

# Using Learning Objects as a Triggers for PBL in Industrial Technology Course

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## Abstract

The study offers a comprehensive and systematic analysis on perception the need of learning objects as triggers for PBL method in Industrial Technology (Civil Engineering) course. Learning objects is defined as an element of a new type of computer based instruction grounded in the object-oriented paradigm of computer field. The research design is a case study which consists of quantitative method. Valid instruments through questionnaire have been applied to 32 lecturers in this study. The results data was divided according to learning object and computer-delivered application to use learning objects in engineering classroom. Using the SPSS 16.0, the frequency, mean and percentage from data was obtained. At the end of this study, the result shows that lecturer have positive perception in learning objects use as a triggers for PBL method in Industrial Technology (Civil Engineering) course. Video element (mean=4.05) got the highest mean score on perception the need of learning objects. The lecturers also gave different view on learning objects using on PBL. It is reasonable to conclude that learning objects is an effective and suitable triggers tool in PBL method suited with higher education environment.

**Keywords:** Learning Objects, Problem Based Learning (PBL), Trigger.

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## 1. Introduction

This paper reviews the requirements and the availability for using learning objects in Technical and Vocational Education base on the lecturers and students perspective. According to Wiley [1] learning objects is element of a new type of computer based instruction grounded in the object-oriented paradigm of computer science. Definition of learning objects is digital entities deliverable over the internet that can be reused to support teaching [2] Any number of people can access and use learning objects to improve attitudes and learning performance. Learning objects is also defined as an interactive web-based tool design to enhance, amplify and guide learning. It is a readily accessible, easy to learn, concept-focussed tool that is a promising alternative for lecture [2]. Nowadays,

learning environment is more focus on student-centered and engaging the students. Students are given the opportunity to control some of the learning environment by having the choice of what question to answer. In addition, students are encouraged to think creatively, critically and innovative.

Reference [3] stated that application of learning objects such as video, audio and internet can attract the attention of students compare to traditional teaching methods. [4] explain that learning objects is any digital resources that can be reused when lecture access the learning object, they would break the material down into small parts. Then, they reassembled these parts to support their own instructional goals. According to [5] each individual can control the learning content where they can

choose the topics to be studied. Today, educators are endorsing constructivist-based learning, active learning and collaborative learning. Educators are required to think about media and medium that can be used for the transformation of information so that the ideas can be used by student effectively.

According to [6], the use of electronic networks can help lecture to prepare instructional media but also enhance their professional interaction.

In this study, PBL were used as the primary method to help student to build the understanding in engineering technique by watching problem presentation using learning objects as a triggers. Learning process in PBL initiated by presenting the questions and problems students must solve these problems critically and creatively [7]. The problem will cause students to focus on the use of problem-solving skills and use existing knowledge as a booster to the process [8]. Then, students will gain knowledge through information from the learning object provided. Therefore, this method can create flexible learning, collaborative learning and to improve the quality of existing towards higher-order thinking skills are complex [9].

Overall, we know those technical lectures are less consumes learning objects to assist in the process of teaching and learning. Besides that, learning objects are not fully utilized to support triggers in PBL. The purpose of this paper was to examine the requirements and the availability by using learning objects as triggers for PBL method in Industrial Technology (Civil Engineering) course among the lectures.

## 2. Problem Based Learning (PBL)

PBL is directly related to constructivist theory and focus on learner-centered paradigm. The use of PBL as an instructional method has been identify as one way to development student competencies to become more self-directed in learning, means they can control their learning and work in a small group [10]. It is a learning approach when students confronted with a problem and challenged to work towards a solution [11]. Problem is a key to engage students with a new idea and construct information to get the answer. Problem-driven instruction also could motivate students to learn the subject due to human nature of curiosity and taking on challenges [12]. The effect of PBL with intrinsic motivation demonstrate that more attraction to the students and the result seem students more extensively in the topic at hand [13].

Reference [14] says that, in most cases, PBL is performed in small groups, fostering discussion and collaborative discovery, as the groups need to work together towards the solution for a specific problem or set of problems. A group has a tutorial leader or facilitator who shares information and guides the group through the learning process. They apply knowledge, reflect what they have learn and plan strategies in order to solve the problem. Furthermore, collaborative learning also provides

opportunities for developing social and communication skills, acquiring positive attitudes towards co-members and learning material, and building social relationships and group cohesion. This is the important part of characteristic in PBL.

In sum of PBL, seven core characteristic of PBL are described by [15]. The first characteristic is that learning needs to be student-centered. Second, learning has to occur in small student groups under the guidance of a tutor. The third characteristic refers to the tutor as a facilitator or guide. Fourth, authentic problems are primarily encountered in the learning sequence, before any preparation or study has occurred. Fifth, the problems encountered are used as a tool to achieve the required knowledge and the problem-solving skills necessary to eventually solve the problem. Sixth, new information needs to be acquired through self-directed learning. Finally, essential for PBL is that students learn by analyzing and solving representative problems

## 3. Research Methodology

The purpose of this study is to examine lectures' perception using learning objects as triggers for PBL method in Industrial Technology (Civil Engineering) course. In this study, the research design consists of quantitative method. Purposive sampling is used in this study. This is refers to a sampling procedure in which a group of subjects that have certain characteristics as respondents in the study [16]. A total of 32 respondents from Faculty of Technical and Vocational Education in Civil Engineering field are selected.

A survey questionnaire developed by the researchers was utilized for data collection in order to investigate lecturers' perception using learning objects as a trigger for PBL. The instrument consists of 16 items in questionnaires to meet the purpose of research. A five point Likert scale was used (5= strongly agree – 1= strongly disagree). Descriptive and analytical statistics as well as the Statistical Package for the Social Sciences (SPSS) were used to find out the lectures' perception using learning objects as triggers for PBL method in Industrial Technology (Civil Engineering) course.

## 4. Result and Discussion

The analysis was conducted to answer the first research question. In this section, 20 items are divided into six main aspects, which include text, graphic, audio, video and animation. These will be used to identify lectures' perception using learning objects as triggers for PBL method in Industrial Technology (Civil Engineering) course.

### Text

Table 1 show the highest mean were 4.53 where the students more easily understood the concept if the description of building materials such as concrete, brick, wood and steel were illustrated through combination of

graphics and text. In addition, lecturer had gave their opinion that the text element should be supported by other learning objects in PBL. [17] also found that the combination of text with other learning objects can access interesting, accurate and complete information. While the lowest mean were 3.41, where lecturers have a moderate

tendency to simple text explanation caused the insufficient information. Lecturers also state that the written text must be brief and clear. These are supported by [18] which the text can deliver comprehensive information to students. Overall, the text elements are at a high level of mean was 3.97.

Table 1: Mean for the needs of text

No	Item	Mean	Level
4	Student understood the concept if the description of building materials (concrete, brick, wood and steel) were illustrated through combination of graphics and text.	4.53	High
2	Student understood if lecture used concise information.	4.19	High
1	Requires to use text for theory explanation in brick works.	3.75	High
3	A simple text explanation caused the sufficient information.	3.41	Moderate
Average		3.97	High

### A. Graphic

From the Table ii, the highest mean are the same as described as in previous discussion of the text elements in which lecturers prefer if graphic elements are supported by text elements. Meanwhile the lowest mean were 3.50, where lecturers need high quality images at a moderate level. [17] emphasized that the graphics were selected need to be high quality and can be used on any computer system.

The researcher also had the same opinion that the selected graphics should be clear and convey with the information. PBL approach seeks to generate curiosity among students through exposure interesting problem [19]. According [20] instructional design and learning repetitive help students develop mental images gradually and form long-term memory of an information. Overall, the graphic elements are at a high level of mean was 3.98.

Table 2: Mean for the needs of graphic

No	Item	Mean	Level
4	Student understood the concept if the description of building materials (concrete, brick, wood and steel) were illustrated through combination of graphics and text.	4.53	High
5	Student easier to remember if true images is use.	3.91	High
6	Need a high quality images.	3.50	Moderate
Average		3.98	High

### B. Audio

From the Table iii, results have shown the highest mean are 3.41 where students need audio in study. Of the use of background music can disrupt the focus of student performance. Researchers think that background music are unsuitable placed along with teaching and learning process. It can interfere with the concentration of students and lecturers. The appropriate background music is placed on certain points. Reference [17] noted that there must be rational to place audio because not all the learning objects must have audio. The lowest mean was 3.00 for the item the student use of audio to enhance the understanding of

self-learning. This result differs from the findings made by [21] in which lecturers were more likely to use audio to support learning process. Reference [22] say, animation software integrated with audio in PBL enable students to engage actively in the process of problem solving. PBL in this study meet the constructivist ideal reference for students to understand the problem scenario and identify things that have been studied based on facts and real experiences [23]. Average, elements of audio at a moderate level of mean was 3.22.

Table 3: Mean for the needs of audio

No	Item	Mean	Level
7	Students need audio in study.	3.41	Moderate
8	Audio can increase understanding.	3.25	Moderate
9	Background music can disrupt teaching and learning process.	3.00	Moderate
Average		3.22	Moderate

### C. Video

From the Table iv, lecturers have high perception (mean=4.16) on video element as the ground work operations can reused many times to increase the understanding on that content. The findings are similar to [9] studies that found that the showing video repeatedly to increase the understanding of students for remember the experiment in the laboratory. Reference [24] support the use of video can reduce the cognitive load and increase

student's skill in problem-solving process. Based on [19] study, also found that implemented of PBL form personal skills and improve academic achievement in every semester. While, the lowest mean were 3.97. Lecturers agreed that documentation work such as work processing brick, wood and steel is more easily understood. Overall, the video elements are at a high level of mean was 4.05.

Table 4: Mean for the needs of video

No	Item	Mean	Level
12	Video as the ground work operations can reuse many times to increase the understanding on that content.	4.16	High
10	Demonstrate work like concrete or brick easier by using video before start the practical work.	4.03	High
11	Documentation work such as work processing brick, wood and steel is more easily understood.	3.97	High
Average		4.05	High

### D. Animation

Based on Table iv, the findings have shown that animation is a popularity learning objects among the students. The highest score were 4.13, where lecturers think that the foundation structure of the building to the roof more clearly seen by using animation. [18] stated that animation allows a difficult concept or content can be explained by using words or static images. It's more easily, interesting and effectively by using animation. This is consistent with Cognitive Theory of Multimedia Learning [25] which states that aid supports animated multimedia displays results better than text input only [26].

This study was consistent with the findings [9] in

which the influence of animated elements have a positive impact in improving the performance and understanding of the lesson content because students are able to feel emotions more clearly through these interventions. PBL online help improve understanding of the lesson content, learning satisfaction and create teamwork [27]. The lowest mean (3.75) represent the students need animation to improve their understanding by the process of cement production through a variety of colour flow. The study conducted by [24] found that animation in the learning approach can create engagement and reducing the burden of cognitions among student. Overall, the animation elements are at a high level of mean was 3.97.

Table 5: Mean for the needs of animation

No	Item	Mean	Level
14	Foundation structure of the building to the roof more clearly seen by using animation.	4.13	High
13	Scaffolding construction will be more interesting if the lecturer using animation elements.	4.06	High
15	Can visualize the compacting concrete pouring work if using a simulation.	3.94	High
16	Need animation to improve their understanding by the process of cement production through a variety of colour flow.	3.75	High
Average		3.97	High

### 5. Conclusion

The education is more geared towards to the needs of technology makes animation is seen important for all parties. Student felt more excited and impressed with the simulation as shown in the process of teaching and learning. However, the lecturer is less interested in animation elements because their think that true picture had better reflected compare to the visual element. The

researcher can conclude that it is very difficult to find teaching materials with all of these elements. In matter of time and energy constraints, the video elements are always a priority.

On the whole of this study, it was found that the audio is less concern among lecturers. Based on their opinion, found that the audio may interfere with the student focus and reduce the effectiveness of teaching and learning

process. However, researchers felt that all the mutually dependent elements of each other. In consequence, each element does not stand alone but they are support altogether. Reference [28] showed improvement in students' exam results after using the help of learning object in learning. Their study supports the use of all learning object tool as an alternative element in contributing to the problem solving process more effective and also increase the curiosity of students. The issue resembles real life and ill structured problem [23].

It's help lecturers on preparing their instructional materials and facilitates the lecturers in the teaching. Students felt very comfortable with this type of learning because online information is relevant and much related to the subject. As we know that the subject of industrial technology exposes students to the latest technologies in building construction. Furthermore, by sharing knowledge and information may increase their potential and quality as a student. However the extent of their willingness and readiness to use the latest technology still be as a question to the researcher. The results show that student felt uncomfortable by using computers in their study. However, the lecturers indicate that they are ready to use learning objects as triggers in PBL method.

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