# Adopting a Project-Based Learning Framework in an Online Course to Enhance the Quality of Student Projects

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**Abstract**: The purpose of this research was to examine pedagogical factors that supported graduate-level Instructional Design students in the rapid adoption and integration of technology-based projects in under 7 weeks, previously accomplished in approximately 9-months. Project-Based Learning (PBL) pedagogy was adopted to redesign a course to scaffold and support the students in the achievement of the course learning outcomes. This pedagogy was selected as its emphasis is on ill-defined problems, problem-solving, collaboration, authentic real-life applications, and the creation of an end product (Savery, 2006). In the revised curriculum, students were challenged to learn instructional design methods and simultaneously produce a robust eLearning deliverable that evidenced the very instructional design principles being learned. The technology project was based on a needs assessment survey designed to capture self-reported gaps in the knowledge, skills, and abilities of individuals in the instructional design field. This exploratory case study reports on the design process related to how the course adopted a Project-Based Learning framework, the varied scaffolding strategies employed to reinforce the achievement of learning outcomes, and the instructional design decisions that facilitated and supported the learners in the achievement of technology-based projects in under seven weeks.

**Keywords:** Instructional design, Project-based learning, Scaffolding, Technology

## Introduction

In a graduate level program, two courses were originally dedicated to the design and development of a capstone technology-based eLearning project. The first course was dedicated to the analysis and design plan for the project; the second course was dedicated to the development, implementation, and evaluation of the project. Both courses were offered online in 7-week formats, however, rarely was a learner able to complete either course in that timeframe. In the majority of instances, projects took upward of 9 months to complete. For a variety of reasons, these two courses were eliminated. As a result, a graduate level course was revised to adopt a Project-Based Learning (PBL) framework that would culminate in the creation of a technology-based project. The achievements of learners in under 7 weeks were astonishing in that they all completed an eLearning project that evidenced competency in instructional design skills and in many instances, the incorporation of premiere eLearning software. This preliminary study examined the pedagogical design decisions that fostered the success



Moore, S. W. (2021). Adopting a project-based learning framework in an online course to enhance the quality of student projects. In V. Akerson & M. Shelley (Eds.), *Proceedings of IConSES 2021-- International Conference on Social and Education Sciences* (pp. 144-149), Chicago, USA. ISTES Organization.

of the students in the new curriculum in an attempt to better understand the phenomenon that contributed to their success.

### Related Literature

Literature supports Project-Based Learning (PBL) as a constructivist learning pedagogy (Dewey, 1938; Savery, 2006). The active learning component of PBL engages learners in authentic tasks, or ill-defined problems, and typically results in the production of an artifact (Capraro & Slough, 2013; Doppelt, 2003). Scaffolding is a concept in the PBL framework in which the instructional leader supports the ongoing development of the learner (Jumaat & Tesir, 2016). It can include instructor contact, peer-to-peer contact, and/or technology/computer interaction. It can increase motivation, and ultimately, learning (Capraro & Slough, 2013). Instructional designers may be systematically eclectic in their approach to designing impactful and deep learning (Ertmer & Newby, 2013). This implies strategically using elements from various frameworks to achieve the desired learning goals. Learning theories can be employed to help motivate learners by ensuring the learning is meaningful, valuable, and relevant (Knowles, Holton, & Swanson, 2015).

### Research Questions

An exploratory study analyzed what factors contributed to the success of the students in the creation of their technology-based projects. The research was guided by these fundamental questions:

1. How was Project-Based Learning adopted in the design of the course?
2. What is the quality of learning since the adoption of the Project-Based Learning approach?

## Methods

This study utilized the case study method to address the two research questions. The case study was chosen for its particularistic characteristics (Merriam, 1998). In this regard, the case study focused its analysis on understanding a particular phenomenon. “The case itself is important for what it reveals about the phenomenon and for what it might represent. This specificity…makes it an especially good design for practical problems – for questions, situations, or puzzling occurrences arising from everyday practice” (Merriam, 1998, p. 29). The following table summarizes the course artifacts used in the analysis:

Table 1. Data Collection Categories & Artifacts

| **Instructor Records** | **Instructional Content** | **Assessment & Feedback** | **Communication Strategies** |
|---|---|---|---|
| Curriculum Map | Syllabus | Instructions | Announcements |
| Program Learning Outcomes | Instructional Content | Rubrics | Discussion Forum |
| Module Learning Outcomes | Instructional Videos | Instructor Feedback | Small-Group Discussion |

**Data Analysis**

The case used in this exploratory study is a program course that piloted the adoption of the PBL framework in which a technology-based project served as the summative assessment. Two course offerings were examined and each served as a unit of analysis. One course was offered in a 7-week online format, and one in a 6-week online format. Using a constant comparative method of analysis (Merriam, 1998), elements were examined to identify, label, and map the strategies and frameworks used throughout the courses (Harrison et. al., 2017). This cross-case analysis helped unify a description of the categories to conceptualize the data (Merriam, 1998). Multiple sources were used to increase the triangulation of the data, including formal resources on Project-Based Learning which served as an "outside source to validate case study materials" (Merriam, 1998, p. 204). In this regard, the curriculum was compared to formalized recommendations in the literature for quality PBL integration in technology-based projects.

## Results

To answer the first research question which sought to better understand how PBL was adopted in the course, analysis discovered three primary categories that emerged. The categories revealed several pedagogical decisions that are believed to contribute and support the success of the both the design and development of the final technology-based projects: (1) the overarching pedagogical framework used, (2) the instructional content which served as a modeled throughout, and (3) key learning theories that were utilized to help design the curriculum. Each of these is discussed below.

First, Project-Based Learning was utilized as the primary pedagogical framework upon which the course was designed. The course proved to be more than a technology project assigned as a summative assessment. When compared to the key indicators of the Project-Based Learning principles as noted in literature, multiple distinguishing PBL principles were incorporated into the adopted course (Boss & Kraus, 2018; Capraro & Slough, 2013; Doppelt, 2003; Savery, 2006). Specifically, five key underpinnings of the PBL framework were evidenced and are described in more detail below:

1. Each student was given the opportunity to select an instructional design project based on an ill-defined problem as indicated through the results of a needs assessment survey. The needs assessment survey was distributed to graduate level instructional design students and revealed self-reported knowledge gaps. The survey results served as the basis for selection of the ill-defined problem in which an eLearning solution was required to solve.
2. All students were asked to devise their own design solution for their selected ill-defined problem. This included making decisions about the curriculum to be developed, as well as which instructional technologies would be used as part of their eLearning solution. In this regard, students were required to select technologies they did not know and that could be used to advance their knowledge and marketability within their diverse career paths. Investigation was required in order to find a technology

solution.

3. Opportunities that promoted collaboration were found at regular intervals throughout the course. These included opportunities for the student, in the mindset as an Instructional Designer, to receive input on their instructional design problems from the design team (their classmates), as well as to help coach and provide feedback to other designers. In this manner, students worked cooperatively together on their individual projects, yet remained focused on their independent eLearning design projects.
4. The faculty member scaffolded and supported the students throughout the entire course. Many of these opportunities were intentionally integrated at key points, such as in the beginning, to help reduce cognitive overload. A discussion forum was provided for all public questions. Additionally, faculty support was also offered in the form of just-in-time "pop-up" office hours when there was a significant increase in the volume of questions being asked. All office hours were offered through optional video-based conferencing sessions which featured small-group instruction as a method to engage those present in helping to offer solutions to design dilemmas.
5. Assessment and reflection were provided at weekly intervals throughout the duration of the course as another means of supporting the learners. There were weekly knowledge and comprehension checks in the form of a quiz that could be repeated to earn a higher score. This was followed by a weekly opportunity to apply the new knowledge gained in a performance-based assessment. Each successive assessment required the learners to methodically work through each stage of the ADDIE instructional design model: Learners *analyzed* a real-life instructional design problem, *designed* a learning plan for the eLearning solution, *developed* the instruction using relevant technology, *implemented* the instruction, and *evaluated* the learning achievement. Feedback was provided on each assessment and learners were asked to remediate any design issues prior to proceeding to the next instructional design phase of their projects. Every member participated as learners in the eLearning solutions developed by their colleagues and by doing so, allowed that Instructional Designer to collect data on whether learning outcomes were achieved. This ultimately helped the learners reflect on their own instructional design skills in a final self-assessment.

Second, the revised course was found to employ a variety of instructional design framework. These were presented and modeled in the course, and learners were assessed on their ability to evidence one or more models in both their design plan and their technology-based projects. The instructional design models included ADDIE, Bloom's Taxonomy, and Gagne's 9 Instructional Events (Gagne, Wager, Golas, & Keller, 2005). Because these models were incorporated in the technology-based projects, it is believed that observing them in action and then applying them as part of their weekly progression in various assessments, helped foster the clear integration of the framework into the final projects. For example, learners were required to include a design plan that incorporated all of Gagne's 9 Instructional Events in the final eLearning projects. Careful attention was noted in assessing the final project, to ensure the events were still present in the technology-based project.

Third, a variety of learning theories were employed to support the design of learning: andragogical, self-directed, and constructivist learning theories (Knowles, Holton, & Swanson, 2015). The integration of an

eclectic framework of learning theories in the design of the course was used to help motivate the learners. Comments in the qualitative course evaluation mentioned that having a real-life instructional design problem to work through, made the learning meaningful, relevant, and inspired their performance.

To address the second research question which focused on the quality of student learning, all final projects were assessed using a performance-based rubric. The rubric was designed to measure the incorporation of instructional design principles and the creative incorporation of instructional technology. The results overwhelming evidenced a robust quality of learning as evident in the following:

- 100% of the learners met or exceeded expected achievement as evidenced in the final project rubric designed to measure the achievement of course learning outcomes.
- 100% of the learners submitted a technology-based project in under 7 weeks, delivering an eLearning solution to an ill-defined instructional problem.
- 100% of the technology-based projects evidenced the highest levels of Bloom's Cognitive Taxonomy, creation.

In conclusion, as observed through the eLearning projects and achievement on the final project rubric, learners were able to progressively build their instructional design solutions within the allotted time of the course, resulting in quality eLearning solutions that evidenced sound instructional design principles. Due to this success, the PBL framework is recommended to support learners in discovering solutions to ill-defined projects.

## Implications

The findings of this exploratory case study support the utilization of learner-centered pedagogies, such as Project-Based Learning (PBL), in the production of technology-based projects. It is believed that this framework was successful because it formed the foundation for an ill-defined problem as applied to real-life needs. Adults are most primed for learning when they can immediately see the relevance, and be key players in deciding why there is a need to know (Knowles, Holton, & Swanson, 2015). The learners were given choice in selecting technologies that were relevant to them professionally; this may have contributed to many selecting industry standard eLearning software such as Articulate Storyline. Ultimately, the technology-based projects were promoted as ones that could be used as samples in professional portfolios, a standard requirement in the profession. This may have further motivated them to excel within the accelerated timeline. Scaffolding learners with multiple levels of support, from commencement to culmination is highly encouraged. Similarly, modeling key concepts the learners are expected to evidence in their projects, may also prove helpful. Providing timely and quality feedback, allowing revisions, and being readily available for consultations, are also key considerations to anyone opting to implement and use a Project-Based Learning pedagogy within their practice.

## Recommendations

As an exploratory case study, additional interviews and focus group interviews would foster greater validity of

the findings and contribute a greater understanding to their motivation to produce caliber technology-based projects given the accelerated timeline. Future research that explores the reactions and motivations of the learners as they progress with their technology-based projects, could shed additional light on their metacognitive strategies that helped them plan, monitor, and evaluate their progress within the accelerated timeframe.

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