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Project-Based Learning and Blended Learning

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ABSTRACT

This paper sets out to show the advantages of project-based and blended learning, based on faculty observations and positive feedback gathered from student course evaluations. The approaches have been successfully adopted in four consecutive first and second year courses, each lasting a semester, in an English-medium engineering college in the Middle East. For this kind of learning to be successful, students should be provided with a framework which guides them in the problem solving and clear goals that need to be achieved. Learning in this kind of environment can be scaffolded to suit students with different abilities to ease learning and knowledge construction. In the case described, scaffolding is done partially through a blended learning environment using a course management system, although other ways of providing students with the necessary information are also possible. The role of the instructor is that of a facilitator who guides the students towards finding their own solutions to the problems being solved. The instructor also assists the students in the technical and soft skills being developed. The paper provides a description of activities linked to project-based learning in a technology-enhanced or blended learning environment. Such activities can be used to enhance college students' lifelong learning skills in areas such as English language, research, teamwork and digital literacy skills.

Keywords: Blended learning, English language, research skills, communication

Introduction

Most students when asked will nowadays turn to the internet for information instead of books or asking people around them. It is to the advantage of traditional learning environments to make use of the vast availability of knowledge and information online. In addition, there are learning platforms such as Google classroom and Blackboard which make it easier for instructors to communicate with students online, thus making knowledge and assistance, which is not bound by place or time, constantly available for students. While the merits of face-to-face learning are well researched and proved, a blended learning environment provides more flexibility to both instructors and students long term, as can be seen from the huge popularity of Massive Open-source Online-learning Communities (MOOCS) and the like. These learning platforms provide access to casual and university level knowledge and learning to anyone who cares to access them. At the moment it certainly seems as the way instruction and acquiring knowledge are developing. However, for most instructors, it is still far away from the realities of the classroom. The current paper looks at ways in which aspects of blended learning can be incorporated into a project-based learning environment.

Background

Helping learners expand their English language skills, critical thinking and research skills through project-based learning (PjBL) provides them with highly useful, life-long learning skills. Much of learning is about problem solving. If the learning process is treated as a matter of problem solving (Allen, Donham, & Bernhardt, 2011), it lends itself to using various tools used in problem solving, such as the scientific method or the engineering design process. Problem-based learning (PBL) has been used, especially in sciences, for a long time, but it does not necessarily involve framing the problem as a project. Solving problems using PjBL provides a frame work in which students can investigate and solve problems, similar to practices used in business and industry.

Basically, according to Blumenfeld et al (1991), project-based learning involves "a question or a problem that serves to organize and drive the activities; and these activities result in a series of artifacts, or products, that culminate in a final product that addresses the driving question" (Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palincsar, 1991, p.371). In other words, the problem to be solved provides a realistic context within which the knowledge acquisition occurs (Amador, Miles, & Peters, 2006). It also provides a platform for students to interact with each other and the instructor(s) where "developmental processes take place through participation in cultural, linguistic and historically formed settings, such as family life, peer group interaction, and institutional contexts like schooling, organized social activities, and work places," (Van Patten & Williams, p. 207, 2015). It is an environment where learning in the zone of proximal development recognized by Vygotsky (Smidt, 2013). According to this theory, there are three zones; the zone in which the learner can do things without help, the zone in which the learner can perform with help, and finally the zone in which the learner cannot perform.

The problems addressed in this kind of learning environment can be related to the students' immediate environment, their studies, and national or global issues. The projects can be small-scale ones done in an afternoon, or larger ones ranging over a semester or even an academic year. In addition, the projects can be pitched at a level that is appropriate to the students' practical, theoretical and general knowledge (Amador, Miles, & Peters, 2006). This type of learning is also ideal for promoting the benefits of working in a team and enhancing teamwork skills.

Nowadays most students have access to the Internet through computers, tablets and mobile phones and are well-versed in using these devices for social networking and seeking for information on the internet using various search engines and watching video clips. The skills can be used for enhancing learning by designing courses to included opportunities for blended learning. Blended learning can be defined as "text-based asynchronous Internet technology with face-to-face learning" (Garrison & Kanuka, 2004, p.96). Incorporating blended learning into PjBL provides students with more variety in the way they approach their studies and more control over their learning. It also allows students to expand on their learning spaces (Lange, Reynolds, & White, 2016). The premises in a school or college for blended learning can be seen to include the technology to provide blended learning as an instructional mode, establishing the ownership of the intellectual property on a blended learning platform, and the issue of moving from time-based to mastery-based measures of student performance (Graham, Woodfield & Harrison, 2013). According to Graham et al (2013), the extremes can be seen as face-to-face-learning and total online learning, whereas the models in between the two can be technology-enhanced learning where there is no reduction in contact time, blended learning where there is some reduction in contact time and mostly online learning with supplemental or optional contact time.

The current descriptive paper illustrates the advantages of using technology-enhanced learning on courses aimed at improving students' English language, communication, research and problem solving skills in the first two years in an English-medium engineering college in the Arabian Gulf region. The data are based on faculty observations and student feedback gathered from student course evaluations. Suggestions are also provided for how this approach can lead to providing students with blended learning platforms.

Context

When the engineering college, where the current study takes place, was founded some 15 years ago, the teachers were given relatively free hands to develop the curriculum, though it was suggested that the overall premises should be based on the American system of a four-year undergraduate college. The main stakeholder was a large regional oil company, whose interests had to be considered, too, as the company hoped to employ most of the graduating students. Based on the traditional American model, first year students take a course called Rhetoric and Composition (Rhet and Comp) to enhance their writing and critical thinking skills. In such courses, students start with descriptive essays and progress from compare-and-contrast, and for-and-against essays to argumentative ones. However, as most of the issues that engineers deal with are solved using mathematics and applied sciences, there is not much room for essay writing or argumentation. Therefore, it was decided by faculty at the time, led by Robert Craig, that a project-based approach be adopted in the first two semesters instead of the traditional Rhet and Comp. Craig had successfully adopted this approach in a previous job in Morocco, where students came up with project to purchase and operate a soft drinks dispenser at the college. The project was a success, the dispenser was installed and profit made was partially used to fund books for the pupils in a nearby primary school. Against this background, it is understandable how staff and students would be motivated to use the PjBL approach to learning.

This idea was introduced to first year Arab students in an English-medium engineering college in their Communication 1 (first semester) and Communication 2 (second semester) courses which were seen to replace the traditional Rhet and Comp (Craig & Bielenberg, 2015) to match the kinds of writing that engineers need to do in their studies and in the workplace. As the depth of the projects increases gradually, the instructor and slowly move from a traditional teaching approach to become a facilitator, at the same time scaffolding student learning. Making the projects partially based on teamwork also provides students with the opportunity to get help from their fellow team mates, instructors, the internet, and other sources, in other words, working within Vygotsky's zone of proximal development (Smidt, 2013).

Communication Courses

In their first semester students work on team-based projects regarding their immediate environment and their studies, based on the scientific method. The class size is typically 20 to 25 students. The assignments are a mix of individual and team-based assignments, including a literature review, a proposal (written and oral presentation), progress reports and a final report and presentation. The major tasks are delineated in the syllabus and, for example, the final report gets written in sections as the project progresses. In the second semester students already understand the scientific method and there is less guidance. In addition, teams are expected to do more work outside class, including collecting data off the college premises. Project topics focus on technical, semi-technical and environmental issues.

Engineering Design Courses

In the second year, the basis is the engineering design process and the projects are basic design projects. Along with developing their research/design projects, students write and present project plans, to do research assignments individually and in teams, participate in projects reviews, demonstrate their projects and project documentation in the form of reports and presentations. The idea is that there is a trade fair at the end of the course in the first semester where the students showcase their designs. In the second semester for some majors, for example, Mechanical Engineering, student teams design and build a product or device and then compete against each other to prove the success of their designs.

Using Technology-Based/Blended Learning in an Established Course

The brief course descriptions provided above provide scope for a technology-based/blended learning environment. In fact, some of the ideas and approaches have come from the students themselves, for example, in the form of document sharing. For their own convenience, many of the students working in teams form WhatsApp groups to stay in touch with each other during the team projects. They also learn to work with Dropbox and Google Docs to share information and work on team documents instead of relying on emailing each other several versions of the same document, which inevitably get mixed up. Moreover, document sharing makes editing and adding information much easier when everybody is working on the same documents, be it prezi presentations, power point presentations, posters or a project plan or final design report. Much of this work happens outside the classroom in a place and at a time convenient for each member of the team, as long as deadlines are abided by. The instructor acts as a facilitator providing suggestions for both online collaboration and content matters, especially during progress reports and project reviews. It is necessary also to clarify when the instructor can be contacted, as students seemed to expect that the instructor would respond immediately to panic messaging or emailing at 11pm at night regarding an assignment due the following morning. Otherwise such communication is highly recommendable and typical students' excuses of files being on someone's computer or electronic storage system are no longer possible to make. Students do not see this form of cooperation so much as homework but rather as working in teams on a project, their reality in the workplace as engineers.

Students are encouraged to submit coursework to an online learning platform. The platform used in the described courses was Blackboard. Assignments were set so students could do multiple submissions and use the plagiarism program to check that referencing in their background research was in order. Moreover, they were encouraged to run their work through a free online vocabulary and grammar check site. This means that the work students hand in is typically of a higher standard than before the use of electronic checks prior to submission. A further advantage is the permanent record of students work and feedback. This is because providing feedback and grading can be done using the online platforms (in this case Blackboard), both instructors and students have a permanent copy of the documentation and the grading that can be referred to at any given time during and after the course in question. There is no need for any more hard copies or emailing of documents.

For acquiring knowledge students can attend face-to-face lectures, work in teams in class using their phones and laptops and be guided by the instructor/facilitator. On the other hand, course materials can be provided through the online learning platform and students can be assisted in how to retrieve the necessary information, leaving room for them to search for alternative explanations as well as those provided by the instructor. As an example, background research guidelines could be provided on power point slides with

a voiceover. Relevant online video clips on, for instance, how to do technical writing or document formatting can be made available for students instead of lecturing on the topic. Selected reading can be posted online and multiple choice or open-ended questions can be required as evidence of the work having been done. A novel approach for me, the author, as a co-teacher on the design course was that a useful way to get information is to first look at pictures and diagrams in Google images and then move onto the websites through the links in the images.

Moreover, online platforms provide discussion forums. One way these can be used is for students to submit documents that are available for others in the same class to comment on, for example, asking students to comment on two or three other students' posts. The platform can also act as a question-and-answer facility for issues regarding course work and the projects at hand. As the monitoring of the use of these facilities occurs technically, in other, words, the programs track the usage, e.g. a record of the amount of visits to a site or a post, the disciplinary aspect of instruction is much less than in a classroom environment, another advantage of including technology-based learning in a regularly taught course. All courses receive and most of the instructors on the courses receive above average evaluations from students at the end of each semester. In addition, student grades are typically high (As and Bs), though there is some argument that there may be some grade inflation due to teamwork assignments, which account for approximately 50% of the course grades. Typically, some of the weaker students complain about the workload, especially in the first course, which is most likely due to the fact that they are not accustomed to working in teams in a project-based learning environment.

Conclusion

Technology-based learning is a great way for students to learn in the 21st century. The facilitative nature of instruction, while initially challenging, is very interesting for instructors, and administratively a lot of time and money can be saved in the long term. The time can be used for enhancing existing courses, providing new courses and doing research. It is true that setting up such courses requires some training for both faculty and students. Furthermore, the initial preparation of the course outline and the materials is very time-consuming. However, the long-term benefits outweigh the short-term, initial obstacles, as such learning develops subject specific knowledge, teamwork skills and critical thinking skills, as well as encouraging life-long learning. It is highly recommended that instructors experiment on problem-based and project-based learning, as well as technology-based and blended learning. To ease into this way of learning and teaching, these methods can first be applied to assignments, then to course modules and to finally entire courses and programs. As the advantages become clearer to students and administration, the compensation system should be understood and executed in a way that is satisfactory to all parties involved. A further attraction is the wide student base that is made possible by blended learning environments where not everyone needs a seat in the classroom and not all teaching needs to be done in school or college. Ultimately, blended learning provides the space for personal learning journeys for both instructors and students Lange, Reynolds, & White, 2016).

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