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The Problem/Project-Based Learning (PBL/PjBL) at Online Classes

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Abstract

The aim of this paper is to analyze the development of effective online Problem-Based Learning (PBL) and Project-Based Learning (PjBL). The collaborative PBL/PjBL become one of the hot issues with the rapid growth of online learning in the era of COVID-19. Educators try to get innovative to continue instruction without sacrificing student engagement, thus adopting an instructional model of PBL/PjBL. The PBL process involves clarifying terms, defining complex problems, brainstorming, structuring and hypothesis while PjBL includes project-planning, implementation, communicating the results of a project in a presentation and evaluations with immediate individually tailored feedback within a predetermined period. Despite the differences between online and offline learning, the benefits of learning online or offline are practically the same if enough bidirectional interactions between instructors and students are possible. We argue that online qualifications are just the same as those of offline ones in PBL/PjBL models, therefore, the standards of online/offline learning are identical since education is a two-way communication.

Keywords: *Problem-Based Learning (PBL), Project-Based Learning (PjBL), Online Learning/Classes, Individually Tailored Feedback*

1. INTRODUCTION

The purpose of this paper seeks to address the required essentialities of online classes amid the COVID-19 pandemic, so this paper addresses the facilitation of the Problem-Based Learning (PBL) and the Project-Based Learning (PjBL) as an instructional model to employ effective communication, solving the problem of lack of communication at online classes. The effective integrating PBL/PjBL into online learning can help students stay connected and engaged [1]. When most of the classes become remote due to COVID-19, educators try to get innovative to continue instruction without sacrificing student engagement, thus adopting PBL/PjBL, an instructional model that includes the strategic, active engagement of students in opportunities to learn through doing.

PBL/PjBL can help students build the skills such as collaboration, communication, critical thinking and creativity. PBL/PjBL allow students to learn about and reflect on real-world problems through well-designed projects and self-evaluation. Students strive with their creative thinking skills to complete their project tasks by utilizing the knowledge in classroom learning. Therefore, the online collaborative learning method becomes one of the hot issues with the rapid growth of online learning in the era of COVID-19.

Then, what is the big deal about PBL/PjBL? PBL is a method of instruction where a problem/question drives the learning during the course. Developing essential questions for the course are open-ended and debatable since engaging questions drive to the heart of the major topics for the course curriculum. Learning in the context of solving a problem is easier to store the knowledge in memory patterns that facilitate later recall for solving problems. PBL combining with PjBL is

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cooperative, self-directed, interdependent, self-assessed learning in a small group with an individually tailored prompt feedback. The process for PBL/PjBL is very different from traditional classroom of lecture teaching, so often require more preparation time and resources to support small group learning with enough feedback.

Under the condition that there are enough bidirectional interactions between instructors and students, we argue that the same level of inquiry, questioning, critique, reflection, scaffolding and collaboration is possible in remote online learning environments as much as in offline learning environments.

2. PBL/PJBL AT ONLINE CLASSES

2.1. How to Employ Effective Communication Techniques at Online Classes

The main difference between online and offline learning is location. With offline learning, participants are required to attend a lecture hall or a classroom. With online learning, on the other hand, participants simply need to log on to the internet from their home or work, practically anywhere in the world. Another difference is the flexibility. Online learning usually has a more flexible timescale to both instructors and students, but offline learning does not offer as much flexibility. Despite advantages of time and location flexibility of online learning, its major disadvantage is the lack of contact communication for active student engagement.

To consider the difference between online and offline learning, here we propose an online/offline domain expressed in terms of three-dimensional factors like social distance, oral/written contexts and online/offline modes (See Figure 1).

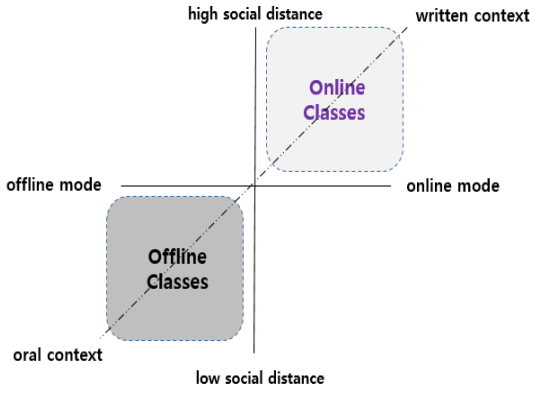

Figure 1. Online/Offline domain

In figure 1, the online and offline domains are in the opposite domains, the upper right domain and the lower left domain respectively. The online and offline domains seem exclusive, but these two domains are not a matter of choice. To employ the same effective communication techniques in online classes as in offline classes, we need to find the optimal convergence point by utilizing each advantage of online and offline classes and adopt an instructional model that can produce the same effective results regardless of online or offline classes. One such teaching method is PBL/PjBL that can help students stay connected and engaged in their online learning. We will discuss the effective integrating PBL/PjBL into online learning in the following sections.

2.2. How to Facilitate PBL/PjBL in Online Classes

Most of the classes become remote due to COVID-19, so educators strive to stay connected with

students without sacrificing student engagement, adopting an instructional model PBL/PjBL for effective online instruction. PBL/PjBL is an innovative approach to learning in the era of ontact (online+ contact). Bell argues that students drive their own learning through inquiry, as well as work collaboratively to research and create projects that reflect their knowledge. He says that from gleaning new, viable technology skills, to becoming proficient communicators and advanced problem solvers, students can benefit from this approach of PBL/PjBL [2].

To prevent students from simply attending classes with just memorization, PBL/PjBL is a good teaching method in which the students can make connections the knowledge with their real life. In a PBL/PjBL classroom, an essential question at the beginning of a course could guide students in small groups to let them answer the question. The students answer the question and present to the class, calling on multiple sources of information. Each group would most likely have different answers or at least have varying support for their responses. In a word, PBL/PjBL is a method of instruction where a problem drives the learning to the heart of the major topics for the course curriculum.

In the following sections, we will consider how PBL and PjBL work in online classes in a similar way as in a face-to-face classroom. We can just translate the face-to-face PBL/PjBL components into the tools for online classes, along with Learning Management System (LMS) with other tools available to instructors and students online.

2.3. The Problem-Based Learning (PBL)

PBL was originally for medical education in order to foster motivation, to promote problem-solving abilities and to encourage student interaction and independent learning [3, 4]. Since then, PBL has expanded to the applications for other programs of learning. Previously mentioned, PBL is any learning environment in which the problem drives the learning. Before students learn some knowledge, they start with a problem. The students discover that they need to learn some new knowledge before they can solve the problem. Some example of PBL environments include research projects, engineering design projects, case study integrating previously learned knowledge and solving the problem. PBL can be a proper solution to the lack of motivation and engagement since it requires students to work in small groups through the steps to answer a problem. A systematic PBL addresses the challenge of motivating students to perform at their highest level while engaging them in the process of learning. That is, PBL is an active learning that can change the passive learning style since it improves the skills such as problem solving, critical thinking, collaborative learning, and so forth.

What is the big deal about problem in PBL? In PBL, you need to solve a problem. Posing the problem before learning tends to motivate students. They know why they are learning the new knowledge. Students should be skillful at problem solving. Jonassen argues that the importance of problem solving seems to have become greater than ever before, and problem solving is one of the most important activities in our everyday and professional lives [5]. PBL works effectively everywhere in our society as the vehicle to promote the learning of concepts and principles as opposed to direct presentation of facts and concepts in a variety of disciplines and levels. The PBL model focuses on the active role of learners by exposing them to a problem to actively solve existing problems and then draw conclusions. The cause-focused clauses that frequently occur in English sentences is also an example of the effect of the PBL model since the cause-focused clauses reflect the currently prevailing perspective of the problem-oriented thinking [6].

To sum up, the PBL process involves clarifying terms, defining problems, brainstorming, structuring, learning objectives, independent study and synthesis [7]. This process identifies what they already know, what they need to know, and how and where to access new information for the resolution of the real-life problems.

2.4. Project-Based Learning (PjBL)

In order for PBL to be cooperative learning, it must require a team project cooperation in small groups, i.e., PjBL. PjBL includes preparation/planning, implementation, reporting and communicating the results of activities, prompt feedback and evaluations within a predetermined period. Through project learning, there is the development of an inquiry process in learning topics that are real in nature to attract students to study.

The research results show that PjBL models motivate students to learn material that exists in everyday life while enhancing creativity [8, 9]. PjBL is one of the scientific learning models that gives students the freedom to plan learning activities, carry out projects collaboratively, and ultimately produce work products for presentation to others [10]. Unlike traditional learning models, the process in PjBL is mainly student-driven learning, involving students in learning knowledge and skills through developing inquiry processes where instructors just act as facilitators or motivators [11]. Therefore, the role of the instructor is to facilitate learning by supporting, guiding and monitoring the learning process [12]. The small group, self-directed, self-assessed PjBL is so great for learning for the student-driven learning where the acquisition of the knowledge is student-centered, not instructor-centered.

In addition, PjBL requires instructors and/or students to develop guiding questions. Thus, this learning model can theoretically influence student learning outcomes and levels of creativity since they can learn best in the process of working toward a goal together. For resources, we have to empower the student groups to be autonomous and accountable for their learning since students learn about a subject through solving a problem by enhancing group collaboration and communication.

PjBL needs regular and prompt feedback for students and requires reflection on learning of both instructors and students. Furthermore, the advantage of PjBL is that skills developed in one module can be used for other modules. Wijayati et al. show that increasing students' creativity with the application of PjBL models produces a positive response to the implementation of the model. The result of the student reflection questionnaire states that the atmosphere of learning is fun and happy with this model by 100%, and PjBL motivates students by 97.3%, which considers learning more effectively and can easily accept lessons by 94.6% [13].

To sum up the major advantages of PjBL: (i) student-driven & high student engagement; (ii) teachers' immediate feedback; (iii) interdisciplinary classes for innovation and creativity; (iv) students' quick growth beyond content; (v) natural for digital online classes.

Finally, let us point the weak points of PjBL. First, PjBL requires an instructor's heavy workload to provide students with consistent feedback since the individually tailored feedback is a time-consuming work. Therefore, the size of the class has to be with small numbers less than 40. Second, PjBL depends greatly on technology. Both instructors and students find themselves in the situation where they have to embrace the digital academic experience of the online classes. Third, there is a pressure to perform on a standardized test. Fourth, there is a threat to higher education because students may not want to study at college in the same way that the traditional college students learn. Therefore, in order for PjBL to be successful and sustainable, it must carefully combine technology, infrastructure, standardized tests and students' recognition.

2.5. A Study to Analyze PBL/PjBL

This case study presents the PBL/PjBL method implemented using two English major undergraduate courses at the University in Korea during the period of COVID 19, fall, 2020. For two junior-level courses of English History and English Syntax, PBL/PjBL methods are used to assess problem-solving skills and project presentation of undergraduate English major students. The result of the student reflection questionnaire and class evaluation at the end of the semester show that

PBL/PjBL in the online classes are fun and quite satisfactory to students almost 100% since PBL/PjBL motivates students well enough. Especially, students are satisfied with an individually tailored prompt feedback. In these courses, we modify the content as well as the educational strategy of the courses in order to incorporate PBL/PjBL and to increase the levels of interest toward design, problem-solving, and independent learning. We provide the students the guidelines designed in such a way that the students can work on a project in groups (3 or 4 people per a group), which involves the skills required for a sustainable real life future. The project-grading rubric is mainly concerned with evaluating the course-learning outcomes.

To summarize the steps, the PBL/PjBL evaluates a paradigm in five phases: a planning phase, a design phase, an implementation phase, project presentation and a reflection phase as in (1).

(1) Planning → Design: project guidelines/grading rubric/ active research/ discussion & feedback → Implementation: project assessment → Presentation → Reflection

The first planning phase involves the instructor planning for the actions in the form of linking the learning strategies to the tasks given to the students. The second design phase includes the project guidelines, the evaluation plan in a grading rubric of the course, group discussion and prompt feedback. The third phase of project implementation involves carrying out what the students in groups plan. One of the main purposes of implementation is to make sure that the team has access to enough resources in order to execute the plan effectively and without any problems. The fourth phase is a project presentation in a form of video recording in case of the online classes. The reflection phase is done at the end with the data obtained during the study to review the approach and suggest improvement.

There is a need for research to examine experiences of online PBL/PjBL, where each group (three to four students per a group) selects one-problem scenario from the multiple problem scenarios given by instructors. For feedback, we use a synchronous discussion board to facilitate the learning process with others. Online PBL/PjBL is beneficial for developing ideas and analyzing information. The other important phase of PBL/PjBL is resolving the problem, that is, the critical task is presenting and defending the solution to the given problem. Students first state the problem clearly, describe the process of problem solving, and then support the solution using relevant data analysis. Being able to communicate and present the solution clearly is the key to the success of the online PBL/PjBL classes since it directly affects the learning outcomes [14]. On the other hand, utilizing technology makes presentation much easier and more effective as it can incorporate visual aids. The web-based tools have collaborative functions for the effective PBL/PjBL process.

3. CONCLUSION

Amid the COVID-19 pandemic, most of the classes become remote and even after corona period, online classes will be more dominant than offline classes. This paper analyzes the development of effective online instructional model, PBL/PjBL. The online collaborative PBL/PjBL becomes one of the hot issues with the rapid growth of online learning in the era of COVID-19. In this period of prevailing online classes, to continue instruction without sacrificing student engagement, instructors thus adopt an active learning, PBL/PjBL, which is an instructional model that includes the strategic, active engagement of students in opportunities to learn through doing.

The PBL process involves clarifying terms, defining problems, brainstorming, structuring and hypothesis, learning objectives, independent study while PjBL includes project-planning, implementation, communicating the results of activities and evaluations with an individually tailored immediate feedback within a predetermined period. The online class result shows that PBL/PjBL models motivate students to learn material that exists in everyday life while enhancing creativity.

To conclude, despite the differences between online and offline learning, the benefits of learning online or offline are practically the same especially when using active PBL/PjBL models. That is, if enough bidirectional interactions between instructors and students are possible, we argue that the

same level of inquiry, questioning, critique, reflection, scaffolding and collaboration is possible in remote online learning environments as much as in offline learning environments. We argue that online qualifications are just the same as those of offline ones when using PBL/PjBL models. Therefore, the standards of online and offline learning are identical since education is a two-way communication regardless of online and offline modes.

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