interaction among students since student work together. Developing blended learning course for nuclear power plant will increase student access to course materials and make them spend more time with course content. The idea of having some assessments online where students can submit and defend their laboratory reports online was developed. Students can be made to use online forums to discuss the lab work to exchange ideas on how to go about the whole laboratory sessions. Scheduling an excursion to a nuclear related facility at

the end of the semester will help students to appreciate the course they study in class and online format.

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