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Ryerson University Zone Learning: A Pilot Evaluation of 21st Century Skills

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INCUBATE INNOVATE NETWORK OF CANADA



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Executive Summary

Ryerson University's Zone Learning ecosystem is a network of incubators, workshops, and pioneering programs supporting new ventures that aim to launch to the public. The participating teams are made up of current university students, recent alumni, and members of the wider community. They stand to benefit from the resources and programming of the university, which can help them to achieve economic and social impact.

The teams are engaged in transformative experiential learning, with potential for the growth of not only their ventures but also their future roles as founders, employees, volunteers, or change-makers. Central to maximizing this growth is ensuring that Zone activities are supporting the development of in-demand skills.

This report details a small-scale pilot study exploring an evaluation framework to measure the skills developed in the Zone network, determine which 21st century skills are being developed in the Zone network, and indicate areas for future study.

Based on a review of literature, the following in-demand 21st century skills were assessed in this report:

- Critical thinking/problem solving
- Creativity
- Communication
- Collaboration
- Curiosity/metacognition
- Initiative
- Persistence/grit
- Adaptability
- Leadership
- Social and cultural awareness
- Ethics and personal integrity
- Risk assessment

Using the developed assessment framework, Zone participant data indicated the highest levels (maximum score 4) of skill attainment for the following skills:

- Creativity (M= 3.49)
- Curiosity and metacognition (M= 3.44)
- Communication (M= 3.41)
- Persistence/grit (M= 3.38)
- Social and cultural awareness (M= 3.36)
- Adaptability (M= 3.35)

Executive Summary

Leveraging focus group and interview data, all of the Zones agreed on the following list of skills attained through Zone activities:

- Critical thinking/problem solving
- Communication
- Collaboration
- Adaptability
- Leadership
- Social and cultural awareness

Based on the results of this study, the proposed framework for evaluating 21st century skills shows the ability to characterize skills developed in both the Zone Learning network and more generally through incubator-based experiential learning opportunities. These results also suggest the Zone Learning model seems to be an innovative and fundamental form of experiential learning to acquire 21st century skills. Finally, increasing the ability to discuss, measure, and assess these skills should be at the core of the experiential learning mission.





Background: 21st Century Skills

Change in the Labour Market

The World Economic Forum describes the accelerating changes in technology, demographics, shifting business models, and the very nature of work as the Fourth Industrial Revolution (World Economic Forum, 2017) and credits this movement with deeply altering the skills needed for participation in the modern labour market. Compared to traditional economic models, there is a rising need for non-routine and often abstract cognitive/analytical skills and non-routine interpersonal skills, such as problem solving, creativity, and collaboration (Autor & Price, 2013).

Canadian Government Skilled Workforce Agenda

In 2016, the Ontario government developed a panel called the Highly Skilled Workforce Expert Panel. Based on a review, the panel developed strategies and recommendations for the Ontario government to help current and future employees and the workforce better adapt to a new technology-driven knowledge economy. A major goal of the report was a call for both employers and educational partners to work together more effectively to help youth prepare for and integrate into the modern workforce. The panel discussed the clear need to better equip youth with the skills necessary for the jobs of today and tomorrow. The panel put forward 28 recommendations that fell under six main themes. The panel identified the need for the Ontario government to commit to strengthening and expanding experiential learning for post-secondary students. The panel recommended that every post-secondary student have at least one experiential learning opportunity to better tailor their training to impart 21st century skills. Opportunities for such skill building can be made available to young professionals through apprenticeships, internships, and work experience, as well as to all employees through workshops, training sessions, and e-courses.

21st Century Economic Skills

The term “21st Century Economic Skills” is defined as “a series of higher-order skills, abilities, and learning dispositions that have been identified as being required for success in 21st century society and workplaces” (Dede, 2009*; Premier’s Highly Skilled Workforce Expert Panel, 2016). The Assessment and Teaching of 21st Century Skills (ATC21S), as cited in Suto (2013), describes a process that moves from skills associated with cognitive/internal attributes to external/action-oriented attributes. The ATC21S states that there are four categories of learning:



Figure 1. Four Categories of Learning. Adapted from “21st century skills: Ancient, ubiquitous, enigmatic,” by I. Suto, 2013, *Research Matters: A Cambridge Assessment Publication*, 15, pp. 2–8.

1. Ways of thinking: Skills that enhance and/or challenge thinking processes (e.g., creativity, innovation, critical thinking, problem solving, decision making, learning to learn).

2. Ways of working: Skills can contribute to more efficient and effective ways to achieve productivity and to reach goals (e.g., communication, collaboration/teamwork).

3. Tools for working: Tools to aid learning and Information and Communication Technology (ICT) literacy (e.g., research on sources, evidence, biases, etc.).

4. Skills for living in the world: Skills that are relatable in a workplace setting and also in everyday life (e.g., citizenship – local or global, life and career, or personal and social responsibility, including cultural awareness and competency).

In addition to ATC21S, the Partnership for 21st Century Learning approaches these skills more as part of a larger categorization of broader skills, as detailed in the following.

Learning and Innovation Skills

- Think creatively, work creatively with others, and implement innovations.
- Exercise critical thinking, reason effectively, use systems thinking, make judgments and decisions, and solve problems.
- Communicate clearly, collaborate with others.

Information, Media and Technology Skills

- Information literacy: access, evaluate, use, and manage information.
- Media literacy: analyze media and create media products.
- ICT literacy: apply technology effectively.

* Dede 2009 did not use the term ‘Economic’ in its definition; it did, however, talk about 21st century skills.

Life and Career Skills

- Adapt to change, be flexible.
- Take initiative, manage goals and time effectively, work independently, be self-directed learners.
- Social and cross-cultural skills: interact efficiently with others, work efficiently in diverse teams.
- Productivity and accountability: manage projects, produce results.
- Guide and lead others, be responsible.

If the skills outlined by ATC21S can be quantified, this system could be used by employers and in university settings (Anderson and Krathwohl, 2001), as cited in Suto (2013), providing a basis for building transferable skills beyond what workers would need to only tailor themselves for a particular job.





Innovation Literacy at Ryerson University

In 2014, Ryerson University published *Our Time to Lead*, a five-year academic plan that set out the mission, goals, objectives, and strategies for Ryerson University (2014–2019). A major priority identified in this document was a commitment to fostering an innovation ecosystem. The academic plan developed a list of strategies to achieve this commitment. One strategy set out in the plan was to evolve and expand experiential learning opportunities for both undergraduate and graduate students. These experiential learning opportunities would allow students to better develop innovation literacy.

Innovation literacy is the response from academic institutions to the demand for 21st century skills. It is defined as the ability to think creatively, evaluate, and apply problem solving to diverse and intangible issues within industry and multidisciplinary contexts (Luke, 2009). It is believed that fostering innovation literacy among highly qualified and skilled graduates is a key differentiator of the Zone Learning advantage, particularly with regard to applied research conducted in close concert with industry and community needs.

The Ryerson University motto, *Mente et Artificio*, is a cross between mindful and skillful action, suggesting that diversity, entrepreneurship, and innovation should play an important role in its education system. Powered by experiential learning and the Zone Learning system, Ryerson tries to include innovation literacy at its core.

**Innovation literacy
is the response
from academic
institutions to the
demand for 21st
century skills.**

Ryerson Zone Learning System

There are 10 incubation Zones across Ryerson University that reflect diverse domains of knowledge and expertise: the Biomedical Zone, Clean Energy Zone, Design Fabrication Zone, DMZ, Fashion Zone, iBoost Zone, Legal Innovation Zone, Science Discovery Zone, Social Ventures Zone, and Transmedia Zone. These Zones provide physical space/infrastructure, mentorship, and community connections for teams developing independent ventures (businesses or social innovations). Zone Learning is available to all Ryerson students, recent alumni, and even external community members with no previous connection to the university. Admission is approved for a four-month term and repeatedly renewable, with entry criteria varying based on the particular Zone.

Some Zones support more advanced teams with a fleshed-out business plan, while others include early-stage ideation projects in the mix. Teams are interdisciplinary in nature and successfully raise hundreds of thousands of dollars in awards, grants, and investments each year. Note that the Office of Zone Learning sponsored this study of the nine Zones under its remit. The DMZ, Ryerson's leading accelerator, was outside the scope of these statistics and this study.

In any given four-month term, there are approximately 750 participants in these nine Zones (excluding the DMZ). Of these, approximately 40% are current students, 20% are recent alumni, and 40% had no previous connection to the university.

Zones

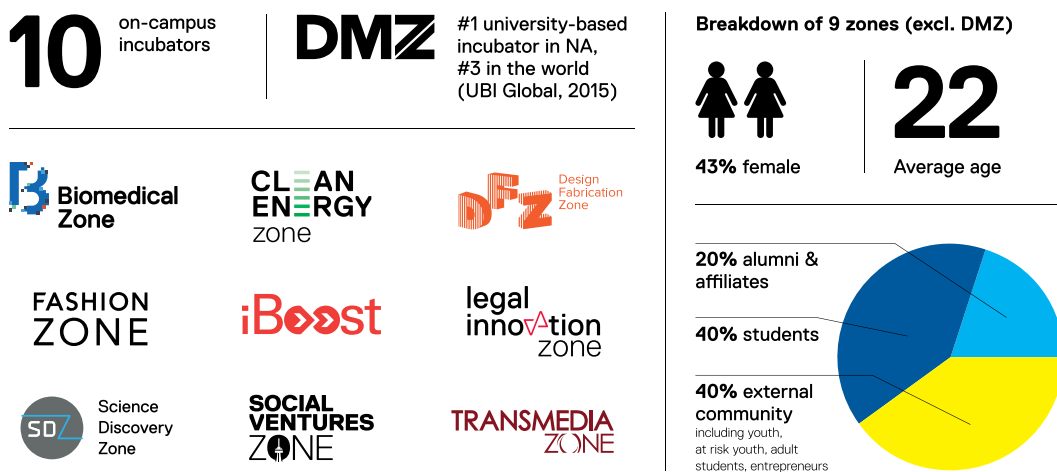


Figure 2. Summary of Ryerson University Incubator network. Source: Zone Learning

For the purpose of this pilot study, we sampled from four different Zones within the Ryerson ecosystem:

- 1. Design Fabrication Zone (DFZ):** incubating design and fabrication projects.
- 2. Fashion Zone (FZ):** supporting projects that develop new products, processes or services within the fashion industry.

3. Social Ventures Zone (SVZ): supporting projects that have a positive impact on local and global communities.

4. Transmedia Zone (TMZ): supporting projects of innovation and experimentation in media and storytelling.

Evaluation Methodology

Key Evaluation Question

Does the Zone Learning experience (innovation literacy) lead to the attainment of 21st Century Economic Skills? If yes, how? Which skills? If not, why?

This remains a pilot study. Investigating long-term outcome achievement through follow-ups with participants (and, importantly, a comparison group of non-participants) was beyond the scope of this initial process. The purpose of this pilot was to explore the evaluation framework and indicate areas for future study. To this end, instead of focusing on social valuation or experimental evaluation, a summative evaluation approach to focus on outcomes experienced by the target group was followed.

This approach allowed us to:

- Have the means to determine whether the program has reached its objective.
- Form the theoretical underpinning of the outcome and impact.
- Make results-based management decisions.
- Better understand the process of skills development and make improvements toward that objective.

Survey

We ran a survey with the four participating Zones. Note that some participants are members in more than one Zone ("co-Zoning"). There were 43 participants in this study, including 38 who actively answered most of the questions.

Focus Group and Interview

We also invited these four Zones to participate in a focus group for students, and we interviewed their directors. A total of three focus groups (DFZ, FZ, SVZ) and four interviews (all four participating zones) were conducted.

Attainment of 21st Century Skills

The Canadian Context

We undertook a literature review of 21st century skills that were identified by employers as in high demand (Ontario Public Service, 2016). We reviewed Canadian-specific literature and identified 15 studies that surveyed employers and human resource personnel, with questions including:

- What skills do you value most in applications?
- What skills do you see as most deficient in employees?
- What skills do recent graduates lack?
- Which skills and attributes matter most to your company?
- Which of these skills are required to succeed in the workplace?

Based on the results of these surveys, we compiled a list of 21st century skills identified in these papers and calculated the frequency with which a particular skill is mentioned across the studies. We chose the top 12 skills most frequently mentioned by employers and human resources personnel as being in highest demand. To ensure consistency with previous in-depth analysis of high impact 21st century skills, this list was compared to the 21st century skills as identified by the World Economic Forum (Figure 3). Only ethics/personal integrity and risk assessment did not appear on both lists.

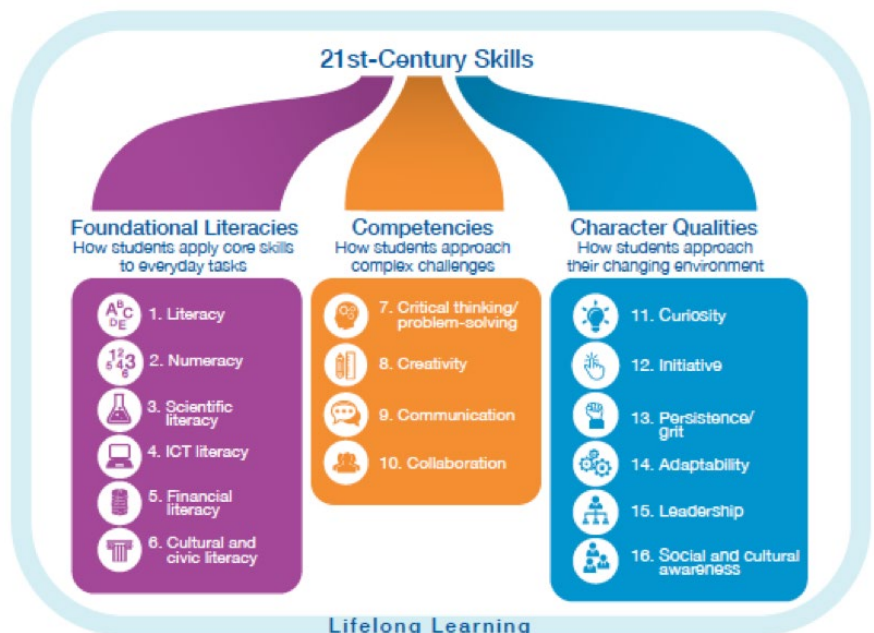


Figure 3. 21st Century Skills as defined by the World Economic Forum. Source: "New Vision for Education: Fostering Social and Emotional Learning through Technology [Scholarly project]," *World Economic Forum*, March 2016. Retrieved June 4, 2017 from <https://www.weforum.org/reports/new-vision-for-education-fostering-social-and-emotional-learning-through-technology>

The following 21st century skills were used to develop the evaluation framework:

- Critical thinking/problem solving
- Creativity
- Communication
- Collaboration
- Curiosity/metacognition
- Initiative
- Persistence/grit
- Adaptability
- Leadership
- Social and cultural awareness
- Ethics and personal integrity
- Risk assessment

Connecting Skills with Affirming Statements

Twenty-first century skills are well agreed-upon, and we found overlapping references from different sources. However, for a specific definition of all the skills, we followed *Partnership for 21st Century Learning* (2015). Although there are numerous dimensions to defining and measuring a skill, we highlighted only the key ones through affirming statements. These affirming statements allow

individuals to connect changes in their abilities to specific skills. Most of the affirming statements that highlight the key dimensions of each skill are validated by the Conference Board of Canada General Innovation Skills Aptitude Test (GISAT 2.0). Table 1 shows the connection between 21st century skills, the definition used, and statements that affirm the development of the associated skill.

Skill Attainment Framework		
Skill	Definition	Affirming Statement
Critical thinking/ problem solving	Ability to identify, analyze, and evaluate situations, ideas, and information to formulate responses and solutions.	<ul style="list-style-type: none"> • I am better at identifying problems and potential solutions, questioning assumptions, recognizing opportunities for change and improvement. • I am more adaptable and reasoned when challenging ideas, seeking solutions, and solving problems.
Creativity	Ability to imagine and devise new, innovative ways of addressing problems, answering questions, or expressing meaning through the application, synthesis or repurposing of knowledge.	<ul style="list-style-type: none"> • I more frequently rethink the way things are done and break the mould. • I look for newer ways to create value in products, processes, and services.

Skill Attainment Framework

Skill	Definition	Affirming Statement
Communication	Ability to listen to, understand, convey, and contextualize information through verbal, non-verbal, visual, and written means.	<ul style="list-style-type: none"> • I recognize that relationships are reciprocal, and I invest more in building and maintaining relationships. • I am more fluent, responsible, and comfortable at sharing information and expertise with appropriate audiences.
Collaboration	Ability to work on a team towards a common goal, including the ability to prevent and manage conflict.	<ul style="list-style-type: none"> • I am better at accepting and providing feedback and guidance in a constructive manner. • I am better at managing conflict for improving team outcomes.
Curiosity and metacognition	Ability and desire to ask questions and to demonstrate open-mindedness and inquisitiveness.	<ul style="list-style-type: none"> • I am seeking more diverse points of view – asking questions, exploring options, and soliciting feedback. • I am better at identifying what to learn.
Initiative	Ability and desire to proactively undertake a new task or goal.	<ul style="list-style-type: none"> • I am better at setting realistic goals and priorities and taking actions. • I am more inclined to see if a solution works and to act on opportunities for improvement.
Persistence/grit	Ability to sustain interest and effort and to persevere to accomplish a task or goal.	<ul style="list-style-type: none"> • I am more tenacious, showing commitment and persistence to get the job done.
Adaptability	Ability to change plans, methods, opinions or goals in light of new information.	<ul style="list-style-type: none"> • I am more frequent in questioning assumptions and recognizing opportunities for change.
Leadership	Ability to effectively direct, guide, and inspire others to accomplish a common goal.	<ul style="list-style-type: none"> • I encourage, mentor, and coach more to share ideas and speak freely, fostering an atmosphere of open-mindedness. • I involve more people by delegating responsibility and supporting their efforts.

Skill Attainment Framework

Skill	Definition	Affirming Statement
Social and cultural awareness	Ability to interact with other people in a socially, culturally, and ethically appropriate way.	<ul style="list-style-type: none"> • I am more willing to learn about other cultures and am open to intercultural dialogue. • I understand that people are a product of their culture, and I am more sensitive to different cultures.
Ethics and personal integrity	Ethics is an external system of rules and laws. Usually there are rewards when we follow the rules and punishments when we break them. Integrity is an internal system of principles which guides our behaviour. The rewards are intrinsic. Integrity is a choice rather than an obligation.	<ul style="list-style-type: none"> • I am better at letting professional ethics and my personal integrity guide my behaviour.
Risk assessment	The skills, attitudes, and behaviours needed to take calculated risks.	<ul style="list-style-type: none"> • I am better at assessing (identifying, quantifying, and prioritizing) risks. • I am better at taking appropriate risks and keeping goals in sight.

Table 1. Skill attainment framework – 21st century skills and associated affirming statements

Using a survey tool and a Likert scale (1-strongly disagree to 4-strongly agree), participants were asked to rank their level of agreement with each affirming statement. The weighted average of the affirming statements for each skill was used to calculate the attainment score outlined in Table 2.

21 st Century Economic Skills	Attainment Score in Zone Learning
Creativity	3.49
Curiosity and metacognition	3.44
Communication	3.41
Persistence/grit	3.38
Social and cultural awareness	3.36
Adaptability	3.35

21 st Century Economic Skills	Attainment Score in Zone Learning
Leadership	3.29
Critical thinking/problem solving	3.27
Initiative	3.27
Risk assessment	3.24
Collaboration	3.20
Ethics and personal integrity	3.03

Table 2. Calculated attainment scores for identified “most desired” 21st century skills

Based on the semi-sharp divide in Table 2, we can find three levels of attainment scores.

Scores between 3.35 – 3.5 (blue background): This level consists of six skills: adaptability, social/cultural awareness, persistence/grit, communication, curiosity/metacognition, and creativity – the last being the highest score. The focus group data suggests a strong emphasis on design thinking, which possibly helps students think creatively about problems.

Scores between 3.24 – 3.29 (yellow background): This level consists of four skills: risk assessment, initiative, critical thinking/problem solving, and leadership. The common theme here is that all four skills, except maybe critical thinking, are very much needed for entrepreneurs but may not be as relevant for all Zone participants. The most likely explanation for such a score is that entrepreneurs usually possess these skills before coming to the Zone Learning system, limiting the potential for further skill development.

Scores between 3.03 – 3.20 (red background): This level consists of two skills: 1) collaboration and 2) ethics and personal integrity. These skills leave the most room to improve. From our focus group, we could not find any specific attention paid by the Zone administration to ethics and personal integrity, so it’s understandable that this remains the lowest score among all of the skills, though still high overall. However, in almost all of the Zones, collaboration was a theme of the conversation as one of the key elements in Zone Learning, despite scoring at the lowest level of attainment.

Focus Group Results

During the course of the interviews, it was discovered that all of the students who were attending the Zone focus groups were Ryerson University undergraduate students who were leading a startup in the Zone. However, there is also an undergraduate internship program where participants volunteer to help with various startups, and we did not have any of these undergraduate interns attend the focus groups. The TMZ and DFZ were asked to invite the undergraduate interns to take part in a separate, intern-specific focus group but were unable to recruit students to participate. Therefore, although there is a network of volunteer undergraduate interns who are participating in the Zone, we were unable to capture their experiences or determine if they had developed any 21st century skills.

Skills List

Both undergraduates and the Directors of the participating Zones were provided with a list of 21st century skills and were asked to identify skills in which they observed a change (in themselves or others) as a result of participation in Zone Learning. The data is compiled in the table below. The maximum frequency of skill observation is n = 4 (SVZ, TMZ, DFZ, and FZ; see Table 3).

Skills	Number of Zones Endorsing Skill
Critical thinking/problem solving	3
Communication	3
Collaboration	3
Adaptability	3
Leadership	3
Social and cultural awareness	3
Persistence/grit	2
Personal integrity/professional ethics	2
Creativity	2
Curiosity	1
Initiative	1
Risk assessment	1

Through this analysis, it can be seen that there is full agreement on skill development for six of the identified skills and partial agreement on the remaining six skills.

Table 3. List of 21st century skills observed

Additional Skills

Students and Zone Directors identified additional skills they felt were developed as a result of participation in the Zone. These skills were not included in the list we presented:

- Team management (2)
- Negotiation/conflict resolution (2)
- Innovation (1)
- Design thinking (1)
- Self-awareness (1)
- Mindfulness (1)
- Gap identification/opportunity seeking (1)

21st Century Skills Learning Process

To further understand and link the Zone activities to the skills attained, the learning process was investigated through the focus groups. Based on the 12 high-demand skills identified, students and Zone Directors were asked to explain what changes they observed and how the various Zone Learning program components/activities led to changes in these skills. These skills have been grouped into two sections: (1) common skills developed in Zones; and (2) Zone-specific skills developed.

Skills were identified as “common skills” if they were included by two (out of four) Zones, or if one Zone uniformly endorsed the program components/activities and how the skills were developed by the program components/activities. This was done to map similarities in skills development across Zones.

Skills were identified as “Zone-specific” if they were endorsed infrequently across the Zones, with only one Zone observing the skill with a maximum of 50% individual participation. This latter section reflects more Zone-specific knowledge and skill development.

Within both of these sections, we characterized skills learning processes using the following format:

1. Which skills were developed.
2. Program component/activity: What aspect of Zone Learning is attributed to the skills developed (e.g., mentorship).
3. How the skills were developed: The activity that led to skill development. This section contains two sub-categories:
 - a) Resource delivery, if mentioned as part of the programming by Zone Directors.
 - b) Psychological/learning change, if mentioned by students in the focus groups.



Common Skills Developed in Zones

Common Skills Learning Process 1	
Endorsing Zones:	DFZ, SVZ, TMZ
Skills developed:	Leadership, teamwork, team and conflict management, collaboration, persistence/grit
Program component/ activity:	Leads of startups manage interns
How the skills were developed:	<p><u>Psychological learning/change:</u></p> <p>Startup leads must learn to manage large projects, mentor interns, and manage team dynamics. Leads identify goals and capacity of interns and match these with opportunities, along with matching skill demand and supply. Leads must also learn to motivate, engage, and manage conflict in the process while communicating expectations and disappointment.</p>

Focus group quotes from Zone members and leaders supporting Common Skills Learning Process 1

"We all really had great initiative and leadership skills. It has been a lot to learn how to work with and manage the people on the team and really keep them engaged. Wanting to do more and also understanding that these are students and they shouldn't take too much on."

"I have a more diverse skill set with starting a business. I have more critical thinking. I am more critical of ideas that people pitch and I can immediately use my 'Social Venture Zone critical thinking hat' on and not just say it is a really great idea. I ask constructive questions and I really try to do that with my team."

"We realize we don't have all the skills, and we are still stuck finding people to fill these skills and relying on other students and have to be aware of their capacity. They sign on (other students) and want to do it and they let us down. We have to step back and wonder if we really needed a student or should I have done it myself... I realize I didn't have the capacity and I needed to get it off my plate first. It is still something I struggle with, we have all these people that want to be part of the team and get involved and they are all full-time students. What balance can I do and not put on others. What do I outsource to our team? What happens if our team messes up and doesn't do it? How am I going to approach this? We have had conflict with team members and I am still learning how to be a bad cop."

Common Skills Learning Process 2

Endorsing Zones:	DFZ, SVZ, TMZ
Skills developed:	Collaboration, persistence/grit, personal integrity/professionalism, adaptability, problem solving, critical thinking
Program component/ activity:	Running a startup and encountering “real world” problems
How the skills were developed:	<p><u>Psychological learning/change & resource delivery:</u></p> <p>With the support of Zones, students learn not to give up when encountering barriers and roadblocks and how to “pivot” to solve problems. Even in the face of frustration, students learn to conduct themselves in a professional manner while negotiating with institutions and industry.</p>

Focus group quotes from Zone members and leaders supporting Common Skills Learning Process 2

“Accepting criticism and accepting rejection and failure, not taking feedback as a personal attack and using that. You need to realize to be better as a person, mentor and more successful, I need to tackle it. You are in the mindset of not wanting to change, then what is the point of any of this? When you get feedback and have a start-up, it doesn’t remain the same, you keep modifying until it is the ultimate product that people want. Accepting feedback and change and adaptability to your market, I wouldn’t have learned otherwise.”

“I have seen myself grow and become more responsible and accountable. Nobody cares if I fail. I need to hold myself accountable and fulfill my responsibilities... With all the other experiences I was doing it for someone else and I didn’t get the same feeling of satisfaction.”

“The Zone model is taking a student and overcoming the challenge. The challenge becomes the point of reference of learning for the student. I can be on the side and push and steer a bit, but you have someone on the side saying, I have to get pushing worm composting at the university, what am I going to do? The experience becomes the teacher, and that is the model that universities are starting to become more comfortable with.”

Common Skills Learning Process 3

Endorsing Zones:	DFZ, FZ, TMZ
Skills developed:	Problem solving, critical thinking, collaboration, leadership
Program component/ activity:	Open physical space; program endorsement of collaboration with industry and other startups (workshops, mixers)
How the skills were developed:	<p><u>Psychological learning/change & resource delivery:</u></p> <p>Students are encouraged to sit, chat, and problem solve together amongst the various startups in the actual Zone space, which is an open space. Students are able to observe more mature teams and interact with them. Industry professionals are regularly in the space, providing diverse backgrounds and extensive experience to help students learn. Fashion Zone students share space with the DMZ, the majority of inter-Zone collaboration being a result of the proximity in space.</p>

Focus group quotes from Zone members and leaders supporting Common Skills Learning Process 3

"Because of the Zone, being in the Zone physically, I have had experience with each one of these skills because we are in such a collaborative environment... However, a lot of the meetings and things that happen in the Zone, it happens in the actual zone. It is observation. You get to observe and interact with other teams solving similar problems, applying to similar grants, trying to solve similar projects."

"I get introduced to a lot of collaborators and their skill sets are not something I would expect. Usually people who have an entire life or all these experience are here and I have to think, how can I learn from them and their experience, so we can improve on their skill set and match my vision to their skill set? It is a really cool way to collaborate and a way that I have never done before."

"You learn through osmosis."

"We are all stumbling through entrepreneurship for the first time, this is our first experience and watching the way other people problem solve and critically think inspires you to see alternative paths to the way you are thinking. I think that is the biggest way."

"We can use advice and strategies from others on how to be effective. Where we sit and chat and problem solve together."

Common Skills Learning Process 4

Endorsing Zones:	DFZ, FZ, SVZ
Skills developed:	Empathy, collaboration, problem solving, social/cultural awareness, curiosity
Program component/ activity:	User-centric design thinking method (to identify and solve social problems)
How the skills were developed:	<p><u>Psychological learning/change & resource delivery:</u></p> <p>Students learn to identify unmet needs and social problems to be solved. The focus is on teaching a method to identify a social problem and letting students solve the problems of the future having learned this method.</p>

Focus group quotes from Zone members and leaders supporting Common Skills Learning Process 4

"Before the Zone, every idea sounded amazing. In our field, we make a fantastic product and realize later there is no market for it... There is a whole three-stage process (idea, market validation and pitch). At first, it was overkill and I had no idea why we had to go through this whole process... When you look at the business canvas model you realize you don't have half the boxes checked. It gave you guidance on what you should be thinking and how you should be thinking about these things for ideas and solutions."

"In solving social issues we get a little bit too conceptual. We are not trying to change the world, when we really want to change the circumstances of an individual. Rather than agencies to solve a world problem, why don't we just do something to help an individual. A personal connection between the problem you are trying to solve is the most important factor in successful entrepreneurship. It brings a certain element of authenticity and commitment by any means. All of a sudden the focus is not on making money but making a difference. If it is a great idea and we believe in it, the money will probably take care of itself. Person development is more important than capital... All the successful problem solving is rooted in empathy. Identifying someone and something in an authentic way and find a real issue to solve."

Zone-Specific Skills Developed

Zone-Specific Learning Process 1	
Endorsing Zones:	SVZ
Skills developed:	Adaptability, problem solving, critical thinking, communication
Program component/ activity:	One-on-one Zone Director mentorship/weekly group meetings facilitated by the Zone Director
How the skills were developed:	<p><u>Psychological learning/change:</u></p> <p>Through modelling and group interaction (feedback), students learn a method of critical analysis that teaches them how to identify problems to be solved, how to analyze others' ideas by identifying strengths and weaknesses, how to ask critical questions, and how to provide constructive feedback. Students are guided through a step-by-step process where they learn a model of thinking. Students are never given the answers but instead must adopt a method of independent thinking to solve the various problems. The instructor sets the guidelines and the learning happens within their boundaries.</p>

Focus group quote from Zone members and leaders supporting Zone-Specific Learning Process 1

"We have one-on-one meetings with [The Zone Director]. After we meet with him, you literally get to critically analyze what you have said, what your goals are, and how you are going to be doing it. The guidance you receive in that process is to actually do it step-by-step... he will actually guide you. He won't tell you the answer, he will guide you to be able to see what you are lacking, what you need to do, and what you are missing, and I think this ties into adaptability."

Zone-Specific Learning Process 2

Endorsing Zones:	DFZ
Skills developed:	Creativity, critical thinking, problem solving
Program component/ activity:	Technical programming
How the skills were developed:	<u>Resource delivery:</u> Providing specific programming around technology and design fabrication methods and design thinking. Teaching the history and transformative nature of technology. This supplements the undergraduate education with a practical, hands-on component.

Focus group quotes from Zone members and leaders supporting Zone-Specific Learning Process 2

"We focus on our programming. We offer programming around specific digital fabrication and design thinking. We promote a lot of critical thinking and creativity that falls within design."

"Here they are augmenting their education and coursework with hands-on experience and fabrication experience."

"They are growing as students while they are growing with their experiential learning projects here."



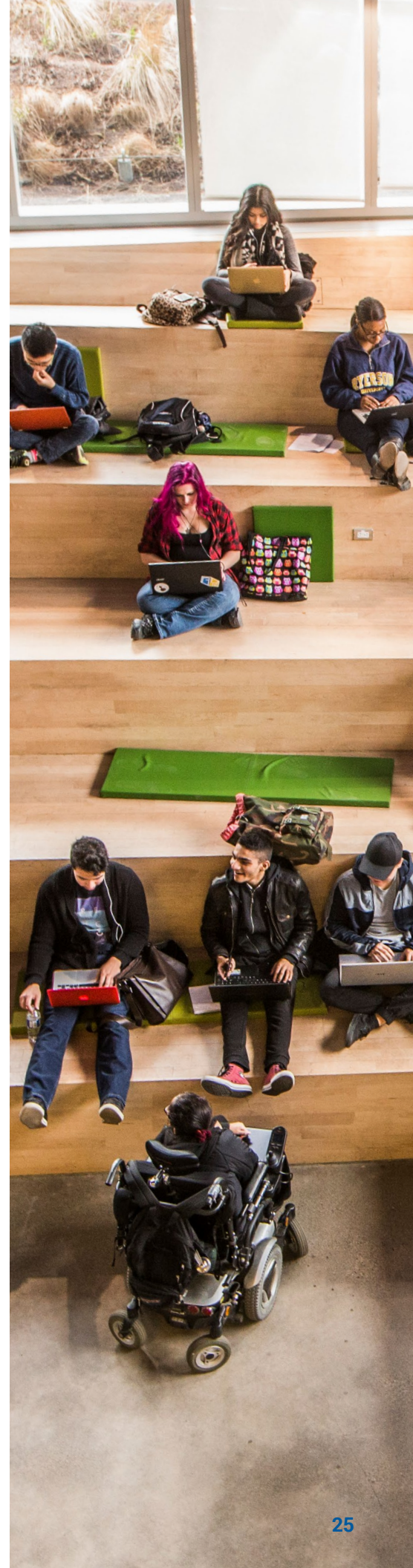
Conclusion

This work has helped to identify high-order 21st century skills that are in demand by Canadian employers. With these skills identified, it has been possible to develop a quantitative attainment framework linking affirming sentences to desired skills. Combining this quantitative measure with qualitative focus group data creates a methodology that allows for a robust characterization of skills developed and learned through the Ryerson Zone network. This methodology for identifying and evaluating 21st century skills shows how the Zone Learning model seems to be an innovative and fundamental form of experiential learning. Furthermore, this type of framework increases our ability to discuss, measure, and assess these skills.

Opportunities for Further Research

The following is a list of recommendations to improve experiential learning outcomes through improved measurement and evaluation:

- Expand the study of 21st century skills development within the Zone system with an eye towards developing a scalable and tested model for performance measurement and evaluation.
- In collaboration with government, industry, and academic partners, test and assess the model, evaluation protocols, and the performance of experiential learning participants outside of Ryerson.
- Develop a deeper understanding of which of these 21st century skills are required for various levels of positions.
- Identify which of these 21st century skills are required for which industries.
- Further study what support services should exist to connect incubator-based experiential learning participants with employment above and beyond new venture creation.



About the Partners



Impactrio Inc.

As a leading social enterprise, Impactrio challenges the perceived trade-off between people, planet, and profit. Impactrio believes that innovation combined with communication and community-level involvement are key to growing the triad in an inclusive way. Whether it is to continue funding a program, to build a platform to promote innovations, to establish a new venture, or to scale them, Impactrio helps organizations design the program, develop the impact strategy, evaluate performance, measure impact, and help tell their impact story to appropriate audiences.



I-INC Network

Founded in 2014 as a truly national network, the Incubate-Innovate Network of Canada (I-INC) accelerates science and technology-enabled innovation, productivity and job creation through programs which enable the individual and collective innovation impact of its member Canadian research universities. I-INC members work closely with complementary local, regional, and national programs to deliver the spectrum of high quality programming and support required to set national benchmarks and move research from the lab to global markets.



Zone Learning

Zone Learning is a new model of experiential learning built to prepare students for the 21st-century workplace. Offered only at Ryerson University, it lets students apply their degree coursework to the development of startups, causes, companies, projects or ventures. Students develop valuable skills through workshops and bootcamps, add to resumes or portfolios with real world experience that employers look for, or even graduate with their own startups.

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