

Reimagining British Columbia Schools:

How to bring British Columbia Schools and Classrooms inline with 21st Century Learning

by

Jacob S. Main
Bachelor of Education, Simon Fraser University, 2008
Bachelor of Arts, Simon Fraser University, 2007

A Project Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF EDUCATION

In the Area of Math, Science, Social Studies and Educational Technology

Department of Curriculum and Instruction

© 2015, Jacob S. Main. All rights reserved.

Re-distributed by University of Victoria under a non-exclusive license with the author. However, in accordance with the Copyright Act of Canada, this work may be reproduced, without authorization, under the conditions for Fair Dealing.

Therefore, limited reproduction of this work for the purposes of private study, research, education, satire, parody, criticism, review and news reporting is likely to be in accordance with the law, particularly if cited appropriately.

Supervisory Committee

Jacob S. Main
Bachelor of Education, Simon Fraser University, 2008
Bachelor of Arts, Simon Fraser University, 2007

Supervisory Committee

Dr. Valerie Irvine, Department of Curriculum and Instruction
Co-Supervisor

Dr. Timothy Pelton, Department of Curriculum and Instruction
Co-Supervisor

Abstract

The problem with the interior spaces in the vast majority of British Columbia (BC) schools is that they are designed to suit the needs of 20th century students. Most classrooms have been designed to accommodate rows of desks, and feature white boards around the perimeter of the room. This design unfortunately does not lend itself to helping students learn the skills identified by educational experts as critical, for youth to be successful in the 21st century. If the Province wants graduates who are well prepared to adapt, innovate, create, critically assess, and navigate the future, then we as teachers, administrators, and school district officials need to reimagine BC schools, in order to provide our students with engaging learning environments to develop their 21st century skills. This project offers recommendations for problem based teaching approaches, as well as suggestions on how best to utilize classroom spaces, in order to effectively reach students, and teach them vital 21st century skills.

Table of Contents

Abstract.....	3
Table of Contents.....	4
Chapter One: Introduction of the Project.....	6
Project Overview.....	6
Research problem and project direction.....	7
Research problem.....	8
Adapting physical spaces.....	9
Adopting more a student-centred and inquiry-based approach.....	9
Description of the project.....	11
Literature Review Overview.....	12
Definition of terms.....	12
Chapter Two: Literature Review.....	14
Introduction.....	14
What are the Foundational Philosophies?	14
How Do the Students Learn?.....	15
Inquiry-based learning.....	16
Problem-based learning.....	22
How do IBL and PBL integrate with the new BC curriculum?	27
Alternative approaches	29
What Does It Look ILke?	32
Conclusion.....	33

Chapter Three: Project “Reimagining BC Schools”	35
Section One: Rethinking and Adapting Existing Facilities	36
What Can Be Done?.....	37
How do we Reimagine Existing Spaces?	39
Why go back to a Failed Model?	40
What About the Impact of Classroom Colour and Furnishings?....	45
Putting It All Together: Classroom Design and Layout.....	46
What does a Reimagined BC Classroom Look Like?	49
Section Two: Rethinking Classroom Approaches.....	51
Putting Focus on the Learners.....	52
What Needs to Change?	53
What Exactly is PBL?	53
How can PBL be integrated into Classroom Practices?	55
Advantages of a PBL Classroom	55
Challenges of a PBL Classroom	55
How does PBL Integrate with the new BC Curriculum?	56
Sounds good, but where do I begin?.....	58
Final Thoughts.....	59
Additional Resources	61
Chapter Four: Professional Reflection	62
Project Overview and Summary.....	63
Professional Thinking and Beliefs	64
Intentions, Activities and Classroom Practices.....	65
How Has My Master’s Experience Made Me a More Valuable Member of My Teaching Community?	67
Recommendations for Getting the Most out of my Master’s Project.....	68
References	69

Chapter One: Introduction of the Project

Project Overview

“Parents fight change because they believe the best thing for their kids is to have an experience like theirs – which they recall through the rose-tinted lens of nostalgia” (Wolfson, Newsweek).

Educational change is a major theme in scholarly articles, but it has also become a prominent topic in popular culture and public discourse as well. I came across the above quote while reading about a story in Newsweek magazine that highlighted changes that were being implemented at a new school in Connecticut. The article went on to discuss how the Fairchild Wheeler Interdistrict Magnet Campus was trying to break down the walls of traditional educational institutions, and create a facility that was more in tune with the needs of students moving forward. The author, Elijah Wolfson, went on to describe the school as a *“standout example of what could be the first major shift in classroom design since the one-room schoolhouse”* (Wolfson, 2014, Newsweek).



Figure 1: Photo of the front entrance of the Fairchild Wheeler Interdistrict Magnet Campus. Courtesy of Ned Gerard/Hearst Connecticut Media



Figure 2: Aerial image of the Fairchild Wheeler Interdistrict Magnet Campus. Courtesy of Hearst Connecticut Media

While the article went on to detail more about this cutting edge school, I could not help but wonder, why this could not be done right here in our own backyard? Better yet, why not reconfigure what schools look, act, and feel like, by using them in a different way? The Bridgeport Public School district spent nearly \$130 million dollars to build their dream school (Wolfson, 2014, Newsweek). We need to explore ways to redesign, rethink and remix the schools we already have. While funding totals for operating budgets have increased over the past decade, the annual amount set aside for the 60 school districts in British Columbia (BC) has increased by less than \$400-million dollars since 2006, and the per student allocation amount has only recently reached above the \$7000 threshold per full-time student (see Table 1). Due in part to these strains on budgets, districts across the province need to stretch their dollars even further.

Research problem and project direction. The rationale behind my project is simple. There is only a finite amount of funding available in the public system in B.C, so it is paramount to make changes at the district, school, and classroom level across the province, to help better stretch taxpayer dollars in order to better serve student interests.

Table 1.

BC School Districts' Annual Operating Budgets:

School Year:	Funding Totals/Allocation per full-time student
2006-07	\$4,497,427,603 (\$5830/FT student)
2007-08	\$4,345,000,000 (\$5851/FT student)
2008-09	\$4,426,685,547 (\$5851/FT student)
2009-10	\$4,551,363,401 (\$5851/FT student)
2010-11	\$4,663,363,400 (\$6740/FT student)
2011-12	\$4,721,363,400 (\$6784/FT student)
2012-13	\$4,725,363,400 (\$6784/FT student)
2013-14	\$4,725,363,400 (\$6900/FT student)
2014-15	\$4,725,636,400 (\$6900/FT student)
2015-16	\$4,827,352,202 (\$7158/FT student)

Note: Adapted from www.bced.gov.bc.ca/k12funding

Research problem. Educators in BC have an opportunity to be on the cutting edge of what public school education can look like in the 21st century. With the pending launch of the new BC curriculum, teachers, administrators and district leaders across the province can take a huge step ahead, by reimagining what schools and classrooms look like for BC students. How can this be accomplished? What are the best classroom teaching approaches to help students learn in a more creative, collaborative and authentic environment? What skills will help students thrive in an ever-changing world? How can these approaches be combined with the government mandated changes that are being proposed in the new BC curriculum?

My purpose with this project is to provide the blueprint to help facilitate necessary changes, and to provide supports for fellow educators to aid the reimagining of what a BC school can be. To do this, I will focus on the following research questions in my project:

- a. How can the physical design and layout of existing facilities create more creative and collaborative environments for learning?

- b. How can educators adopt a more student-centred, inquiry-based learning models that would align with the new BC Curriculum?

Adapting physical spaces. One of the central themes found throughout the literature researched for this project, was making sure the students have a say in the design process (Read, 2010; Johnson & Ruiter, 2013). As crucial lighting, paint colour, the configuration, and furnishings are within a school or classroom, equally as important is the feel and flow of each room. New classroom need to be welcoming places for students to learn, relax, collaborate, and work. Important for educators, is the accessibility of their classrooms. It should be a place where they have room to move around, somewhere where they can create work zones, and still have enough space to store their resources (Bill, 2014). Coffee shops, restaurants and even playgrounds have changed dramatically since the turn of the 21st century, so why is it that many classrooms still look the same as they did in nearly a century ago?

Adopting more a student-centred and inquiry-based approach. Changes in educational approaches that increase student engagement, work creatively and collaboratively and teach learners the 21st century skills so that they can be better prepared to innovate and rethink the as yet unknown problems of tomorrow. In order to do this, there also needs to be a priority shift towards investing in committed educational professionals, so that they have the training, resources, and time to do the sort of meaningful, hands-on learning that will be discussed further in this project.

The two primary approaches that will be discussed are inquiry-based learning (IBL) and problem-based learning (PBL). Both are similar in nature, in that they are framed around the principle that students' learn best through inquiry and experimentation, but there are subtle differences in how they are facilitated and taught.

Below is a modified comparison chart that outlines some of the key similarities and differences in the approaches, as outlined in Unver and Arabacioglu's 2011 journal article, *Overviews on Inquiry Based and Problem Based Learning Methods*.

Table 2.

Overview on Inquiry-Based and Problem-Based Learning Methods.

	INQUIRY-BASED LEARNING	PROBLEM-BASED LEARNING
Philosophical Aim	Driven on raising questions based on real observations.	Focused on the solution of ill-structured problems.
Framework	Inquiry	Inquiry
Pioneers	John Dewey, Madame Curry, Robert Karplus, Joseph Schwab, Marshal Herron, Roger Bybee.	John Dewey, Barrows, Savey & Duffy, Williams, Stepien & Gallagher.
Principle	Acquiring knowledge from direct observations by using deductive questions. Best learning approach for human nature.	Maximizing learning with investigation, explanation, and resolution by starting from real and meaningful problems. Best learning approach for maximizing learning with investigation, and resolution by starting from real and meaningful problems.
Key Elements	Exploration, invention, application.	Identifying problems, activating prior knowledge, encoding specificity, elaboration of knowledge.
Students Prior Knowledge / Skills	Not important-student can produce knowledge from their observation.	Prior knowledge and skills application is important.
Teacher Role	Leader, coach, model, facilitator. Source of driving questions.	Facilitator and coach rather than leader.
Student Role	Interprets, explains, hypothesizing designing and directing own tasks, sharing authority for answers.	Determining whether a problem exists, creating an exact statement of the problem, identifying information, data, and learning goals, creating a working plan. Source of driving questions.
Specific Outcomes	Conceptual understanding of science principles, comprehension of the nature of scientific inquiry and a grasp of applications of science knowledge to societal and personal issues, creativity, intelligence.	Effective problem-solving skills, self-directed, lifelong learning skills, effective collaborations.

Note: Adapted from Unver, A. O., & Arabaciouglu, S. (2011). Overviews on Inquiry Based and Problem Based Learning Methods. *Jurnal Pendidikan IPA*, p. 307.

As a public school teacher, I have implemented problem-based lessons in my classes, and admittedly there have been challenges in adopting PBL practices in the classroom. The difficulties have stemmed from the amount of preparation necessary to adequately prepare students, and the development of clear research questions for student projects. Despite the difficulties in adapting from a teacher-led lesson, to an inquiry-based lesson, the results in student engagement have been worth the extra work. Any perceived failures in classroom execution and delivery were my own, and did not mitigate the educational value of the work done. Quite the contrary, my stumbles laid a path for the successes that came later. Learning through doing is a far greater teacher than learning through observation alone, which again are key elements to the IBL and PBL approaches. As an educator, I place a great deal of importance on public education and access to the resources that are necessary to elevate, improve, and invigorate our schools. There could be an argument that improvements can only come with increased funding, but I believe there is a way to make better use of our existing facilities. There are other ways to structure the teaching day. There is an opportunity to turn existing conventions on their ear, and make the classroom a place where individualism and imagination flourishes and where schools cater to the students, and not the other way around.

Description of the project. There is a need for a new outlook on how, who, what, where, and why we teach what we do in British Columbia. There is also a need for someone to assess possible answers to these questions, and to present them in a way that is easily digestible, relevant, and applicable. The intention of this project is to create a document that can serve as a blueprint for how schools can remake themselves. It will provide academic and industry related research to back up the ideas that will be forwarded. The project will also feature images, diagrams, resources and lessons to help educators better understand the applicability of the project. The information will be compiled in an eBook, for easy sharing and accessibility, with the intention of making it available to anyone who wishes to take on the challenge of reimagining and remaking their classroom or school.

Literature Review Overview

The purpose of the literature review is to look at different articles, educational publications and videos that address the topics of physical design, student-centred inquiry-based learning, and seeing how they coincide or can be implemented or adopted into the all-new BC Curriculum.

To aid in my research, I accessed peer-reviewed journal articles from both Summon 2.0 and Google scholar database search engines. In order to keep my research as current as much as possible, I attempted to keep the articles cited to those published within the past ten years. To aid in my research, I also accessed additional electronic resources such as videos, web publications and blog entries, which I located conducting web searches. To aid in narrowing the results from the data base search engines, some the key terms I searched included: constructivism, problem-based learning, inquiry-based learning, 21st century skills, student-centred learning, e-learning, hybrid education, blended learning, classroom design, colours and learning, and lighting and learning.

In discussing these terms in the literature review, it is important to have a common understanding as to what they mean, as definitions can differ in practice and in the literature. Below is a definition of terms to provide a foundation for the reader in reviewing this project.

Definition of Terms

Constructivist theory: A theory that suggests learners actively construct knowledge through activity, and the goal of learning is to promote deeper understanding rather than superficial memorization (Hernandez-Ramos & De La Paz, 2009).

Curricular competencies: A list of five skills outlined by the BC Ministry of Education as critical skills for 21st century learners and citizens. 1) communication 2) critical thinking 3) creative thinking and innovation 4)

personal responsibility and well-being 5) social responsibility. (BC Ministry of Education, 2012).

Inquiry-based learning: An educational approach that is learner-centred and driven on raising questions based on real observations (Unver & Arabaciouglu, 2011).

Problem-based learning: A learning approach that requires an educator to primarily function as a facilitator and guide, while the students focus on the solution of ill-structured problems (Unver & Arabaciouglu, 2011).

Teacher centred instruction: Knowledge is transmitted from the educator to the students who are passive recipients of knowledge (Huba & Freed, 2000).

Learner-centred instruction: Students construct knowledge through gathering and synthesizing information, and integrating it with the general skills of inquiry, communication, critical thinking and problem solving (Huba & Freed, 2000).

Flipped classroom approach: A teaching approach in which a teacher provides information to the students ahead of time, so that the class time can be used for informed discussion and debate.

Online learning (e-learning): An approach that utilises the internet to allow students to learn from remote locations away from a school.

Ubiquitous learning (u-learning): An approach to learning which is similar to e-learning, except that it is accomplished utilising mobile phone technology (Tsai, Tsait & Hwang, 2012).

Online peer learning: students to learn from each other by sharing useful information and learning experiences to solve problems in an online environment (Tervakari et al., 2012).

Hybrid model of learning: A learning approach that “combines face-to-face interactions with web-delivered educational content” (Crews & Butterfield, 2014, p. 40).

Chapter Two: Literature Review

Introduction

The province of BC is on the cusp of adopting a new curriculum that is poised to better address the needs of students, and that focuses more on the cross-curricular competencies of: Communication, Critical Thinking, Creative Thinking and Innovation, Personal Responsibility and Well-Being, and Social Responsibility (British Columbia Ministry of Education, 2012, p. 5). This literature review uncovers research that supports the implementation of IBL and PBL as effective approaches in accomplishing the BC Ministry of Education's proposed changes. The literature review also addresses the issues of reimagining the physical layout and design of classrooms and schools, so that they can become more engaging and effective learning environments.

What are the Foundational Philosophies?

At the core, all of the educational approaches researched fall under the umbrella of the Constructivist Theory, where "learners actively construct knowledge through activity, and the goal of learning experiences designed by teachers is to promote a deep understanding rather than superficial (and short-lived) memorization" (Hernandez-Ramos & De La Paz, 2009, p. 152). The key steps in implementing a system that follows the principles of constructivism is understanding that:

- *Learners bring unique prior knowledge and beliefs to a learning situation.*
- *Knowledge is constructed uniquely and individually, in multiple ways through a variety of tools, resources and contexts.*
- *Learning is both an active and reflective process.*
- *Learning is developmental. People make sense of their world by assimilating, accommodating, or rejecting new information.*
- *Social interaction introduces multiple perspectives on learning.*

- *Learning is internally controlled and mediated by the learner.*

(Hernandez-Ramos & De La Paz, 2009, p. 152)

The idea that learning is built upon previous experiences and is accomplished through actively participating in the learning process creates a perfect platform for IBL and PBL and the acquisition of 21st century skills. This does not mean that the constructivist approach or that IBL do not have their implementation challenges (Windschitl, 2002, p. 133). There is a notion that the constructivist approach means that teachers sit back and allow students to learn without intervention or guidance. This is of course, a false notion. Any inquiry-based learning environment requires an adaptable, caring and well-informed educator to lead the charge: one that asks the right questions, provides the right encouragement, feedback and guidance, and equally as important, corrects student misconceptions (Muller, 2012).

There is also the question of how culture and language affects a student's ability to excel in an inquiry based learning environment? IBL can pose issues for English as a Second Language (ESL) students who are not proficient or comfortable enough to fully engage discussions, and for those students who are accustomed to traditional instruction practices (Hayton & Bache, 2012, p. 415). However, with sufficient support from within the learning cohort and the teacher, it is possible to overcome both the language and cultural obstacles.

How Do the Students Learn?

Any time you start to tinker with or try to improve something that is used by the public, it is vitally important that you consider how those changes will affect the users. For a simplified example, consider a transit company wanting to change the location of a bus stop. The transit officials should consider how the changes will impact its riders. Will users be able to still easily access the new location? Is it still accessible for riders with mobility challenges? Is it in a safe and well-lit location? These are all fairly simple, but important, questions to ask and answer. In the case of schools and public education, the questions and answers are certainly more complex and convoluted. What is not convoluted or complex,

is that when any amendments are proposed to schools, and the changes directly affect students, then the primary focus must be on students and how the alterations will impact them (McCabe & O'Connor, 2014, p. 357).

Inquiry-based learning. Central to the theme of change is a focus on student-centred learning. By centering the learning focus on the student it encourages the students to be active learners and to take more responsibility of their learning. However this may be difficult, if not improbable in some classrooms (Hayton & Bache, 2012, p. 415). A student-centred learning approach such as IBL relies heavily on the educator letting go of his or her control over the traditional teaching practices and turning the steering wheel over to the students (McCabe & O'Connor, 2014, p. 351). In order to fully “let-go,” the teaching professional needs to have a tool cabinet full of abilities and skills, including: professional knowledge, a flexible and reflective teaching approach and the capacity and willingness to work with a multi-levelled classroom alongside students with varied learning needs. It requires an open-mind, patience and a student-first mentality on the part of the educator (Harris & Sass, 2011, p. 810).

Some of the fundamental elements of student-centred learning are mirrored in constructivist practices. The learners' classroom time should be purposeful, active and engaging, and the students should be encouraged to discover their learning (Tangney, 2014, p. 267). Due to the fact that learning is individualized and built upon that student's own prior knowledge, it makes the task of checking for understanding all that more important, and challenging for the teacher (Nicol & McFarlane-Dick, 2006, p. 215). This is why in the student-centred approach, taking time for reflective practices by the students where they have the time to think back, synthesize and make sense of their newly acquired knowledge is paramount. The following comparison charts compiled by the University of Connecticut's assessment department outline some of the differences between the teacher-centred and the learner-centred paradigms (Allen, 2004; Huba & Freed, 2000).

Table 3.

Comparison of Teacher-centered and Learner-centered paradigms

Teacher-Centered Paradigm	Learner-Centered Paradigm
Knowledge is transmitted from professor to students	Students construct knowledge through gathering and synthesizing information and integrating it with the general skills of inquiry, communication, critical thinking, problem solving and so on
Students passively receive information	Students are actively involved
Emphasis is on acquisition of knowledge outside the context in which it will be used	Emphasis is on using and communicating knowledge effectively to address enduring and emerging issues and problems in real-life contexts
Professor's role is to be primary information giver and primary evaluator	Professor's role is to coach and facilitate Professor and students evaluate learning together
Teaching and assessing are separate	Teaching and assessing are intertwined
Assessment is used to monitor learning	Assessment is used to promote and diagnose learning
Emphasis is on right answers	Emphasis is on generating better questions and learning from errors
Desired learning is assessed indirectly through the use of objectively scored tests	Desired learning is assessed directly through papers, projects, performances, portfolios, and the like

Focus is on a single discipline	Approach is compatible with interdisciplinary investigation
Culture is competitive and individualistic	Culture is cooperative, collaborative, and supportive
Only students are viewed as learners	Professor and students learn together

Note: Comparison charts are copied from information found on the University of Connecticut department of assessment website. The charts are based on information from Mary E. Huba, and Jann E. Freed's book "Learner-centered assessment on college campuses: Shifting the focus from teaching to learning." (Huba & Freed, 2000). Retrieved from <http://assessment.uconn.edu/docs/TeacherCenteredVsLearnerCenteredParadigms.pdf>

Table 4.

Teacher-centered versus learner-centered instruction

Concept	Teacher-Centered	Learner-Centered
Teaching goals	<ul style="list-style-type: none"> • Cover the discipline 	Students learn: <ul style="list-style-type: none"> • How to use the discipline • How to integrate disciplines to solve complex problems • An array of core learning objectives, such as communication and information literacy skills
Organization of the curriculum	<ul style="list-style-type: none"> • Courses in catalogue 	<ul style="list-style-type: none"> • Cohesive program with systematically created opportunities to synthesize, practice, and develop increasingly complex ideas, skills, and values
Course structure	<ul style="list-style-type: none"> • Faculty cover topics 	<ul style="list-style-type: none"> • Students master learning objectives
How students learn	<ul style="list-style-type: none"> • Listening • Reading • Independent learning, often in competition for grades 	<ul style="list-style-type: none"> • Students construct knowledge by integrating new learning into what they already know

		<ul style="list-style-type: none"> • Learning is viewed as a cognitive and social act
Pedagogy	<ul style="list-style-type: none"> • Based on delivery of information 	<ul style="list-style-type: none"> • Based on engagement of students
Course delivery	<ul style="list-style-type: none"> • Lecture • Assignments and exams for summative purposes 	<ul style="list-style-type: none"> • Active learning • Assignments for formative purposes • Collaborative learning • Community service learning • Cooperative learning • Online, asynchronous, self-directed learning • Problem-based learning
Course grading	<ul style="list-style-type: none"> • Faculty as gatekeepers • Normal distribution expected 	<ul style="list-style-type: none"> • Grades indicate mastery of learning objectives
Faculty role	<ul style="list-style-type: none"> • Sage on the stage 	<ul style="list-style-type: none"> • Designer of learning environments
Effective teaching	<ul style="list-style-type: none"> • Teach (present information) well and those who can will learn 	<ul style="list-style-type: none"> • Engage students in their learning • Help all students master learning objectives • Use classroom assessment to improve courses • Use program assessment to improve programs

Note: Comparison charts are copied from information found on the University of Connecticut department of assessment website. The charts are based on information from Mary Allen's book "Assessing academic programs in Higher Education." Allen, M. (2004). Retrieved from <http://assessment.uconn.edu/docs/TeacherCenteredVsLearnerCenteredParadigms.pdf>

The teacher takes on a much larger role as a facilitator, guide and time manager. The educator may not be providing information from the front of the class, but just as the students are taking an active role in their learning, the teacher too is active, engaged and involved by checking in with students,

redirecting, encouraging, questioning and suggesting resources when needed. Educational researchers Alan McCabe and Una O'Connor concluded their 2014 article entitled "*Student-centred learning: the role and responsibility of the lecturer*" by pointing to student-centred learning as superior to the traditional teacher-centred approach

[Student-centred learning's] cooperative nature has transformative potential for conceptions of teaching and learning, not least in relation to how and why students learn. The precept of joint responsibility for learning is a fundamental starting point that enables lecturers and students to re-define traditional roles and boundaries. It is from this that a genuinely productive, critical and reflexive educational relationship can emerge. (McCabe & O'Connor, 2014, p. 356)

In their research, McCabe and O'Connor (2014) were dealing with older students, but the philosophical and pedagogical approach can be applied with younger learners as well. According to the American-based National Research Council, there are three sound principles of learning that teachers should understand:

- 1- Students' prior knowledge should be corrected when possible.
- 2- Students need factual knowledge and a conceptual framework to organize the knowledge.
- 3- Metacognition improves the learning process (Bixler, 2011, p. 75).

Correcting prior knowledge could be difficult when dealing with personalized learning, but obstacles to implementing a student-centred focus can be overcome, by taking the time to find out what a student or students know about a given topic prior to the diving into an activity. A know-wonder-learn activity or a quick check-in with the student can help correct any misconceptions, or provide direction for the student to find the correct information (Muller, 2012).

Even though a student-centred approach proposes that students take ownership of their learning process, it does not mean the abandonment of scaffolding or structured class time. It is important that any student-centred or

inquiry based classes that expectations, deadlines, time restrictions and instructions are clearly defined from the start. In studying the challenges that international students faced integrating and adapting to an inquiry-based approach, Ian Bache and Richard Hayton found a number of key elements helped both students and educators adjust to the challenges of inquiry-based learning. Their first recommendation is that more time needs to be allocated to helping students understand the IBL philosophies and why they are learning in such a way. Explanation and clarification needs not only to take place at the beginning of any inquiry-based class or assignment, but also throughout the entire process (Hayton & Bache, 2012, p. 422).

Inquiry-based work should also be conducted in smaller groups where the students have a better opportunity to have their voices heard, but also because it creates greater individual and collective ownership of the learning. Groups of three or four students are far more effective, than using larger groups, and teachers should occasionally be involved in the group selection process to ensure students have an opportunity to collaborate and learn with different peers (Hayton & Bache, 2012, p. 422).

The final recommendation the researchers made was to utilise “mini-lectures” to help introduce a topic and guide reading at the end of a class or seminar, and to supply support material such as a handout on the material covered with questions to help guide the independent inquiry. The study authors suggest the “mini-lecture” should not take place within a seminar because it could give the students the impression that they do not need to do their preparatory readings (Hayton & Bache, 2012, p. 422).

The basic premise of IBL is similar to student-centred, they really are two parts of the same equation. Inquiry is the basis of the research and student-centred is the focus of the teaching approach.

The term IBL is used to refer to various forms of active, self-directed learning, where the student has ownership over their learning and development. The process of inquiry is at the heart of these forms of learning. The role of the teacher is to facilitate

this process of inquiry, for example by giving a group of students a research task or aim: ‘the tutor is there to guide rather than dictate (Hayton & Bache, 2012, p. 411).

Bache and Hayton (2012) claim that IBL “*is a pedagogy which best enables students to experience the processes of knowledge creation*” (p. 412). While their article sings the praises of inquiry-based learning, they concede that it can be difficult for students from educational backgrounds that primarily use a teacher-centred lecturing style, and it poses enormous challenges for students who are learning in a second language (p. 217).

As any good educator knows, there is no “magic pill” or “one size fits all” solution to engaging and challenging young minds, but we do know that the answers are not found in the classroom approaches of the 20th century. Students need to develop the skills necessary to succeed, thrive and innovate in the 21st century, and those skills are best developed through *creative, critical* and *collaborative* practices. One such avenue is the problem-based learning approach (PBL).

Problem-based learning. PBL involves students working collaboratively to solve or answer a thought-provoking question, or in the case of projects, to build or create something creatively and cooperatively. The idea behind PBL is that students will learn best by doing, immersing themselves in their work, finding creative solutions and working together to find answers or solutions. Studies, like the one conducted by Bate, Hommes, Duvivier and Taylor (2014), suggests that PBL increases the retention of knowledge, basic concepts and self-directed learning skills in the medical students they studied. More importantly, their findings indicated that student engagement increased, because of intrinsic interest in the subject matter (p. 3).

In a separate study conducted by Hernández-Ramos and De La Paz (2009), the content knowledge, attitude and opinions were compared between two groups of eighth grade history students at separate schools. One group was taught using a traditional approach, while the other learned the same material

using a multimedia PBL approach. Their findings found also that the PBL approach aided with student engagement and interest.

Students' attitudes towards learning history and social studies, and towards working with each other, were significantly more positively affected by the PBL experience compared to students in the [traditional learning] group (Hernandez-Ramos & De La Paz, 2009, p. 167).

In addition to increasing students' overall engagement, PBL can also help lead to social and cognitive advantages when compared to individual learning (Lattimer & Riordan, 2011, p.18). The teaching method provides students an opportunity to learn how to collaborate with others (Bate, Hommes, Duvivier & Taylor, 2014, p. 7), which in a social context gives them an advantage over students who rarely experience the challenges of learning to navigate different personalities and opinions.

Because of the focus on group learning, with minimal teacher intervention, PBL can create some hurdles for teacher buy-in and implementation. Teachers have traditionally been the focal point of a classroom, imparting information and details to their students, but with the teacher being a periphery component to learning, it can be a disjuncting transition for some educators. In their study, Vega, Jiménez and Villalobos (2013) listed some of the frustrations expressed by teachers in implementing a PBL approach:

- Planning requires more preparation time when compared to lecture-based approaches.
- Need for more class time and fewer lesson changes.
- Because it is a challenge, some teachers may resist adopting PBL in their classroom (p. 326).

The researchers concluded that PBL only succeeds with support of "appropriate methodologies and technological tools" (Vega, Jiménez & Villalobos, 2013, p. 326).

Strengthening Vega, Jiménez and Villalobos' assertion, researchers at Purdue University echoed the sentiment that support for teachers is the key to

implementing successful PBL. Ertmer and Simons (2005) wrote that “without adequate support, the adoption of PBL methods likely to be extremely limited” and cite the amount of time required to plan, students not taking an active role, and struggles with assessment as barriers that are difficult to overcome (p. 3). They listed the following suggestions to help educators overcome the barriers to successful implementation: 1) *Planning*, 2) *Implementation* and 3) *Assessment* as the three vital stages of Project Based Learning (Ertmer & Simons, 2005, p. 3).

As mentioned earlier, planning can be challenging because it requires time on the part of the teacher ahead of time, and for the students during the course of their school day. This can be difficult in situations where class times are limited or set, and students must transition frequently. These obstacles can be overcome through more flexible schedules, collaboration between instructors, adequate time given to educators to prepare and plan, and with support from administration who support the tenets of PBL. Furthermore, implementing the PBL approach requires adequate class time, clear explanations, well-defined parameters (to keep students on task and focussed) and a willingness by teachers to become educational guides, and to leave the art of discovery learning to students by reducing the time spent lecturing.

Assessment is perhaps the trickiest of the three prescribed stages. Since the majority of work is done in groups, and there isn't a clear template or exemplar to follow, assessing can be tough. To overcome the challenges of assessment, research conducted at Florida Gulf State University suggested a model rubric, in order to provide students a clear understanding of teacher expectations (Kunberger, 2013, p. 260). The sample rubric is intended for upper intermediate or high school students, but could easily be adapted to be used at the lower grade levels.

Table 5.

Simplified Rubric for PBL Projects

Criteria	Exceeding	Meeting	Approaching	Not Yet Meeting
Problem Description (20%)	Clear, concise and a complete description of the problem	Fairly clear and concise, with a mostly complete problem description	Presents an unclear or incomplete problem description	Does not present a description of the problem
Assumptions & References (25%)	Clearly states, justifies all assumptions and references.	Clearly states and justifies assumptions, but may be missing some references.	States and justifies assumptions, provides some references	Does not clearly state assumptions or provide adequate references
Process (30%)	Logical, well-defined process that can be easily replicated	Includes a well-defined, logical and replicable process.	Includes a replicable process.	Does not provide or provides a difficult to follow process
Results (10%)	Clear, detailed and well presented	Clear, detailed, reasonable & unambiguous.	Results are clear and presented appropriately	Results are unclear or presented inappropriately
Clarity and Completeness (15%)	Clear, concise, well-written and smooth & logical	Clear, concise and well-written	Noticeable spelling or grammatical errors / may be illogical	Significant spelling or grammatical errors, with no logical flow

Note: Adapted from Kunberger, T. (2013). Revising a design course from a lecture approach to a project-based learning approach. *European Journal of Engineering Education*, 38(3), 254.

Kunberger also suggests that while PBL is intended to be a collaborative process, conducted alongside other students, it can still be assessed when done individually. In her 2013 study entitled “ *Revising a course from a lecture approach to a project-based learning approach*,” she wrote:

While a majority of the projects were group based, the course also included an individual project which, while review in nature, still required the student to synthesise [sic] information, perform potentially complex analyses, distinguish between relevant and unrelated material, and justify the reliability of multiple sources of information. (Kunberger, 2013, p. 266)

While it is certainly possible to include and assess individual work completed as part of a PBL unit, there is something lost in doing the work individually, as students from PBL approach feel better prepared in the interpersonal skills of communicating, co-operating and managing when working in groups (Bate, Hommes, Duvivier & Taylor, 2014, p. 3).

Another way to approach to take to PBL is to follow the Stanford d-school model of “design thinking.” With this model, the codification for PBL is to use an artistic or scientific way of thinking, by breaking each element of the process into:

- Understanding and empathy
- Defining the problem
- Brainstorming solutions
- Prototype a solution
- Testing a solution
- Reiterating

(Yokana, 2014).

While the d-school’s approach is different that the more simplified version posited by Ertmer and Simons, both feature the same elemental components of creating and understanding a problem, working collaborative and creatively to solve the problem, and presenting the solution or product to others for consideration. In either case, the students are deeply involved in the learning process and drive their own inquiry and discovery.

Ertmer and Simons say that educators need to find a way to integrate the PBL approach into current areas of need within their curricula.

It is important for teachers to be realistic as they plan for and implement their first few PBL units in the classroom...it is

recommended that they begin by identifying areas in the curriculum that have problems or issues already embedded within them (Ertmer & Simons, 2005, p. 12).

Armed with Ertmer and Simons' recommendation, and the research findings on the potential of both inquiry and problem-based learning on student engagement and performance, the next obstacle is to find out how these approaches correspond with the new BC curriculum.

How do IBL and PBL integrate with the new BC curriculum? Before setting out to overhaul and update the current BC-mandated provincial curriculum, the Ministry of Education enlisted help from educational experts from across BC to help carve out and justify a new direction for the curriculum. After years of consultation and meetings with representatives from the Ministry of Education, principals, superintendents, school staff members, teachers, parents, school trustees and students from across the province, it was agreed that the “province needs a more flexible curriculum that prescribes less and enables more, for both teachers and students” (British Columbia Ministry of Education, 2012, p. 2).

With the new focus on a more flexible and adaptable curriculum in place the advisory and working groups came up with a set of Cross-Curricular Competencies to frame the new curriculum. Their suggestions were:

- Communication
- Critical Thinking
- Creative Thinking and Innovation
- Personal Responsibility and Well-being
- Social Responsibility

While the advisory groups differed slightly in their approaches to the competencies, their recommendations were complementary. The advice given during the consultation process was to: reduce the number of prescribed learning outcomes, make the curriculum more manageable, flexible and easier to personalize, and to place more focus on key concepts and big ideas. In doing so,

the thought is that these changes will make the curriculum more relevant to learners, and encourage greater innovation, personalization, creative thinking and collaboration (British Columbia Ministry of Education, 2012, p. 7-8).

What is encouraging about the new BC curriculum, and the thinking behind it, is that it should empower teacher to customize their classes to their students' needs and not to those of the curriculum. It provides a more flexible platform from which to work and learn for both the student and educator. With this in mind, how does British Columbia's new curriculum coincide with IBL and PBL? The short answer is very well, especially since both IBL and PBL environments feature classes which are student focused, with a propensity for peer-collaboration, co-operative learning practices, and creative and critical thinking skill development.

If we gauge those tendencies against the Cross-Curricular Competencies, then it is fair to assume IBL and PBL approaches can aid educators to achieve all of the desired proficiencies, including both personal and social responsibility. In terms of the necessity of learning outcomes, the new Ministry Curriculum has far fewer outcomes. My question is, are provincially mandated learning outcomes still useful if teachers have more control over the curriculum?

According to research conducted by Brooks, Dobbins, Scott, Rawlinson and Norman (2013) at the University of Leicester, the university students they studied still found learning outcomes useful, provided they helped guide them in their learning and didn't restrict it (Brooks et al., 2014, p. 731). So with a clearer view of how inquiry and problem-based approaches could work within the new BC curriculum, are there any other creative, collaborative and communicative learning styles that could compliment an IBL or PBL foundation in a classroom or school?

Alternative approaches. One of the biggest advantages available to teachers since the beginning of the 21st century is access to wireless technology and the prevalence of Wi-Fi and the Internet. With the Internet, mobile technology, social media and interactive digital platforms being an everyday reality for most students across the province, it would be a serious oversight to

not include technology as part of the framework of any new school. Rather than focusing on the devices, that change and are replaced daily by better more advanced models, my research focussed on teaching and learning approaches that integrate technology into their structure, yet still are collaborative in nature.

One approach that is not necessarily a technology-reliant method, is the flipped classroom approach. This approach operates on the premise that a teacher provides information to the students ahead of time, so that the class time can be used for informed discussion and debate. Blogs sites, websites, classroom management tools like *Google Classroom* or *Edmodo* could all be used to support the distribution and hosting of class material in a flipped classroom. Alternatively, information could just as easily be emailed, tweeted or texted to students as links, provided each has access to the internet or a mobile device. For educators, the flipped classroom design should “incorporate the clear structure, readily available class information, and schedule milestones that are found in online class designs” (Crews & Butterfield, 2014, p. 45). The clear well-defined expectations are a common theme that runs throughout all of the learning approaches being posited in the research and the flipped classroom or online learning is no exception.

Online or e-learning, is an approach that utilises the internet to allow students to learn from remote locations away from a school. Online learning has many different forms, but the ones I was most interested in for the purpose of this review, were ones that were interactive between the educator and student, and more importantly between the students themselves. The three approaches I chose to research were: 1) U-Learning, 2) Online Peer Learning, and 3) Hybrid Education.

Ubiquitous Learning (U-Learning) features a learning environment where students can access digital materials or feedback by using their mobile devices in real situations. The two major characteristics of U-Learning are: a) support of seamless learning, and b) adjustable model of learning materials based on a students' location and individual needs (Tsai, Tsait & Hwang, 2012, p. 252). U-learning provides students an opportunity to take their learning on the road, by

tapping into their classes remotely, via their mobile device. This approach provides the flexibility and personalized learning that is important in both IBL and the new BC Curriculum, but is still very individualistic. This is not to say that learners cannot work collaboratively, but it does mean that they would need to seek out collaboration with peers, unless it was mandated by the instructor as part of the course. As teachers, the research trio of Tsai, Tsait and Hwang (2012) suggest “when designing u-learning environment, educators should in particular, provide authentic information and close to real-life situations, resulting in the students preferences for engaging in cognitive activities” (p. 259). So through a well-crafted and explained class, educators could use the u-learning model to facilitate the type of learning that acknowledges the core values of both IBL, the new BC Curriculum and the acquisition of the core competencies. U-learning however could be a little individualistic, so is there a more viable model that is built around collaborative online practices?

Online peer learning requires students to learn from each other by sharing useful information and learning experiences to solve problems (Tervakari et al., 2012, p. 35). This is accomplished in a similar fashion to how a teacher would pose a question in class in a PBL environment, the only difference being that the classroom is virtual, and the students are online, and not at tables or desks. The teacher’s involvement is not simply as a questioner, he or she must also engage student learning by finding opportunities or suggesting resources that could aid the learning process. In this regard, the teacher takes a very similar support role to that of a PBL educator. Another way the teacher encourages discussion amongst peers is through online forums, where questions are posed, answered, discussed and debated (Tervakari, et al., p. 40). Online Peer Learning provides learners a web-based environment to communicate and collaborate. It also gives instructors a platform to host forums, share ideas and distribute and host materials. On the downside, this format requires a high level of student motivation and time management skills. A lack of time or procrastination on the part of the learner can lead to undesirable results or failure (Tervakari et al, p. 36).

The last model researched was the hybrid education model that features some of the best features of online and face-to-face learning. Researchers Crews and Butterfield (2014) describe hybrid education as “a modality that combines face-to-face interactions with web-delivered educational content” (p. 40). Some of the best features of this model is that it incorporates a number of the new BC curriculum’s core competencies: *Communication, Critical Thinking, Creative Thinking, Personal Responsibility* and *Social Responsibility*. Because it is multi-access learning, it gives the learner a chance to learn on their own time, through online forums, through peer-to-peer online interactions and with and from each other and an educator in a traditional classroom environment. Of all the models, it is by far the most flexible, adaptable, and personalized option. A 2009 study cited by Crews and Butterfield, found that “not only do students do well in blended courses, but that a growing number of students actually prefer them to those offered in other modalities.” The most positive features of the hybrid model reported by students in the study, was the interactivity of the classes, including class discussions and group projects (Crews & Butterfield, 2014, p. 40 & 41).

Equipped with the knowledge that student engagement, skills acquisition and success can be achieved both online and in the classroom environment, the next question is, what should learning environments for 21st century learners look like?

What Does It Look Like?

A massive part of the rethinking and redesigning of schools needs to not only be how educators educate, and how students learn, but serious considerations need to be given to how we use physical spaces for learning. When considering how to design educational spaces, the most important group is often left out of the process.

[The board of directors, administrators, teachers, parents, architects and / or interior designers may be involved in the design process, [but] the children’s perspective is often overlooked (Read, 2010, p. 76).

In his publication on remaking the class, educator and designer, David Bill

echoed the need for student input “students are the primary users and should be at the center of such a remake process.” Bill (2014) further suggests making the redesign process a collaborative affair, inviting input and help from teachers, students, parents and community experts. The idea of bringing the community into the design of a classroom may seem foreign to some educators, who have traditionally been masters of their domain, but the need to make a learning space more than a room to read and write, is vital if schools want to replicate working environments of the 21st century. Desks in rows are a product of 20th century thinking, and are not the reality of many of today’s Google and Starbucks inspired work environments.

In the course of their research into how lighting and colouration affects student learning, Ruiter and Johnson (2013) indicated that while choices should be researched-based, they should also be collaborative and incorporate students’ input into the final design (p. 555). In both cases, the experts point to the inclusion of students in the design process as a vital, but often missed step.

The *New Classroom Design Challenge* (Roman, 2009) is one way to spawn student engagement and creative thinking in the design process. Roman suggests that the challenge will engage students in the design process by gathering their opinions together to come up with creative new ways to redesign their physical space (p. 35). Getting student input is a fantastic first step, but the reality of making wholesale changes to a classroom space without adequate funding or district approval, can be something that might scare some educators away from the task. However if educators really want to make the most of their teaching efforts, then careful consideration of their current classroom design and arrangement should be a priority.

In her study on listening to children's preferences about classroom design, researcher Marilyn Read (2010) suggests teachers should consider the following questions about their classrooms:

- 1) Does my classroom reflect a welcoming learning environment?
- 2) Does my classroom design represent the curriculum or theoretical perspective of the [school]?

- 3) How do the children in my classroom perceive the designed classroom?
- 4) What type of design characteristics do the children in the environment prefer and why? (p. 75).

All of these questions lead back to a central theme in the design process, one that focuses on the best physical arrangement, lighting and colouration of a classroom for students, and the need to involve and consult them in the process. Teachers are often assigned classes based on which rooms are not occupied, rather than which room would be best for a group of students. Schools can do better by making rooms more open, less cluttered, brighter and more colourful. Students need spaces that inspire, excite and get their creativity flowing. A room with a chalkboard, row of uncomfortable, well-worn desks, builder beige walls, and fluorescent overhead lights are not the answer.

Conclusion

Based on the research conducted, there is a need for the BC Ministry of Education, school boards, school districts, school administrators, teachers, school staff and parents to do better for the students. Funding of course helps, but a rethinking and redesign of what schools are is what is desperately needed. How schools work, the hours and calendars they keep, what students need to attend daily, the use of physical spaces inside and outside, the need to integrate better and utilise community expertise and services, and most importantly how schools can better serve students and prepare them for the unpredictable challenges of tomorrow is what is paramount.

In the course of the literature review, the research has demonstrated that a constructivist approach that builds on student knowledge and corrects student misconceptions in a creative and collaborative way is a bedrock foundation for reform. The studies within the review also point to IBL, and more specifically PBL approaches, as being well-equipped to help students obtain the cross-curricular competencies that the BC Ministry of Education would like all BC students to possess. The integration of technology, mobile device and online learning platforms are also vital to schools being more flexible and adaptable, while

accommodating student-centred learning practices and providing secure places for the acquisition of relevant research information. Support by, and especially for education professionals is key to helping move BC schools away from the antiquated ways of the 20th century learning. Teachers need to be better supported, given more time to better understand their students' needs, collaborate with peers, plan creative and engaging units, and integrate new pedagogical approaches that reflect the challenges of teaching today's students to prepare for the unknown realities of tomorrow.

Learning needs to be more collaborative, cooperative and innovative, and students should have a larger say in what they learn. Instead of topics that have little or no significance to students, classroom material should be inspired by Global themes, cross-curricular studies, and inquiry-based learning. Students must be the drivers of their own education, and teachers should be a crucial, yet complementary part of the student's educational journey, acting as caring, compassionate, and well-informed guides and mentors. Schools need to be a place where students want to be, and the design and usage of the facilities need to be reimagined as places of creativity, discussion, problem solving and innovation.

In the next chapter, my project infuses the research ideas and findings summarized in this literature review, and strives to provide direction and strategies to aid educators make the necessary changes to help reimagine BC schools.

Chapter Three: Project

Reimagining British Columbia Schools

Image courtesy of [Korea Education and Research Information Service](#)



How to bring British Columbia Schools and Classroom
inline with 21st Century Learning

Jacob S. Main

Section One: Rethinking and Adapting Existing Facilities

"Village School (Holmdel, New Jersey) Class Picture (2nd Grade - 1971-1972)" by [Corey Seeman](#) under CC BY-NC-SA 2.0



"Parents fight change because they believe the best thing for their kids is to have an experience like theirs - which they recall through the rose-tinted lens of nostalgia."

- [Newsweek article, September 2014](#)

Peek in the window of almost any classroom across British Columbia, and you're likely to find a familiar site. Inside you'll find desks or tables neatly arranged in rows, a teacher's desk parked near the front class, and white boards, or possibly even chalk boards, intermittently placed around an off-white, or pale beige room. It's a common scene, the kind that brings parents back to their days as students. And while those memories may be cherished ones, nostalgia does very little to improve their children's education.

The problem with the interior spaces in the vast majority of BC schools is that they are designed to suit the needs of 20th century students. The classrooms may have served the needs of the students' parents, but most spaces do not lend themselves to helping students learn the skills identified by educational experts as critical, for youth to be successful in the 21st century. If the Province wants graduates who are well prepared to adapt, innovate, create, critically assess, and navigate the future, then we as teachers, administrators, and school district officials need to reimagine BC schools, so they all can provide BC students with engaging learning environments to hone 21st century skills.

The intention of this [e-book](#) is to serve as a resource for educators across our amazing province. It focuses on how changes to the BC curriculum, along with student-centered pedagogical approaches, and improved classrooms design can aid us meet the needs of 21st learning. Hyperlinks to additional web-based resources have been included throughout the text, to help in the reimagining process.

What can be done?

- Changes need to be made without relying on additional funding from the Ministry of Education. Funding for BC schools has increased by less than \$400-million dollars since 2006, and only this year as the funding dollars per student reached above the \$7000 per student mark.
- Educators need to explore ways to redesign, rethink, and remix the schools we already have.
- Schools need to better utilize existing spaces to help stretch education dollars.

With the pending launch of the new provincial curriculum, teachers, administrators, and district leaders can be on the leading edge of change of education, by reimagining what schools and classrooms can be for BC students.

Image courtesy of Hearst Connecticut Media.



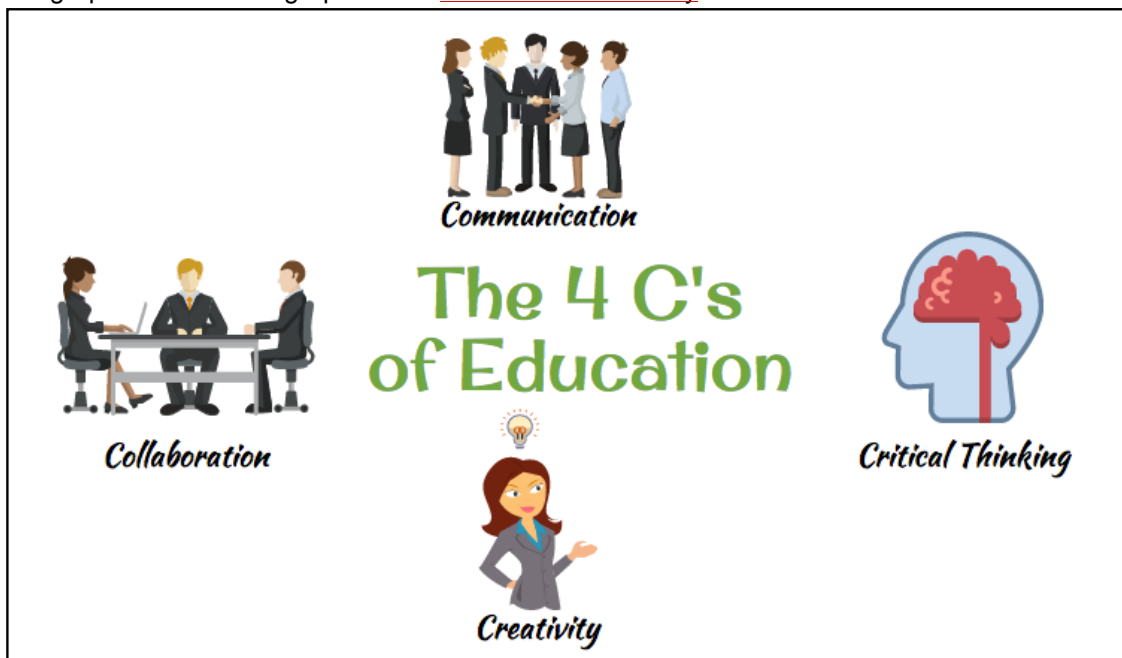
The state of the art [Fairchild Wheeler Interdistrict Magnet Campus](#) in Bridgeport, Connecticut cost nearly \$130-million to build.

Public education in British Columbia has always been under close scrutiny. Funding totals for BC students only recently crested the \$7000 per year allocation threshold, resulting in tough financial decisions for school districts, board trustees, administrators and educators across the province. While student-funding allocations have remained relatively stagnant over the last decade, significant investments in new facilities have been made to build new schools in growing communities. This means however, that cities and towns with stable or declining populations are less likely to get new schools. With a new school costing upwards twenty millions of dollars, it is increasingly important to reimagine how we use existing facilities across the province.

How do we Reimagine Existing Spaces?

While the idea of transforming physical spaces of the classroom and school, is not a new one, the reality is that in order to prepare today's students for tomorrow's challenges, they need, and deserve, to have environments that foster the cornerstone attributes of 21st century learning: **Communication, Critical Thinking, Creativity and Collaboration.**

Infographic based on a graphic from [connections academy](#)



In the 1960's and 70's a number of schools across the continent adopted an educational and architectural approach called "*Open Concept Schools*." The concept was based in the idea of the old single room schoolhouse, where the teachers taught all subjects to a class of students of different ages and abilities. The "*open classrooms*" were large open spaces where a team of teachers would instruct a multi-aged, multi-leveled group of students at the same time. After some initial success, the idea was scrapped in favor of a more traditional approach, and nearly all of the "open schools" were portioned up with walls, room dividers or bookcases, and students reassumed the familiar configuration of

desks in rows, and teachers at the front of an enclosed classroom.

Photograph courtesy of David Stroble



A typical classroom layout for students in a non-open concept classroom in the 1970's. Teacher in front, a blackboard and desks in rows.

Why Go Back to a Failed Model?

Perhaps calling the “*Open Concept Classrooms*” experiment a failure is a bit harsh. Maybe the idea was ahead of its time? Maybe there wasn't the necessary willingness to make it work, or perhaps the technology of the day, simply made it an ineffective model for most educators? In any case, times have changed, and the needs of students are no longer best served in static or confined spaces. It may be time to re-open the classroom setting, giving the room more flexibility and flow, and to place more focus on the learning of the students, and not solely the convenience of the teacher.

Education and design experts suggest that new schools and

classrooms should be adaptable, open, and washed in natural light. Furnishing should suit a variety of learning styles, and classroom configurations should be easily adaptable to the needs of the activity or lesson.

Seating arrangements should be suited to the learners needs and not solely on that of the educator. Shapes, colors and sizes of furniture should be functional, flexible and help foster creativity.

Photo courtesy of Jens Röttsch



A student-centered classroom setting at [Berlin Metropolitan School](#)

With these considerations in place, a number of newer schools that have been built around the Lower Mainland of British Columbia seem to be taking this more adaptive and open approach to the design of their buildings.

At [Katzie Elementary](#) in Surrey, BC, a different approach has been taken, as two large classrooms have been adjoined by an accordion-style solid sliding wall. While the closed accordion wall doesn't provide any additional light into the space, it does provide a much more open working environment than the smaller glass sliders used at Yorkson Creek Middle School.



In both these examples, the classroom colours were kept neutral, and small rectangular desks were used as adaptable student workspaces. Some other schools have taken a more colourful and radical approach

Take for example the rainbow-coloured rolling chairs and desks at the [Monterrey Institute of Technology and Higher Learning](#) in Mexico City.

Image courtesy of [Leigh Thelmadatter](#)

Taking an equally colourful, but more unconventional approach, educators at [Avery Coonley School](#) in Illinois, developed a radical solution to individualized student learning. ACS's "*interconnected learning spaces*" feature a semi-private pod with a fold-down seat, a reading light, and a bookshelf. While it certainly is not the most collaborative work environment, it definitely pushes the envelope of classroom design.

Image courtesy of Avery Coonley School



What About the Impact of Classroom Colour and Furnishings?

"Our School" by [woodleywonderworks](#) under CC BY-NC-SA 2.0



Take a look inside almost any primary classroom, and you will likely see walls covered in brightly coloured posters, images, and charts. Yet look inside an intermediate or high school classroom, and the colours seem to disappear.

[Randall Fielding](#), an expert in educational architecture suggests that there are simple truths around the use of colour in schools, and that covering classroom walls in beige, gray and off-white paint, is not one of them.

Randall Fielding's Expert Colour Tips:

1) Primary Colours are not always best.

Children tend to prefer colours of nature and human skin tones, and primary colors can be harsh, and are best used sparingly.

1) Don't get caught up in color stereotypes.

Research that indicates red incites aggression, and that green is relaxing is overly simplistic and outdated. Different colours used thoughtfully, can all be effective in learning environments.

3) Don't get stuck in neutrals.

There is a long standing common myth that neutral colours keep the focus on the teacher and not the architectural elements of a room. Research into colours indicates that learning “benefits from a carefully applied stimulus-rich environment, not from a palette dominated by gray, beige, white, or off-white.”

Putting It All Together: Classroom Design and Layout

In the course of this first section, a number of points around classroom design have been suggested, and they include:

- Classroom spaces should be flexible.
- Classrooms need to provide enough room for easy movement.
- Classrooms should feature a lot of natural light.
- Classrooms should be focused on student learning.
- Classrooms should offer both individual and collaborative spaces.
- Classrooms should have adaptable furnishings.
- Classroom colours should be thoughtfully chosen.

What has yet to be addressed, is how do teachers get started with their redesign?

With help from [Edutopia](#), designers from the [Stanford D School](#), and members of the [Third Teacher+](#) design team took these design tips and put them into practice at [Roosevelt Middle School](#) in San Francisco.

Below are the YouTube links to each of the Remake your Classroom videos:

[Remake your Classroom - Part One](#)

[Remake your Classroom - Part Two](#)

[Remake your Classroom - Part Three](#)

Here is a list of recommendations for how to improve classroom design and functionality, based on the advice given in the 3 part video series.

All finalized classroom designs should:

- Match teaching and learning goals.
- Improve teacher/student mobility, overall flow and utilization of existing space.
- Incorporates the students' preferences and suggestions.
- Focus on sustainable design by using recycled, repurposed and reclaimed materials.
- Have a realistic, but manageable budget. To keep costs in check, and to realize a truly collaborative design, the work should involve educators, students, community support and volunteers.

Based on the advice given, here are the key takeaways from the three part video series and the design experts' advice:

Planning Portion of the Design:

- Consider the educators' needs and preferences when creating a teaching zone.
- Consider how layout can improve classroom flow. Collaborative learning environments require adaptable rooms that are easy to move around.
- Thoughtfully plan different styles of collaborative work spaces.
- Remember to increase space within the classroom by providing adequate storage.
- Classroom furnishings should be sturdy, adaptable and varied.

Execution of the Design:

- De-clutter & Clean. Get rid of things you no longer need, and clean all surfaces.
- Reconfigure. Consult and brainstorm different configuration for classroom furnishings with all user groups (especially the students).
- Repurpose & Reuse. To help minimize cost and the impact on the environment, consider how existing furniture can be refreshed, reused or repurposed.
- Share the Spotlight. Don't be afraid to get the school community and volunteers involved.

Revealing and Reveling in the Design:

- Enjoy and chronicle the process as you go, and don't be afraid to adapt plans if something better is proposed.

- Invite the community to celebrate in the results.
- Reflect on learning. What was learned, which skills were honed as part of the design and remake process.
- Always consider ways to improve and adapt the space. Even the greatest designs can be improved upon.

What does a Reimagined BC Classroom look like?

The classroom of BC Educator [Alison Galloway](#) is a perfect example of how to effectively use earth tones, and not primary colours, to offset her off-white walls, creating an open and inviting room.

The following four images Courtesy of Alison Galloway



Galloway's classroom furnishings are functional and adaptable, and they help bring much needed colour, texture, and variety to an otherwise neutrally-coloured room.



The furnishings and layout provides a number of different learning zones, and seating options for the students to collaborate, make, and create in.





Section Two: Rethinking Classroom Approaches

Image courtesy of [Oregon Department of Transportation](#)



Putting the Focus on the Learner

- Requires students to be active learners, and take more responsibility for their education.
- Requires teachers to be comfortable in turning the wheel over to the student to drive their learning. Become more of a facilitator, mentor and advisor.
- Important to learn about students' prior knowledge, and correct any misconceptions.
- Classroom time needs to be purposeful, relevant and engaging.
- Time needs to be given for synthesis & reflection.
- New projects or problems should be introduced with “mini-lectures” to help frame, explain and clarify expectations.
- Works best when there is more time provided for student work and fewer class changes.

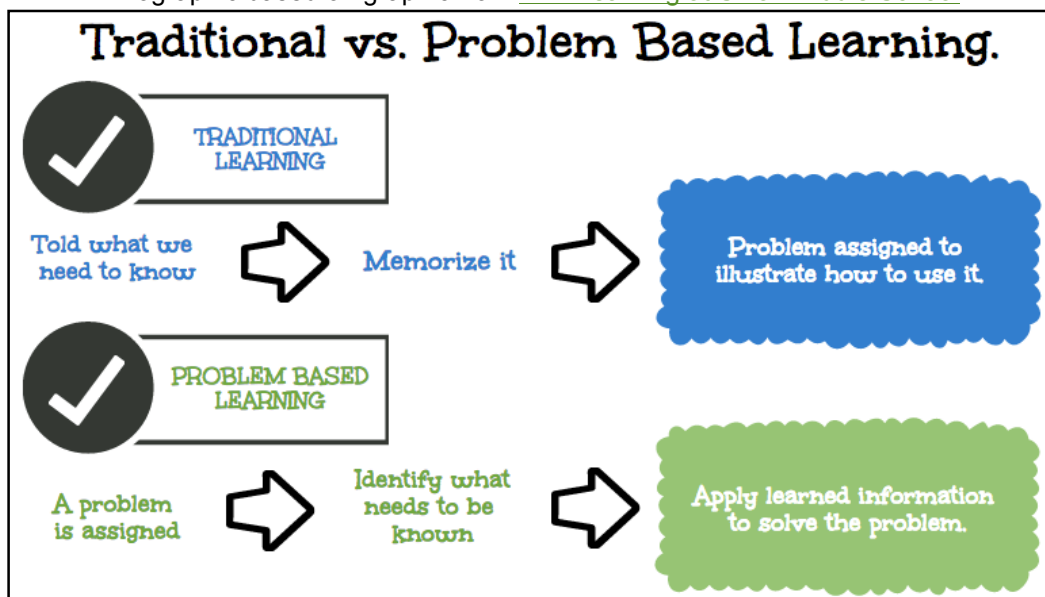
*Student learning is not
something done to them,
it is something done
by them.*

While the first section of the e-book addresses the need to remake the classroom, section two tackles how educators can best use the time they have with their students to guide them in the leaning process.

What Needs to Change?

Students need to take a greater role in their learning experience. Traditional learning approaches viewed students as “empty vessels” needing to be filled. Teachers were viewed as the fillers of those vessels, by passing along knowledge to the students. In turn, students’ were expected to memorize the information, and the proof of “learning” came by reiterating what they retained on a test. In this traditional approach, the student is a passive recipient of knowledge, and learning is limited to the confines of the lesson or assignment. In this traditional approach does little to develop the critical thinking or creative thinking skills necessary to take a different look at real world problems.

Infographic based on graphic from [PBL Learning at Small Middle School](#)



If the expectations of students are to follow, restate information taught, and not question authority, then the traditional approach remains an effective model. If schools hope to cultivate creative, innovative and imaginative thinkers, then a different approach needs to be taken. The approach necessary is a well-planned, student-centered PBL approach to classroom learning.

What exactly is PBL?

There is some well-deserved confusion around exactly what P.B.L stands for. Is it Project Based Learning or is it Problem Based Learning? The short answer is...yes. PBL is interchangeable between to two learning approaches, which are very similar, but not exactly the same.

The following comparisons stem from an excellent [article](#) by [John Larmer](#), the Editor in Chief at the [Buck Institute for Education](#).

Project Based	Problem Based
Often multi-subject	More often single subject, but can be multi-subject
Can take weeks or months to complete	Tend to be shorter, but can be lengthy
Follows general, variously-named steps	Follows more traditionally prescribed steps
Includes the creation of a product or performance	Doesn't always require a product, perhaps just a suggestion
Uses real-world, authentic tasks, settings or scenarios	Often uses fictitious scenarios as "ill-structured problems"

Similarities between Project and Problem-Based Learning:

- Focus on an open-ended question or task.
- Provide authentic applications of content and skills.

- Build on 21st century skills.
- Emphasize student independence and inquiry.
- Are longer and more multifaceted than traditional assignments.

How can PBL be Integrated into Classroom Practices?

Adopting a PBL approach requires a lot of planning on the part of the teacher, but if creating a student-centered, inquiry-based learning environment is paramount, then it is worth the additional time and effort.

Advantages of a PBL Classroom:

- More active, hands-on learning and collaboration between students.
- Projects or problems are often based on authentic challenges.
- Work is student-driven and inquiry-based.
- Teaches the students practical life long skills such as problem solving, critical thinking, peer interaction, creativity and patience.
- It is well suited for cross-curricular or multi-grade level learning.

Challenges of a PBL classroom:

- Requires the educator to do a lot of pre-planning, trouble-

- shooting and experimentation prior to introducing the problem or project.
- PBL needs adaptable work environments and flexible teaching timetables.
 - PBL requires the teacher to relinquish their role as provider of knowledge, and embrace the role of educational facilitator.
 - Because PBL is frequently student-driven, it can pose difficulty for unmotivated students, students with learning challenges, and those who are new language learners.

How does PBL Integrate with the New BC Curriculum?

Before setting out to overhaul and update the current provincial curriculum, the BC Ministry of Education enlisted help from educational experts from across BC to help carve out and justify a new direction for the curriculum. After years of consultation and meetings with representatives from the BC Ministry of Education, principals, superintendents, school staff members, teachers, parents, school trustees and students from across the province, it was agreed that BC needed a more flexible curriculum that prescribed less, and enabled teachers and students more.



Communication -The communication competency encompasses the set of abilities that students use to impart and exchange information, experiences and ideas, to explore the world around them, and to understand and effectively engage in the use of digital media.



Thinking - The thinking competency encompasses the knowledge, skills and processes we associate with intellectual development. It is through their competency as thinkers that students take subject-specific concepts and content and transform them into a new understanding. Thinking competence includes specific thinking skills as well as habits of mind, and metacognitive awareness.



Personal and Social - Personal and social competency is the set of abilities that relate to students' identity in the world, both as individuals and as members of their community and society. Personal and social competency encompasses the abilities students need to thrive as individuals, to understand and care about themselves and others, and to find and achieve their purposes in the world.

The previous three graphics were captured from the BC Ministry of Education's [new curriculum webpage](#), and demonstrate and explain the importance of the new cross-curricular competencies. The competencies place increased importance on educating well-rounded communicators and thinkers, who are empathetic and socially responsible in their interactions with others.

Image courtesy of [giftedstudieswku](#)



With the new focus on a more flexible and adaptable curriculum in place, educational experts from across BC came up with a set of cross-curricular competencies to help frame the new curriculum.

- Communication
- Critical Thinking
- Creative Thinking and Innovation
- Personal Responsibility and Well-being
- Social Responsibility

What is most encouraging about the new BC curriculum, is that it should empower teachers to customize their classes to their students' needs, and not solely to those of the curriculum. The changes provide a more flexible platform from which to work and learn, for both the students and educators alike.

Sounds Good, But Where Do I Begin?

As previously mentioned, adopting a PBL approach takes a lot of forethought and planning to implement effectively. Fortunately there are a lot of fantastic free resources to help you get started on the web. Here are some of the better ones:

[Buck Institute for Education Resources Page](#)

This webpage has the most access to different forms of PBL links and resources.

[The Buck Institute for Education](#) is a non-profit organization with a focus on helping teachers, schools and school districts establish PBL learning environments for their students, in all subject areas and grade levels.

[Edutopia Project-Based Learning Page](#)

[Edutopia PBL Planning Page](#)

Both webpages provides access to articles, blogs, videos and other web-based resources.

[Edutopia](#) is part of a [George Lucas Educational Foundation](#), and it is an educational website created to be an online community for educators, students and parents. Edutopia's goal is to increase knowledge of collaborative practices for K - 12 education, in hopes of fostering more innovative, and creative leaders and learners.

[High Tech High Projects Page](#)

This site is an incredible resource for any teacher looking to establish a project-based learning environment in their class. The page feature examples, overviews, videos, instruction and downloadable copies of learning materials for free. There is a wide range of subject areas, many cross-curricular, and tons of different projects related to different topics to choose from.

[High Tech High](#) is comprised of 13 charter schools in California. HTH's focus is on developing academic, and citizenship skills, that will enable each student to be successful throughout their careers.

Final Thoughts

When I set out to research and write this publication, my intention was to create something that could help improve the classroom experience for students. As a proponent of collaborative, hands-on learning, and I knew I wanted to include PBL approaches, but did not know what my research angle would be.

As I began wading through dozens of scholarly articles, educational publications, and blog posts, it was eventually an online news article that popped up on my twitter feed, that led me to refining my eBook's focus. My inspiration was a 2014 Newsweek article called, "[What Classrooms Can Learn From the Google Campus](#)" by [Elijah Wolfson](#). After reading the article, about a new state-of-the-art school built in Connecticut, I found myself asking, "Can't we do more with our current schools, without needing to spend 126-million dollars?" I knew our province wouldn't spend that kind of money for just one school, so I began pondering how we could rethink and redesign our existing schools and classes to better serve BC students. This publication is a product of trying to answer "How we can do more with less?"

This e-book is not intended to provide all the answers. Its purpose is to offer practical information, resources, and sound pedagogical advice, in hopes of inspiring others to rethink their classroom design and teaching approaches.

On the next page you will find more resources to help you make your school a place where students can be inspired to critically assess, create, innovate, and develop their 21st century skills.

Best of luck!

[Jacob S. Main](#)

Additional Resources:

8 Tips and Tricks to Redesign Your Classroom. [Edutopia](http://www.edutopia.org/blog/8-tips-and-tricks-redesign-your-classroom).
<http://www.edutopia.org/blog/8-tips-and-tricks-redesign-your-classroom>

Aligning 21st Century Learning with 21st Century Learners. [21 Foundation](https://www.youtube.com/watch?v=Zu01G8h4yNI)
<https://www.youtube.com/watch?v=Zu01G8h4yNI>

A new classroom design challenge. H. T. Roman. The Technology Teacher. March 2009, Vol. 68, No. 6. *Note: Weblink is a preview only. The full article available through Academic Databases.*
<https://www.questia.com/library/journal/1G1-195679868/a-new-classroom-design-challenge-students-will-gain>

Capture the Learning: Crafting the Maker Mindset. [Edutopia](http://www.edutopia.org/blog/capture-learning-crafting-maker-mindset-lisa-yokana).
<http://www.edutopia.org/blog/capture-learning-crafting-maker-mindset-lisa-yokana>

Enabling Innovation. Transforming Curriculum & Assessment. [British Columbia, Ministry of Education](https://www.bced.gov.bc.ca/irp/docs/ca_transformation.pdf).
https://www.bced.gov.bc.ca/irp/docs/ca_transformation.pdf

New BC Curriculum. [British Columbia Ministry of Education](https://curriculum.gov.bc.ca/home).
<https://curriculum.gov.bc.ca/home>

Project Based Learning: Explained. [Buck Institute for Education](https://www.youtube.com/watch?v=LMCZvGesRz8).
<https://www.youtube.com/watch?v=LMCZvGesRz8>

Project Based Learning at High Tech High. [Buck Institute for Education](https://www.youtube.com/watch?v=xfP53Alnbhk).
<https://www.youtube.com/watch?v=xfP53Alnbhk>

Sir Ken Robinson: Bring on the Learning Revolution! [TED Talks](https://www.youtube.com/watch?v=r9LeIXa3U_I)
https://www.youtube.com/watch?v=r9LeIXa3U_I

Chapter Four: Professional Reflection

Project Overview and Summary

My Masters project revolves around the idea that BC's schools, and classrooms, need to be rethought, redesigned and revamped. This claim stems from curricular competencies outlined in the new BC curriculum, the tenets of 21st century learning, and elements of effective classroom design.

My project is divided into of four chapters, each complementary to the next. Chapter one is the introduction, chapter two, the literature review, the third chapter is my eBook, and the final chapter is my professional reflection.

In chapter one, the introduction provides an explanation to the relevance and importance of the project. It also, presents the research problem, project direction, and offers an overview of the literature review.

Chapter two, the literature review, provides the necessary academic support and justification for the project. The learning approaches researched within the review, fall under the theoretical umbrella of Constructivism, and the ideals of 21st century learning. Some of the topics researched and discussed within the chapter include: inquiry-based learning, problem-based learning, the new BC curriculum, and effective classroom design.

Sandwiched in between the research and reflection portions of the project, is my eBook, "Reimagining BC Schools." It is a free, interactive, electronic publication, embedded with dozens of hyperlinked resources, and videos. It is intended to be an introductory guide for BC educators, who are interested in adopting more collaborative, hands-on learning environments, and improving the effectiveness, and efficiency of their classroom design. My hope is, readers will find it to be a useful, resource-rich guide that helps them reimagine what their classrooms can be.

The concluding section, chapter four, is a professional and personal reflection on the process of creating my Master's project, and the recollections of what I have learned over the course of my educational journey through the University of Victoria's TIE Grad program.

Professional Thinking and Beliefs

When we started the Master's program back in 2013, I would have considered myself to be a giving, and open-minded educator. I quickly discovered, that I was not nearly as liberal with my work as I proclaimed to be. In order for me to really buy-in, grow my PLN, and contribute meaningfully to a community of learners and educators, I had to let go of some of my existing views on the ownership of the materials and products I had created. Initially, I was hesitant to share my ideas and educational resources to an audience outside of my immediate colleagues and friends. I believed I should guard my work, and only share it with those who had earned the right to access my intellectual properties.

Adding to my hesitance to share online, I was also very skeptical about how social media could be used to aid in my professional development. Social media, to me, was more about telling others about your weekend, or a great concert you had seen. I did not see its potential as a means of sharing, and celebrating successes. Twitter was a fad in my mind, and I could not see how it would positively impact my teaching.

Lastly, I had become overly comfortable in the familiar routines of my classroom practices. I was doing exactly what I had been taught as a student. Give information, review information, test the information learned. I was satisfied with my approaches in the classroom. My students scored well on tests, and that must mean I was doing a good job. I was a lot more focussed on student performance than learning. The notions of creativity, innovation and critical thinking, were for art, physics and law classes.

Thankfully, in all three cases, I have reformed my views, so that they are more inline with 21st century realities, thinking, skills development, and teaching practices.

As I close in on graduation, I know that I am far more open to creating professional connections, and sharing my ideas, thoughts and work online. I am hopeful that my eBook "Reimagining BC Schools" will be the first of many

educational resources that I create, as I transform my role from educational consumer, to that of an educational producer.

As it turns out Twitter is not a fad, and in spite of my initial hesitation to use it, and other forms of social media, I have embraced Twitter and blogging as a means of developing an online identity, both professionally and personally. I do not tweet everything I do, see or learn about, but I try to be thoughtful and purposeful in what I do share out to the world. One of the greatest revelations of me using Twitter, and blogging on Weebly and Google+, is that it gives me insight into the thoughts and interests of other educators that I have come to respect and admire.

As a part of building an online community throughout the TIE Grad program, I have come to appreciate the power of online relationships, as a meaningful and viable alternative to face-to-face relations. Because of the time I have spent online with people, that I have never actually met, I have a greater number of educational influences that I can draw inspiration from, contact for assistance, or draw from for resources. Because I know I can rely on them for help, knowledge and support, I feel compelled to do the same, by making my work available online, and by tweeting or posting educationally valuable information that may help them in their daily practice or professional development.

Intentions, Activities and Classroom Practices

In terms of my day-to-day work in the classroom, I am still very much a “big picture” teacher, and my educational approach has not deviated much since beginning the TIE Grad program. I remain dedicated to creating learning environments that focus on the students’ needs, which are creative and collaborative, and which always embrace teachable moments, even if it comes at the expense of the lesson. A more regimented educator might view my instructional approach as whimsical or free-flowing, but I would call it broadly focused, intentional, and adaptable. With that being said, my increased knowledge of educational philosophies, approaches and technology-enabled

classroom resources, has definitely improved the skill set that I bring with me to class each day.

One of my biggest takeaways from TIE Grad is the understanding that providing technology without context, does not increase lesson quality. However, technology as a tool for learning, within a quality lesson, can accentuate wonder, creativity and innovative thinking. As devices such as iPads, smart phones and even laptops made their way into my classroom, I would see the engagement by students as a sign of a positive learning experience. What I was missing, was the understanding that without a defined purpose, or intention supporting the use of technology, the device served more as a shiny distraction, or temporary play thing, than as a valuable learning tool.

My classroom practices are often guided by the Four C's of education: Communication, Critical Thinking, Creativity and Collaboration. As these four qualities are also reflected in the Core Competencies of the new BC curriculum, I am thankful for having been introduced to so many pedagogically sound applications, and websites over the course of our studies. I have adopted applications like Voki, Flipquiz, Google Apps for Education, Google Classroom, Aurasma, Explain Everything and Duolingo into my classroom practices. Each of these was either introduced to me through one of my classmates' presentations, a professor or guest speakers' lesson, or discovered as part of my research. I am grateful for this, because having these applications available, has made our class learning environment far more inclusive (especially for those with anxiety or ESL learners) engaging, and relevant for my students. In addition, because of the vast array of apps and sites available online, I am more critical and discerning in my choices. Completely my Masters in Technology in Education has helped me recognize and view technology as a ends to a means, and not the end itself. In turn, I believe, because of my increasing knowledge and comfort with educational technology, I am now better suited to work alongside my students through 21st century challenges, and prepare them for their futures.

How Has My Master's Experience Made Me a More Valuable Member of My Teaching Community?

Having completed my Masters experience, it is hard to imagine how some of my perspectives have changed as an educator. I have been extremely fortunate to have learned from some excellent instructors over the past few years. From the beginning, Valerie Irvine has encouraged individuality, and professional growth at our own rate, and in our own way. She has always been supportive and understanding. Tim Pelton, has patiently guided me through, and taught me to pay attention to even the smallest details, something that I have always struggled with. Tim has also preached continuity and clarity in my work, and for that I am thankful, as I am not only meandering in my work, but also often overlook the importance of flow and consistency of focus. From Alec Couros, I had the chance to witness firsthand how social media, and the Internet can help us reach out and share our ideas and questions. Not only that, but Alec also helped me realize the importance of fostering meaningful professional relationships, as he called upon his learning network time and time again, to help lead our class through extremely entertaining, varied and insightful classes. Finally, Nick Zaparyniuk ignited my interest in design philosophy, demonstrated how to create well-planned and intentional course structure, and opened my eyes to the fascinating world of TED Talks videos.

I would be remiss of me not to mention the invaluable contributions. and support of my classmates over the past few years. Keith Rispin always provided witty, self-deprecating humour, as well as sage advice, and honest commentary during class, and with his writing. Alison Galloway was extremely supportive during our Inquiry Learning group meetings, encouraging me to follow take a design angle for my project, when I doubted it would fit into my work. Alison also agreed to let me use photos of her amazingly well-designed classroom in my eBook. But the two classmates that I could not have completed my project without are Tracey Thorne and Lorrie Burnham. As classmates and co-workers when we set out to tackle our MEd together nearly 3 years ago, we have all been by each others' side throughout. We studied together, struggled together,

celebrated together, knowing all along that I could rely on either of them if I needed an explanation, clarification, or a simply a pick me up.

Upon completion of the TIE Grad program, my intention is to share, guide and help others in my school, and my district to help other educators get involved with integrating useful and purposeful technologies in their classrooms and schools. I plan to take a more active role, volunteering through as a digital literacy coach, grade level leader, and as a presenter at district professional development sessions. Part of my impetus to complete my Masters was to increase my overall knowledge and ability, but also to be able to be considered for leadership role in my district, with a long-term goal of transitioning into a school administration position.

Recommendations for Getting the Most out of my Master's Project

- 1) Have an open mind to the ideas presented. There is a lot of excellent information and advice available in the hyperlinks and throughout the text of the eBook. Adopt the ones that you believe fit into your teaching philosophy, classroom approaches and in the case of design, can be addressed realistically within your physical space and budget.
- 2) Embrace the resources available to you online, and adapt them to your needs. Implementing PBL into your classroom is rewarding and exciting, but requires a lot of preparation ahead of time. Focus on the learning and building your expertise with existing projects that suit your needs. This will allow you to cultivate your confidence and skills, making it easier to know what to do, and what not to do when designing your own PBL unit.
- 3) Do not be afraid to fail. Be reflective and be a good listener, especially to the feedback from your students, when considering what could be improved from your lesson, assignment, project or even teaching approach. Also, do not be afraid to make adaptations on the fly, if you feel it would benefit your lesson, you class, and especially if it can help an

individual students be more successful. The purpose of teaching is not to create perfect lessons, or assignment, but rather to support student learning.

- 4) Break your learning, and planning into manageable portions. Much like the strategy used by some marathon runners, break things down into smaller sections. Some runners will divide their 42 kilometers into 6-kilometer chunks, so the task doesn't seem so daunting. Tackling new classroom practices can feel overwhelming, but focus on one task, goal or approach at a time, and reimagining your classroom will be that much more attainable.

References

- 21 Foundation (2012, October 29) *21:21 – Aligning 21st Century Learning with 21st Century Learners*. Retrieved from <https://www.youtube.com/watch?v=94GFQHxoDoU&t=10>
- Allen, M. (2004). *Assessing academic programs in higher education*. Bolton, MA: Anker. Retrieved from <http://assessment.uconn.edu/docs/TeacherCenteredVsLearnerCenteredParadigms.pdf>
- Bate, E., Hommes, J., Duvivier, R., & Taylor, D. C. M. (2014; 2013). Problem-based learning (PBL): Getting the most out of your students - their roles and responsibilities: AMEE guide no. 84. *Medical Teacher*, 36(1), 1-12. doi:10.3109/0142159X.2014.848269
- Bauer, J., & Prenzel, M. (2012). European teacher training reforms. *Science*, 336(6089), 1642. doi:10.1126/science.1218387
- Bill, D. (2014, August 4) 8 Tips and Tricks to Redesign Your Classroom. *Edutopia*. Retrieved from <http://www.edutopia.org/blog/8-tips-and-tricks-redesign-your-classroom>
- Bixler, A. (2011). What we Muggles can learn about teaching from Hogwarts. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 84(2), 75. doi:10.1080/00098655.2010.507825
- Bollag, B. (2005). *Chronicle of Higher Education. Consensus Grows on Basic Skills That Colleges Should Teach, but Gauges of Those Abilities Are Poor, Report Says*. Retrieved from http://assessment.uconn.edu/docs/resources/NEWS/ChronicleOfHigherEd_ConsensusGrows.pdf
- British Columbia, Ministry of Education. (2013) *Draft Curriculum*. Retrieved from: <https://curriculum.gov.bc.ca/draft-curriculum>

- British Columbia, Ministry of Education. (August 2012) *Enabling Innovation. Transforming Curriculum and Assessment*. Retrieved from:
https://www.bced.gov.bc.ca/irp/docs/ca_transformation.pdf
- Brooks, S., Dobbins, K., Scott, J. J. A., Rawlinson, M., & Norman, R. I. (2014). Learning about learning outcomes: The student perspective. *Teaching in Higher Education*, 19(6), 721-733. doi:10.1080/13562517.2014.901964
- Conner Lambeck, L. (2014, February 17) Fairchild Wheeler draws mixed reactions. *Connecticut Post*. Retrieved from
<http://www.ctpost.com/local/article/Fairchild-Wheeler-draws-mixed-reactions-5240655.php>
- Crews, T., & Butterfield, J. (2014). Data for flipped classroom design: Using student feedback to identify the best components from online and face-to-face classes. *Higher Education Studies*, 4(3), 38. doi:10.5539/hes.v4n3p38
- Drake, K. N., & Long, D. (2009). Rebecca's in the dark: A comparative study of problem-based learning and direct instruction/experiential learning in two 4th-grade classrooms. *Journal of Elementary Science Education*, 21(1), 1.
- Dunn †, R., & Honigsfeld, A. (2013). Learning styles: What we know and what we need. *The Educational Forum*, 77(2), 225-232.
doi:10.1080/00131725.2013.765328
- Ertmer, P. A., & Simons, K. D. (2005). Scaffolding teachers' efforts to implement problem-based learning. *International Journal of Learning*, 12(4), 319-328.
- Hayton, R. & Bache, I. & (2012). Inquiry-based learning and the international student. *Teaching in Higher Education*, 17(4), 411-423.
doi:10.1080/13562517.2011.640998
- Harris, D. N., & Sass, T. R. (2011). Teacher training, teacher quality and student achievement. *Journal of Public Economics*, 95(7/8), 798-812.
doi:10.1016/j.jpubeco.2010.11.009

- Hernandez-Ramos, P., & De La Paz, S. (2009). Learning history in middle school by designing multimedia in a project-based learning experience. *Journal of Research on Technology in Education*, 42(2), 151.
- Huba, M. E., & Freed, J. E. (2000). *Learner-centered assessment on college campuses: Shifting the focus from teaching to learning*. Boston, MA; London: Allyn and Bacon. Retrieved from <http://assessment.uconn.edu/docs/TeacherCenteredVsLearnerCenteredParadigms.pdf>
- Johnson, C. S., & Ruiter, G. A. (2013). (Re)-Envisioning Classroom Design with Light and Colour. *Academic Research International*, 4(4), 550.
- Kothaneth, S., Robinson, A., & Amelink, C. (2012). Tablet PC support of students' learning styles. *Journal of Systemics*, 10, 60-63.
- Kunberger, T. (2013). Revising a design course from a lecture approach to a project-based learning approach. *European Journal of Engineering Education*, 38(3), 254.
- Lattimer, H. & Riordan, R. Project-based learning engages students in meaningful work: Students at High Tech Middle in project-based learning. *Middle School Journal*, Vol.43, No. 2 (November 2011), 18-23.
- McCabe, A., & O'Connor, U. (2014). Student-centred learning: The role and responsibility of the lecturer. *Teaching in Higher Education*, 19(4), 350-359. doi:10.1080/13562517.2013.860111
- Mroczkowski, J. A. (2009, September 16). 21st-century classroom challenge. *The Windsor Star*.
- Muller, D. (2012) *The key to effective educational science videos*. TEDxSydney. 27 May 2012. Retrieved from <https://www.youtube.com/watch?v=RQaW2bFieo8&t=25>
- NYSAIS-Now (2015, February 8). *Yong Zhao Interview* retrieved from <https://www.youtube.com/watch?v=MHKpTGJbFL0>

- Read, M. A. (2010). Contemplating design: Listening to children's preferences about classroom design. *Creative Education*, 1(2), 75-80.
doi:10.4236/ce.2010.12012
- Roman, H. T. (2009). A new classroom design challenge. *The Technology Teacher* [H.W.Wilson - EDUC], 68(6), 34.
- Tangney, S. (2014). Student-centred learning: A humanist perspective. *Teaching in Higher Education*, 19(3), 266-275. doi:10.1080/13562517.2013.860099
- Ted Talks (2010, May 24) *Sir Ken Robinson: Bring on the Learning Revolution!*
Retrieved from https://www.youtube.com/watch?v=r9LeIXa3U_I
- Tervakari, A., Silius, K., Tebest, T., Marttila, J., Kailanto, M., & Huhtamäki, J. (2012). Peer learning in social media enhanced learning environment. *International Journal of Emerging Technologies in Learning (iJET)*, 7(3), 35-42. doi:10.3991/ijet.v7i3.2173
- Tsai, P., Tsai, C., & Hwang, G. (2012). Developing a survey for assessing preferences in constructivist context-aware ubiquitous learning environments. *Journal of Computer Assisted Learning*, 28(3), 250-264.
doi:10.1111/j.1365-2729.2011.00436.x
- Unver, A. O., & Arabacioglu, S. (2011). Overviews on Inquiry Based and Problem Based Learning Methods. *Jurnal Pendidikan IPA*, 303-310.
- Vega, C., Jiménez, C., & Villalobos, J. (2013). A scalable and incremental project-based learning approach for CS1/CS2 courses. *Education and Information Technologies*, 18(2), 309-329. doi:10.1007/s10639-012-9242-8
- Windschitl, M. (2002). Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers. *Review of Educational Research*, 72(2), 131-175. doi:10.3102/00346543072002131
- Wolfson, E. (2014, September 8). What Classrooms can learn from the Google Campus. *Newsweek*. Retrieved from

<http://www.newsweek.com/2014/09/19/what-classrooms-can-learn-google-campus-268707.html>

Yokana, L. (2014, December 2) Capture the Learning: Crafting the Maker Mindset. *Edutopia*. Retrieved from <http://www.edutopia.org/blog/capture-learning-crafting-maker-mindset-lisa-yokana>