VANCOUVER ISLAND UNIVERSITY

TRANSITIONING FROM UbD TO PROJECT BASED LEARNING

A Resource Guide for Educators

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TRANSITIONING FROM UbD TO PROJECT BASED LEARNING

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OLTD 512

Contents

Understanding by Design (UbD)

Defining Characteristics of UbD

Understanding by Design (UbD) is a three-stage process for unit design that was put forth by Jay McTighe and Grant Wiggins in their book, Understanding by Design, first published in 1998, then revised in 2005. The purpose of this work was to provide a framework for good design, assessment and instruction that focuses on learners developing understanding of important ideas. Wiggins and McTighe (2005) describe Understanding by Design as "an approach to planning that helps us meet standards without sacrificing goals related to understanding" (p. 5). The intent is to ensure learning through instruction that is clearly planned out and guided by explicit learning goals.

UbD is very much a standards driven approach to design in which the planning process is driven by the desired results; the learning outcomes are the first consideration, and these then provide the framework to guide teaching, learning and assessment (Wiggins & McTighe, 2005). This emphasis on starting the planning process by identifying the desired end results is why UbD is also referred to as backward design. According to Wiggins and McTighe (2005), "Backward design is goal directed. We aim for specific results and design backward from them accordingly" (p. 56).

UbD: The Three Stages of Design

Stage 1: **Identify the desired results**

In this first stage of backward design, teachers are required to determine the big ideas, or enduring understandings, that they want their students to have by the end of the unit. Teachers must consider, "What should students know, understand and be able to do?" (Wiggins and McTighe, 2006, p. 17). Teachers then develop essential questions based on these targeted understandings that can be used to guide their instruction and student learning activities.

Stage 2: **Determine acceptable evidence**

This is where teachers must consider, "How will we know if students have achieved the desired results? What will we accept as evidence of student understanding and proficiency?" (Wiggins & McTighe, 2005,p. 18). The collection of multiple sources of data is encouraged, such as performance assessments or projects combined with quizzes, reflections, constructed responses and other possible evidence. The use of both formative and summative assessments is emphasized, with the formative assessments

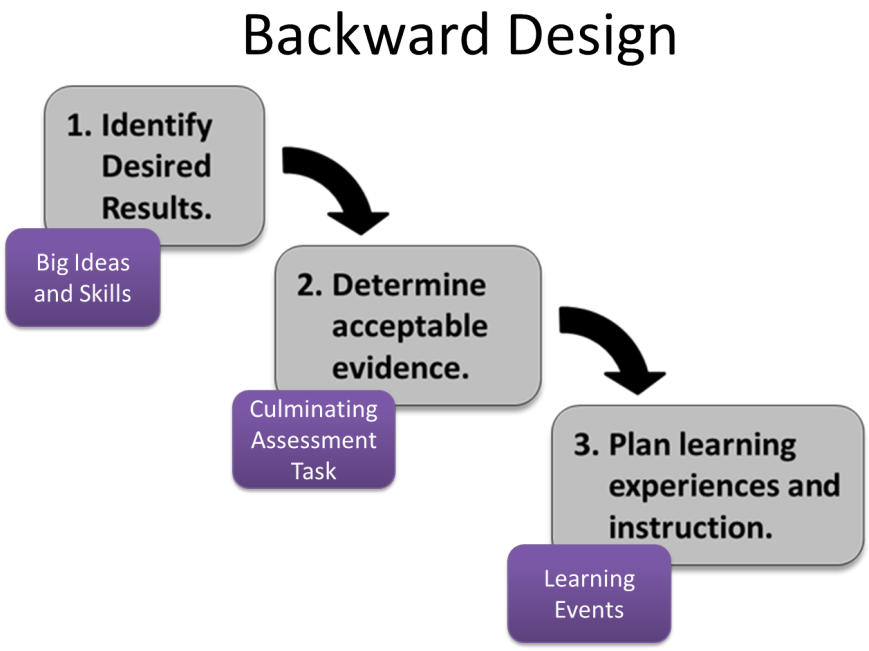
providing teachers with ongoing feedback; allowing them to monitor student understanding and revise lesson materials and strategies as needed.

Stage 3: Plan learning experiences and instruction

It is in this third stage of the design process that teachers make choices about which teaching methods, lessons and resources can be used to best support student achievement of the previously identified goals. Wiggins and McTighe (2005) suggest the acronym WHERETO in this stage of their backward design template in order to guide teachers in this instructional planning process.

> W = Help the students know Where the unit is going and What is expected? Help the teacher know Where the students are coming from (prior knowledge, interests)?
> H=Hook all students and Hold their interest?
> E=Equip students, help them Experience the key ideas and Explore the issues?
> R = Provide opportunities to Rethink and Revise their understandings and work?
> E = Allow students to Evaluate their work and its implications?
> T = Be Tailored (personalized) to the different needs, interests, and abilities of learners?
> O = Be Organized to maximize initial and sustained engagement as well as effective learning? (Wiggins and McTighe, 20015, p. 22)

Figure 1.1 below provides an overview of this 3-stage design process.



Wiggins, G. P., & McTighe, J. (2005). *Understanding by design*. Association for Supervision & Curriculum Development.

Theoretical Underpinnings

In the Understanding by Design model, student understandings are the key aim, not simply content knowledge. Wiggins and McTighe (2005) describe understanding as meaning making, and being focused around the development of students' ability to use the knowledge and skills learned as well as their ability to transfer these learnings to other contexts. Based on this description of understanding as meaning making, it is no surprise that Wiggins and McTighe themselves tie UbD to constructivism, claiming, "Understandings are the constructivist result of attempts by the student to make sense of the work and lessons, using inquiry, performance, and reflection" (2005, p.58). The UbD approach however does not specifically state the types of instructional strategies that are to be used, leaving the door open for a greater emphasis on behaviourist or cognitivist approaches, or any combination thereof. In fact, one may argue that the somewhat rigid, teacher-led design approach leaves little room for students to diverge from the specified learning activities, resources and targeted outcomes, therefore potentially limiting their abilities to construct their own understandings and devise personally relevant meanings about the topic of study. An approach such as this that begins by first turning to the learning outcomes assumes that all learners need to develop the same knowledge, skills and understandings. As such, in UbD students could be seen as consumers of learning (Cho & Trent, 2005); they are vessels that can be filled through the identified sequence of instructional strategies and materials.

Based on the design planning sequence, it is clear that assessment is a stimulus for instruction. This illuminates an underlying positivist philosophy inherent to UbD that may act in opposition to the desired constructivist approach explicitly described by Wiggins and McTighe (2005). Cho and Trent (2005) find that "When assessment becomes a major driving force in implementing the curriculum, classroom practice may fall short of a dynamic, meaning making process that occurs between teacher and students" (p.117). This focus on assessment and data driven decision making requires that students are able to present observable evidence of achievement of the stated outcomes and can lead to teachers taking on the role as objective assessors, searching for quantifiable methods of gathering this evidence, potentially ignoring the multiple-constructed realities that constructivists incorporate and build upon (Cho & Trent, 2005; Johnson & Onwuegbuzie, 2004).

Project Based Learning (PBL)

Experiential learning has been a part of traditional education for over a hundred years. However, it has only been in the last thirty years that Project Based Learning (PBL) has been accepted as a revolutionary learning theory. PBL is a learner centered instructional approach where teachers take on the role of facilitators, and students are able to develop agency and become autonomous in their own learning. PBL allows for students to "demonstrate greater levels of cognitive engagement in school work, and they report using more self-regulation, cognitive, and metacognitive strategies." (Weinstein, C. & Mayer, 1986) Thus, due to the use of these strategies, research has shown, students gain a deeper understanding of the subjects they are studying. Moreover, Strobel and Van Barneveld (2002) state that PBL is more effective when compared to traditional instruction as they are able to demonstrate increased long-term retention of content, they perform as well, or better, than traditional learners in assessments, they have improved collaboration and problem-solving skills, and have a more positive attitude towards learning (p. 54-55) since their experience is more meaningful. With a need to adapt to twenty-first century learners, and a mandated educational shift towards core competencies, PBL is an instructional model that evolves as the world changes through driving questions.

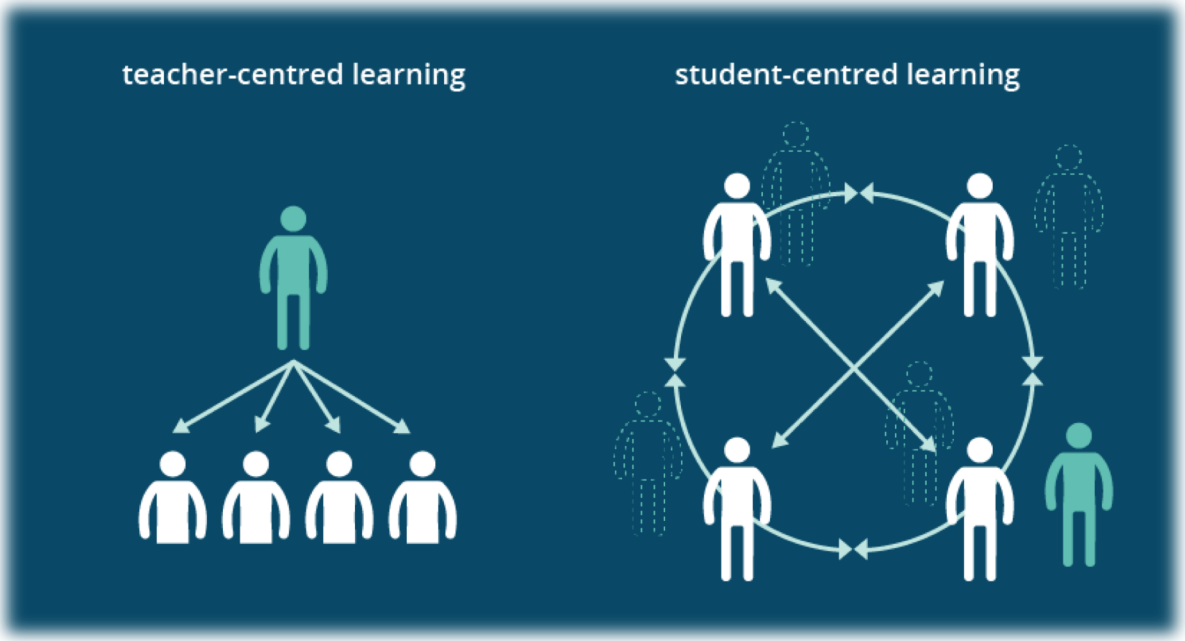


Image Courtesy of www.openlearning.com

Defining Characteristics of PBL

The definition of Project Based Learning continues to evolve as our rapidly changing world demands new skills and knowledge from our learners. One of the most recent definitions by Barrows' (2002) identifies PBL's key components as:

- Ill-structured, unresolved problems are presented so that students will generate not only multiple thoughts about the problem, but multiple ideas about how to solve it.
- A student-centered approach in which students determine what they need to learn. It is up to the learners to derive the key issues of the problems they face, define knowledge gaps, and pursue and acquire the missing knowledge.
- Teachers act as facilitators, asking students the meta-cognitive questions they want students to begin asking themselves. In subsequent sessions, guidance is faded.
- Authenticity forms the basis of problem selection, embodied by alignment to professional or 'real world' practice. (Barrows, 202)

Moreover, PBL is a learner centered approach to teaching and learning. Real world problems are used to capture student interest, provoke thinking, and acquire new skills. The student and teacher become co-learners, co-planners, and co-evaluators, working in a partnership to frame questions, set goals, structure learning activities/tasks, develop skills, and reflect on the process of learning as well as identify assessment points and criteria. Therefore, each project meets individual learners where they are at and allows learners to develop areas for growth and measure this growth throughout the process.

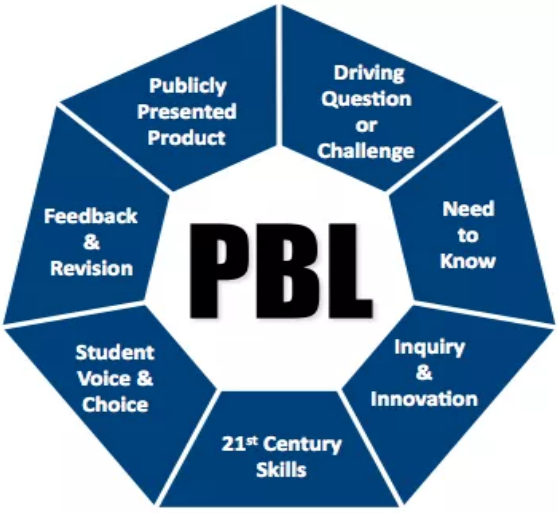


Image courtesy of emergingedtech.com

PBL: A Seven Step Process

Step 1: Driving Question: Students, with the guidance of facilitator, come up with a question a driving question or question of inquiry. This question should address a problem.

Step 2: Need to Know/ Learning Objectives: Students identify the curricular or cross-curricular learning objects and/or competencies that their project will meet. These objectives need not be content-driven and they may evolve throughout the process.

Step 3: Inquiry and Innovation: Students begin to gather information that is aligned with their learning objectives and driving question. Scaffolding around data collection, valid resources, etc. will be required from the facilitator.

Step 4: Incorporation of 21st Century Skills: These skills are woven throughout each part of the project.

Step 5: Student Voice and Choice: Students are provided with the agency to identify what they will present based off of their learnings and how they will present it.

Step 6: Feedback and Revision: Both the student and the teacher provide timely and relevant feedback. Students are provided with the opportunity to act on the feedback and revise their work.

21st Century Skills

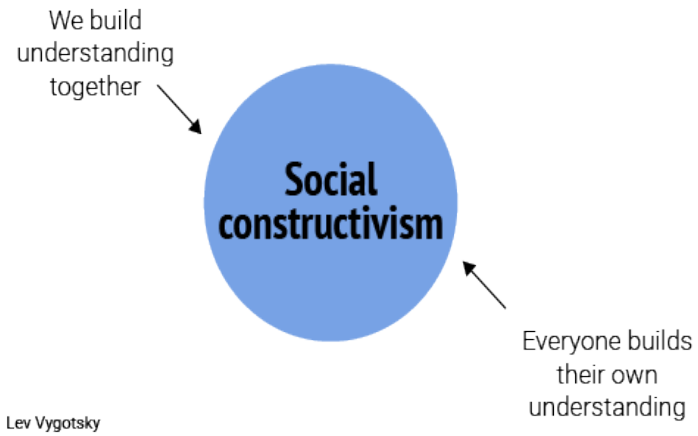
Ravitz, Hixon, English, and Mergendoller (2012) have defined 21st century skills as the following:

- **Critical Thinking:** students being able to analyze complex problems, investigate questions for which there are no clear answers, evaluate different points of view or sources of information, and draw appropriate conclusions based on evidence.
- **Collaboration Skills:** refer to students being able to work together to solve problems or answer questions, and draw appropriate conclusions based on evidence and reasoning.
- **Communication skills:** refer to students being able to organize their thoughts, data, and findings and share these effectively through a variety of media, as well as orally and writing.
- **Creativity and Innovation Skills:** refer to students being able to generate and refine solutions to complex problems or tasks based on synthesis, analysis, and then combining or presenting what they have learned in new and original ways.
- **Self-Direction Skills:** refer to students being able to take responsibility for their learning by identifying topics to pursue and process for their own learning, and being able review their own work and respond to feedback.
- **Global Connections:** refers to students being able to understand global, geopolitical issues including awareness of geography, culture, language, history, and literature from other countries.
- **Local Connections:** refers to students being able to apply what they have learned to local contexts and community issues.
- **Using technology as a tool for learning:** refers to students being able to manage their learning and produce products using appropriate information and communication technologies. (Ravitz, J., Hixson, N., English, M., & Mergendoller, J., 2012, p. 3)

Step 7: Presentation:
Students identify how their presentations meet the assessment criteria in which they helped develop. The facilitator is able to observe the learnings and engagement of students in the process when students present their material.

Theoretical Underpinnings

Knowledge is contextualized. Thus, Project Based Learning uses complex problems to allow learners to construct knowledge. According to Sumarni, "Project Based Learning (PBL) is one of the constructivism approaches in which the cooperation among the students in finding and building their knowledge is done through active learning. (Sumarni, 2015, p. 478). More specifically, PBL adheres to social constructivism as "learners are constructing and sharing knowledge and asking and answering questions in an authentic context." (Chanpet, Chamosuwan & Murphy, 2018) Having students work through real problems allows for each learner to interact with their environment in order to find a solution while using various different skills and gaining different perspectives and knowledge. Additionally, the activity theory is also strongly rooted in PBL. The activity theory, "places learning firmly in the perspective of contextual human praxis, and argues that conscious learning emerges from activity rather than as a precursor to it. When applied to education, activity theory helps educators to appreciate that the true focus of inquiry should be the everyday activity of persons acting in a setting." (Jonassen & Rohrer-Murphy, 1999) Project Based Learning closely mimics the way in which humans navigate the world using knowledge, intrinsic motivation, thinking skills, creativity, and awareness: everyday people outside of the education system are faced with problems, multiple outcomes, and the need to seek out resources and knowledge to best solve each problem. Therefore, PBL allows students to transition more successfully into the 21st century creative workplace which places more of an emphasis on the strength of human skills than factual knowledge and memorization of content.



"Give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking; learning naturally results." – John Dewey

Before the Implementation of PBL

While transitioning to a Project Based Learning model can be difficult and time consuming for educators, when implemented correctly, it has a significant number of benefits for both students and teachers. Before beginning the process of implementation the following three things should be considered: expectancy-based beliefs, subjective task value (attainment value, intrinsic value, utility value), and cost.

Expectancy-Based Beliefs:

Expectancy-based beliefs is whether or not the teacher or student believes that they will be successful with PBL. According to Eccles and Wigfield (2002) expectancy for success is defined as "individuals' beliefs about how well they will do on upcoming tasks." (p. 119) These beliefs are shaped by past successes and failures, cultural inputs, and socializers such as peers, colleagues, administration, and parents. (Eccles et al. 1983)

Subjective Task Value:

Subjective Task Value can be equated to motivation. This motivation is the initial driving factor behind whether or not an individual is wanting or willing to perform the given task, and why they want to. (Wigfield, 2010) As Eccles (2009) states, "subjective task value is directly related to personal and collective/social identities and the identity formation process underlying the emergence of these identities. (p. 82) Attainment value, intrinsic value, and utility value all fall under the subject task value.

Attainment Value:

The importance of doing well on a task and if that task fits with the individual's identity. According to Eccles (2009), people will attribute higher value to choices that are consistent with their identities and offer opportunities to them to fulfill long-range goals.

Intrinsic Value:

Intrinsic motivation is "doing an activity for its inherent satisfactions rather than for some separable consequences." (Ryan & Deci, 2000, p. 56) Thus people who find joy in completing a task, rather than feeling pressured to complete it, will be more interested in it.

Utility Value:

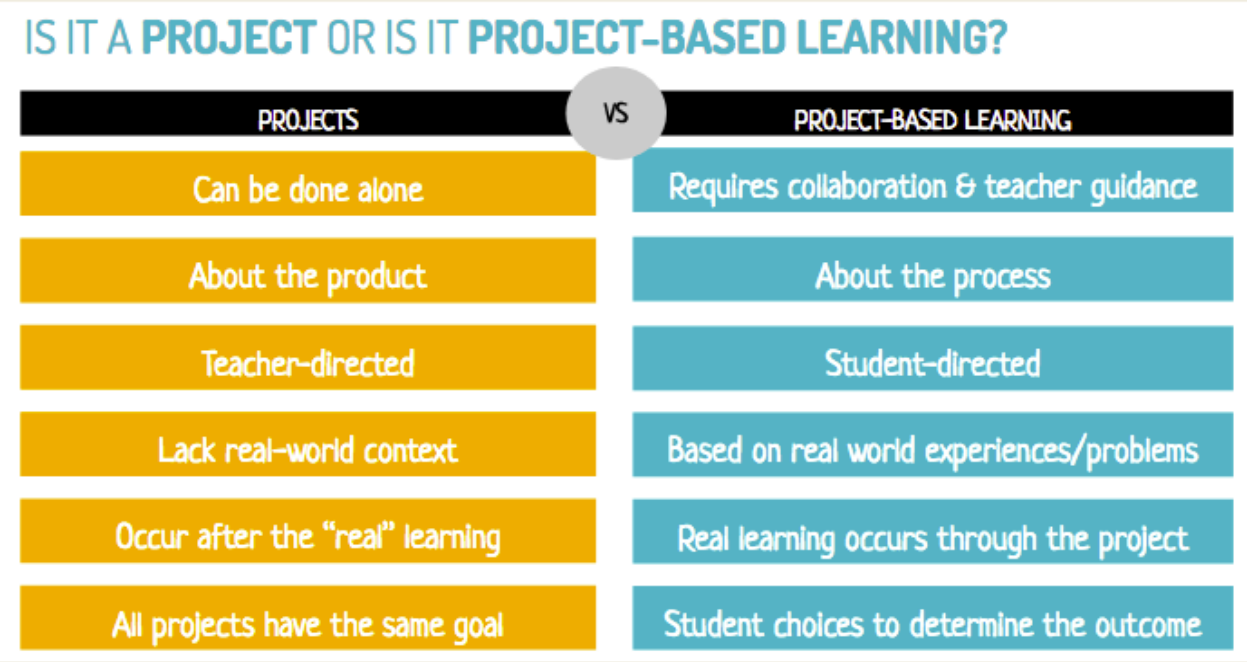
Utility value is how helpful or useful a certain task is in reaching current or future goals. (Eccles & Wigfield, 2002) Whether an individual is or is not interested in a task, for the tasks sake, if it facilitates their future goals it has utility value. (Eccles & Wigfield, 2002)

Cost:

Eccles et al. states that cost can be divided into perceived effort, opportunity cost, and psychological cost failure. For both students and teachers, perceived effort, is the amount of effort needed to be successful at completing the task and if the benefit of completion is worth the effort. Opportunity cost is the loss of valued alternatives, and psychological cost of failure is described as the anxiety related to the potential of failure at the task. (Eccles et al. 193) As there are always potential costs when transitioning to new educational models, it is imperative to do a cost benefit analysis.

Projects for Assessment vs. Project Based Learning

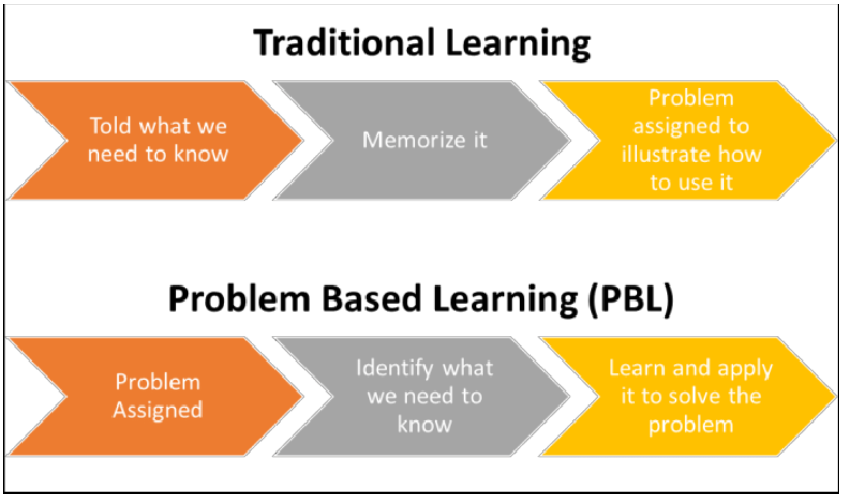
Many educators believe that they are engaging in Project Based Learning by simply incorporating projects into curricular units that previously did not involve a project. Major differences between projects and PBL are that projects are created by the teacher, they meet specific and targeted subject learning outcomes, they have clear pre-determined answers, and are evaluated/assessed only by the educator whereas PBL is student-centered and based off of a driving question that can span multiple discipline areas, with each student identifying their own learning needs, outcomes, and areas for growth. The following infographic, created by Gavin Hays, outlines additional differences between the two.



https://eduadventures.wordpress.com/

Note that the role of the teacher has shifted when it comes to Project Based Learning. Project Based Learning requires teachers to act as facilitators or mentors in the learning process. According to Barrows (2002) teachers initially prompt students with meta-cognitive questions and in subsequent sessions fade that guidance. Thus, teachers no longer deliver content through a top-down approach but instead they scaffold and model different types of learning, strategies, and skills that will lead to students being successful with PBL. The result of such an approach to teaching is that learners are motivated to persist at authentic problems, meld prior knowledge and experience with new learning, and develop rich domain-specific knowledge and thinking strategies to apply to real-world problems. (Blumenfeld, et. al., 1991, p. 371) Another key difference is where the learning occurs. During a project, the learning has already occurred and likely been assessed before the project has been started. In PBL the project is the mode for the learning to occur. Therefore, each step in PBL is a place where growth can occur, knowledge to be obtained, and reflection to happen. The following figure shows where the project, or problem, is assigned in both the traditional classroom and the PBL classroom.

Furthermore, in PBL the students guide their own process of learning, and each learner identifies the outcomes, competencies, and their own specific learning needs. While it may initially be difficult for educators to pass on the tasks of planning, creating learning experiences, and assessments, the teacher's role becomes even more significant through the scaffolding and mentorship role. The teacher may create the driving question for students, or the students may create their own driving questions. As students need to be able to identify big ideas, learning outcomes, competencies, and outline how they will meet their targeted goals, many use an Understanding by Design GRASP (Goal, Role, Audience, situation, Products) template in order to plan out their PBL project. Through the use of GRASP templates, students are able to structure the design and implementation of their project, they "are encouraged to apply their understanding to a problem/challenge/issue that requires the creation of products to demonstrate understanding while addressing the goal and audience for the task. This application provides relevant opportunities for students to use content and skills from the classroom in a meaningful way." (Reese, 2018) A reasoning process that is used to reinforce PB, according to Walker and Leary (2009) is "backward-or hypothesis-driven reasoning involves testing a series of preliminary diagnoses and reasoning backward through the probabilistic model of principles to determine the concepts or presenting symptoms that should be present if the diagnosis is accurate." (Walker & Leary, 2009, p. 15) Therefore, teachers do not forego their traditional design models totally, they simply model how to use these design models, such as UbD, to help guide students in their planning, goal setting and reflection.



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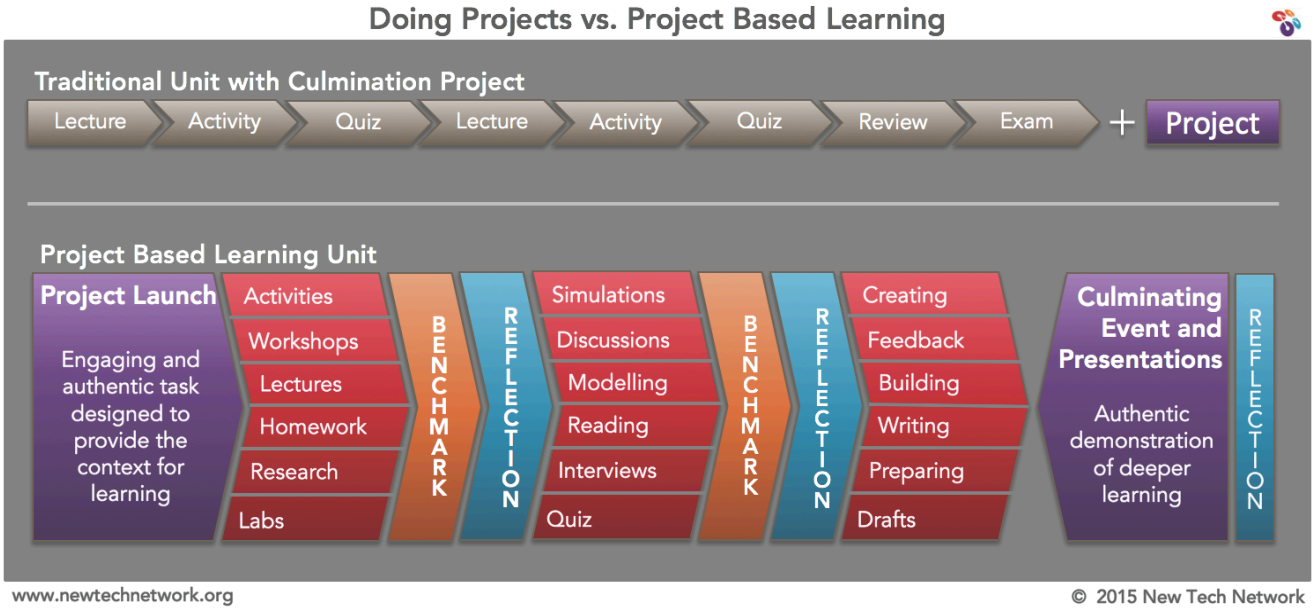
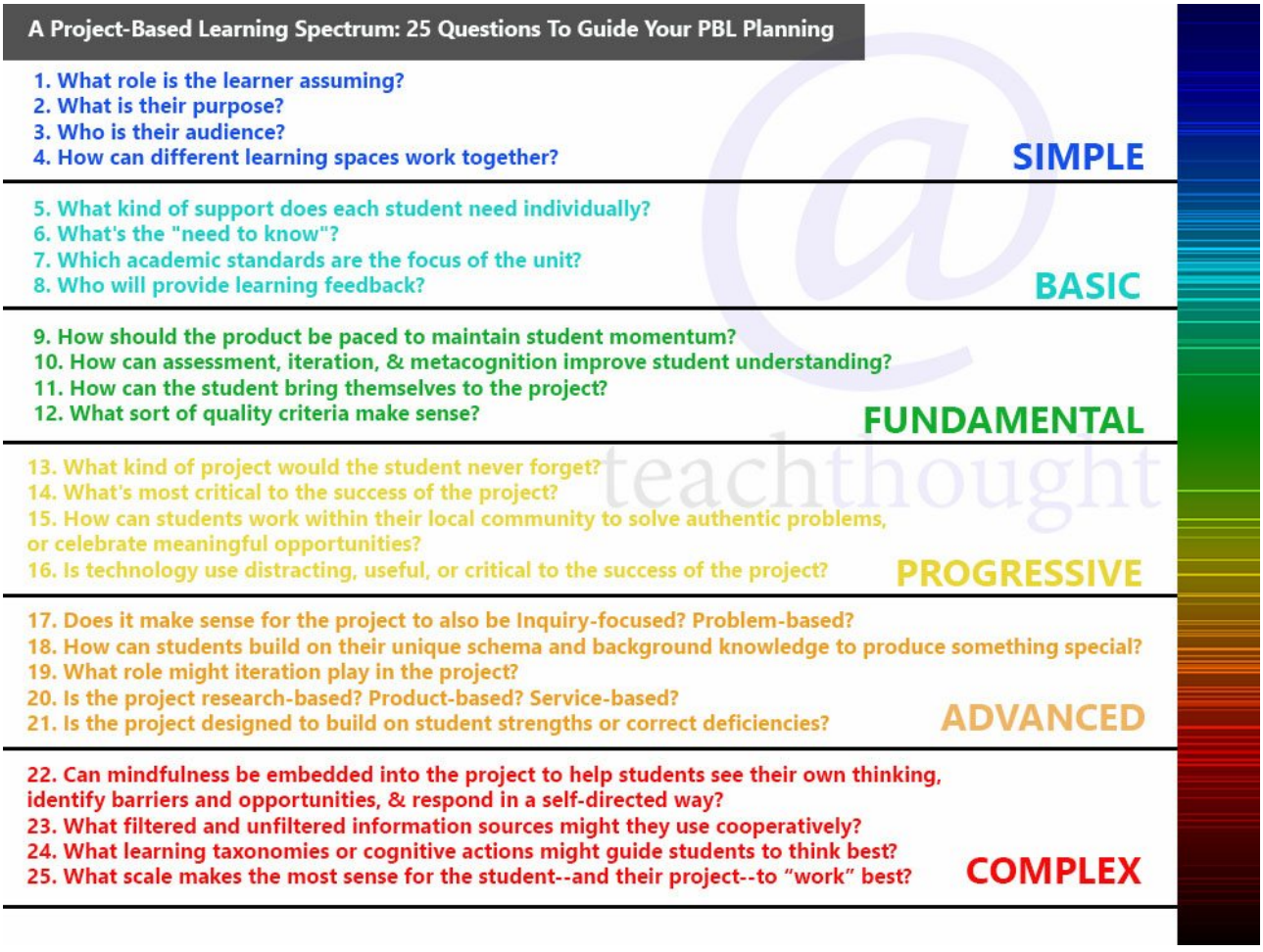


Project Based Learning Complexities

Pre-Planning Questions:

As the role of the teacher shifts to that of facilitator in Project Based Learning it is important to understand the complexities of PBL before embarking on it. PBL is cyclical in nature and has many moving pieces, since each learner is likely to be faced with different challenges at different types. Moreover, Baron et al. (1990) state that the major struggles that students experience with PBL are the result of not having the skills required to be successful in self-directed learning. Thus, the following spectrum of questions was created to guide educators through these complexities as part of a pre PBL planning process.



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Creating Driving Questions for Project Based Learning

The creation of driving questions can be the most challenging part of Project Based Learning. Driving questions can be created by the teacher or by the students themselves. The basis of problem selection in PBL is formed by authenticity which is embodied by alignment to real world or professional practice. As such, in order to generate a workable solution to each problem, the problems are inherently cross-disciplinary and require students to investigate multiple subject. (Barrows, 1996) Therefore, a strong driving question needs to be open-ended with not definite solution, engaging, and in alignment with the learning goals.

There are seven popular types of driving questions. The interests and passion areas of each learner in a classroom should fall under one of these seven types:

Question Type:	Sample Question:
Problem Solving: Finding a real world problem requiring a solution	How can we keep conflict minerals out of the supply chain?
Educational: A project that's purpose is to teach others	Could a dog live in a desert?
Convincing: A project that tries to change opinions of others	How can we create a local park that people would go to?
Big Ideas: A project that tackles a broad theme	How is evil depicted in other cultures?
Opinion: Formulating an opinion by considering all sides	Should pets be allowed in classrooms?
Divergent: Predictions through alternative scenarios	What if Canada stopped exporting electricity to the United States?
Scenario-Based: Accomplishing a task by taking on a fictional role	Imagine you are a beaver. How would you construct your home?

Each driving question will likely be revised multiple times as the student progresses on their learning journey. The initial driving question should generate a list of other questions which will be able to guide the research process and the planning of learning activities.

Resources

Rational:

The purpose of the following section is to provide a selection of ready-to-use lesson plans and templates utilizing Backward Design and Project Based Learning. Links are currently active. These have been developed to demonstrate the application of both learning designs following the above analysis. It can be a time-consuming endeavour to create a lesson plan that follows the new BC curriculum with an applied design theory. To that end, these plans have been created to encompass learning design with an online platform and/or blended learning environment in mind.

Backward Design

Intermediate

- 2D Geometry: Where can we find geometry in our world? How can geometry be used in art?
- Fairy Tales: How does culture affect characters, setting, plot, and illustrations in stories? What can we learn about a culture through the use of stories?

*Shared with permission from M. Mullis

Secondary

- 1984: a literary comparison for a discussion of totalitarianism and the Cold War (originally used in conjunction with History unit)
- Poetry: identify, interpret, and use poetic devices in contexts that are relevant to students' current studies/interests
- History: End of the Cold War: a look at the forces, processes, events, and key figures that brought about the end of the Cold War

*Shared with permission from M. Elson

Templates for Backward Design

Retrieved from: All Things Curriculum and Assessment, School District 60

- Backward Design Unit Plan Template

Retrieved from: University of Saskatchewan

- Understanding By Design Unit Template

Project Based Learning: A Unit Plan and Week One Lesson Sample

- Our Amazing Bodies: Systems Working together. A cross-curricular exploration of the organ systems of the human body. Grade 5-6.
- Our Amazing Bodies: Week One Lesson Plan
- Student self-assessment for Organ Systems

  *Shared with permission from N. Hamilton

Templates for Project Based Learning

Retrieved from: http://learningnetwork.setbc.org/pblresource/

- PBL Unit Planner Template
- PBL Lesson Planner Template

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