



## Project-based Learning and Assessment Unit Plans

Carol Anne Cao<sup>1</sup>, Shannon W. Sahabi<sup>2</sup>, Joseph Isaac<sup>3</sup>

### Abstract

*Are you ready to incorporate project-based learning (PBL) into your curriculum? Do you know how to get started? Come join these experienced presenters and learn how to create a driving question, deconstruct science standards, how to effectively assess through formative and summative methods, how to decide on products and presentation, what to grade (and what not to), how to write and use rubrics, and how to teach those rubrics to students. Bring a unit that you are ready to transform and leave with a running start for a PBL experience! This informational session is geared toward beginning and experienced teachers who want to improve their assessment methods, while connecting citizen science and 21st century skills to their current curriculum. Unit plans for both PBL and assessments will be provided as well as a discussion on how these plans will help with assessment validity and reliability. In addition, presenters will cover how to tackle the challenges with science standards, including how to connect these standards with IEP goals for students with special needs.*

**Keywords:** *project-based learning, assessment, 21<sup>st</sup> century skills*

### 1. Introduction

School-aged children worldwide are growing up immersed in a media-rich, ubiquitous, “always connected” world. Politicians, educators, parents, and business communities are voicing concerns over the need to reform the educational system to effectively prepare students for a much more technology driven, interconnected and competitive “flat world” across the globe [2, 12]

The Partnership for 21<sup>st</sup> Century Skills, a coalition that includes the U.S. Department of Education, large businesses, and community leaders, examined the skills required by students to be successful in this global economy [7]. These skills emphasized higher cognitive proficiencies, such as problem-solving competencies, research, and communication skills [11]. A gap currently exists between the skills taught in the general high school education and those desired by universities and future employers. Though the skills that ask our students to think critically, creatively, and analytically are not new, nor specific to the 21<sup>st</sup> century, the focus on these skills has been amplified more recently due to the economy and job force demands [13].

### 2. Project-based learning

PBL involves authentic research, guided by student’s own interests, and is a viable instructional strategy to help students access the curriculum. Key features of PBL include: student choice in the activities and interests they want to study; students learn to communicate and collaborate with peers; students develop critical thinking skills; students discover concepts and content through real-life projects; and students connect new learning to past experiences [1, 6].

PBL is an inclusive approach that allows for differentiated learning and all students can participate at their own abilities. Projects can be adapted to the various learning styles and can work at their own pace. When students are given ample time to read, think, respond, collaborate, and create, students are more likely to understand and apply knowledge to new experiences [14]. In addition, since the role of the teacher in PBL is the facilitator, less time is spent on providing knowledge and more is spent guiding individual students in their exploration of knowledge. Implementation of PBL in the classroom can allow students opportunities for success, as well as collaboration and critical thinking skill growth, to help them learn and explore their interests.

When the teacher's role is to facilitate rather than acting as the source of information, the students' exploration of knowledge is achieved as they discover answers to their own questions. For students to construct knowledge, they need the opportunities to explore for themselves and practice authentic research skills. By considering student interest in creating a PBL unit, the teacher fosters intrinsic motivation and stimulates a passion to learn. When students have voice and ownership of their own learning, they can be more motivated to work at their own ability levels and achieve skill growths that

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<sup>1</sup> Texas Tech University, United States

<sup>2</sup> Texas Tech University, United States

<sup>3</sup> Texas Tech University, United States



enable them to accomplish their goals. Additionally, students need to feel safe in their endeavors and in sharing ideas with others. In this environment, students learn to respect themselves, their surroundings, and others.

### 3. Assessments

Assessment is the process of gathering evidence of student learning to inform instructional decisions [15]. Teachers want to know what students know and can do – the content and the processes. Value is often placed on assessments on the school, district, state and even, global levels. However, assessments do not always look at individual students. Corrigan, Bunting, Jones, and Gunstone (2013) believe that even though value is placed on assessment, what is valued within these assessments and how the value is demonstrated may not be so simple [4]. The goal is to focus on assessments and design assessments as learning, of learning and for learning. In order to perpetuate student learning growth, it is imperative to formatively assess students daily (without grades or marks) to see where they are in terms of content and processes. It is designed to provide direction for improvement and/or adjustment to a program for individual students or a whole class [10]. Here, learning gaps can be discovered before “the big test” and differentiation can take place. Formative assessments include homework, classroom discussions, synchronous quizzes using technology for immediate feedback, pen and paper quizzes, first drafts, private conferences, teacher observations, self-reflections, peer evaluations, labs or learning activities and portfolio entries – these are assessments *for learning* [15]. A key component of formative assessment is descriptive feedback. The most effective feedback gives specific comments on errors plus suggestions for strategies to improve [5]. Summative assessment is concerned with certifying learning [8] and designed to provide information when making judgments about a student’s achievement at the end of a sequence of instruction [10]. Summative assessments offer data on student mastery and can be used to compare students to students, class to class, or school to school. Accountability of the teacher or school is also measured by scores on high stakes summative exams. Summative assessments include selected response tests (multiple choice, true/false, matching) and products (short answer, essay writing, projects, final drafts and performance assessments such as a final portfolio) – these are assessments *of learning* [15]. Multimodal assessment models should be used as different methods match four kinds of learning targets: knowledge, reasoning, skill, and product [16]. When designing an assessment, the teacher should list the learning goal or standard, what kind of target it matches, and the relative importance of each standard.

### 4. Unit plans

The PBL allows teachers to organize projects by focusing on key features. The plan begins with looking at the standards and the challenges or investigations of the project. All PBL activities begin with a “Driving Question” [1]. This question will guide all activities and will be the basis of presentations, assessments, and performance. The unit plan will also allow teachers to focus on development of relevant 21<sup>st</sup> century skills such as collaboration, creativity, communication, and critical thinking. The plan also focuses on formative and summative assessments, resources needed, and reflection methods.

Traditional assessment plans often consider and design assessments at the end of the process, after standards-based curriculum has been taught. What students are supposed to learn should be determined before planning activities. The goal of the assessment plan of action is to gain clarity with assessments about what objectives and standards students are meeting and how evidence of this mastery can be provided [9].

To achieve more clarity in assessments, a “backwards” design should be employed [17]. The “backwards” design has its emphasis on measuring understanding using multimodal assessments to gain information about student learning and instructional methods [3]. In this design, standards are chosen first and deconstructed. Next, both formative and summative assessments are made to determine how mastery of these standards will be achieved. Subsequently, curriculum and teaching are designed around the assessments. Throughout this process, there is interplay of assessments, curriculum, and teaching – assessment data informs teaching, which, in turn, informs the curriculum. Advocates of this design believe there is “significantly greater clarity about intended outcomes that follows from designing the assessment tasks” in this manner [9, p. 60]. Therefore, a need for transformation within assessments is evident and can provide more meaningful information that will drive education. Sample unit plans and templates will be provided during the presentation. In addition, focus will be placed on how PBL and assessments can be adapted to students with disabilities.



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