Vocational cross-curricular program for at-risk students

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Abstract

Alberta is an industrial force within Canada. Nonetheless, it is a travesty that there is still a high percentage of students who fail to complete their high school education. Despite many initiatives to improve student retention and promote high school completion within the province, there continues to be groups present in the Albertan society who remained educationally disadvantaged. These groups include individuals who may have not completed their secondary education and consequently will have difficulty finding steady employment and opportunities for future career advancement. The research for this paper focuses on the study and assessment of programs geared towards retaining high risk learners at school and discusses the possibility of developing an industrial arts program with the goal of offering opportunities for vocational students to complete their high school education. In particular, this research examines the practice of specialized industrial arts education and proposes a cross-curricular learning program that utilizes skills to allow regular and academic at-risk high school students to complete their high school education by increasing their academic ability through the development of practical vocational skills in applied programs.

Keywords: industrial arts program, vocational education, high school education, at-risk learner, academic and vocational skills, experiential learning, inquiry based study, project-based learning

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Vocational Cross-Curricular Program for Regular and Academic At-risk Students

Academically, over the last few years, I have been immersed in the notion of cross-curricular learning, and particularly intrigued by the idea of how to keep students engaged in schools and become lifelong learners.

Since very few have put program like the one I am presenting I did rely on the bits and pieces that were used in my classroom to create the foundation for this research project.

To reach my goal, I have researched previous data and literature depicting the foundation of an industrial arts program for regular and academic at-risk students that would promote cross-curricular learning, skills building and high school completion. I also have experimented in the classroom by implementing a math section in the Fabrication 10 course. After numerous years of trying I have establish experimental section of the Fabrication course that are part of the puzzle for this research project. All these steps has permitted me to prepare and present the framework for this future project.

In examining this topic, I have come to believe, based on the current courses offered throughout our school board, that better methods and programs could be used to reach the goals of better preparing learners for life outside the school system. While doing the preparation work for this project, I had the opportunity to review various studies and projects with the goal of motivating high-risk students to remain in school.

Research Question

The main goal of this research project is to question what needs to be considered to implement multi-credit courses in a cross-curricular environment that would enable secondary students to complete their high school education. This research is geared towards helping learners who may be operating on the fringes of the educational system and are considered at-

risk for completing their high school. For the most part, these learners have been marginalized from traditional school settings due to a disability of some kind, a history of experiencing difficulty in academic environments, and an overall absence of success in school settings for any number or combination of social, psychological or physiological reasons. At-risk students can be defined as the following:

1) First, academic at-risk students are defined as being: “students who were not at grade level expectation" (Kumabe, 2006 p. 1).
2) A second type of at-risk students would be students who are socially plagued by demographic factors such as: “low socio-economic status, ethnicity, single-parent family, large family" (Wehlage, 1987, p. 70).
3) And, last, McCann and Austin (1988) wrote that “children who exhibit behaviors that interfere with themselves and others attaining an education” (as cited in Cardon, 2000, p. 49).
4) Johnson (1997) implied that:

   With such a broad range of negative outcomes, one third to one half of students could be considered at-risk. It is also interesting to note that satisfaction with school had a significant impact on at-risk students’ decision to remain in school. (p. 35)

Primarily focusing on at-risk learners, this study will address the following question: How can we give learners the opportunity to be engaged, successful, and build vocational and academic skills while completing their high school program? The research will be broken in two main areas of study:

1) What characteristics of a program would help keep at-risk students in school?

2) How can a cross-curricular/hybrid method of delivery achieve and reach the goal of helping at-risk students to stay in schools?

Answering these questions will help me elaborate on the second part of my project which will examine the creation of a Career and Technology Studies program that would be cross-curricular in nature while, at the same time, offer high school credits in different areas of study. I will also offer some speculation about the impact such a program would have for students who are considered at-risk learners.

Rationale

It appears common that students who are doing exceptionally well with hands-on work sometimes struggle with traditional teaching methods (poor school performance vs. great hands-on skills), ultimately resulting in their eventual premature departure from formal schooling. Career and Technology Studies (CTS) courses like welding, mechanics, and construction are all courses that use hands-on learning and problem-solving in an environment outside regular classroom boundaries. Studies have showed that students learned math and science better through manipulative methods than through bookwork or traditional lecture methods (Cardon, 2000). Based on these findings, it would be realistic to say that a multi-credit/cross-curricular hybrid program based on experiential learning with a problem-based approach to education would encourage retention of these students in schools.

Experiential learning is the approach to education that primarily informs this research as it provides a foundational base to the concept of a multi-credit/cross-curricular program that would help retain students by providing them with practical applications for learning and, as a result, create incentives for success. This project is interesting for three distinct reasons:

1. The project is aligned with the new vision and document from Alberta Education called Alberta Inspiring Education (Alberta Education, 2010a).

2. The proposed curriculum both builds skills and gives confidence to students who have traditionally been low achievers. Observations show that time after time low-achievement and poor self-esteem are usually the first predictors for students dropping out of school.

3. This program would offer the chance to create a dynamic curriculum that uses experiential/hands-on learning that benefits students by allowing them the ability to get multi-credits in a cross-curricular environment.

Theoretical Foundations

Considering this project is about finding ways to create a cross-curricular program that offers multi-credit courses, literature chosen to underscore this study draws from theories based on experiential approaches to learning and Problem-Based learning theory. This literature outlines strategies and methods used to improve and reach goals of establishing effective and flexible practices in a multi-credit/cross-curricular learning environment. The literary support for this study explores why such programs would benefit at-risk students and how these programs could be applied to current educational practice. However, from a preliminary view of these sources and my own teaching experience, it is evident that many factors influence classroom dynamics. Consequently, this review considers the following factors: student ability; teaching strategies; classroom management; and, techniques to support student engagement that will hopefully produce students who are striving for higher achievement while completing CTS courses and related cross-curricular subjects.

In particular, the literary sources that support this study have inquired into the efficacy of vocational and regular programs models for at-risk students (Ainley, Foreman & Sheret 1991,

Bishop 1988, Cardon 2000, Johnson 1997, Johnson 1998, Kumabe 2006, McCann & Austin 1988, Richards 2011, Wehlage 1987); vocational teaching (Bishop-Clark, Hurn, Perry, Freeman, Jernigan, Wright & Weldy 2010, Claxton, Lucas & Spencer 2012, Corrigan 2013); active and effective teaching practices and strategies (Ambrose 2010, Greene, Miller, Crowson, Duke & Akey 2004, Hindman, Stronge & Tucker 2004, Long & Ehrmann 2005, Maughan, Teeman & Wilson 2012, Ozer 2004); and work-based, problem-based and experiential learning (Clark, Threeton & Ewing 2010, Dewey 1938, Hung 2011, Schmidt and Rotgans 2011, Tongsakul, Jitgarun & Chaokumnerd, 2011). The articles that explore the theories experiential and Problem-Based learning differ in their perspectives and provide varying degrees of evidence that reinforce the success of this approach to learning.

Still, it was important to include a wide sample of articles and studies to gather a wide spectrum of applied research that offer proof of the claims made in this research. All these documents were chosen based on the following criteria: they are peer-reviewed articles; they include levels of learners; and they indicate the effectiveness and feasibility of reproduction of the program. Some articles provided better support than others (Ainley, Foreman & Sheret, 1991, Cardon, 2000, Claxton, Lucas & Spencer, 2012, Richards, 2011, Tongsakul, Jitgarun & Chaokumnerd, 2011, Wehlage, 1987), but all met the precedent criteria.

Definition of success

Because success can be defined in many ways, it is necessary to define success within the framework of this project. The definition of success in high school is that the system can provide all the necessary tools for students to be able to complete high school with a solid academic and social foundation that prepares them for future work or learning. Alberta Education defines high school success as follows:

> Succeeding in high school is a way for students to create a solid foundation for their own positive future. Successful graduates have a direct positive impact on their own lives, their families and the members of their community. Alberta's future prosperity rests on our youth and their ability to adapt to an ever-changing world (Alberta Education, 2010b).

Thus, this statement demonstrates the relationship between success and the goals of vocational education.

Dr. Owen Corrigan (2013) in one of his numerous blogs made the case for an alternative route to traditional learning when he spoke about vocational education as one retaining a robust academic core that "ensures strong learner progression, and affords students choice and flexibility throughout their education" (p. 6). To reach these goals, we need to create an environment that is favourable for nurturing student learning. To create this environment, effective teaching methods should be used in the classroom. I have included Claxton, Lucas and Spencer's ideas about effective teaching for reference (see Table 1, p. 40), for some of these methods). But, before we get to the teaching, let's talk briefly about the learners. What is learning? In the book, How Learning Works Ambrose, (2010) defined learning as: "change that occurs as a result of experience, increasing the potential for improved performance and for future learning" (p. 3). Please note how the word experience is used; this term could easily refer to the word experience meant for hands-on learning while teaching CTS.

Experiential learning

Second, I will dig deeper into the idea of hands-on/experiential learning for this research. There seems to be a consensus that constructivism is the philosophy of choice for teaching industrial arts classes. As cited by Ozer, Vytgosky and Cole (2004) "Constructivism, as an

educational philosophy, claims humans are better able to understand the information they have constructed by themselves".

In essence, constructivism views learning as more than just a cognitive exchange. It is a social, cultural and contextual process positioned through language into real world activities where learners are at the centre of the experience and the learning (Vytgosky, 1978). In these learning situations, it is imperative that learners have a chance to put into practice acquired skills in an environment that reinforces the practice and mastery of skills.

The last part, as stated by Ozer (2004), is significant. He suggested that "for learning to happen, a learner must be confident in his or her skills". Ozer (2004) makes the following statements about hands-on learning:

> Consequently, learning is affected by our prejudices, experiences, the time in which we live, and both physical and mental maturity. When motivated, the learner exercises his or her will, determination, and action to gather selective information, convert it, formulate hypotheses, test these suppositions via applications, interactions or experiences, and draw verifiable conclusions. In essence, constructivism transforms today's classrooms into knowledge-construction sites where information is absorbed and knowledge is built by the learner.

A Review of the Literature

In this review, I included articles that fall into these three categories: (1) programs for at-risk students, (2) hands-on/project-based learning, and (3) programs designed to keep students in classrooms (dropout prevention). Through a discussion of these articles, I hope to use the data discovered to create a foundation for my project that would be to build a program that offers multi-subjects and multi-credits for at-risk students. Note that I am not trying to reinvent the

wheel; research has been completed on this same topic. In fact, there seems to be consistency and related themes amongst these articles. When a researcher starts to dig deeper, it is easy to see topics, as intertwined – all detailing with how factors define at-risk students, the importance of hands-on learning, teaching strategies that allow students to be successful, and how some ideas would improve student retention to graduation.

Programs for At-Risk Students

The fact that some at-risk students seem to prefer hands-on learning rather over a traditional classroom setting is one of related theme. Cardon's (2000) study noted how at-risk students "found school in general to be boring and academically focused. Although the students in the study had difficulty experiencing achievement and success in their other subjects, they saw success and achievement in the technology education program" (p. 53). This statement is corroborated when Bishop (1988) affirmed that "students who have difficulty with academic subjects often seek out vocational courses precisely because they offer a different setting and different modes of learning" (p. 12). These facts cannot be understated and can help us build a realigned curriculum that would include core subjects usually taught in traditional settings. If this is the case, why not use CTS hands-on methods to keep these students interested?

These affirmations lead to an understanding that there seems to be an effective teaching recipe for these students. Johnson (1998) stated, "If the probability of academic success is to be increased for at-risk learners, teachers must conscientiously implement 20 basic instructional principles" (p. 167). Claxton, Lucas and Spencer (2012) outlined 18 basic instructional principles. Of these 20 principles, many were found in other sources of literature. Here are some examples:

a) Small class size and learning space (Ainley & Sheret, 1987; Wehlage, 1987)

b) School satisfaction (Ainley et al., 1987; Bishop, 1988; Cardon, 200; Wehlage, 1987)

c) Problem-based learning and the value of learning from experience and practice (Clark, Threeton & Ewing, 2010; Claxton et al. 2012; Johnson, 1998; Tongsakul et al. 2011; Schmidt et al. 2011)

d) Knowledge building and integration of subjects (Cardon, 2000; Claxton et al. 2011; Schmidt, Rotgans & Yew, 2011)

Small Class Size and Learning Space.

Classroom size seems to impact the dissemination of learning. Schmidt et al. (2011) emphasized small class size and noted three findings:

1) Small class sizes provide a platform for the development of friendship in the classroom (p. 795).

2) Small class sizes enable closer contact between students and teachers (p. 795).

3) Small class sizes generates peer pressure that is useful in motivating students (p. 795).

Almost 25 years earlier, Wehlage (1987) found that:

> small size is crucial for several reasons, face to face relationships on a continuing basis are necessary if teachers are to communicate the sense of caring…all students can be known in a personal way by the teacher…personalize and individualize their instructional effort. (p. 71)

The physical part of the classroom also seems to influence the learning outcomes. "Classrooms should support the activities of affective learning: that is, situated, collaborative, and active learning. What might such spaces look like? Do any such spaces exist yet?" (Long 2005, p. 46). Usually teaching and learning should shape the building. In vocational situations, the importance of physical space is recognized, yet it needs to be stated that space is not always

physical. A concrete example is the use of Moodle. Moodle is not a physical space per se; yet, it allows curriculum builders to create a space where students say: "I want to learn here, I want to learn now." This has been our school's experience. The right space does not guarantee success, but it helps. The right learning space is the foundation for the creation of a community within the classroom. It would create that platform require to create that trustworthy environment.

School Satisfaction.

School environment has an underestimated impact on the retention of students at school. One conclusion from Greene, Miller, Crowson, Duke and Akey, (2004) in regards to school satisfaction is stated in the following: "Students who perceived their classroom as supporting autonomy and mastery-oriented evaluation rather than competitive evaluation, expressed higher levels of self-efficacy" (p.474). It then becomes the role of the institution and its teachers to create this environment. Kumabe (2006) further outlined the importance of this element in his review when he mentioned, "If students feel connected to their school, this will have positive outcomes, such an increase in self-esteem and academics" (p. 6).

Many studies have shown that the classroom and the school climate created has implications for the students.

Hands-on/Problem-Based Learning (PBL)

Problem-Based Learning (PBL) occurs when "student learning is initiated and consequently driven by a need to solve authentic, real-world problems" (Hung, 2011, p. 531).

The origins of Problem-Based learning probably go back to 1920s when Celestin Freinet, a primary school teacher, returned from World War I to teach in his village in south-east France. Because of his injuries, he was too breathless to speak to the class for more than a few minutes so he created a new system of learning. This new system encouraged his pupils to take control of

their own studies, communicate effectively, be more cooperative and evaluate their own progress (Khadjooi & Rostami, 2011, p.12).

In Problem-Based learning, the role of the instructor shifts from presenter of information to facilitator of a problem-solving process. Although the Problem-Based learning process calls on students to become self-directed learners, faculty facilitators guide them by monitoring discussion and intervening when appropriate, asking questions that probe accuracy, relevance, and depth of information and analyses; raising new (or neglected) issues for consideration; and fostering full and even participation (Mayo, Donnelly, & Schwartz, 1995).

Though Problem-Based learning has traditionally been associated with the study and research methods medical students use to determine ways of solving problems through knowledge sharing and collaboration, this learning approach can be applied to vocational based training as a way to integrate knowledge and the understanding of concepts into practical and specific situational learning contexts (Allen, Donham, & Bernhardt, 2011).

Allen et al. (2011) describe how Problem-Based learning involves students forming questions to identify positions, organize relevant ideas, and use prior knowledge to complete assigned learning tasks. Once learning tasks are completed, the application of knowledge is reinforced through discussion and recognition of the learning is integrated into learners' overall cognition. The role of the teacher in this process is as a facilitator of the learning and as co-inquirer in the application of concepts and knowledge into conceptual frameworks.

According to Barrows and Tamblyn (1980), Problem-Based learning is a way to create student centered learning environments that serve to engage learners through collaborative and realistic learning experiences, which aligns well the learning needs of students in CTS classes.

Maninger (2006) found when a group of behavioral problematic students become more responsible for their instruction by using technology; it "gives them an atmosphere of active learning. They are involved in their learning at all times, make their own learning decisions, and buy into classroom learning" (Maninger, 2006, p. 43).

In a project-based/hands-on learning environment, it is important that students develop mastery, acquire component skills, practice integrating them, and know when to apply what they learned. Students must both develop the component skills and knowledge necessary to perform complex tasks and practice combining and integrating them to develop a greater fluency and automaticity (Carnegie-Melon, 2014). Within the process of skill development and application to practical tasks, educators facilitate learning through developing a conscious awareness of the elements of mastery required to help students learn more effectively and stay motivated. This point is reinforced by Wurdinger (2005).

> Students are at the center of the learning process, taking active roles creating, presenting and discussing ideas that require them to solve problems. The key idea behind all these approaches is to begin the learning process with a problem that leads to interaction, such as discussion or hands-on involvement, and can be used as a mechanism to engage students in a variety of activities or projects (p. 12).

There is broad support for the conclusion that Problem-Based learning methods enhance the affective domain of student learning, improve student performance on complex tasks, and foster better retention of knowledge (Allen, Donham & Bernhardt, 2011 p. 26). However, establishing effective Problem-Based Learning situations presents a challenge for educator. The literature reports that the challenge emerges because the process is time-consuming and research-intensive (Hung, 2011, p. 538). Additionally, Problem-Based Learning projects must align and

support current curriculum objectives so they are effective ways to learn related concepts and skills. Hung noted the importance of acknowledging that a teacher's role and responsibilities are not diminished using a Problem-Based learning approach; rather, PBL augments and complements a successful program rather than replaces it.

Drop-Out Prevention

According to Calgary Catholic School District trustee Linda Wellman, about 25% of Alberta high school students fail to acquire a diploma in the normal three years (Kauffman, 2015). Statistics have shown that throughout their lifetimes, students who did not finish high school are more susceptible to unemployment than those who did finish high school. According to Richards (2011), the impact of not completing high school is quite extensive: "One of the most robust predictions about any teenager's future is that dropping out of high school will increase the probability of a life marred by lengthy bouts of unemployment and poverty" (p. 1). In April 2015, the unemployment rate for Alberta youth between the ages of 15 and 24 was 17.1 per cent, higher than the national average of 13.6 per cent (Government of Canada, April 2015). It was alarming when I was looking for statistics on the topic and came across the Alberta Chapter of the United Way.

> Alberta has one of the lowest graduation rates in Canada with only 74% of young people finishing high school within three years of entering grade 10. Even five years after starting grade 10, nearly 20% of students will not have completed high school. The cost of a high school drop-out is considerable, not only on the individual, but to society overall. Individuals who do not complete high school tend to have lower levels of civic participation and considerably higher consumption rates of health care and social

assistance. The actual cost of a single drop out, in Canada, is $15,850 annually, for their entire lives (United Way, 2015).

Dubé, Bélanger, Fontan, Beaulieu And Lévesque (2014) identified factors that influence retention in high school programs. These include personal factors affecting the students, school environment, curriculum and pedagogy, family dynamic and the community. Because so many factors outside of school influence drop-out rates, for the purpose of this project the focus will be put on factors that can be addressed at the school.

The majority of dropouts said they were not motivated or inspired to work hard, and many said they would have worked harder if more had been demanded of them. These students said they longed for better teachers who kept classes interesting and more one-on-one instruction from teachers who knew their names and what their interests actually were Bridgeland, Balfanz, Moore, Friant, & Civic, 2010, p. 6.

Although most participants asserted that the causes of student dropout were complex and multifaceted, including student apathy, boredom, and a perceived lack of relevance surfaced early in the discussions (Bridgeland et al. 2010). A good vocational program will keep students in the classroom; a great one will give the students the extra skills to build a solid foundation. In his article “Vocational education for at-risk youth: How can it be made more effective” Bishop (1995) used Kulick’s study (1994) to elaborate “that the review of literature concludes that the option of participating in vocational education lowers drop-out rates” (p. 10). Norton (1997) was clear that “students showed a desire to attend math and hands-on courses like arts” (as cited by Cardon, 2000, p. 49). It is implied that arts courses are similar to technology courses because they focus on teaching students through hands-on activities. “Practical and vocational elements

have shown significant positive outcomes for learners aged 14-16 in terms of engagement, attitudes and attainment" (Corrigan, 2013, p. 13).

Taken together, these reviews suggest that, to successfully retain at-risk students in school, classrooms should reinforce a continuous learning environment where transformation is not a measurable factor, but an expected factor. Bridgeland Et al. (2010) add to this recommendation when they mentioned:

> Most students, teachers, and parents recognized that a failure to connect classroom learning to career interests and the real world was a problem underlying high school dropout and that this failure, compared to many other causes, was something that could be addressed with dynamic, engaging teachers, students receptive to learning, and parents willing to engage (p. 6).

In this case, sensitivity to students would be the key to success. In working to attain these goals, it would be naïve for a teacher to think that each student will get the same classroom learning experience. Of course, it needs to be acknowledged that all students learn differently. A research project such as the one I am engaged in is developed through applied or action research. The proposed program targets at-risk students, but will also work for regular academic students. These students might be doing exceptionally well with hands-on work, but may be struggling in core subjects. In reality, this program provides at-risk students a unique opportunity to complete their high school requirements.

This transformation can be fostered in a classroom where effective communication habits based on trust can be built, creating a safe haven for learning and sharing. I also think the citizenship aspect of the classroom is really important. Teachers not only teach, but they also

demonstrate the skills, the attitude and the social foundation through their own actions promoting more of a mentorship than a teacher-student relationship.

Literally, they have their future in their own hands and therefore need to take their learning seriously and we can help them tackle their goals by enhancing the student confidence in themselves and promote a certain work ethic by fostering their ability to meet with success and create a connection with the curriculum.

Building Futures

After many unsuccessful attempts to find previous educational projects similar to the one I work on, I found a TED talk that describes an ongoing project with Rockyview School Board: Building futures where innovations become program improvement (2013).

Building Futures is a project created by the Rockyview School District. Greg Rankin and his teaching partners Jarrett Hooper based this project on Alberta Inspiring Education (2010). This view of learning reflects the same principles that have been covered in Dewey's (1938) work that the basic element for learning is experience and reflection. These teachers use house building as the vehicle to reach their goals. They built two houses in a period of ten months, September 2013 - May 2014.

The project includes 32 grade 10 students from George McDougall High School in Airdrie, Alberta. The students were from many realms of the education spectrum, from Advance Placement (AP) to knowledge and employability programs (K & E). This wide range of levels might look problematic at first because of the wide gap in skills and knowledge; however, this range actually turned out to be the strength of the program. The program involved students combining their strengths to accomplish various tasks. These students were given clear guidelines about expectations and rules and did abide by them to stay in the program.

These students not only built a house but also learned with the help of McKee homes who supplied the land sites, the tradespeople (over a 100 trades are used to build a house), and a grant from McKee homes to make the project successful.

The first building erected was a garage that was used as a classroom, followed by two houses. An example of the strategies used is a newspaper that was published and sold once a month (English credits). They also used the same project for info-pro, leadership, and many other credits. This project was truly cross-curricular, multi-credit based: in addition it promoted the culture of perfection while using real-world scenarios to engage the students.

Rankin was adamant that the students currently participating found the experience extremely positive; the fact that no one has dropped the class was amazing. He also suggested that this project is definitely giving students confidence in their abilities to deal with the challenges presented to them, promoting success using different skills set and finally they were able to develop a deserved sense of pride when they are showcasing the work accomplished. These preceding affirmations were from a TEDx profile name Building Futures (2013).

Project management

The management for this research project was the easy part. It was broken into five steps. Step one was curriculum alignment. Step two defined student enrolment criteria. Step three presented the pilot project to the school board. Step four implemented the program in the school. Step five was the construction of the house and the dissemination of the results. Over 30% of the grade 10 population applied to get into the Airdrie program. As well, in the first year George McDougall High School offered the Building Futures, the program was recognized on a national level and was awarded second place in the Canadian Education Association's (CEA) 2014 Ken Spencer Award for Innovation in Teaching and Learning (Chorney, 2014).

I concluded after reflecting on the TEDx talk and personal communication with the teachers that if each student contributed a part of the learning, the sum of all these parts creates superior knowledge as a whole. Knowledge sharing then becomes a major source of program content. Because the educator's role is to contribute by having a clear message and expectations for the students, the teacher must be an essential part of the construction process. At the end of the day, the purpose of this educational environment is to offer choices to learners to ensure their knowledge building and subsequent success in the program. These choices are the stepping stones to learning because students are working on a topic or project that interests them. In other words, students are acquiring knowledge and expertise, creating a physical or social product (projects, decision-making skills, and communication skills) through a process of discernment, decision-making, and problem-solving. The process of learning and inquiry follows the following sequence.

From the information gathered in this research project, I was able to identify and adapt the existing program (Building Futures) to my own needs. I had to revise and review what they had already done to stage the steps of my research project. I believe, for my project to be successful, I need to follow these steps. I also used the conclusion of the literature review previously done on these topics that included hands-on learning/Project-Based Learning, model program for at-risk high school learners and successful vocational programs. I would like to think of the first trial of this project as a prototype. Please note that, if the project is approved for a trial, all these steps would be make for an easy implementation using two teachers working as a team. Summary of the implementation and the project timeline in Table 2, p. 41and Table 3, p. 43.

Procedure

Step 1: Develop the mission statement that would summarize the project

It is important to develop the appropriate mission statement for this project. We do not want to mislead those who would be getting involved. To avoid this situation, it is imperative that the promotional work is well designed and uses words that impact and will be understood by student.

This project would benefit at-risk high school students by proposing a hybrid approach to learning using hands-on/project-based learning to engage students in their learning. This project would be done in a cross-curricular environment that would promote the acquisition of skills and competence in a flexible multi-credits class environment. The ultimate objective would be to keep these high school students feeling confident about their academic skills until they graduate, knowing they have the tools and the skills to conquer anything.

Step 2: Design and planning of the steps that need to be done to implement the project

The first part of the planning was to realign the curriculum by matching the curriculum objectives with the learning outcomes of the CTS cluster. For this project I used the Fabrication 10 course from the TMT cluster (Trades, Manufacturing and Transportation); three core subjects (English, mathematics, science); two elective subjects (info-processing and leadership); and, finally Career and Life Management (CALM). A detailed master schedule with all the units to be covered has been included for a better understanding (see Table 4, p. 34).

It is important to note on the master schedule that the program is broken into 17 weeks, which corresponds to one high school semester and would have a target of instruction of 255 hours. This structure could easily be changed and be spread over two semesters. For the actual instructional period, students would be in this course for a half-day. The last week would be

reserved for catching up on uncompleted coursework if necessary. All course objectives are from Alberta Education Curriculum.

There are 60 hours for each 4 week block of courses. These hours are flexible, meaning that they can easily be moved around to accommodate topics being taught at any given time within the course schedule.

The courses that would be interactive in this master schedule are Fabrication 10, Math 10-3, Science 14, and CALM 20. Each of these courses has been broken into number of hours in a calendar type of schedule. Some course components do not have any time allocated to them, indicating that they would have been covered under another section of the course. This is an intended duplication and overlap of skill practice and development, Meaning that we do the delivery of the topic more than once in the same course.

The trade math component (10-3) will be covered throughout the course. The delivery for that component is allocated to an average of five hours a week. This method of course delivery would give plenty of time to go over basic theory and still allow for the application of theoretical course concepts to be put into practice.

In the science program, two modules, *From Life to Lifestyle* and *Matter and Energy in the Biosphere*, will be introduced in conjunction with all the other topics. This means that these courses will be taught in a traditional ways and would be evaluated as part of the final research projects. The fact that the final project will be assessed helps cover some components of the CALM 20 course as well.

The CALM components *Career and Life Choices* and *Portfolio* will also be used to apply for the Register Apprentice Program (RAP) program in addition to being used in the Career Next Generation if the students are interested in pursuing a trades or part-time employment. These

sections of the course are related to writing cover letters and developing resume and interview skills.

A small component of English 10 and Info-processing 10 could be used if teachers are willing to use the weekly journal component for their program. There are also optional credits that could be used toward their program if students participate in making a documentary, creating a website, or completing other components of options that fall into the English or Info-processing curriculum.

A high probability of participants for this project would come from various academic levels and it will be necessary to cover the learning outcome at all levels. It is important to assess the level of prior knowledge of the students before placement in the program. This assessment will also help determine the appropriate learning content and approach. Based on the pool of students to be registered, it will be essential to find what mathematics, English, and science levels will need to be incorporated into the program. The needs in these specific subject areas could be assessed by the appropriate specialists. The results of such research would provide us with an indication of the motivators and the preferences of our learners.

To keep communication open after this step, it is really important to have a website, blogs, Facebook, Twitter, and other engaging communication tools. I will have to upgrade my technological abilities. Truly, the goal of this project is to cultivate a reflective model for sharing.

Step 3: Recruitment and implementation

Recruitment of students needs to be done during the spring prior to the program. I believe a good marketing campaign using the following strategies are keys for the recruitment of the candidates. One idea is to take advantage of the feeder schools visits that currently promote our high school. There are also two major open houses to promote our school on site; and, last, I

think it would be important to develop a good information package for the grade nine counselors that would be followed up by a presentation for them. It would require a dynamic presentation to entice all stakeholders to support this project.

We also have the district website. A webpage that talks about the program and is well linked with all the junior high principal and counsellors will create a candidate pool that would be accessed by principals for this program. For the implementation to be successful, it must take place in a harmonious way; administration, students, parents, teachers, and the community need to be aligned towards the goal of this project. The merits of this operation are to develop a flexible culture of learning and offer not better but different choices to reach the same learning outcomes.

Administration. School administration must be on board with this pilot program. They have to believe in the students and the teacher, just as the educator must have faith in the learners. There should be a set of rules that will bring the group together. A peer-to-peer culture must be encouraged where individual talents can contribute to a culture of sharing in the classroom. To have school administration on board, I must demonstrate the benefits students will take away from this project. Also, I must be connected by staying current with methodology and trends and by becoming cognizant of how current practices can help create a dynamic classroom environment. This awareness can contribute to focusing on learning as a process, not an end goal. The principal must establish and target a population that would benefit from such a program. With the implementation of welding camps in the summer it would be easy for administration to recommend students from grade eight and nine to be part of a hybrid high school program. Finally, but not leastimportant, I will create with the help of administration an environment that motivates students and provides a sense of pride and independence.

Students. It is important that teachers and administrators are able to assess students' prior knowledge, background, and interest to find out if students are interested in the technology courses. It would make sense for students to write a short essay detailing the reasons why they believe they would fit in such a program.

We can also have a blank registration policy where everyone who applies would be accepted in the program and, from there, work with their particular strengths and weaknesses. By doing so, any bad habits can be corrected during the course. In general, student strengths and weaknesses should be acknowledged and incorporated into the classroom setting.

The knowledge students bring to bear in the classrooms they enter, influences how they filter and interpret what they are learning. If students' prior knowledge is robust, accurate, and activated at the appropriate time, a strong foundation for building new knowledge emerges. However, knowledge that is inert, insufficient for the task, activated inappropriately, or inaccurate, can interfere with or impede new learning. Once prior knowledge and skills are assessed, there is a range of potential responses, depending upon the type of course, the uniformity of results, and the availability and type of supplemental materials and alternatives (Carnegie-Mellon University, 2014).

Collaboration. Collaboration and contribution are two key concepts for this project. As a collective group, we all have the tools to be successful; however, the success of this project relies on the collaboration and contribution from students, teachers and administrator. These ingredients lead to student accountability. These concepts also focus on getting the best from students and creating global knowledge. Using a systematic approach to CTS, I would be initiating collaboration, creativity, and innovation. This point is also important because without the support of the school board, a project of this immensity would not even get off the ground.

Parental support. This program starts at home and therefore depends on the support of parents to make it work. “One-hundred percent of students considered their parents either very or somewhat supportive of them enrolling in a dual credits course” (Bishop-Clark, Hurn, Perry, Freeman, Jernigan, Wright & Weldy, 2010, p. 84). It is also evident from my experience as a teacher that parental support will have a big influence on the student.

Teachers. Teachers must get on board with such initiatives because time and energy is needed for this program to work. Teachers associated with such program must provide support, be engaged and lean toward a mentorship approach to learning. In other words, educators must become personal with the students. “Effective programs aimed at promoting school completion focus on building students’ relationships with teachers, parents, and peers” (Christenson & Thurlow, 2004, p. 38).

Hindman, Stronge and Tucker (2004) have put together a handbook for teachers. The main points are that teachers control their own presentation, personality, and practices. Teachers establish, manage, and maintain learning focused classroom environments. Teachers organize time, communicate expectations, plan instruction, present curriculum to support active and engaged learning, and monitor student progress. Finally, teachers identify student potential, and meet the needs of special classroom populations.

School community. The program must create opportunities for students to demonstrate their skills. The community can also create opportunities for students to show these skills. There are programs such as the Registered Apprenticeship Program (RAP) or Career Next Generation. There are also opportunities for the students that are part of the program to demonstrate their skills in competition like Alberta skills regionals and the Calgary Catholic School District welding rodeo.

Step 4: Monitoring and evaluation

It is important, even when the project gets into gear, that it keeps being refined and promoted. Before day one, I must identify progress markers to monitor the project properly. I need to create a stringent schedule of steps so as to make sure I record milestones, progress, or setbacks. These reflections must be done to keep reviewing, adjusting, or implement changes that occur. Planning will be a key to accurate evaluation. This project is a living process and hopefully not a case where, the research is finished, goes in a binder on a shelf. It is also imperative that the teachers teaching the students' regular classes are aligned with the program objectives and have open communication with the teacher in charge.

Step 5: Summary, findings and conclusion

It is imperative that I create an informative and reflective report that will highlight the finding of the project and provide an analysis of and recommendations from the key positive and negative points. This report will help stakeholders review, evaluate and assess the validity of the project.

Step 6: Validation and improvement or termination

I would like to start this part with my definition of success. For many students, success means having high marks and passing courses with flying colours. For this project success is much broader than academic success because it also has a social component. This concept not only involves education (integration of academic knowledge), but also socialization (acquisition of knowledge, values, attitudes and behaviors useful for social functioning) and skills (preparation for professional integration). Its full potential is realized when personal goals are set by the student, which add a new dimension to the definition of success.

When one invests much time in a venture like this project, one hopes it will work the way it was planned; however, this project might not be successful or might not provide the expected results. Still, I would expect that a successful program can be implemented in more than one school giving an opportunity for students in different geographic areas of our school board to benefit from this project.

My research project seeks to discover if this program will become successful. If it shows merit, perhaps the next step would be to create a vocational dual-credit program that would encourage students to choose courses from post-secondary programs from a technical institution while still in high school. In their report in association with the American Youth Policy Forum, Lerner and Brand (2006) reinforce this fact when they mentioned that "These programs are high value programs, because they provide many of the important elements that have been missing from high school for most students: challenge, engagement, access to the adult world, and support (p. 7).

Finally, this research project might be expanded after the results are published. Perhaps it could be enlarged by analyzing the influences of the setting on the success of the learners. There could also be investigations surrounding the effects and the influence of the culture of success on learning. This research project might become a great start to redefine or just to refine a hands-on, cross-curricular, multi-credit pedagogy that works for students and promotes student learning. I am not so pretentious to think that the foundation of my research project is the only effective way to teach at-risk students in industrial art classes. A number of questions remain and new questions have emerged from this research. A bigger debate arises from such questions as: What defines effective teaching in industrial arts? How can success be defined for students? Because of the wide-array of subject matter in industrial arts, a one-size-fits-all philosophy is impossible.

Conversely, how can the industrial arts teaching program be unpacked and packaged in order to fulfill the expectations of learners?

Study/Project Limitations

A topic that arose when sharing with other teachers was oriented towards teacher training. Before the actual learning begins, teachers should receive proper training in their respective teaching disciplines so they can apply their learning during their practicum. In their 2012 study "What leads to positive changes in teaching practices?", Maughan, Teegan and Wilson make an important point by addressing the issue of teachers training and noting that "research should explore the ways in which Initial Teacher Training (ITT) encourages teachers to be receptive to change, as well as being outcome-focused and collaborative-minded" (p. 35). Are we evaluate based on marks or on the level of skills and experience acquired while doing a course or being in class? In effect, are teachers themselves being trained through a process or end result oriented education?

One problem I encountered with this research is the large number of theories one might engage when inquiring about teaching industrial arts education. There is such a wide-array of literature and research about industrial arts education and effective teaching that creating a literary review becomes quite a challenge. The other problem was that few programs have been implemented which offers multi-credits or, multi-subjects courses, which makes these data difficult to obtain and assess.

Conclusion and Considerations for Further Study

The main objective of a school system should be the success of every student. The reality is that, with dropout rates increasing and students unable to find where they fit in the system, school systems are facing new challenges. To find a solution to these challenges, important

changes need to happen in the vision of the school administrators and in the way teachers share the content in their classroom.

The main goal should be to have a delivery system where students feel good about themselves, are happy to be in class, and feel the need for continuous improvement. To change the learning environment requires a substantial effort by revising the delivery of the curriculum so as to improve the success of these at-risk students.

This research project has helped me realize that the goal of learning success need not to follow one unique path because the goal of success is not the same for everybody. Students can demonstrate their learning process and success through achieving a series of clear, attainable targets and objectives. Forging a path that students might follow helps educators step back to become more flexible in the way school programs may be delivered. I side with Christenson and Thurlow (2004) regarding the global approach to successful program to retain students in school; they promote the fact that:

> Successful programs are comprehensive, interfacing family, school, and community efforts rather than offering a single, narrow intervention in one environment; are implemented over time rather than at a single period in time; and make an effort to tailor interventions to fit individual students rather than adopting a programmatic ‘‘one size fits all’’ orientation. (p. 37)

Research into the literature did offer; much evidence, answers, and suggestions about what need to be considered to offer multi-credits courses in a cross-curricular environment. This study answered questions such as: What do I need to know and do to offer multi-credit courses? What strategies keep students engaged so they stay in school? Having the knowledge of what will or will not work. I can easily build a program adapted and designed so that at-risk and

regular students can successfully complete high school. Thus, it is time to give the students opportunities to step into a program that offers close monitoring and provides an environment of success. I trust this research project will help me discover answers that will help all of us make a difference by doing things like curriculum re-alignment.

Much to my surprise, during my research I could not find articles or studies that disagreed with the premises of this project. I conclude, then, that evidence seems to be going in my favor for the implementation of this project.

Finally, this research could be expanded even after the results are published by analyzing the influences of the setting on the success of the learners. This could include investigation into the effects and influences of a culture of success on learning. This research promises a great beginning towards redefining or refining a hands-on, cross-curricular pedagogy that works. I believe more research on this topic would help indicate how to implement such a program in schools on a daily basis. In fact, such a program is a kick start for some students to become lifelong learners. Realistically, suggestions from this research might not provide ultimate answers, but they may be a good starting point and stepping stone for school boards, teachers and students to get this project going and help students earn their high school diploma.

References

Ainley, J., Foreman, J., & Sheret, M. (1991). High school factors that influence students to remain in school. *Journal of Educational Research*, *85*(2), 69-80.

Alberta. Alberta Education (2010a). Inspiring education a dialogue with Albertans. Retrieved from https://education.alberta.ca

Alberta. Alberta Education (2010b). Inspiring Education, Initiatives, High School Success. Retrieved from http://inspiring.education.alberta.ca

Allen, D.E., Donham, R.S., Bernhardt, S.A. (2011) Problem-Based Learning. *New Directions for Teaching And Learning, no. 128*, 21-29. Retrieved from www.wileyonlinelibrary.com

Ambrose, S. A. (2010). How learning works: Seven research-based principles for smart teaching (1st Ed.). *San Francisco, CA: Jossey-Bass.*

Barrows, H., and Tamblyn, R. (1980). Problem-based Learning: An Approach to Medical Education. *New York: Springer*.

Bishop, J., & State Univ. of New York, I. v. (1988). Vocational education for at-risk youth: How can it be made more effective? *Working Paper*, 88-11.

Bishop, J. H. (1995). Vocational education and at-risk youth in the United States. *Vocational Training: European Journal, 6*, 34-42.

Bishop-Clark, C., Hurn, J., Perry, S., Freeman, M., Jernigan, M., Wright, F., & Weldy, N. (2010). High school teachers teaching college courses to career technical education students? A story of success. *Journal of Career and Technical Education*, *25*(2), 78-93.

Bridgeland, J. M., Balfanz, R., Moore, L. A., Friant, R. S., & Civic, E. (2010). Raising Their Voices: Engaging Students, Teachers, and Parents to Help End the High School Dropout Epidemic. *Civic Enterprises.*

Canada. Government of Canada (2015). Labour force survey. Retrieved from http://www.statcan.gc.ca

Carnegie-Mellon University (2014), Retrieved from http://www.cmu.edu.html

Cardon, P. L. (2000). At-risk students and technology education: A qualitative study. *Journal of Technology Studies*, *26*(1).49-57.

Chorney, A. (2014, March 13). Building futures program receive national award. Airdrie City View. Retrieved from http://www.airdriecityview.com

Christenson, S. L., & Thurlow, M. L. (2004). School dropouts: prevention considerations, interventions, and challenges. *Current Directions in Psychological Science, 1,* 36.

Clark, R. W., Threeton, M. D., & Ewing, J. C. (2010). The Potential of experiential learning models and practices in career and technical education. *Journal of career and technical education*, *25*(2), 46-62.

Claxton, G., Lucas, B & Spencer, E. (2012). *How to teach vocational education: A theory of vocational pedagogy.* City & Guilds Centre for Skills Development, London, United Kingdom.

Corrigan, O. (2013) *Technical matters building a high quality technical and vocational route through the education system*. London, UK: Heron, Dawson and Speyer.

Dewey, J. (1938). Experience and education. *New York, NY: Collier Macmillan Publishers*.

Dubé, F., Bélanger, J., Fontan, J., Beaulieu, G., & Lévesque, M. (2014). An Educational Community to Promote High School Students' Retention and Academic Success. *Journal Of Case Studies In Education, 5.*

Greene, B. A., Miller, R. B., Crowson, H. M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom perceptions and motivation. *Contemporary educational psychology*, *29*(4), 462-482.

Hindman, Jennifer L., Stronge, James H., Tucker, Pamela D., (2004) Handbook for qualities of effectives teachers, *ASCD.* Alexandra, Virginia, USA.

Hung, W. (2011). Theory to reality: a few issues in implementing problem-based learning. *Educational Technology Research and Development*, *59*(4), 529-552.

Johnson, G. M. (1998). Principles of instruction for at-risk learners. *Preventing School Failure*, *42*(4), 167.

Johnson, G.M. (1997). Resilient at-risk students in the inner-city. *McGill Journal of Education*, *32*, 35-49.

Khadjooi, K., & Rostami, K. (2011). Problem-based learning. *Gastroenterology & Hepatology From Bed To Bench*, *4*(1), 12-16.

Kaufmann, B. (2015, April 20). School drop-outs predicted to soar — trustees blame Tory cuts to education funding. Calgary Sun Retrieved from http://www.calgarysun.com

Kulik, J. A., Bangert, R. L., & Williams, G. W. (1983). Effects of computer-based teaching on secondary school students. *Journal of Educational psychology*, *75*(1), 19.

Kumabe, T. (2006). Deconstructing the “At-Risk” of Student Success-A Literature Review Summary. (2006). yrdsb.ca. Retrieved March 6, 2014, from http://www.yrdsb.ca

Lerner, J. B., Brand, B., & American Youth Policy Forum, W. D. (2006). The college ladder: linking secondary and postsecondary education for success for all students. *American Youth Policy Forum*, 176.

Long, P. D., & Ehrmann, S. C. (2005). Future of the learning space: breaking out of the box. *Educause Review, 40*(4), 42-58.

Maninger, R. (2006). Successful technology integration: Student test scores improved in an English literature course through the use of supportive devices. *Tech Trends: Linking Research and Practice to Improve Learning, 50(5)*, 37-45.

Maughan, S., Teeman, D. and Wilson, R. (2012). What leads to positive change in teaching practice. *NFER Research Programmed: Developing the Education Workforce*.

Mayo, W., Donnelly, M., & Schwartz, R. (1995). Characteristics of the ideal problem-based learning tutor in clinical medicine. *Evaluation & The Health Professions, 18*(2), 124-136.

McCann, RA., and Austin, S. & Research for Better Schools (1988). At-risk youth: definitions, dimensions, and relationships. *Philadelphia: Research for Better Schools.*

Ozer, O. (2004, October-December). Constructivism in Piaget and Vygotsky, retrieved from Fountain Magazine 48, http://www.fountainmagazine.com

Rankin, G. (2013, October 14). *Building change: Greg Rankin at TEDxRockyViewSchoolsED* [Video file]. Retrieved from https://www.youtube.com/watch?v=RsA9gTJeNJ4

Richards, J. (2011, January 6). School dropouts: Who are they and what can be done? Retrieved from http://www.cdhowe.org

Schmidt, H. G., Rotgans, J. I., & Yew, E. H. (2011). The process of problem-based learning: what works and why. *Medical education, 45*(8), 792-806.

Tongsakul, A., Jitgarun, K., & Chaokumnerd, W. (2011). Empowering students through project-based learning: perceptions of instructors and students in vocational education institutes in Thailand. *Journal of College Teaching & Learning, 8*(12).

United Way Calgary and Area (2015). School Completion Retrieved from http://www.calgaryunitedway.org/main/upstart/upstarts-work/school-completion

Vygotsky, L. S., & Cole, M. (1978). Mind in society: the development of higher psychological processes. Cambridge: Harvard.

Wehlage, G. (1987). A program model for at-risk High School students. *Educational leadership. 44*(6), 70.

Wurdinger, S. D. (2005). Using experiential learning in the classroom: practical ideas for all educators. *Lanham, Md.: Scarecrow Education.*

Appendix A

Tables of Teaching and Pilot Project Implementation

Table 1

Effective teaching strategies

1) Relevant teacher training and professional development	6) To involve a blend of teaching methods
2) Critical thinking	7) Involve feedback
3) Hands-on learning	8) Questioning and investigative
4) Practical programs	9) Application and reflection
5) Experiential learning real world experience	10) Theoretical models and exploration

Note. From "How to teach vocational education: A theory of vocational pedagogy" by G. Claxton, B. Lucas & E. Spencer, E. (2012), City & Guilds Centre for Skills Development, London, United Kingdom.

Table 2

Pilot project implementation steps

	Pilot project scope
Step 1	Develop the mission statement that summarize the goal of the project
Step 2	Design and planning of the steps that needs to be done to implement the project
Step 3	Recruitment and implementation
Step 4	Monitoring and evaluation
Step 5	Summary, findings and conclusion
Step 6	Validation and improvement or termination

Table 3

Cross-Curricular project implementation timeline

March-April	Students registration	
May	Program marketing	Letter sent to all grade 10 families to promote the new program.
May	In-school students and parents information night	Interested students and parent meeting at school
May	Students selection (18 students)	Students would be picked based on their academic needs.
June	Acceptation letter	Letter would be sent to the successful applicant.
June	Student orientation	It is important for the students to have that orientation in June so if they decide not to do the program we can give the chance for someone on the wait list to do it.

Following year September -May	Program start	Every morning for two semesters
September	Weekly meeting (September only)	Administration should meet weekly with teachers that are involved. Students should meet weekly in order to give feedback.
October -May	Bi-weekly meeting	If necessary, these meeting would be there to meet with students that need extra help or for inputs
October -May	Administration monthly meeting	For updates on the program
October -May	Desire to learn (D2L) Progress Report	Progress reports should be send monthly. It is important for the students to have accurate up to date reports. It helps keeps the students motivated.
October -May	Monthly tracking questions	Students would have to answer a questionnaire once a month in order to

		see the progression of the project.

Appendix B

Suggested Program Delivery

Suggested program delivery Grade 10 cross-curricular welding program

Grade 10 cross-curricular welding program-Suggested teaching							
Alberta education objectives		Week 1-4	Week 5-8	Week 9-12	Week 13-16	Week 17	Total hours
		60	60	60	60	15	255
Welding Theory (125 hours/5 credits)						4	
Safety							
Health and safety (3 hours)	Legislation	1					
	Creating safe work environments	2					
	Shop hazards	2					
	Personal proctection and PPE	1					
Material handling (1 hours)	Material handling basic knowledge	1					
Trade mathematics							
Applied Trade Mathematics (20 hours)		5	5	5	5		
(thread with math 10-3)							
Fab 1010 Fabrication tools and materials							
Hand tools and power tools (3 hours)	Hand tools	2	1	1	1		
	Power tools	2	1	1	1		
Fab 2040 Thermal cutting							

Welding and cutting theory	Power source safety	1					
	Welding equipment	1					
Fab 1040 Oxyacetylene welding							
Oxyfuel welding + cutting (2 hours)	Oxyfuel safety	1	2				
	Oxyfuel basic theory	2					
Fab 1048 Semi-automated/Automated welding							
Gas metal arc welding (GMAW)	GMAW safety	1					
	GMAW basic theory	2					
Fab 1050 Basic electric welding							
Shielded metal arc welding (SMAW)	SMAW safety	1					
	SMAW basic theory	2					
	Welding procedures	1					
	Basic weld quality + weld faults	1					
Fab 1100 Fabrication principles							
Metal Fabrication	Layout techniques (6 hours)	2	3	1	2		
	Metal forming techniques (4 hours)		2	1	2		
	Assembly and prepapration techniques (3 hours)	2			1		
Drawings and interpretations	Blueprint and drawing interpretation (4 hours)			2	2		
	Joint design and welding symbols (2 hours)			1	1		
Welding Practical (N/A)	Shielded Metal Arc Welding (SMAW)		3	2	2		
(some practice welds will be used for assesment)	Gas Metal Arc Welding (GMAW)			4	4		
	Assembling Fabrication (step block)			4	4		
	Oxy-Fuel welding and cutting			4	4		

Assesment	Theory	1	1	1	2		
(some practice welds will be used for assesment)	Practical		3	3	4		
Total hours							124
Math 10-3 theory (125 hours/5 credits)						4	
Unit pricing and currency exchange (13 hours)	Proportional reasoning	2		2	2		
(thread with Fab 1010 and Fab 1100)	Unit price	1					
(thread with Fab 1010 and Fab 1100)	Setting a price		1				
(thread with Fab 1010 and Fab 1100)	Currency						
Earning an income (12 hours)							
This unit threads with CALM 20 (financial management)	Wages and salaries	2					
(Threads with currency)	Alternative ways to earn money			3			
	Additional earnings				1		
	Deductions and net pay				1		
Length, area and volumes (21 hours)							
(thread with Fab 1010 and Fab 1100)	Systems of measurement	1	1	2	1		
(thread with Fab 1010 and Fab 1100)	Converting measurements	2	1	2	1		
(thread with Fab 1010 and Fab 1100)	Surface area	1	1	1	1		
(thread with Fab 1010 and Fab 1100)	Volume	1	1	1	1		
Mass, temperature and volume (12 hours)							
(thread with Fab 1010 and Fab 1100)	Temperature conversions	1					
(thread with Fab 1010 and Fab 1100)	Mass in the imperial system	1	1				
(thread with Fab 1010 and Fab 1100)	Mass in the international system	1	1				
(thread with Fab 1010 and Fab 1100)	Making conversions	2	1	1	2		
Angles and parallel lines (19 hours)							
(thread with Fab 1100 (drawings and interpretations)	Measuring, drawing and estimating angles		2	2	2		
(thread with Fab 1100 (drawings and interpretations)	Angle bisectorsand perpendicular lines		2	2	2		
(thread with Fab 1100 (drawings and interpretations)	Non-parallel lines and transversals		2	1	2		

(thread with Fab 1100 (drawings and interpretations)	Parallel lines and transversals		2	1	2		
Similarity of figures (15 hours)							
(thread with Fab 1100 (drawings and interpretations)	Similar polygons		1	1	1		
(thread with Fab 1100 (drawings and interpretations)	Determining if two polygons are similar		1	1	1		
(thread with Fab 1100 (drawings and interpretations)	Drawing similar polygons		1	1	1		
(thread with Fab 1100 (drawings and interpretations)	Similar triangles		1	1	1		
Trigonometry of right triangles (24 hours)							
(thread with applied trade math, line 14)	The pythagorean theorem		2	1			
(thread with applied trade math, line 14)	The sine ratio		1	1			
(thread with applied trade math, line 14)	The cosine ratio		1	1			
(thread with applied trade math, line 14)	The tangent ratio		1	1			
(thread with applied trade math, line 14)	Finding angles and solving right triangles		1	1			
							90
Science 14 theory (125 hours/5 credits)						4	
Investigating property of matter (10 hours)							
(thread with Fab 1040, Fab 1048, Fab 1050)	Understanding matter	1					
(thread with Fab 1040, 1048)	Pure substances, elements and compounds	2	2				
(thread with Fab 1040, Fab 1048)	Mixtures and their uses	2	2				
	Solutions and the environment	1					
Energy transfer technologies (8 hours)							
(thread with Fab 1040, Fab 1048, Fab 1050)	Heat and heat transfer	2	2				
(power source and equipment, oxyfuel welding)	Controlling heat transfer		2				
(thread with Fab 1010)	Simple machine and energy transfer		2				
From life to lifestyle 6 hours + project							
(traditional teaching)	Structure and function of plant and animal cell						
	Life function common to kiving thing						
	Food for life						
	Maintaining homeostasis						

Matter and energy in the biosphere 6 hours + project							
(traditional teaching)	The web of life						
	Populations						
	Ecosystems and biomes						
	Protecting the environment						
							18
Career and life management (75 hours/3 credits)						3	
	Personal choices	3					
	Resource choices		3				
(thread with English)	Career and life choices			3			
(thread with English)	Portfolio				3		
							12
		60	60	60	60	15	255
		Week 1-4	Week 5-8	Week 9-12	Week 13-16	Week 17	Total hours

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University of Alberta
Bachelor of Education
Major: French Minor: Science and Math

1984-1987
Institut Agro-Alimentaire de Saint-Hyacinthe
College degree
Plant and Animal science (Zootechnology)

Teaching experiences

Currently at St-Mary's High School/St-Monica school

Position: Welding Fabrication/Construction/Mechanic teacher
Organisation: Welding Rodeo, At-Risk youth camp

Bishop O'Byrne High School, Bishop Carroll High School

Position: Teaching Senior High School CTS
Subjects: Welding and metal fabrication 10-20-30, school coordinator for skills Alberta
Duties: Designing courses and new curriculum, learning facilitator, instructing and teaching,
coaching: coaching junior boys rugby,

January 2005 - December 2005 (teacher exchange)
Gladstone Park Secondary College
Victoria, Australia

Position: Teaching Junior and Senior High School.
Subjects: Technology (wood working and electronics)
Duties: Designing courses and new curriculum, learning facilitator, instructing and teaching,
coaching: coaching Junior & Senior boys rugby, junior soccer

Calgary Catholic School Board

Position: Teaching Senior High School curriculum in both French and English.
Subjects: Metal fabrication, Math, Science, Religion, Careers and Life Management, French as Second Language
Duties: Designing courses and new curriculum, learning facilitator, instructing and teaching,
coaching: coaching Junior & Senior boys rugby, City championship 1998-1999

September 1989 - September 1992
Department of the National Defence

Position: Staff Officer
Duties: Planning and management for NORAD and Fighter Group Commandant executive assistant. Paratrooper, Air Weapons controller Training.

*Awarded Military Skill Award for Leadership
*Won Gold Medal Cadet Fitness

January 1988- March 1989
Agriculture Canada, Genetic Department (Montreal and Ottawa)