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Entrepreneurial Thinking in Secondary Education:

Fostering the development of employable skills among secondary school students

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Thesis
Fall 2019
Master's of Education Entrepreneurship
Oulu University of Applied Sciences

ABSTRACT

Oulu University of Applied Sciences
Master of Education Entrepreneurship

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Title of Master's thesis: Fostering the development of employable skills among secondary school students

Supervisor(s): Blair Stevenson

Term and year of completion: Fall 2019

Number of pages: 90

Addressing a lack of relevance and authenticity of the learning environment in the secondary education system in terms of preparing high school students for the future workforce is essential. Supporting young generations to learn how to become adaptable in a future workforce should become a greater focus point of the education system. The objective of this study is to explore the impact of entrepreneurial education and how entrepreneurial thinking activities foster the development of employable skills. The need for students to learn how to communicate their ideas effectively, adapt, problem-solve and think critically is essential. This thesis is grounded in Golden & Rodriguez's (2018) work on the "Measuring Entrepreneurial Mindset In Youth: Learnings From the NFTE's Entrepreneurial Mindset Index". Golden & Rodriguez's (2018) suggest that introducing an entrepreneurial mindset into the classroom is an important focus point in many programs and initiatives that aim to prepare the young generation for the future (Gold & Rodriguez, 2018). In fact, one of the most common forms of experiential learning in secondary education in Ontario is entrepreneurial education. The Entrepreneurial Thinking program's approach has students working on topics of their own interest. The program integrates new concepts of teaching and learning, and STEM curriculum connection through problem solving, critical thinking, and creativity to foster the development of employable skills in a collaborative and engaging environment. A multi-method research methodology was used to explore a variety of in-person and online experiences aiming to give high school students the skills they need to learn how to organize a business enterprise as well as the adoption of employable skills. This study highlights that giving students the flexibility and the opportunity to work on a project of their own interest, increases student engagement and improves learning outcomes by empowering them to choose and define the scope of their innovation project and see the tangible link between entrepreneurial and STEM education, and the success of their project. Findings further suggest that, by shifting the focus to a student-centered approach, students can better connect with their learning, creating meaningful experiences and connections.

Keywords:

STEM education, entrepreneurial thinking, creativity, problem solving, critical thinking.

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1 INTRODUCTION

School systems across Canada have recognized and prioritized how essential the development of 21st century skills is to future readiness (Council of Ministers of Education). At the same time, the Ontario Government has recently announced its renewed plan on transforming K-12 education to focus on the importance of development of employable skills (Ontario, Chapter 1, Section B: A Plan to Build Ontario Together: By Preparing People for Jobs, 2019).

During the recent transition in the last couple of years in the Ontario political landscape, the terminology shift from 21st century skills to employable skills has taken place suggesting that “today’s students, and tomorrow’s entrepreneurs, innovators, and workers, have the skills they need to succeed in a high competitive global economy” (Ontario, Chapter 1, Section B: A Plan to Build Ontario Together: By Preparing People for Jobs, 2019). Therefore, while referring to the skills that better prepare the students for the future as the 21st century skills as well as employable skills, for the purpose of this study, these terms are used interchangeably.

Currently, the increase in instructional time devoted to teaching and learning strategies to promote deeper learning and equip students with the necessary skills is not enough (Service, 2016). The lack of connections in classroom learning to real world problems, as well as an over reliance by educators on direct instruction, leads to a lack of opportunities for peer collaboration as identified by (Chiu, Price, & Ovrachim, 2015) as key barriers to the development of employable skills and student engagement. Employable skills are defined as transferable skills needed by an individual which employers often express interest in from an employee (Employability skills, 2019).

Educational practices, such as cooperative learning and problem-based learning, encourage students to collaborate on design solutions to problems in an authentic environment, increasing student engagement, motivation, and learning (Meyrick, 2011). At the same time, providing students with greater autonomy and choice regarding their learning, increases student engagement and academic success (Gasiewsk, Eagan, Garcia, Hurtado, & Chang, 2011). “Student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education” (Student Engagement, 2019).

Dr. Camille Rutherford, Director of e-Learning for Brock University Education, and lead researcher for Educational Research and Innovation Hub (ihub) notes that *“an over emphasis on standardized test results has created an environment where many educators are often fixated on direct instruction and a narrow band of academic indicators and have forgotten about the importance of relationships”* leaving little time for exploring real world learning approaches.

In the workplace, problem solving is collaborative, interdisciplinary, and continuous. As noted by innovation expert Steve Johnson (Johnson, 2010), insights emerge from “collisions” of expertise contextualized through a shared problem-solving process. By contrast, in formal education, problems posed to students are rarely solved in an interdisciplinary way, and seldom have a connection to real world situations or problems.

Students are often more motivated when solving real-world problems and express a preference for doing rather than listening (Lombardi, 2007). Connecting students with real-world situations creates forms of authentic learning that overarches “across disciplines and brings students into meaningful contact with future employers,

customers, clients, and colleagues who will have the greatest stake in their success” (Lombardi, 2007).

The introduction of experiential learning and real-life experiences offers significant teaching advantages by “allowing students to transform themselves during the learning process (Efstratia, 2014, p. 1258). Experiential learning is more than just learning by doing, it is the process of reflecting on the experience gained during the learning process and being able to apply what has been learned in a true and meaningful way (Education O. M., Community-Connected Experiential Learning, 2016). Through experiential learning students are able to make connections between course content and its real-life application. Experiential learning provides students with authentic learning opportunities that facilitate the development of 21st century skills, including critical thinking, problem solving and creativity (Education O. M., Community-Connected Experiential Learning, 2016).

One of the most common forms of experiential learning in secondary education in Ontario is entrepreneurial education which has gained significant attention among educators in Ontario during the last decade on all levels of education from as early as elementary grades to the post-secondary level. The psycho-social benefits of experiential learning embedded in entrepreneurial education practices have been clearly presented in “The Impact of Experiential Learning Programs on Student Success” prepared by the Canadian Council on Learning (Learning, 2009) by highlighting that increased self-esteem and engagement in the workplace or school, improved motivation, and improved social and leadership skills (Education O. M., Community-Connected Experiential Learning, 2016). Entrepreneurial Thinking activities use mental abilities such as understanding and solving problems and challenges (Holland, 2019).

Students actively participate in experiential learning are able to meaningfully identify and reflect on their learning, a process that helps students develop new skills, new attitudes, and new ways of thinking (Linda Lewis, 1994) (Education O. M., Community-Connected Experiential Learning, 2016).

The Ontario Leadership Framework highlights the importance of collaborative learning cultures by connecting schools, school communities and districts to work together and learn from each other with a central focus on improving teaching and learning (Education O. M., Ideas Into Actions, 2013).

However, in a report on the effect of double cohort studies on student progress King, Warren, Boyer and Chin in 2005, specified that schools are failing to provide students with courses designed for their needs and that can prepare them for their future (Learning, 2009).

The focus on 21st century skills development is arguably presented by Silva (2009) in her “Measuring Skills for 21st Century Learning” paper as “an emphasis on what students can do with knowledge, rather than what units of knowledge they have” (p.630). However, complex thinking and analytical skills, are presented by the International Society for Technology in Education as an integral part of the learning process at every stage of development (Bransford, Brown, & Cocking, 2000) (Organization for Economic Co-operation and Development, 2004) (Kozma, 2003) (Silva, 2009).

Preparing students to meet the 21st century workforce implies the development of a repertoire of skills students should master since they will be evaluated and assessed in an authentic way. The American Society for Training and Development (ASTD) ranked Leadership, Critical Thinking and Creativity among the highest skills

sought after by the employees, with up to 20% of organizations indicating a deficient in these skills among young graduates (Trish Boyles, 2012)

Entrepreneurship in education is gaining momentum in schools across Canada as curriculum-based programs as well as extracurricular entrepreneurial programs. Although not yet as common at the elementary level, entrepreneurial based programs are increasingly more common at the high school level. In Ontario, for instance, through the Specialist High Skills Major (SHSM) initiative supported by the Ministry of Education, the entrepreneurship programs are part of grade 11 and 12 curriculum. The Specialist High Skills Major lets students focus on a career path that matches their skills and interests while meeting the requirements of the Ontario Secondary School Diploma (Education O. M., SHSM, 2018). In Alberta, for instance, students are introduced to entrepreneurship concepts through a game-based program that teaches students about running a virtual business (Johne, 2018).

Extracurricular programs that are teaching students the concept of entrepreneurship can also be found across the country. These programs are offered to elementary and secondary students through clubs and partnerships such as: Junior Achievement of Canada, Canada Youth Business Foundation and Learning Partnership. In Ontario, entrepreneurial programs such as the Summer Company, DECA (Distributive Education Clubs of America) Ontario or i-Think are helping students develop employable skills outside of the classroom.

For example, the Summer Company funded and supported by the Ontario Government helps youths between 15 and 29 years old, start and run their own summer business by providing funding, advice and services. Fully funded by the Government of Ontario, the Summer Company offers students the opportunity to receive hands-on business training from successful business leaders, as well as

financial support. Students can access the program resources both online and in person mentoring sessions. Running since 2001, over 7000 students have participated in the program. Unfortunately, the downfall of the program is the limited time offered for students to work on developing their own business, as it is offered during the summer break only. Nevertheless, upon completion, the students can walk away with as much as \$3000 they can use towards developing and continuing to run their business project (Ontario, Start a summer company: students, 2019).

DECA Ontario prepares emerging leaders and entrepreneurs in hospitality, marketing, law, finance and management in high schools and post-secondary institutions across Ontario. The program allows students to develop confidence, employability skills and demonstrate leadership while fostering a climate that encourages innovation and diligence (DECA, 2018). Acting as a not-for-profit international organization since 1946, more than 10 million of students world-wide have participated in the program with thousands of students enrolling in the program every year. The program offers extra-curricular mentorship opportunities. There are face-to-face professional learning series where the classroom teachers or college instructors are trained by certified trainers and corporate partners. The limitations of the program are reflected in the restricted number of professional development fields offered to student to explore and expand their projects in, as well as the participation fee and traveling costs. This aspect of the program limits students' participation to only those interested in skill development strictly in the business, law, finance and management, leaving outside the students with strong interest in arts or STEM fields for instance.

With a focus on professional development and run in partnership with Rotman School of Management of University of Toronto, the i-Think program provides

educators with the tools to create rich learning experiences, no matter the grade level and subject they teach, enabling critical thinking, creativity and collaboration in the classroom. The i-Think program helps educators advance their practice on teaching critical thinking and problem solving through training, coaching and co-development of experiences in integrative thinking and innovation (Management, 2018). The program's restraints are reflected in the enrolment cost (regular prices from \$449 to \$649) and limited time of training (up to three days of face-to-face training sessions).

Educators across Ontario and Canada are looking for concrete processes and tools to enable deeper student engagement with STEM and other core curriculum through real world contextualization of learning.

The Ontario Ministry of Education's Achievement progression chart from Knowledge to Understanding to Communication to Inquiry and Application is encouraging teachers to think about the extended learning process and the full range of cognitive skills students need to be effective learners and problem solvers in a 21st century context (Education M. o., 2004).

Ontario teachers have lacked concrete methodologies, appropriate training, community connections, and tools for designing 'real world learning' (Guo, 2014). For this reason, the shift for teachers to teach experiential learning is a dramatic one, for which their training has not prepared them. Recently, the Ontario Ministry of Education's approach to support teachers, schools and system leaders in shifting their practices for modernizing and transforming education for deeper learning practices and developing employable skills, has contributed to enhanced teaching and learning practices that foster deeper learning and the development of 21st century skills (Dede & Frumin, 2016).

Real world learning requires the engagement and support of community experts and mentors. Teachers need help with the practical know-how to find and engage appropriate experts and mentors and need well-defined roles for experts within the learning process. In a recent review of effective teacher professional development, Linda Darling-Hammond (2017) mentioned that to “prepare students for education and work in the 21st century, students must develop mastery of challenging content, problem-solving, effective communication and collaboration, and self-direction, [and] teachers must employ more sophisticated forms of teaching” (Darling-Hammond, Hyler, & Gardner, 2017). Furthermore, industry describes the need for similar competences, according to the World Economic Forum (WEF) the top 3 skills that will be most desired by employers by 2020 are: complex problem-solving, critical thinking and creativity (Gray, 2016). In today’s dynamic workforce market, some jobs are changing faster than others, and many of the current jobs will not exist in the near future. According to the latest research, “soon we’ll be as good as the skills we possess” (The Future of Jobs Report, 2018). Moreover, to help students develop employable skills, a collaborative effort is essential between educators through rich teaching and learning strategies, schools through specialized instructional programs and the community through mentorship opportunities. Fostering collaboration among educators as well as engaging community members facilitates deeper and authentic learning opportunities (Darling-Hammond, Hyler, & Gardner, 2017).

Over the past year, inspired by students’ interest in participating in activities and programs tailored to their interests, a small group of teachers with District School Board of Niagara have developed an entrepreneurial thinking program for high school students.

The Entrepreneurial Thinking program has been presented and approved at the system and school level, primarily as a pilot program with the opportunity for extension to multiple schools across the board during the following school year.

The funding for the program has been provided by the piloting schools as well as at the board level through a Ministry funded program supporting the development of employable skills. Ontario Ministry of Education's deep focus on the development of specialized skills, trades and an increase in students' employability for the jobs of tomorrow enabled the right environment for developing and implementing a program. The program allows high school students to gain transferable employment experience while exploring potential future career paths but also allowing them to practice professional and ethical behaviour, problem solving, creativity and critical thinking skills.

The program offers students and teachers an experiential learning methodology that applies key features of Design Thinking (problem finding and solving) to the learning process and connects learning to community context. The offering empowers students to choose issues in their school and home communities that matter to them as the basis for inquiry projects. It also supports change in teaching practice needed to support real world learning across the curriculum yet is very efficient and flexible in the demands it places on teachers.

The purpose of this study is to explore the entrepreneurial-based programs in secondary education and highlight how entrepreneurial thinking activities such as, problem identification and validation, critical thinking, creativity, communication, could foster the development of employable skills and enhance student engagement in the classroom. Many 21st century skills, such as critical thinking and problem solving contribute to a well-prepared workforce of the future (Beers, n.d.). There is a natural

match between 21st century skills and employable skills by creating opportunities for students to become self-directed learners, helping students to understand and use critical thinking strategies, solve problems, and to share and generate new ideas. Aside from being future ready, students need a vast and specialized set of skills and knowledge as they need to apply these in an unknown environment and circumstances (OECD, 2018).

Therefore, capturing a representation of entrepreneurship education in a high school environment would be of great value to teachers in particular and to schools in general in establishing a more robust and continuous entrepreneurial-based program as part of the high school curricula. Surveying participating teachers during the program to collect feedback and assess their responses in relation to the program, as well as classroom observations and student surveys, is also a great tool in creating a comprehensive picture of the program effects. While individual interviews with program mentors highlight the importance of the community within the program as an essential element in the success of the program.

The two questions addressed in this research into Entrepreneurial Thinking in education are:

1. How do entrepreneurial thinking activities foster the development of employable skills?
2. How does participation in entrepreneurial thinking activities enhance student engagement?

While chapter 1 provides an introduction and illustrates the background of the study, the following chapters provide a much more detailed discussion of the literature, methodological exploration, findings, and discussion of implications of this research. Chapter 2 explores and reviews the literature of inclusive practices relevant to this

study. The chapter features sections on entrepreneurial thinking in education, problem based learning and creativity. Chapter 3 discusses the research design, methodology, data collection and analysis that form the grounding of this study, as well as ethical concerns associated with this study. Chapter 4 presents the findings of the research, while chapter 5 summarizes the research concluded.

2 LITERATURE REVIEW

The following section is a review of literature focusing on entrepreneurial thinking in education, problem solving, critical thinking and creativity. These concepts are specifically highlighted because they have been identified by the World Economic Forum as the top three skills employers will be looking for by 2020 (Gray, 2016). It is suggested in this study that these skills can be developed through entrepreneurial focused programs as a supportive ecosystem in increasing the potential of nurturing new ventures and innovation.

The study also observes the impact of an Entrepreneurial Thinking educational program on student engagement, which aims to equip students with skills they need to succeed in the future. Through its use of a flexible problem finding and solving process, the program is designed to enhance student engagement while fostering STEM (Science, Technology, Engineering, and Math) skills. The program's focus on student engagement is critical as multi-year research undertaken in Canada and the United States has noted the majority of students are not engaged at school (Appleton, Cristenson, & Furlong, Student engagement with school: Critical conceptual and methodological issues of the construct, 2008) (Willims, Friesen, & Milton, 2009).

Working with mentors and community organizations, having the opportunity to work on projects of their own interest helps students develop their imagination, innovation and empathy, and creates an environment where every student learns in the manner they are most ready to be successful. The entrepreneurial education environment in the classroom leads to intense engagement and collaboration among students. Students are encouraged to explore issues they are passionate about, empowering them to innovate and collaborate.

Also, students' proficiency with technology enables students to experiment with different technologies in an authentic way increasing the engagement level as well as fostering creativity, communication, and problem-solving skills (Vockley & Lang). Project Tomorrow (2010) report states that "as a result of using technology in the classroom, students are more motivated to learn, apply their knowledge to practical problems, and take ownership of their learning. Teachers also report that, by using technology, students are developing key employable skills including creativity, collaboration and skills in problem-solving and critical thinking. Furthermore, "the learning experience becomes more meaningful for the student as teachers have new found time to differentiate instruction to a greater degree and have more access to information about how their students are doing academically" (p.2). During their participation in the program, students had access to a range of technology like 3D printers, drawing pads, professional photo and video cameras which allowed students express their learning in a more engaging and meaningful way.

The table below presents the level of skills and experience students develop while using technology in the classroom (Taylor & Parsons, 2011).

Table 1 Skills and Experience developed

Skills and experience	
Students more motivated to learn	51%
Apply their knowledge to practical problems	30%
Ownership of learning	23%
Creativity	39%
Collaboration	30%
Problem solving and critical thinking	27%

At the same time, some common pedagogical approaches often associated with the entrepreneurial education present important similarities, however, none of them offer a complete journey of authentic or experiential learning.

The following table displays the unique features of entrepreneurial education in comparison to other pedagogical approaches and highlights the interaction with the outside world, iterative experimentation or innovativeness which can generate a higher level of motivation, engagement and deep learning.

Table 2: Comparison of pedagogical approaches.

Major focus on...	Entrepreneurial education	Problem-based learning	Project-based learning	Service-learning
... problems	X	X	X	X
... opportunities	X			
... authenticity	X	X	X	X
... artifact creation	X		X	
... iterative experimentation	X			
... real world (inter-)action	X			X
... value creation to external stakeholders	X			X
... team-work	X	X	X	
... work across extended periods of time	X		X	X
... newness / innovativeness	X			
... risk of failure	X			

Similarities and differences between entrepreneurial education and some pedagogical approaches often stated to be similar (Lackeus, Entrepreneurship in Education, 2015).

The element of choice is vital in students' success and opens up the opportunity to develop their own interest and therefore the engagement and deeper learning abilities. At the same time, encouraging and supporting teachers to adopt a different mindset when it comes to teaching and learning practices is also very important in student success. When education programs that suppresses imagination are replaced with one that cultivates imagination, originality, critical thinking, boldness and empathy (Arora, et al., 2019), it allows students to grow personally and build future professional mindsets.

While participating in entrepreneurial education, students can find their own passion, understand their own educational needs and identify the right learning approach to help them become successful and develop their own path. The importance of content in the development of employable skills as well as teaching and learning strategies is also critical for student success. The access to information, relevance and ability to link learning to real life experiences help students foster their future skills. Based on a survey conducted by Dell Technologies, by 2020 Gen Z will make up 20% of the workforce and only 57% of them rank their education good or excellent at preparing them for their future career. Fifty-two percent are confident about their non-technical skills and 94% admitted they do not feel ready for the workforce (Technologies).

More so, studies show that industry reports on workforce trends recognize an employable skills gap among young graduates (Shepell, 2018). For example, the Morneau Shepell (2018) survey on the shifting nature of the Canadian labour market, lists as the top transferable skills employers are seeing gaps in are:

1. Teamwork
2. Communication
3. Problem-solving
4. Analytical
5. Resiliency (Shepell, 2018)

Also, the same report presents the top five skills employers are looking for in an entry-level and mid-level hire the following:

Table 3: Top five skills employers look for (Shepell, 2018)

Top five skills employers look for in entry-level hires

1	2	3	4	5
Collaboration/teamwork/interpersonal/relationship-building skills	Communication skills	Problem-solving skills	Analytical capabilities	Resiliency

Top five skills employers look for in mid-level hires

1	2	3	4	5
Collaboration/teamwork/interpersonal/relationship-building skills	Leadership/management skills	Communication skills	Industry-specific knowledge and experience	Problem-solving skills

Therefore, the need for investment in secondary and post-secondary education in terms of content and execution is evident as the skills gap among young generation presents major challenges in supporting much needed talent.

2.1 Entrepreneurial Thinking in Education

Entrepreneurship in education can take many forms – teaching “about” entrepreneurship, teaching “for” entrepreneurship and teaching “through” entrepreneurship, with the first two forms being more characteristic to specialized programs and post-secondary education, while the third form of entrepreneurship in education can be relevant to all students across all levels of education. (Lackeus, *Entrepreneurship in Education: What, Why, When, How*, 2015) .

Entrepreneurship education is presented by the World Economic Forum in 2009 as a way to develop innovative knowledge that can solve complex social problems. It can also help build skills that can serve young people to start new businesses and become self-employed and emphasizes skills such as critical and creative thinking,

collaboration, self-regulation, and fostering deep understanding (Darisi & Watson, 2017).

There are three major aims of entrepreneurship education: learning to understand entrepreneurship, learning to become entrepreneurial, and learning to become an entrepreneur (Seikkula-Leino, Ruskovaara, Ikavalko, Mattila, & Rytkola, 2010). Therefore, the focus on entrepreneurship education at elementary and secondary levels help promotes entrepreneurship as a possible source of future opportunities, as well as the development of social skills such as communication, .collaboration and presentation skills.

Some common pedagogical approaches of entrepreneurial education are problem-based learning, project-based learning or design thinking; when students identify and work on authentic problems while developing entrepreneurial non-cognitive competences such as perseverance, self-efficacy, learning and social skills (Lackeus, *Entrepreneurship in Education: What, Why, When, How*, 2015). Design thinking, a user centric approach of problem solving, became recently incorporated in a wide variety of subjects and industries, including education. Viewed as a design process, design thinking depends on planning and analysis, facilitating adaptive learning (Glen, Suci, & Baughn, 2014) vastly interconnecting with business studies and entrepreneurship. Design thinking provides students the ability to explore the real-world problems and to associate practicality with theories (Glen, Suci, & Baughn, 2014).

One of the main objectives of entrepreneurial education is to help students develop entrepreneurial competences such as resilience, perseverance or interpersonal skills through an entrepreneurial thinking approach. Ontario Government research indicates that increasing the exposure of entrepreneurial education

opportunities to students as early as secondary school is a critical determinant of economic development from the community level to regional or national level (Seizing Global Opportunities: Ontario's Innovation Agenda, 2019). Often when collaboration is minimal in the regular classroom, students' independent work does not create the complete or beneficial environment for students to foster entrepreneurial skills. Entrepreneurship occurs when individuals interact with each other within a dynamic environment where change and value take place. Allowing students to express their ideas through the "learning-by-creating-value" approach (Lackeus, Entrepreneurship in Education, 2015) defines the entrepreneurial education.

Ontario Ministry of Education research has indicated that the level of student engagement and motivation is significantly higher when learning is directly connected to situations when students are directly interested or passionate about in their community or in the world (Education O. M., Community-Connected Experiential Learning, 2016). More so, research has found that the experiential learning through entrepreneurial thinking approach contributes to the development of 21st century competences by "giving opportunities for authentic learning, engaging students actively, fostering co-operation and collaboration, meeting individual interests, empowering learners and expanding horizons beyond comfort zones" (Furco, 2010).

Entrepreneurs are known as action-oriented individuals and their "learning occurs through experience and discovery" (Pittaway & Cope, 2007, p. 212). One of the most popular forms of experiential learning is represented by entrepreneurial education which gained more attention among the educators in Ontario during the last years on all levels of education from as early as elementary grades to post-secondary level.

The hands-on, discovery-based approach nurtures an entrepreneurial mindset which reinforces the similarities and the link between the two. The real-world opportunities students are exposed to create and carry on a solution is what ignites the entrepreneurial-solving skills (Root, 2017). The essence of entrepreneurial thinking cannot be found in a confined classroom, instead students need to connect with the outside world to understand, interact and communicate. Therefore, for the purpose of this study I would like to equate entrepreneurial thinking with experiential learning.

In a 2009 report of Canadian Council of Learning, it has been highlighted the effect of experiential learning programs on student success with emphasis on experiential learning programs offered in Ontario and its impact on student academic success, psycho-social benefits and graduation outcomes (Learning, 2009) .

The psycho-social benefits of experiential learning embedded in entrepreneurial education practices have been clearly presented in “The Impact of Experiential Learning Programs on Student Success” prepared by the Canadian Council on Learning (Learning, 2009) by highlighting increased self-esteem and engagement in the workplace or school, improved motivation, and improved social and leadership skills among students (Education O. M., Community-Connected Experiential Learning, 2016).

However, according to a survey published by the Government of Canada in 2012 addressing the teaching and practice of entrepreneurship in education, just a limited number of students had access to entrepreneurship education with 28 percent of institutions who had an objective to deliver entrepreneurship opportunities to students in all faculties (Chris Parsley, 2012). The survey focused on six areas of entrepreneurship: education strategy, instructional infrastructure, teaching and

learning, and development and outreach; which indicates that close to 40 percent of education organizations did not have a clear strategy of delivering entrepreneurial education (Chris Parsley, 2012).

At the elementary level, entrepreneurship education becomes relevant for developing reasoning, problem solving skills and transferable skills. By teaching entrepreneurship and how to be an entrepreneur student change the way they learn in terms of beliefs, values and attitudes. Also, introducing entrepreneurial education at the elementary level shows significant improvement in students' attitudes towards entrepreneurship and their knowledge of basic economic concepts (María de LourdesCárcamo-Solís; María del PilarArroyo-López; Lorena del Carmen Alvarez-Castañón; ElviaGarcía-López, 2017). At the secondary level, entrepreneurial education provides students with the right skills that entrepreneurs will need to function within the economy, focusing on innovation, risk taking, imagination, problem solving and decision-making skills (Kent, 1990).

Additionally, Audretsch (2007) stated that the quality of entrepreneurial activities at the post-secondary level is a critical determinant of the economic vitality of industries. For that matter, the federal and provincial governments in Canada are making entrepreneurial education a priority under the banner of employment, innovation and economic development goals (Sá, Kretz, & Sigurdson, 2014). More diverse experiential learning opportunities that provide hands-on knowledge, access to business networks and mentoring program are instructional strategies used to generate entrepreneurship.

Overall, all levels of education have seen an expansion and diversification of entrepreneurial-related offerings, such as majors, minors, and specializations. However, some of the barriers of integrating entrepreneurship in education mentioned

by the interviewed institutions were: limited number of people responsible for implementation of entrepreneurship in education at the organizational level, limited funding available and a lack of strategic integration.

The main educational programs including entrepreneurship studies are business and engineering, however a shift towards “arts entrepreneurship” focusing on non-profit, social innovation programs have become more noticeable (White, 2016). This allows students to express and develop their entrepreneurship skills within a creative sector such as music, arts, publishing, extending the opportunities outside of the business and engineering areas (Phillips, 2011). However, for the purpose of this paper the focus remains on entrepreneurship in education only.

Applying any of these approaches, students can connect learning to relevant and authentic topics, applying higher level thinking strategies and transforming the education in a deep, engaging and tangible experience.

2.2 Problem Based Learning

Problem solving through experiential learning can take many forms and shapes. The way one student approaches an idea to solve a problem will be different than another student, exposing them to different paths, resources and experiences throughout the entire process. Chapman et al. (1992) presented a list of characteristics that an experiential activity should focus on:

- Importance of balance between experiential learning and theory
- The need of a safe working space for students throughout the entire process

- The relevance of learning, where learning activities must be personally relevant to the student and to allow the student to make connection between their learning and the real world
- The importance of reflection on learning
- Immersive experience when students become emotionally invested in their work
- The development of meaningful relationships between the student, teacher and the learning environment
- The opportunity for students to expand their learning outside their comfort zone. (Schwartz, 2012)

A common approach of introducing entrepreneurship into the classroom is through problem-based learning. Students are either offered a scenario or potential problems or they are encouraged to identify their own, leading to a more engaging, high interest level activities and positive outcome.

The learning process used to identify the solution emphasizes the problem finding method, and typically receives short attention both in education and in the real world. Students spend as much time exploring and validating the problem as they do developing a solution, leading to a much higher quality of outcomes.

Encouraging students' imagination by allowing for finding and recognizing skills such as problem identification, problem definition, problem expression, problem construction, problem finding and solving methodology supports cognitive development, motivation and creativity (Runco & Nemiro, 1994).

For teachers, the problem finding and solving methodology helps students move forward with learning assignments where they lack real world experience or context - it helps students contextualize issues that they have trouble relating to.

Research shows that students achieve more when they are highly motivated and interested in their own topic while sustained through meaningful real-world experiences (Bell, 2010). As Dewey (1938) describes that “learning by doing” has great benefits in shaping students’ learning as they are encouraged to explore, engage and collaborate, while also developing their curiosity love for learning. The earlier this approach is introduced the greater the success fostering the development of essential 21st century skills (Bell, 2010).

In the meantime, the learning environment is a key consideration since it includes the system and the learning dynamics. The way students engage with one another influences their learning. National Research Council (NRC) states in a report from 2005 that engagement is reflected in the connection between the student and the social context in which learning takes place (Mombourquette, 2013).

In Canada, student engagement is a serious problem, according to a 2011 report from Canadian Education Association (CEA) only 70% of students are socially engaged in school (Mombourquette, 2013). Also, Dunleavy and Willms (2011) reports that only 42% of grade 10 students, 41% of Grade 11 students and 45% of Grade 12 are intellectually engaged. A deep focus lies on the learning environment that can promote higher engagement level as a reciprocal process of having students connected with real life experiences and skills (Willms, Friesen, & Milton, 2009). Across Canada, an increased attention to the relation between quality of learning environment and student achievement highlights the social and academic engagement as it can create more effective and engaging learning environments (Willms, Friesen, & Milton, 2009).

Relevancy and direct connection to real-life situations is a key factor for engaging learners as students’ work “needs to be meaningful and authentic and worthy of their

time and attention” (Willms, Friesen, & Milton, 2009) (Taylor & Parsons, 2011). In allowing students to decide on their topic of learning and clearly define their work, learners become intellectually engaged while working on matters relevant to their own lives. Student engagement comes from encouraging problem-based learning based on personal choice, creativity and imagination, communication, critical thinking and collaboration within and outside the classroom.

The learning process and the multiple connections of classroom activities to Science, Technology, Engineering and Math (STEM) curriculum and the Innovation, Creativity and Entrepreneurship (ICE) competences help teachers integrate subject matter across areas (Building Innovation, Creativity and Entrepreneurship in Ontario, n.d.).

Problem based learning (PBL) activities foster “critical thinking and problem-solving skills; active participation in the learning process including self-direction, identification of one’s own learning needs, teamwork, creative discussion, and learning from peers; and the integration and synthesis of a variety of knowledge” (Gürses, Açıkyıldız, Dogar, & Sozbilir, 2007, p. 99). According to Savery (2006) the problem-based learning approach allows learners to “integrate theory and practice and apply knowledge and skills to develop a viable solution to a defined problem” (p.12). PBL brings great implications among students facilitating the development of valuable skills such as teamwork, listening, cooperation, and presentation skills, offering multiple advantages over the traditional teaching and learning methods, by motivating the students and encouraging them to set their own goals. As a student-centered concept, PBL touches multiple educational practices from problem-oriented to experiential and interdisciplinary learning, when students may expect to “reach a complex level of

comprehension through project work which would not be possible in conventional classes” (Graaff & Kolmos, 2003, p. 661).

Therefore, in a rapidly changing environment, students need all the support they can get from teachers, schools and society to develop and grow the necessary skill set as a successful and powerful future-ready workforce.

2.3 Creativity

Recent studies indicate a constant decline in creativity among elementary students since 1990 (Bronson & Merryman, 2010) while in the same time a 2010 American Management Association study describes creativity and innovation as one of the top critical skills needed for business success today and in the future (Schmidt, Soper, & Facca, 2012).

“Creativity is production of something original and useful” (Bronson & Merryman, 2010) and has been identified by many researchers as connected to entrepreneurship. In the same time, according to Youl-Lee, Florida, and Acs (2004), “entrepreneurship is a form of creativity and can be labeled as business or entrepreneurial creativity because new businesses are original and useful” (p.882).

In the same time, creativity has been also defined as being of different types: expressive where the quality of the product is not important; productive; inventive; innovative; and “emergentive as an entirely new principle or assumption around which new schools flourish” (Sawyer, 2012) including new and abstract forms of thought. Also, according to Kaufman and Beghetto (2009) there are two levels of creativity: the creativity inherent in the learning process and the professional experience in a creative domain (Kaufman & Beghetto, 2009).

Creativity should be central in education and Morrison and Johnson (2003) argued that creativity should be introduced widely across curriculum and not restricted to a specific course. By integrating arts into the STEM curriculum, STEAM education encourages students to think differently or approach a problem in a different way. Arts adds the ability to approach a situation from a new and creative angle offering students the freedom of expression with more creative and effective ways to communicate (Maslen, 2017).

Creativity helps students develop their ability to analyze situations from different perspectives (Bronson & Merryman, 2010). In addition, research has shown that creativity fosters better problem-finding and problem-solving skills development and creative students are better able to handle stress and overcome difficult situations. Similar studies highlight the positive influence of creativity in schools, with students developing high self-efficacy and confidence about their future and their ability to succeed (Bronson & Merryman, 2010).

The 2010 American Management Association highlighted the importance of creativity in the future due to the changes in the nature of work, global competition and organizational structure (Schmidt, Soper, & Facca, 2012).

A report released by the World Economic Forum in 2016 states that “creativity will become one of the top three skills workers will need. With the avalanche of new products, new technologies and new ways of working, workers are going to have to become more creative in order to benefit from these changes.” (Gray, 2016).

Bell (2010) argues that “teaching students active listening skills enhances collaborative ability as well as creativity” while working on topics of their own interest which is essential for their own success. Creativity can be fostered by learning environment, practice and trust. Also, by collaborating with others, students can

develop and refine their creativity (Trilling & Fadel, 2009), applying their ideas to real-world examples relevant to their learning and connected to their own interest.

Additionally, entrepreneurship has been associated with creativity, and as Hamidi, Wennberg and Berglund (2008) note that “creative individuals are more likely to engage in entrepreneurial behavior (p.305).

Based on the various conceptualization of employable skills outlined above, this study will focus on the development of problem solving, critical thinking and creativity skills as the most relevant to the context of secondary school in preparing students for future careers. Those skills complement expected competences to be covered in the curriculum.

3 RESEARCH METHODOLOGY

This chapter provides an outline of the study including data collection methods, implementation and description of participants. The chapter presents the study context, research methodology and design, pilot studies, selection of site and participants, description of participants, data collection and recording techniques, and ethical considerations.

3.1 Study Context

The research focuses on secondary students' exposure to a variety of online and in person experiences aiming to give them the knowledge they need on how to organize and operate a business enterprise. The program, offered by one of the local high schools, allowed students to engage in entrepreneurial learning while working on their entrepreneurial venture throughout the school year. The projects development and complexity varied based on student interest from advertising and rebranding activities to podcasting or audio/video literacy. The program was powered by a strong community partnership with the local post-secondary organization via a series of mentorship sessions and in-kind services and resources. Throughout the program students had the opportunity to connect with industry and community representatives and worked towards building a positive relationship within their network while exploring entrepreneurship as a career path. The program was created based on student interest in entrepreneurial focused initiatives.

The overall objective of this research is the study of the development of sustainable long-term adoption of employable skills that students will benefit from and

foster as they prepare to begin their professional careers in various industries in Southwestern Ontario, Canada, or beyond. The purpose of this research however, is to highlight the benefits of the Entrepreneurial Thinking program in enhancing student engagement, collaboration as well as developing creativity, problem solving and critical thinking skills as presented later on in the findings section of this paper.

3.2 Research Methodology and Design

A multimethod research methodology was used during this study to explore a variety of in person and online experiences aiming to give secondary students the knowledge they need about how to organize and operate a business enterprise as well as the adoption and development of employable skills such as critical thinking, problem solving and creativity. The multimethod research including qualitative, survey and evaluation methodologies increases the possibilities of getting varied and extensive results. The “multimethod research enables the qualitative researcher to study relatively complex entities or phenomena in a way that is holistic and retains meaning” (Roller, 2015).

Through evaluation research which assesses the impact of some programs or policy or intervention (Ruane, 2015) had a very practical, results-based orientation, it was possible to document the program progress, changes and improvements.

A qualitative approach was chosen to present both individual and collective values from the participants. This research method has the ability to provide the data to explore participants' perception while looking to assign meaning to participants' inquiry. Qualitative research is considered an effective method for elucidating, deciphering, and organizing the opinion of the participants (Guba & Lincoln, 1994).

The considerations of adopting a qualitative research methodology are reflected in the need to support the discovery of new information as well as to understand better the information in the form in which it is experienced (Hoepfl, 1997).

Ruane (2015) presents the unstructured (qualitative) interview as the simplest interview option to let the respondent talk and as an option to give the respondent more control over the pace and direction of the interview (p. 193).

Qualitative research is an appropriate method to the context of this study since it allows gaining a greater understanding of the program, its approach, context and implementation. While allowing for comprehensive observations, the qualitative research in comparison to quantitative research which tolerates very controlled conditions, allows for an enhanced level of detail which can provide great insights during the examination.

This type of research is suitable while working with students as it allows for observations and data collection processes through open-ended questions that offer the participants the opportunity to express their impressions and experiences in their own words, taking the conversations to where they feel fit. As Hoepfl (1997) notes, the qualitative research reports are typically rich with detail and insights into participants' experiences (p. 49).

However, as Ruane (2015) highlights one special challenge of the unstructured and semi-structured interviews is keeping the responded on point. Weiss (2004) says that "good interviewing provides windows into people lives". Also, another important issue that the interviewer must keep in mind is the respondent's honesty when "the diligent interviewer must also be on the ready for detecting false claims" says Ruane (2015).

There are multiple characteristics of qualitative research and Hoepfl (1997) lists a few based on a synthesis of multiple authors.

1. Qualitative research uses the natural setting as a source of data. The researcher observes, describes and interprets settings as they are.
2. The researcher acts as an instrument of data collection.
3. Qualitative research predominantly uses inductive data analysis.
4. Qualitative research reports are descriptive.
5. Qualitative research has an interpretative character.
6. Qualitative researchers pay attention to distinctive as well as the general characteristics, seeking the uniqueness of each case.
7. Qualitative research has an evolving design.
8. Qualitative research is judged using special criteria for trustworthiness.

(Hoepfl, 1997, p. 49)

In alignment with these characteristics, the research methodology used throughout this study has been defined by the natural setting as the source of data, while the researcher paid attention to distinctive as well as general characteristics.

While the qualitative research focusses on getting to know the interviewee better, through the process of unstructured interviews, it encourages the interviewee to share their thoughts, experiences, knowledge, leaving room for interpretation or analysis to the investigator (Barbara DiCicco-Bloom, 2006). Here a series of ethical issues must be considered: protecting the interviewee's information, effectively informing interviewees about the nature of the study, and reducing the risk of exploitation (Barbara DiCicco-Bloom, 2006, p. 319). With these in mind, the researcher should always assure the interviewee freedom of expression, through a personal and intimate nature of the interview. In order to conform to these points, all interviews took place in

a private environment during a time previously set and convenient to the interviewee. With the interviewee's full consent, the audio of each interview was recorded for the purpose of accuracy and observation details. The audio files were securely stored on a password protected hard-drive.

Data were gathered through three methods: (a) field observations; (b) a combination of online questionnaire completed by all participants; and (c) individual interviews with a selection of educators representing high school and post-secondary environments.

Based on the characteristics of the study along with the audience, qualitative research offers the right method as an approach for examining the progress and impact of the Entrepreneurial Thinking program among high school students, along with the experience of teachers and mentors during the program. Classroom observations were conducted focusing on a series of behavioural, cognitive and emotional student engagement characteristics. The data gathered through questionnaires, unstructured and semi-structured interviews and observations captured an early stage image of what the program has accomplished and suggestions about ways of improving, developing and future implementation.

Before participating in the interview and questionnaire process, the participants were asked to provide consent and articulate any concerns regarding the data collection process.

A group of 21 students in grades 9 to 12 applied to participate in the program, while a similar group of students was identified and formed a control group. The students forming the control group (45% females and 55% males) have been selected based on their interest in attending similar classes as the group of students participating in the program, but not interested in the Entrepreneurial Thinking

program. The findings based on the answers of the students in the control group will not be discussed in this paper as additional information might be needed.

3.3 Pilot Study

The Entrepreneurial Thinking program was designed so students could experience entrepreneurship concepts through a variety of activities and collaborative opportunities while practicing their oral communication skills, critical thinking, writing, media literacy, speaking and listening. Through its use of a flexible problem finding and solving process, the program was designed to enhance student engagement while fostering STEM (Science, Technology, Engineering, and Math) skills. The program's focus on student engagement was critical as multi-year research undertaken in Canada and United States has noted the majority of students are not engaged at school (Appleton, Cristenson, & Furlong, Student engagement with school: Critical conceptual and methodological issues of the construct, 2008) (Willims, Friesen, & Milton, 2009).

The program aimed to empower students to choose and define the scope of their innovation project and allowed them to see the tangible link between STEM learning, mindset, and the success of their project. Since the beginning of the pilot program in September 2018, a class of 21 students in grades 9 to 12 entered the program. These students joined the program for various reasons: out of curiosity of what Entrepreneurial Thinking is, for the opportunity to explore and work on a project of personal interest, or for learning what it takes to start a business. The flexibility of the program and being with their friends were also important reasons for students to enroll in the program. Half way through the program, the transformation of the program was

evident on student engagement and collaboration with 93% average attendance throughout the first seven months of the program.

During the program, students spend as much time exploring and validating the problem as they do develop a solution. The program's structure spans the entire school year, allowing students to focus on problem validation and solution development during one hour per week for a 10-weeks working block. This working model ensured students dedicate enough time and importance to the core program activities which help foster creativity, problem solving and critical thinking.

The Entrepreneurial Thinking program learning process provided multiple connections to STEM curriculum and Innovation, Creativity and Entrepreneurship (ICE) competences, helping teachers to integrate subject matter across subject areas. Taking students through the four stages of entrepreneurial thinking concept: design thinking, ideation, customer research and discovery, and branding students developed valuable skills. For instance, they learned persuasive writing skills as they develop pitches at multiple stages of their projects; data management skills as they designed, populated, and created visualizations of survey information to validate assumptions, digital media literacy skills as they developed social media campaigns targeted to changing attitudes or increasing awareness of an issue and their solution, information and communication technology skills as they developed and tested app prototypes and websites.

With the support of the school and based on preliminary observations and discussions with fellow educators across the District School Board of Niagara, the classroom teacher who developed the program identified a clear curriculum gap relating to the development of soft employable skills within secondary education. Motivated by the possibility of introducing the program to high school students as soon

as the following school year, the same teacher proposed to run the program in collaboration with the local educational technology incubator. The proposed program included teacher facilitated/student-directed lessons encouraging students to pursue their own learning interest.

As part of the program, a multi-layered ecosystem was developed to support real world learning. The ecosystem was composed of:

- Educational technology incubator, an innovative applied research facility co-located inside a school, which offers a wealth of technology resources and tools for exploring student project-based learning.
- Maker space within the school, providing access to core technologies and support for experiential learning.
- Educational technology conference which provides a forum for sharing information and best practices among educators across the region and country.
- Youth entrepreneurial network of 35 sites across the region where youth 12 to 28 years of age are invited to collaborate and gain access to appropriate mentorship and support from community experts.
- Local post-secondary organizations which provide access to networks of professionals engaged in developing educational technologies and industry partners.

Building on the professional experience and skills set of the two participating teachers, the program allowed these teachers to experience the flexibility of teaching within a collaborative environment where students were supported by peers and offered flexibility from direct instruction. Through this program, teachers had the opportunity to work with students and help them get involved in the design and critical

thinking of a question in order to develop and enhance engagement, building knowledge and solving problems as a team. Selection of Site and Participants

The location of the program was determined based on multiple factors. The main location including the course delivery was selected based on the level of interest expressed by the participating high school. The maturity and overall implication of the Business program department at the school level, the level of support from the upper management team of the school, Business teacher, Co-op teacher, Student Success coordinator and students' level of interest in participating in such a program, all played a very important role in school selection as part of the pilot program.

The participants were high school students who were interested in entrepreneurial initiatives as well as students looking for new opportunities to develop or improve on their communication, writing, media skills. The mean age of participants was 17.24 years, while the most common grade was 12. Out of the total number of participating students, 48% of the students in the program were female, while 52% were male.

Twenty-one students from grade 9 to 12 enrolled in the program at the beginning of the school year (September 2018) and expected to complete the program at the end of the school year (June 2019). Being offered for the first time within the school board, the program was promoted to all grade 9 to 12 students within one school (a total of 210 students), specifically to students showing high interest in entrepreneurial activities, community development, wellness, art, business or technology were accepted into the program.

Participating students were all from the same high school with similar socio-economic background and future aspirations – first generation of post-secondary applicants.

Project Timeline and Activities

September 2018	<ul style="list-style-type: none"> • Recruitment of program instructors. • Teachers' engagement in the school. • Recruitment of students participating in the program. The recruitment form was sent to all grade 9 to 12 students in the school. • Scholl teachers will specifically promote the program to students emphasizing the focus of the program, opportunities and benefits.
October 2018 – June 2019	<ul style="list-style-type: none"> • Completion of various forms/questionnaires related to employable skills awareness and assessment; student engagement; student interest; community engagement. • Throughout the program students will be asked to complete a series of forms/questionnaires to help observe student engagement and achievement.
November 2018	<ul style="list-style-type: none"> • Completion of questionnaire by control group students. The questionnaire will try to capture students' perspective on skills development, collaboration and engagement.
March – May 2019	<ul style="list-style-type: none"> • Classroom observations and meetings. • Off classroom interactions and event participations • Documentation of classroom observations.
June 2019	<ul style="list-style-type: none"> • Analysis of pilot data

	<ul style="list-style-type: none"> • Revision of pilot training support materials • Development of comprehensive training and support materials for program enhancement.
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Twenty-one students from the same school, grade 9 to 12, not participating in the program were randomly selected to form the control group. Students have been selected on a volunteer basis and were willing to offer their time to answer the survey questions and participate in the interview after school hours. The findings from the control group will later be observed and analyzed in comparison to the findings from the participating group.

The program was run by two teachers/instructors who played different roles in disseminating new ideas and approaches to instruction in practice teaching and learning. One of the two instructors was a teacher veteran with the board, previously holding system level positions, serving multiple schools across the board, and focusing on developing and implementing trade skills-based programs while also having a strong background in engineering and computer science. The second instructor's role within the board was focusing on developing co-op programs and opportunities for high school students as well as promoting entrepreneurial based initiatives for both students and teachers, connecting the students and teachers with the local community.

3.4 Data Collection and Recording Techniques

Data were gathered through three methods: (a) field observations; (b) a combination of online questionnaire completed by all participants; and (c) individual

interviews with a selection of educators representing high school and post-secondary environments.

Students who presented interest in enrolling into the program were asked to complete a form including questions related to their interest and prior knowledge associated to entrepreneurial concepts. This served as a pre-survey and starting point of the research project. Results of this pre-survey will be presented in the findings section.

Following a series of mini-activities after four weeks from the start of the program, students were asked to complete a second questionnaire focusing on skill development and how they feel in relation to the job market trends such as critical thinking, problem solving, and creativity identified by the World Economic Forum as the top three employable skills by 2020.

Throughout the program (from September 2018 to June 2019) students were asked to complete short questionnaires/surveys as well as were individually interviewed in relation to skill development and level of engagement. The questionnaires, interviews and in-class observations took place during the same time as the writing of this thesis.

The project also captures direct weekly in-class observations recorded through written notes of participating student interactions throughout the program. The role of the teacher/facilitator of the program has also been studied during classroom observations leading to written notes of factors on disseminating new ideas and approaches to instruction in practice teaching and learning.

Table 4: Total Frequency of Participating Students by Gender and Grade

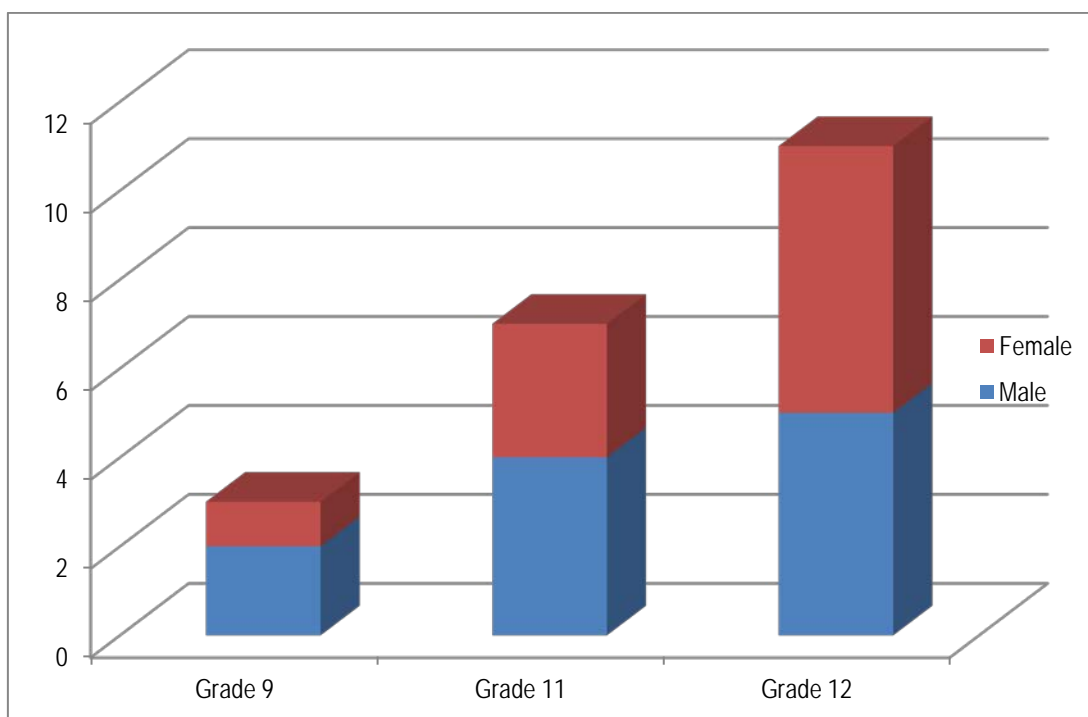


Table 5: Interview Participant Demographics

Participant	Gender	Teaching grade	Teachable Subject
Mary	Female	Secondary	Co-op education
Naomi	Female	Secondary	Computer Science
Kyle	Male	Adult Education	Computer Science
Brenda	Female	Post-Secondary	Business
Shannon*	Female	Post-Secondary	Professor of Education

* Names of the interview participants have been changed to maintain confidentiality.

Questionnaires are a form of survey research where questions are posed via a self-administered instrument (Ruane, 2015). The questions asked in the questionnaire (Appendix A) focused on gathering information related to students' general knowledge and perception in relation to employable skills development and competences.

Additionally, interviews (Appendix B and C) were conducted with five educators (only two participating in the program) representing a variety of education levels and teaching expertise and mentors selected on a critical case basis of sampling. The participants were selected in order to fully explore the range of perceptions revealed by the nature of the program.

Questionnaire Data

The questionnaire was designed to survey students and quantifies their perception related to program relevance aligning to student interests, student engagement, and behaviour. The survey included a series of open-ended questions which served as a starting point for exploratory inquiries during the interviews.

The students' questionnaire was completed online through the use of an electronic survey form and took approximately five minutes to complete. The open-ended questions solicited students' perspectives on the importance of development of employable skills. The process of data collection and recording was automated and compiled through the online form captured into an exportable file.

Interview Data Collection

The teacher and instructor delivering the program, along with external educators and academic staff from within the school board and higher education partners were contacted and a mutually convenient time and location was arranged for an interview. The interviews featured questions aligned with the *Tell Them From Me Survey* which is a student survey commissioned by the Ministry of Education and implemented by The Learning Bar, a third-party research foundation which provides educators with insight they need to make informed school planning decisions. (About The Learning Bar, n.d.) The questions were entirely open-ended which give the participants the opportunity to express their opinions based on their past experiences and were

designed to allow participants to craft detailed and unique responses from their personal academic practice. The development of the questions enabled the interviewer and the participants to move from one question to the next in a more organic way to ensure interview fluidity and to provide more effective opportunities for disclosure and expression of opinions.

Some interviews were audio-recorded while others were written answers based on participating educators' availability to meet in person. The interview answers, both audio and written, were securely stored on a password protected hard-drive.

3.5 Ethical Considerations

This study featured a combination of online student questionnaires and teacher, instructor and academic staff structured audio and written interviews. The validity is a judgement based on various types of evidence (Paul C. Price, 2019) and in this study was done through students' written submission of their open-ended questionnaire responses and through the process of soliciting participant consensus with regard to emerging data. The reliability is the consistency across items (Paul C. Price, 2019) which in this study are reflected by students' responses throughout the study with relation to the program's focus on skills development.

Since working with students, throughout the entire study, every possible effort was made to ensure complete privacy policy compliance as well as data gathered, captured and recorded ethically aligned with direction and sensitivity to the data protection and privacy protocols of the District School Board of Niagara. The participants' confidentiality was maintained at all times, with student data collection maintaining anonymity and all hard copies were secured in physical locks and electronic data were secured on a password protected hard drive.

Limitations to this study include the focus of this study on the specific demographic of the school, as non-characteristic to the rest of the schools in the region due to the focus on first generation post-secondary students. The scope of this paper was limited by timing, location, eligibility criteria and availability of participants. Also, there was no conflict of interest since I was not involved either directly or indirectly in the program developed and implementation. The Entrepreneurial Thinking program is an academic year-long program starting in September and ending in June. Therefore, a full study of the program will require an extended period of time running into a secondary academic year.

4 FINDINGS

This chapter provides a complete outline of the findings of the study during the first half of the pilot year of the program.

To better understand the experience of students and teachers in the conception and execution of this program, qualitative research methodologies were implemented. Two student questionnaires were conducted alongside five qualitative interviews with the two participating instructors and three advisors to the program. This chapter starts with the description of the Entrepreneurial Thinking program and how the program was created and organized, followed by teachers' perspective and students' perspective on the program.

The following section outlines the program based on student questionnaires and observations, teachers' interviews and literature review in connection to development of employable skills.

Participating students and teachers were observed throughout the program. The observation took place during weekly classroom meetings, off classroom interactions and event participations as part of their academic experience.

The study focusses on how entrepreneurial education supports the enhancement of employable skills such as critical thinking, problem solving and creativity skills as identified by the World Economic Forum (Forum, 2018) as the top desired skills that employers will find most valuable by 2020.

The Entrepreneurial Thinking program was designed to allow students experience with entrepreneurship concepts through a variety of activities and collaborative opportunities while practicing their oral communication skills, critical thinking, writing, media literacy, speaking and listening. Through its use of a flexible

problem finding and solving process, the program is designed to enhance student engagement while fostering STEM (Science, Technology, Engineering, and Math) skills.

The Entrepreneurial Thinking program's real-world learning process is modelled on design thinking methodologies in the workplace, where problem solving is collaborative, interdisciplinary, and continuous. A key benefit of the program is that students discover where their own strengths and interests are, and how to leverage these to advance real world learning projects in a peer-to-peer learning environment. The program is adaptable to the skills and comfort level of each participant and the highly flexible approach supports modular additions in response to specific teacher and student needs. Also, the core technologies are accessible to use to support student teams, as well as for ongoing collaboration between students and teachers.

The program was built using a problem finding and solving approach closely modeled on design thinking practice in the real-life entrepreneurial sector. The initiative empowers students to explore and validate the assumptions they have about the nature of the problem with continuous reference to local context, narrow down the scope of the problem to a level commensurate with their knowledge base and capacity, and develop and validate a prototype solution.

Students' Perspective

This section describes the students experience while participating in this program and how this opportunity helped them develop new skills, knowledge and the opportunity to learn from the class collaboration and opinions of their colleagues.

The program was introduced to the entire community of one local school, which enrolls 210 grades 9 to 12 secondary students. One student mentioned that "the opportunity to participate in a class with his friends, who usually don't share the same

academic interests” sounded interesting enough for him to try. Also, curiosity and trying something new, such as attending a class with various grade level students was the reason few other students shared.

One of the senior students mentioned that “to work on my business idea, to connect with community experts and to learn about business development stages” were the main reasons of joining the Entrepreneurial Thinking program.

By participating in this program, students viewed that they benefited on multiple levels. They gain improved communications skills, learning at each stage of a problem-solving process how to communicate their ideas and share information gained through research and validation with teachers and peers. Students learn what their own strengths are and how they can apply these strengths to make their team stronger.

One group of students working on an app prototype commented that: “we never had to adjust a project so many times to get to a solution we all were happy with”. The students felt that the experience prepared them to be successful in any work environment that requires critical and creative problem-solving skills.

Unlike other programs, the Entrepreneurial Thinking program was designed to connect classroom learning with real world experience, and since one of the instructors was a non-academic leader, it facilitated the connection at a deeper level.

The non-academic member of the team, whose background and experience in community relations, and media outreach complimented the team perfectly. With a focus on playing an active mentoring role within the program, the vision of developing and implementing an entrepreneurial based program for high school students was an obvious match. Her observation on the program’s benefit of real-world collaboration was:

“Collaborating with a real world, community-based media company to work on creating a movie, definitely helped students improve communication skills, critical thinking, team work and collaboration skills. From the very first phase of the program it was really evident how students have improved on those skills.”

Findings from student interviews suggest that community engagement was a vital part of the learning process. Integrating with the community members and engaging them in contributing to and participating in the program is an integral part of the program. For those focusing on the problem-solving aspect of their projects, to find the best solutions, students must first understand and validate the problem. To deeply understand the problem, they must reach out to the impacted community members. The instructors played a dynamic role in helping students engage with local experts in supporting student projects. The community engagement offered an authentic way for students to share the current state of their projects and experts to provide mentorship or information that enhanced real world learning.

One of the participating students mentioned:

“This program and getting real world experience from ihub & BioLinc helped me develop a ton of transferable entrepreneurial skills like problem solving, communication, critical thinking, time-management & leadership. Being entrepreneurial is a life skill & important in all fields.” –
Grade 12 student

The unique ecosystem in place to support real world learning means that the collaboration process occurs on multiple levels and accesses a wide range of community supports and infrastructure needed for success.

Highlighting the cross-curricular aspect of the program, a group of students enrolled in the program “to benefit of its tools and resources such as community connections to help with a school project and also to improve on communication skills”.

In terms of skills development, students shared their interest in the program as a platform to improve on their employable skills with 59% mentioning the importance of developing employable skills; problem solving (30% identifying this skill as important), critical thinking (29% identifying this skill as important) and creativity (18% identifying this skill as important) being the next mentioned skills in terms of importance in developing a successful professional career. One student mentioned: “They [these skills] allow people to expand their thinking and be able to solve new things that they wouldn’t be able to solve before.”

Other skills identified by the students as playing an important role in the employability factor were: commitment, optimism, respect, initiative, hard work, teamwork, perseverance, leadership, consistency, confidence.

Some of the students highlighted the importance of critical thinking, problem solving and creativity as career propulsion tools, where others pointed to the importance of participating in extracurricular activities and seeking mentorship opportunities. Working on challenging projects, focusing on problem solving and critical thinking were all mentioned by multiple students, as they expressed their opinion on how to develop employable skills.

Through its flexible approach of problem finding and solving process, the program was designed to enhance student engagement while fostering STEM (Science, Technology, Engineering, Arts and Math) skills. Students are so much more engaged when they make personal connections to curriculum. One of the instructors noted that “students are here every time. No one is skipping out.”

The program environment led to intense engagement and collaboration among students. Students were encouraged to explore issues of interest to them, empowering and leading them to insight and innovative thinking and problem-solving approaches by fostering and disseminating identified challenges and creative solutions.

As one of the program teachers mentioned, the learning process is invaluable helping students to develop their ideas and messages and teaches them how to share and tell their story through personal connections. The program provided multiple ways for students to share their ideas with one another and with the teacher and the community through the use of technology such as digital videos, graphic design software, ideation maps, mind mapping apps, and other contemporary communication platforms. In this way, students gained insights into effective communication and persuasive writing at each stage of the process, so that when – during the final stage of their project – they are invited to pitch their ideas to their peers, teachers and community mentors, they are already confident in their public speaking skills and know how to present their story effectively using a variety of media.

By creating an environment in which all students' voices and contributions are valued, the learning process helped students gain self-understanding in respect of the contribution they were able to bring to the team, which helped students attach learning to topics of their own interest. Throughout the program students learn how to manage their effort and resources, and better interact with peers. The entire process sparks imagination and boosts their self-esteem.

Teachers' Perspective

The program allowed teachers to experience the vulnerability of the learning within a collaborative environment. In the same time the nature of the program allowed

teachers to step back and create space for their students to lead and bring forward ideas and perspectives.

One educator interviewed during this research said she have seen many 'quick fixes', often involving technology, but that there is a lack of comprehensive solutions that recognize the realities of limited preparation time and the need for multiple supports to shift the culture of learning.

The Entrepreneurial Thinking Program was developed and implemented by a team of academic and non-academic professionals, as a pilot opportunity for high school students. Each team member played a distinct role in the program development and implementation. The collaboration between the two instructors, each one representing a strong connection between the school board and educational technology incubator demonstrated a boost in the school board's capacity to support authentic real-world learning experiences for students, with special emphasis on STEM education.

The participating teacher commented that "the hands-on use of tools offered a better learning model. The use of technology was transparent and facilitated connection of learners to real world problems as well as supporting a collaborative, inclusive learning and problem-solving process".

Throughout the program, the teachers emphasized on the problem definition supporting students in the process of learning how the development of the question itself is the key to the quality of learning outcomes.

One of the mentors mentioned:

"The Entrepreneurial Thinking program promotes student engagement. The process of identifying a problem and finding solutions enables

students to take ownership of their own work and stand out in a healthy competitive approach.” – Business Analyst

Another mentor highlighted that “the entrepreneurial thinking program engages students in ways that are very different from their typical classroom work and they are much more excited, dedicated and focused on the task”.

As a key characteristic of the program in the development of employable skills, one of the program’s influencers commented:

“In addition to developing their oral speaking and writing skills having to communicate their solution to the real world to non-students really highlights the skilled communication that students develop as part of this program. Skilled communication is very different from just communicating in the classroom talking to other students and talking to their teachers. With skilled communication they are focused on preparing their ideas and communicating with an external audience and authentic real-world audiences - these are key skills for future success.”

– Associate Professor

One of the instructors also noted “a huge progressive curve particularly around communication, specifically because being a student directed program, they need to take initiative to communicate in order for them to push their idea forward in order for them to benefit in the program.”

Similarly, the other instructor noticed:

“The first improvement noticed is communication skills... very obvious when students get the opportunity to meet with mentors, community members, university professors. Being able to present their idea in a small group and then extrapolate that from the group of students they

are working with and within their comfort zone and being able to go out and meet with industry professionals and being very comfortable with that.”

Also, the same instructor mentioned:

“In terms of problem solving and critical thinking, students were tasked since the beginning of the semester (program) to identify what is their need they are meeting, what are they trying to accomplish and being able to examine that critically and figure out what needs to be done and how to develop a plan to meet what they need to accomplish”.

Reinforcing everyone’s insights, while speaking with program mentors and community representatives, the importance of critical thinking, problem solving, and creativity skills development was clearly identified in unanimity.

“Entrepreneurial thinking gives students a very pragmatic approach to problem-solving and teaching them how to become problem solvers as well as helping them to identify real problems in their community. This is a skill that will be of benefit to them in school and further in their future being able to identify the underlying issues to a problem and to solve that problem is an essential skill”. – Associate Professor

One of the program mentors also mentioned:

“I think an entrepreneurial thinking skill is a super skill that helps students not just think outside the box but also question why there is a box in the first place. An Entrepreneurial Thinking program that encourages students to work in group provides students an opportunity to look at a problem through multiple lenses and communicate their findings with

their peers in an effective way that help generate new ideas.” – Business Analyst

The program enhances the ecosystem by providing a flexible learning design that draws together teachers, students, partners and community members, technology experts and entrepreneurs into a process where the use of tools and resources is optimized for effective and efficient use. This are characteristics highlighted by one of the instructors as the importance of the program’s fluidity to allow “students to change their ideas as their interest change”.

The lead instructor and program creator discusses the importance of a program such as the Entrepreneurial Thinking program in the post-secondary environment as a venue to help students identify their passion moving forward in their professional careers:

“The Entrepreneurial Thinking program is needed as students need the opportunity to explore their own passion and things that are important to them...it allows students to focus on those interests and look at how those interests can evolve into something that could become a career option, could become an entrepreneurial venture and they don’t have the opportunity to do that within the curriculum.”

Evident from the very beginning of the program, the student engagement level proved to remain at a high level throughout the program, clearly reflected within the class attendance.

As one of the teachers explained:

“Within this program, students are always showing up, they stay late, they want to come in, and they come in ahead of time. You don’t see people skipping out. They are always in full groups, in full conversations,

and always working even when they seem they are not being serious – they are just having fun while doing it, which is very important from the student engagement piece, when other similar programs don't have the same reception. This speaks a lot to the nature of the program and how it empowers them.”

The student attendance averaged 95% throughout the year (Appendix D), in comparison to similar programs where the student attendance average was between 58% and 90% suggests that it is “fully student powered and fully student driven” an aspect of the program as described by one of the program teachers, “is really important because it allows students to be self-directed with their learning and really explore the entrepreneurial development cycle organically and allows them in real life explore what innovation looks like”, ultimately allowing students to focus on their own passion and interest.

Throughout the program, students gained hands-on experience with an iterative design thinking process that is modelled on the one used in many workplace settings today. The program offers a viable solution to the integration of student experiential learning in technology and entrepreneurship, a solution that takes into account the limited time and resources teachers have available to support experiential projects. The program also addresses a core challenge faced by existing entrepreneurship offerings in schools, which typically involve assigning students an arbitrary business idea such while offered only to business stream students.

As mentioned by the lead instructor:

“The Entrepreneurial Thinking program allows students who are not business focused to have entrepreneurial based opportunities and allows students to have an entrepreneurial mindset developed outside

of the course, offering the opportunity to develop a variety of different ideas.”

As innovation being the focus of the program, students use technology comprehensively in doing research, and interact with community members as part of the validation process, using social media campaigns, apps, and digital media resources.

The same instructor also highlighted the importance of mentorship opportunities and community connections:

“The opportunity for students to connect with mentors through the innovation hub is invaluable for them. The experiential learning piece is really important for students, and in the actual classroom often time they don’t have this opportunity, to connect with outside people in their area of interest.”

Through a project-based learning approach while working on their own ideas, students experience entrepreneurship concepts through a variety of activities and collaborative opportunities. Based on weekly observations, since the beginning of the school year (September 2018), the level of student engagement has been clearly noted – students tend to spend more time collaborating and developing their ideas; they have been more active during class time, asking questions or seeking solutions to their own ideas or challenges.

The overall classroom atmosphere has been transformed to a positive vibe and energy, with open discussions and sharing ideas in a more engaging approach such as storytelling, critical thinking, problem solving.

One of the instructors described “doing a lot of ice breakers, getting to know each other, getting into that creative zone and separating what is

entrepreneurship from business, and then starting to dive in ... a more student friendly approach which really enhances student engagement as well.”

The program capitalizes on the range of benefits through the local school board and its partnerships and connections to local higher education institutions, including developing a formal mentorship model involving co-op placements, and pairing current and past executives with youth and innovators.

As the instructors pointed out:

“More diverse students can participate in the program since it is not targeted towards business students only and is more focused on their own passion and innovation.”

Throughout the program, students gain greater ownership and responsibility of their learning as they apply knowledge to make a contribution to improving their learning experience. They also demonstrate greater engagement and motivation to learn, being inspired by their passion and by the dynamics of the peer-to-peer learning.

5 DISCUSSION

This section provides a discussion based on the planning and implementation of the program for the first time in a high school environment at the Niagara Board.

The Entrepreneurial Thinking program offered teachers and students a shared collaborative space. The learning process involved multiple STEM (Science, Technology, Engineering and Math) curriculum connections, such as problem solving, communication, technology, research, and ICE (Innovation, Creativity and Entrepreneurship) skills and is fundamentally cross-curricular in nature. The entire experience connected teachers and their students with community and industry mentors, further enriching perspectives and building a unique community engaged in entrepreneurial-based STEM learning.

The flexible and open-minded approach offered opportunities to integrate new concepts/models of teaching and learning into the learning environment. From STEM and project based learning to personalized and student-centered learning approach, the program's level of inclusivity and adaptability to students' needs is remarkable. Students, who often have a hard time expressing their ideas, or working collaboratively with their peers, now find a way to share and learn from one another as one of the students noted:

“The best part about the program was working together... [] and sharing ideas and knowing each other's experiences”.

While participating in the Entrepreneurial Thinking program, the majority of the students stated that they gained hands on experience with an iterative design thinking process that is modelled on the one used in many workplaces today. During the first semester of the program, the students were supported by mentors as they developed

an innovative concept for solving a problem, or pursuing a personal interest idea, such as learning how to develop an app, create a video, or develop a music platform, helping them to see the connection between the ideas and the required learning outcomes. The connection and collaboration between students and community mentors was carefully created based on students' interest or ideas and challenges they decided to tackle. Often following a previous collaboration with the school board, mentors from the community were fully dedicated to work, mentor and inspire the students as they navigate through the program.

5.1 Comparison to the Ministry Survey

The following discussion is a comparison of the identified effects of the program by participating students and teachers and the findings presented in the "Tell Them From Me" Survey which is a tool administered by the Ministry of Education across the country to provide school leaders with insight into students engagement, wellbeing and effective teaching practices at their school, from students' perspective (Evaluation). The "Tell Them From Me" Survey is a useful resource as a country-wide indicator of student engagement and wellness in supporting student success. The survey offers a source of information with over 50,000 students participating since 2005.

The Entrepreneurial Thinking program offers opportunities for teachers to explore new technologies that enhance the problem finding and solving process, such as ideation and mind mapping apps. Teachers connect on a deeper level with their students, while introducing these tools directly to their classroom to enhance learning across the curriculum, boosting student engagement and peer to peer learning and supporting inquiry-based projects.

During the course of several months in-class direct observations were made of participating students and interviews were conducted with the program teachers as well as with participating mentors that led to enabling a snapshot of the impact of the Entrepreneurial Thinking program on high school students.

5.2 Entrepreneurial Thinking program improves student engagement.

With a focus on student engagement and overall student motivation and participation in the program, it has been observed that although this being the first time when a program of this kind has been offered within the school board, the enrolment level surpassed the expectations of a new program with 21 high school students enrolled in the program. Most students expressed their interest in the program due to its focus on topics of individual interest, flexibility and team-work approach to learning. Based on these characteristics it has been observed that the Entrepreneurial Thinking program helped students identify their strengths and how they prefer to learn, providing access to various tools and resources while helping them to remain engaged during the class and also continuing their learning outside the classroom as well.

The findings based on the weekly course attendance reflect a major gap between student motivation and interest in the Entrepreneurial Thinking program, the nation score presented in the “Tell Them From Me” survey in terms of students’ level of interest and motivation, identified by the outcome and question:

“Students who are interested and motivated: Students are interested and motivated in their learning.” – Nation total 25%

“Students that are regularly truant: Students skip classes or miss days at school without a reason or arrive late for school or classes.” – Nation total 38% (Mombourquette, 2013)

In comparison, the Entrepreneurial Thinking program's attendance throughout the observation time frame was 95%.

Through a series of interviews conducted throughout the program, it was evident for all mentors and program instructors that the engagement level during the time the program was running was clearly higher than similar programs. For example, the level of attendance registered by the control group has been noted at an average of 74% rate throughout the same period of time when the Entrepreneurial Thinking program was running. One of the instructors noting that "I rarely see all or most students attend every single class", while the other instructor mentioned "Within this program, students are always showing up, they stay late, they want to come in, and they come in ahead of time."

Students' interaction and motivation to work with one another during this program was clearly presented in some of the students' comments about one the reasons for joining the Entrepreneurial Thinking program which offers them the opportunity to work and collaborate with their friends, some of them being of different age or attending different classes throughout the day. As one of the participating students mentioned "the best part about the program was working together...[] and sharing ideas and knowing each other's experiences". While another student noted that the program helps them "develop teamwork and social skills and help problem solve".

Therefore, the relevance and authenticity of the learning environment is crucial in students' success in relation to engagement, motivation, confidence, self-esteem and development of employable skills. This aligns well with the literature-based findings about the learning environment playing a key element in the learning dynamics as presented in the National Research Council (NRC) report from 2005. In their report on student engagement, Appleton, Christenson and Furlong (2008) argue

that “engagement is the primary theoretical model for understanding dropouts and is necessary to promote school completion” (p.372). With students’ engagement presenting a real problem across Canada, the Canadian Education Association (CEA) presents that only 70% of the students being socially engaged, while the Entrepreneurial Thinking program is already recording very positive outcomes in terms of engagement and motivation among the students.

One student mentioned “I like this program because it allows me to spend more time with my friend who is in a different grade than I and we can never take classes together.” The process of collaboration offered students the opportunity to solve challenges together, enhancing their ability to successfully interact in group work and expand their ability to establish new relationships, to negotiate divergent points of view, and allow everyone a voice. A different student expressed her desire about the program as it opens up “the possibility to be creative and work on a project of my own interest. I always wanted to have my own business and this program gives me the chance to try and see if I’m good at it.”

One mentor also noticed that “students are taking ownership of their work, they feel empowered for be an active player in their education. They are more goals oriented inside and outside the classroom.”

Measuring student engagement has been always challenging, however based on students and instructors’ feedback, the classroom dynamics include positive energy, collaboration and meaningful learning experiences.

Entrepreneurial Thinking program fosters employable skills

The majority of the students answered positively to the question related to employable skills development during their participation within the Entrepreneurial Thinking program. Thirty% of the participating students identified problem solving as

one of the skills the program helps them grow and 29% of the same group of students indicated that critical thinking is also one of the important skills they have the opportunity to improve. Aside from these, creativity and decision making were the next skills identified by the students to develop while participating in the Entrepreneurial Thinking program and as important for their future careers.

In the same time, a similar outcome has been reported by all mentors and instructors participating in the program who acknowledged critical thinking, problem solving, and creativity as the main skills students have the opportunity to develop during their enrolment in the Entrepreneurial Thinking program. This indicates that the development of employable skills as key component of the program is evident to everyone participating in the program – students, teachers and mentors.

One mentor mentioned “This Entrepreneurial Thinking program definitely allows students to improve their problem-solving skills, critical thinking and communication skills. They improve their communication skills through the entire term while communicating with the facilitators, fellow participants and industry experts they meet along the way.”

Another mentor also noted while referring to the development of problem-solving skills as “being able to identify the underlying issues to a problem to solve that problem is an essential skill”. A similar finding was presented in the National Education Association report in terms of the including critical thinking, creativity, collaboration and communication as key components of the 21st century practice (Association, 2010)

The Conference Board of Canada has also identified innovation, creativity and problem solving skills as employable skills and recognized the importance of “assisting students in developing the knowledge and skills that will lead to become personally

successful, economically productive, and actively engaged citizens” (Service, 2016, p. 11). Both students and teachers also noted an increased confidence level among students while participating in the program. The educators have noticed that the students are more likely to participate in the class activities and collaborate with each other. Also, students seem more confident to “connect with mentors” and collaborate outside the classroom, as noted by one of the educators.

Most students, as observed and indicated in the survey and interview find Entrepreneurial Thinking program engaging and a great experience for improving their confidence through the development of employable skills. These findings clearly surpass the outcome score presented in the “Tell Them From Me” Survey with regard to skill challenge and confidence level across the nation.

“Skill challenge: Students feel challenged in their language arts, math, and science classes and feel confident of their skills in these subjects.” - Nation total 47% (Mombourquette, 2013)

At the same time, technology also played an important role in student success, since the Entrepreneurial Thinking program offers a variety of technological tools to help students express their learning. Students’ learning became more immersive and interactive throughout the program with unlimited access to information and a range of technology such as: 3D printers, VR/AR devices, drawing pads, professional photo and video cameras, AV system, and more. Sharing the location of the program between an EdTech incubator and a school computer lab, students’ access to technology was unobstructed. The technical and non-technical support offered by the program’s instructors gave students the additional tools to help them engage in their own learning.

This aligns well with the finding presented in the Project Tomorrow (2010) report which states that using technology in the classroom helps with students' motivation to learn as well as the development of employable skills. Also, the learning experience becomes more meaningful for the students.

Another important characteristic of the program identified by the most students and also unanimously by the instructors is the authenticity of learning experienced by the students. Students get to "explore the entrepreneurial development cycle organically and allows them in real life explore what innovation looks like" shares one of the instructors. This characteristic of the program enhances the ability of the students to become creative, innovative, knowledgeable and skilled learners, able to tackle the challenges that will arise in the 21st century.

Many students found the program as the right opportunity to connect with community mentors, meet professionals and work on ideas and projects they are passionate about but they don't have the access to the tools to help them push it forward. In contrast, the "Tell Them From Me" survey finds students perception in terms of the relevance of learning fairly low across the nation.

"Relevance: Students find classroom instruction relevant to their everyday live (score rated out of 10)". – Nation total 5.6 (Mombourquette, 2013)

Here, an important role is also played by the instructor as a main facilitator of integration of collaboration, creativity, critical thinking and communication as key components of the 21st century teaching and learning (Association, 2010). This points to a positive collaboration and communication through integration of technology, a strategy and practice that should now be integrated in any school environment.

5.3 Conclusion

By cultivating entrepreneurial mindsets in schools, students are gaining a better understanding of their own learning, connecting learning with real life experiences through experiential learning opportunities. Working with mentors and community organizations and having the opportunity to work on projects of their own interest helps students develop their imagination, innovation and empathy, creating an environment where every student learns in the manner they are most ready to be successful.

Not only for the classroom teachers, but the Entrepreneurial Thinking program can leverage the skills and expertise of instructional coaches and education assistants to support system-wide implementation by creating the conditions for teachers and coaches to share innovative teaching practices since its design adds a powerful interdisciplinary tool kit through its accessibility and adaptability.

By prioritizing the development of partnerships inside the school or across the school board, educators can address the significant challenge of cross-curricular and integrated instructional design resources, adding value to the internal innovation and knowledge dissemination networks and resources, such as instructional coaches.

The engagement of community experts and university graduates as well as graduating students to mentor students participating in the program, builds on the experiential learning value of the program, increasing students' engagement in the learning process. The teachers participating in the program recognize the value of engaging community expertise to support real world learning projects for the students. The Entrepreneurial Thinking program supports teachers in finding and engaging relevant experts that students can use to drive deeper understanding of real world learning. In this rapidly changing world, students need to be critical thinkers and find

innovative solutions to the world's problems by developing essential employable skills such as problem solving, communication and creativity. More than half of students participating in the program highlighted the importance of the Entrepreneurial Thinking program in the development of employable skills.

Through a problem finding and solving framework the program provides students with more choice in their learning which is key to enhancing their knowledge, while in the meantime allowing teachers to bring elements of STEM learning into their classroom as a vital key to nurture critical thinking, problem solving and creativity.

Based on the findings, it is suggested that the Entrepreneurial Thinking program is empowering to students because they are able to choose and define the scope of their innovation project and can see the tangible link between STEM learning and the success of their project. This approach helps students prepare and gain employable skills such as creativity, problem solving and critical thinking, skills that many employers are looking for. Having students experience real life opportunities while working on projects of personal interest, connecting and collaborating with community and industry mentors as part of the course requirements brings an important factor of authenticity and level of confidence within the learning environment.

Focusing on entrepreneurship, the program engages students' passion for topics they are passionate about and draws out a much deeper level of student engagement compared to other programs or initiatives.

Giving students the flexibility and the opportunity to work on something of their own interest increases student engagement and improves learning outcomes. Also, by shifting the focus from a teacher-centered teaching and learning method to a student-centered approach, students are in charge of their own learning, creating meaningful experiences and connections.

Working in teams or just simply observing others approaches to problem solving, the program opens students' mind and gets them to a place where they probably would not have had the resources to get to on their own. By the end of the program, students are expected to build a notable skill set which many employers are currently looking for. After all, getting students ready to embrace their future professional career and be successful is one of the main goals of this program.

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6 APPENDIX

6.1 Appendix A

Students Questionnaire

According to the World Economic Forum (WEF) the top 3 skills that will be most desired by employers by 2020 are:

- Complex problem-solving
- Critical thinking
- Creativity

1. Why do you think these skills are important?
2. How do you think you can develop these skills?
3. What other skills do you think employers are/will be looking for?

6.2 Appendix B

Mentors Interview Guidelines:

Introduction: Thank you for agreeing to participate in this study. Over the next 15 minutes I will ask you a series of questions about the Entrepreneurial Thinking program implementation and development, as well as suggestions and recommendations.

The following questions guided the mentors' interviews:

1. Why do you think an Entrepreneurial Thinking program is needed?
2. Is there anything else out there similar? Why this one?
3. Would you agree that participating in an Entrepreneurial Thinking program will help students improve their problem solving, critical thinking and communication skills?
4. Would you agree that this kind of program enhances student engagement?
5. What would you focus more on? Which part/aspect of the program would be more important?
6. What is your advice on how to attract more students to participate in a program like this next year?
7. What is your advice on how to get more teachers interested in bringing this program into their schools?

6.3 Appendix C

Instructors Interview Guidelines

Introduction: Thank you for agreeing to participate in this study. Over the next 15 minutes I will ask you a series of questions about the Entrepreneurial Thinking Program implementation and development, as well as suggestions and recommendations.

The following questions guided the instructors' interviews:

1. Why do you think this program is needed?
2. Is there anything else out there similar? Why this one?
3. Would you agree that completing the Entrepreneurial Thinking program will help students improve their problem solving, critical thinking and communication skills?
4. Would you agree that this program enhances student engagement? Explain why?
5. What would you change to make it better? Which part/aspect needs most improvement?
6. What is your advice on how to attract more students next year?
7. What is your advice on how to get more teachers interested in bringing this program into their schools?

6.4 Appendix D

Table 6: Entrepreneurial Thinking Program attendance

Date	Percentage of students attending the class
October 1, 2018	92%
October 8, 2018	Holiday
October 22, 2018	100%
October 29, 2018	92%
November 5, 2018	100%
November 12, 2018	Break
November 19, 2018	92%
November 26, 2018	92%
December 3, 2018	100%
December 10, 2018	92%
December 17, 2017	92%
January 7, 2019	92%
January 14, 2019	100%
January 21, 2019	Exams
January 28, 2019	Exams
February 4, 2019	Break
February 11, 2019	92%
February 18, 2019	Holiday
February 25, 2019	Show Day

March 4, 2019	92%
March 11, 2019	Break
March 18, 2019	100%
March 25, 2018	92%
April 1, 2019	92%
April 8, 2019	100%
April 15, 2019	92%
April 22, 2019	Holiday
April 29, 2019	100%
May 6, 2019	92%
May 13, 2019	92%
May 20, 2019	Holiday
May 27, 2019	92%
June 3, 2019	100%
Program average	95%

6.5 Appendix E

The level of engagement throughout the program has been observed based on the following indicators:

Table 7: Way engagement was observed

Engagement category	Engagement indicator
Behavioral	Class attendance
	Assignment completed
	Attention
	Effort
	Off-task behaviours
	On-task behaviour
	Participation
	Task Engagement
	Time collaborating with the group
	Cognitive
Challenge	
Critical engagement	
Elaboration	
Explanation	
Focus	
Improved understanding	
Interpretation	

Emotional

Problem-solving behaviour

Psychological investment in learning

Reflection

Self-regulated interest

Anxiety

Boredom

Collaborative social interaction

Enjoyment

Enthusiasm

Excitement

Interest

Passion

Sense of class community

Student-student interaction
