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Implementation of Professional Skills into Technical Education Programs

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Abstract

There are limited contemporary Canadian studies regarding the inclusion of professional skills into technical education. Contentions include what skills are requisite and/or prioritized in various industries. This research sought to explore this gap with a range of academic and industry stakeholders.

This mixed methods study encompassed questionnaires, document analysis, and interviews/focus groups and included faculty members, students, and industry member representatives. There were 595 who completed the quantitative component and 56 individuals who participated in the qualitative interviews. Questionnaires included learner exist surveys, employer satisfaction surveys, and professional skills ranking instrument. Document analysis of job advertisements supported the development of the instruments. Interviews explored stakeholder nuanced perspectives.

Academics, leaders, and industry representatives recognized the importance of integrating professional skills to two-year technical programs, but identified these were not always intentionally taught. While skills were deeply valued, there were barriers to reaching consensus across stakeholder groups about the "set" of skills. Finally, it would require a concerted effort by leaders, teaching academics/instructors, industry representatives, and curriculum designers to select which skills to integrate into the program and support to teach and assess these skills to maximize graduate outcomes. A proposed model – the Model of Professional Skill Development in Technical Education Programs – was created designed to integrate both professional and technical skills within program design and implementation. This model be useful to subject matter experts, curriculum designer, leaders who are keen to ensure integration, teaching and graduate success, and students who want to optimize their success in transitioning from learner to employed graduate.

Keywords: Skills, curriculum, technical skills, professional skills, employer, faculty

Introduction

Globalization of higher education and additional quality assurance requirements have driven many two- and four-year degree program institutions to develop measurable graduate outcomes that are designed to ensure that a student attains the necessary skills to participate in society and gain lifelong career success. “Skills transform lives, generate prosperity and promote social inclusion” (OCED Skills Outlook, 2013, p. 28). Skills that enhance learning place an “emphasis on what students can do with knowledge, rather than what units of knowledge they have” (Silva, 2008, p. 2). Institutional programs wanting to increase their profiles and the success of their graduates have increasingly integrated new competencies that address the skills and knowledge of both technical skill and professional skill development at an undergraduate level.

Professional skills, also known as “soft skills”, “communication skills”, “broad-based skills”, or “liberal arts skills” that are designed to address a student’s ability to work effectively across positions, environments, and situations. Professional skills have become recognized as the benchmark for student success that can be measured across academic disciplines and should be central to modern post-secondary institutions because these skills, when developed, can fuel innovation and economic growth (Benjamin et al., 2013; Levy & Murname, 2004). Integration of professional skills as graduate outcomes provides post-secondary programs the mechanisms to incorporate real-world domains where a student can be asked to draw from everyday experiences and construct responses, not simply select answers on tests (Benjamin et al., 2013).

Key challenges include faculty time and expertise, leadership support, industry understanding of learning, and specific curriculum design. Technical skills can be narrowly defined and granular while professional skills are based “on idiosyncratic interpretation of skilled

action, which raises the extent to which traditional teaching (e.g., lecture) may advance competencies that allow for ample discretion" (Varela, 2020, p. 180).

The notion of inclusion of professional skills in a two-year technical education was encouraged, but that a concerted effort by leadership, faculty, industry, and curriculum designers would need to be made in order for student learning of professional skills to be successful. Therefore, a proposed model for design and delivery of professional skill outcomes was developed specifically to integrate both professional and technical skills during program development. Subject matter experts in both teaching and curriculum design who wish to adapt program outcomes to build beyond technical skill outcomes may use the Model of Professional Skill Development in Technical Education Programs.

Context

The study occurred in a large urban centre with one specific public higher education institution with a population of 24,000 full and part-time students. The identified institution offers multiple technical programs from certificates to degrees. For this study, two-year diploma program students were chosen as the target population because the programs are time abled to embed professional skills in the curriculum. The diploma programs are well established and there are both technical and professional skill instruction currently designed into the curriculum. This study involved 40 two-year diploma programs currently offered at the institution in Business, Energy, Information and Communications, Hospitality, Manufacturing and Automation, and Health.

Students, faculty members, and industry partners participated in the study, providing insight into the opportunities and barriers of professional skill inclusion into the curriculum. The participation of these three stakeholder groups in this study offered insight into the user-specific

perspectives of which professional skills were most important for students to graduate with from a two-year education program.

Conceptual Framework

This study was based on numerous linking elements, literature, and stakeholder's feedback. There were four key assumptions. First, there was a review of the significance of globalization of education and how it has affected higher education practices (Beerkens, 2002; Canadian Council on Learning, 2011; Commission of the European Community, 2007; Duderstadt, 2000; Jones et al., 2002; Knight, 2008; Marginson, 2009; Robertson et al., 2002). Second, how skills, credentials, and recognition of the post-secondary program are an important factor in the success of graduates across borders (Castells & Hall, 1994; Clegg, 2008; Goddard & Chatterton, 2000; Harloe & Perry, 2005). Third, the review explored the importance of quality assurance in post-secondary programs. The national and international acceptance of graduates with specific credentials became very important in a globalized economy (Council for Higher Education Accreditation, 2011; Ewell, 2002, 2008, 2008, 2009; Luijten-Lub et al., 2005). Fourth, the research supported the relevance of how broad-spectrum skills are defined across programs and industry through multiple research reports. Concepts that underpin this study included the globalization of education with aligned expectations for quality assurance within post-secondary; industry perspectives related to their demands for "skilled" graduates; the professional skills agenda; and the perspectives of different stakeholders within industry and higher education—particularly those who service technical training (Bosanquet et al., 2012; Chan, 2013; Coll & Zegwaard, 2006; Ewell, 1999; Day et al., 2007; Matsouka & Mihail, 2016; Nagarajan & Edwards, 2009; Silva, 2008; Tremblay et al., 2012).

Related Literature

The literature is saturated with references regarding the positive and negative effects of globalization on higher education (Bancino & Zevalkink, 2007; European Commission, 2007; Lohmann et al., 2006; Kuks & Kuks, 2010; Marginson, 2009; Matsouka & Mihail, 2016.). The increased interconnectedness puts pressure on institutions to compete in a new knowledge economy. Partnerships between industries, institutions, and students are providing concrete initiatives that can promote and enhance a national strategy. Hazelkorn (2005) suggests that governments look at the collaboration between the academy, industry, government, and community to enhance and widen target participation in the global economy.

Meny (2008) describes multiple factors that increase exposure to market demands, such as leadership and the creation of change from administration to faculty. Standards of practice are influenced and created based on the leaders' "views, preferences, and interests" (p. 332). Leaders, industry partners, students, and faculty all have a part to play in the integration of both technical and professional skill development. The importance of all members participation regarding development and assessment of skills is highlighted by a paradigm shift to understanding learning outcomes is an indication of movement from "an instruction paradigm" where there is a focus on lectures to learn to a "learning paradigm" where student learning is supported through multiple ways (Barr & Tagg, 1995, p. 1). Including professional skills instead of replacing technical skills in curriculum will enhance the conversation for educators and employers and increase employability for graduates (Terego, 2009).

Measuring professional skills, in addition to technical skills, will reinforce already identified institutional learning outcomes and support student engagement in this new paradigm. According to Tremblay et al., (2012), there are many ways to measure learning outcomes, but there

are mechanisms already in place that can embrace a wide spectrum of criteria. For example, several areas of graduate outcomes have been identified as necessary skills by industry and education and encompass five broad areas of learning, including "broad integrative knowledge, specialized knowledge, intellectual skills, applied learning, and civic learning" (Adelman et al., 2011, p. 4). Conceptual understanding using cognitive skills in combination with application to real-world complex problems both in academic and non-academic settings increase the success of learning outcomes (Adelman et al., 2011). According to Adelman et al., learning outcomes are intended to be summative, present a range of performance, identify mastery, demonstrate achievement of competency, and be differentiated across disciplines. An integrated approach of embedding interdisciplinary skills throughout the program demonstrates a greater depth of learning and allows for more complex classroom learning (Bajada & Trayler, 2013; Wilhelm et al., 2002).

Changes in education design and delivery are established by provincial governing bodies, but the criteria for how these changes should occur are different depending on jurisdiction and accreditation requirements. Herein lies the challenge to Canadian universities: "the challenge to change" (Cameron, 2010, p. 170). Recently, in Alberta, the Alberta 2030: Building Skills for Jobs was released by the Government of Alberta to address the need to reevaluate curriculum as "the skills demands of employers are rapidly changing as more people seek to strengthen skills including new digital, critical thinking, communication, social skills, and collaboration skills. We must do everything possible to ensure post-secondary graduates and other adult learners are equipped with the skills for jobs" (p.4). Employers were a part of the proposal to increase professional skills as a means to re-skill or upskill students to stay competitive in an ever-changing market. Complex skills, such as critical thinking, problem solving, teamwork, verbal, interpersonal, and written communication, cross-cultural competence, ethical practice, and

information literacy, should be reinforced in conjunction with the development of technical knowledge (Purnell, 2012). Tang (2019) offers insight into the need for a systemic application and adoption of inclusion of skills from policymakers, scholars, and faculty.

Tremblay et al., (2012) predicted, "As higher education is going through a fundamental shift from an instruction paradigm to a learning paradigm – the value of Assessment of Higher Education Learning Outcomes (AHELO) types of measures will only grow in importance" (p. 56). Agreement on the inclusion of technological skills in curriculum is evident but there is a lack of incorporation of professional skills identified by industry in program design. Emphasis on community partnerships and supporting business enterprises within the curriculum are crucial signs of changes in engagement practices from institutions (Clegg, 2008). Partnerships, strategic repositioning, and community initiatives are critical to the creative thinking of post-secondary institutions.

The necessity of faculty and industry to integrate learning has become a greater conversation regarding skill attainment. According to Coll and Zegwaard (2006), the concept of Work-Integrated Learning (WIL) provides a dual purpose for educational programs to integrate both academic skills and industry needs. Skills such as teamwork and cooperation may be seen by faculty as important, but they are unclear as to how to incorporate the need for those skills into the curriculum. This consolidated approach to teaching is embraced for the benefit of the graduate. The former President of Harvard contends that technical learning can be obsolete within a short period of time after graduation and that "the most important kind of learning is about how to learn" (Davis, 2013, p. 13).

Student representation in the governance of educational programs is recognized as an important institutional practice but there are other ways that student involvement would improve

higher education, such as partnership in quality assurance of curriculum, transferability between institutions, understanding graduate data, and hiring in the appropriate occupations. Learning through partnership and cooperation between academics and students can only improve the quality assurance of programs and student outcomes (Alaniska & Eriksson, 2006). College Student Alliances (CSA) (2012) provided the Ontario Government with its recommendations regarding education in Ontario. Crucial to their suggestions were to have college accreditation recognized by educational institutions for the knowledge that is specific to careers and meets industry standards for employment. CSA pointed out that application to colleges have nearly doubled in the last five years and that the combination of theoretical and practical aspects to education provides benefits to both the student and the larger community. CSA argued that standard assessments used to measure skills, such as writing and critical thinking, are narrow in scope and should be expanded to evaluate a program based on technical skills identified by industries. Their survey results indicated that in most cases less than 50% of the students surveyed felt that the students could apply their learning to their chosen field of employment.

Industry has become an integral participant in the development and assessment of expected professional skills outcomes (Charoensap-Kelly et al., 2016; Lewis, 2007; Winstead et al., 2009). In addition, the design of assessment tools to measure professional skill curriculum enhances student learning by connecting outcomes to teamwork, presentations, and other communication skills (Keshavarz & Baghdarnia, 2013; Winstead et al., 2009).

Integrated curriculum that embeds interdisciplinary learning is multi-faceted and provides faculty and learners the opportunity to learn across a parchment and not just at the end with a capstone project. As Bajada and Trayler (2013) explain, there needs to be a framework for curriculum design that marks the journey of the learner throughout the program. The capstone is

enriched as the complexity of the learning process precludes the final project expectations. In addition to promoting student proficiency, there must be practical real-world elements that reinforce skill development (Muir, 2004). The creation of experiential learning inside the classroom through technological means provides another curricular design alternative to having students away from campus and also provides an alternative model for the distance learner experiences (Devadason et al., 2010; Khan, 2014).

Research Methods

This study employed four-stage, mixed-methodological research design within the pragmatic paradigm (Cresswell 2008; Morgan, 2007; Patton 1990; Johnson et al., 2007). This study used three forms of data collection: Stage 1 was the collection of institutional documents, including graduate outcomes, program design standards, curriculum standards, and current job postings; Stage 2 included the questionnaire; and stage 3 implemented focus groups with a sample from all three stakeholder groups; students, faculty, and industry. Despite the large volumes of data, the distinct phases allowed for logical, sequential, and manageable flow of data. Data was further explored through homogeneous focus groups to further probe the quantitative results, which provided detailed personal views of the participants in order to explain their beliefs around professional skill development in a technical diploma program (Creswell, 2013).

Multiple documents were collected including The Employer Satisfaction Survey (years 2012, 2013, 2014, 2015, 2016), Institutional Graduate Outcomes, Professional Skills Questionnaire, review of 30 job posting for the institution, and Curriculum Design Standards document. A total of 595 students, faculty, and industry members participated in the questionnaire; Industry members, 56; student members, 332; faculty members, 207. An additional 56 people

participated in the homogeneous focus groups including industry members, 8; student members, 40; faculty members, 8.

For stage 4, quantitative data was analyzed using high frequency codes in each stakeholder role and qualitative data was sorted into themes that emerged because of the iterative process by the research member.

Results

The participants of this study recognized the changing nature of professional skills education and the importance of their perspective on this subject matter. The complexity in configuration, duration, and expertise was noted differently by each group. Four themes emerged from the analysis of the qualitative and quantitative data of this study: (1) common professional skills required of successful graduates in a technical education program recognized by stakeholders; (2) the differences in the skill sets of professional skills from all four participant groups, Employer Survey results, and focus groups; (3) the barriers for inclusion of skills into a technical program; and finally (4) the opportunities for inclusion of professional skills in a technical education program.

The Most Important Skill – Problem Solving

All participant groups identified problem solving as the most important graduate professional skill. Over the last decade, the importance of professional skill development has been recognized in higher education worldwide (Shakir, 2009). Faculties such as engineering, information technology, and business have created some form of professional skill development curriculum (Kumar & Hsiao, 2007; Slaughter, 2010). For instance, students (47%), faculty (76%), and industry (64%) agreed that problem solving was the most important professional skill to acquire along with technical skills.

Faculty participants indicated that there were several courses and opportunities to problem solve in certain programs across the schools. Of the comments received, 51% were regarding the application of theoretical concepts to practice within the classroom for the ability to apply problem solving and analytical skills. Of the comments, 30% of all faculty who responded identified that they use real-world industry examples in their everyday teaching to connect students to the professional skills they will need and to solve the problems they will encounter. One commented:

> *Many of the assignments that students work on mimic the processes and tasks they will be required to complete. We want them to exercise critical thinking/problem solving, and conceptual thinking (most importantly in a creative way), however we don't necessarily teach how to think conceptually and solve problems.*

However, several barriers were identified by faculty members as to why problem solving and other professional skills could not be developed better for graduates, which included the need for more time in the program to learn and incorporate problem-solving activities. Learning material is based on how much they can learn in a two-year time period and that the application of learning depended on the faculty member and their understanding of professional skills. Up to 30% of the comments included: "*Time, competing programs, cost of additional teaching*"; "*an attitude of wanting to be given answers rather than solving problems*"; "*Ability to solve problems…lack of practice time*".

Differences in Skill Set Attribution

Study participants focused on all professional skills sets required to improve graduate outcomes and future employment opportunities. Each group was also asked what they thought of

the other groups' responses and if they agreed or disagreed with the other groups' skill sets. Although each group agreed on problem solving as the most important skill for graduates, each group ranked several skills as more important for their second and third choices. The themes of multiple importance of skill sets based on perspectives emerged further during the focus group sessions. Indicated in Table 1 are students', faculty's, and industry partners' choices for top skills for graduates. Each group indicated their belief of the top skill not ranked to equal 100%.

Table 1:

Overall Three Most Important Skills for Graduates by Reporting Groups

Participants	**Most Important Skill**	**Second Most Important Skill**	**Third Most Important Skill**
Faculty	64% Problem Solving & Analytical Skills	27% Personal Organization & Time Management Skills	22% Decision making Skills
Industry Partners	76% Problem Solving & Analytical Skills	42% Interpersonal Skills	33% Personal Organization & Time Management Skills
Students	47% Problem Solving & Analytical Skills	33% Creativity, Innovation, Change Skills	25% Technological Literacy Skills

Faculty Responses

The faculty focus group discussed the overall results of the questionnaire from the industry partner perspective and the student perspective. Two faculty members mentioned that the skill sets for each group make sense depending on need. "*Industry knows we* teach *technical skills and now they want interpersonal skills and all the rest as well*" and "*students think they are going to change the world but they have to work first*". Finally, faculty members from business and

engineering technologies stated that students think that overall they have high technological skills, but that they need to also understand the basics and not just social media.

When asked about the time management skills of students, several faculty members noted that two factors inhibit good time management skills: first, the nature of a two-year program and the amount of learning that needs to take place. Second, the immaturity of most students and the need for ways to develop these skills along with the acquisition of technical knowledge.

> *Written communication skills seem weak or underdeveloped. Time management can be a problem. Paying attention to details, following instruction as well as giving instruction. Many students are young and are in a developmental stage. Other students are international and can be weak. A shared body of assumed knowledge for a person in an age group is inconsistent. Motivation to learn for the intrinsic benefit can be difficult*.

During the focus group, it was posed that time management was important because of the nature of faculty work, and while all agreed to some degree, several remarked that industry also has deadlines and students don't get to "*hand things in late at work, we at least give chances*."

Industry Responses

Industry Partners questionnaire recognized interpersonal skills as the second most important skill needed by graduates of a two-year program. The industry focus group recognized that 80% of the group wanted more professional skills, but that the amount had to be balanced with technical skills because of time limitations. "*Industry expectation: attitude, attendance, willingness to be flexible and get involved in a new task when needed. Self-leadership: not lowering their standards to the lowest common denominator but working to reach a high professional standard."*

Indicated in Table 2 are the results of the questionnaire from industry partners. Other than empathizing with others, industry reported that interpersonal skills were either "very high" or "high" over 70% of the time. Of the comments received, 10% explained that industry has the need to train graduates further in their technical education but that school should be the place where a student should establish good work ethics and practice. "*Personal time management and organizational skills (these are base level transferable skills). Additionally, working in a team atmosphere, therefore a solid understanding of work styles*."

Table 2:

Interpersonal Skills Question Results – Industry Partners

Skill: Interpersonal Skills	**Very High**	**High**
Working well with peers	49%	43%
Working under supervision	23%	51%
Empathizing with others	26%	43%
Understanding the needs of others	26%	45%

In the employer satisfaction survey (2015), industry reported 97% of graduates "exceeded" or "met" expectations when working with others. In the industry focus group, all members of the group agreed with this high percentage in the report, but noted that graduates without these skills would not or at least should not be hired into a position at any company.

Personal organization and time management was ranked the third most important skill that a graduate would possess upon graduation. Like faculty members, 33% of industry respondents indicated that "*common sense of effectively managing themselves is not always common … they (graduates) should have common sense and establish good work ethics and*

practices". Each member of the focus group indicated that it was crucial to future success of the graduate to manage themselves, set priorities, and meet deadlines. One member indicated that "*interpersonal skills come with experience and the value of integrity and an ability to admit when you need help*".

Student Responses

All students responded similarly on the rankings of their second and third most important professional skills needed upon graduation. Students identified creativity, innovation, and change and technological literacy as important (Table 3).

Table 3:

Student and Program Specific Student Responses

Group	Second Most Important Skill	Third Most Important Skill
Students	33% Creativity, Innovation, Change Skills	25% Technological Literacy Skills

Student reported that creativity, innovation, and change skills, and technological literacy were their second and third choices for important skills for graduates to have upon completion of their programs. When asked about these skills in the focus groups, students focused on technological literacy as important to learning as the program moved so quickly they often had to review materials through the institutional learning management system (LMS) to keep up. Classes were segregated, and students were left to connect learning materials from one class to the next. As one student reported, "*tradeoffs were required: time spent working versus time spent learning*". During the focus group, more than 50% of the students stated that time was the limiting factor to learning. Another student stated:

I don't get as much hands-on experience as I think employers would prefer, and I don't get to develop my skills to perfection in any particular area as well, due to time constraints, not so much because of what is being taught.

Students in the focus groups were asked what they thought of the other responses from faculty and industry regarding their second and third skill choices of (2) personal organization and time management skills; and (3) decision making skills, and interpersonal skills. They responded that faculty want students to learn and move on so time management makes sense for faculty to choose as important, but that it was different in industry and time management meant getting the work done but with supervision and direction. Several students indicated that they felt the important skills were not the same at school and in the workplace. Two-thirds of the students felt that the workplace is where they will learn the interpersonal skills and that when they are in school they need to focus on learning technical skills to get a job.

Constraints for Professional Skills Inclusion

Constraints for incorporating professional skills in a technical program included time restraints for delivering enhanced curriculum in a two-year program; the expertise level of the faculty member; the predesigned curriculum; the additional institutional supports outside of the program and classroom; and student readiness to learn. The exploration of barriers to inclusion of professional skills in the curriculum were exclusively explored in the questionnaire and focus groups for all participants. Barriers were indicated by all participant groups reflecting on the current state of the program they were in, taught in, or employed graduates from. Industry partners were not asked about constraints, but rather, what skills should be emphasized at school versus in industry.

Students recognized that 62% of the time they were not ready for post-secondary learning and that they had their own barriers to learning. Some students recognized that they did not yet have the skills to think beyond the technical knowledge, but that they knew these skills were important. Some students stated that the curriculum does not support learning skills beyond technical learning. Two-thirds of the students stated they were just trying to "keep up" with the expectations of post-secondary programs. "*I would like to see less time in lectures, with more hands-on projects (labs/assignments/projects, both with and without professor supervision). New concepts could still be introduced in this setting."*

Time Constraints

Each sub-theme connects to the other, but in the case of time, many faculty members thought of time differently. One-third saw time as the amount of time needed to complete the course or program; that time was short and technical knowledge was emphasized more. "*The program in general and the attitude of keeping students retained at the cost of them learning and believing, requiring them to show proficiency in these areas and then just passing them anyways*."

Faculty members reported frustration with regard to the length of classes and programs. Fast-paced learning, switching courses from week to week (in some cases), learning a new language for industry, and the lack of ability to apply the learning were issues raised. "*Students need an opportunity to apply what they have learned independently of course content and be given feedback based on what they have done*". Another faculty member stated, "*Ability to problem solve. Ability to communicate effectively. Lack of feedback due to large class size and lack of practice time*". These were all barriers to reinforce professional skill building.

In the focus group, time was also discussed as part of the delivery system of applied learning. "*Insufficient hours to enable mastery of knowledge and skills while also trying to*

facilitate group and individual problem-solving experience". Each program is designed to deliver theory and application together, but this often frustrated these faculty members because of the time needed to set up immersive situations and the lack of time for students to complete and absorb the learning before moving on. "*Time allotted to each course and the misconception by academia that students of applied learning do not require higher level learning skills, only memorization skills*".

Faculty Expertise

The second sub-theme under barriers to professional skill development was faculty expertise. The focus group conversation discussed the relevant skills needed for professional development and although they believed they had them they were more comfortable with the technological skills. "*It's more difficult than it seems on the surface, soft skills are our hard skills and they need to be practiced in front of and on strangers, this can be intimidating to young adults*". This comment had a few other focus group faculty members agreeing that they did not know how to teach these skills and that they just learned them through experiences in industry.

Other faculty focus group members said that they could teach these concepts, but that they were hard to grade and questioned if they were really valued by industry or just the parchment. "*Competing programs do not offer these skills, cost of additional teaching and assessment cannot be recovered*". In addition, many faculty members felt it was not their role:

> *While I can provide resources for writing skills, my main role is to assist learning material for my academic course". When faculty members said they focused on these skills "they (students) don't see the benefit of developing communication skills*.

Faculty members also commented that while they agreed these skills were important, student "buy-in" could be difficult.

> *Students do not see the immediate value and don't put enough effort into the material. Soft skills are more difficult to encourage learning than in hard skills for a technical college*". In addition, "*They are not given the opportunities in many courses and do not have interactive instructors that place them in a collaborative environment*.

Faculty members also discussed technical standards and how each program had these clearly defined. In technical education, there was usually one right answer, but professional skills were dependent on the skill sets of the faculty members as well. "*Different interpretations of these skills*" and the lack of consensus on how to grade them were a barrier to inclusion. Other factors that influenced professional skill application in the classroom were prior learning experiences, program focus, time required to apply them, and personal values and beliefs of faculty members. One faculty member stated, "*The individual energy, inclination, and intrinsic motivation of each instructor to emphasize these skills*". Several instructors stated it was the easy way out to not assess or apply these skills, which was the opposite of "*the creation of a dynamic learning environment*".

When the focus group was asked why there was a lack of desire from some instructors to add these skills into learning, it was acknowledged by the group that workload was an issue. As well, for some, they recognized their own skill deficiencies and did not want students to learn bad habits from them. "*Fear of failure, not understanding the needs of the industry and skills needed and lack of curriculum components teaching such skills*". Also, many of the faculty members had been teaching for over a decade and there was a fear that they no longer knew what type of

professional skills were needed in the workplace, but that they knew what technical skills were needed.

Curriculum Constraints

Results from the questionnaire indicated that 28% of faculty members suggested that due to the design of the curriculum there are multiple reasons why professional skills are difficult to include and assess. Several faculty members indicated that external accrediting bodies recognized communication skills, but other skills such as problem solving and conflict resolution were not assessed. They stated that curriculum is heavy with information and additional content would overwhelm both students and faculty members. "*Their curriculum is already full and adding more outcomes isn't always possible, students wouldn't appreciate the importance until much later is their career*". In addition, it was felt that curriculum merely reinforced memorization in the time period given to deliver it.

> *The curriculum does not support the student's personal development, only the short-term retention of technical information. The personal development of learners must be pursued as a value-added component by professor/instructor/teacher who delivers the course/program*.

Faculty members discussed the time and effort it took to change the curriculum to include professional skills and that this was difficult. "*The inertia generated by metric driven inertia usually is enough to thwart incorporating support. For most I would say it requires far too much risk and pioneering to make the required support appear*". At this institution, there is a centralized curriculum process that defines changes to assessments and outcomes that can limit or at least impede an instructor to incorporate these changes. Several instructors discussed their "work around" was to include it in the rubric used to assess the assignment. Half of the

instructors stated they do not use a rubric for marking, but thought it was a good idea and agreed to share their materials.

> *Students are provided with ample opportunities to practice (professional skills), however, receiving feedback on quality assessments can be a factor … many of our formal assessments in the program are structured as 'checklists'. Checklists are certainly valuable for the task-based skills (communication and time management, etc.) there are multiple variables that are not represented on feedback with a checklist … If the instructor is not highly skilled with developing assessments, the students face the barrier of receiving quality feedback.*

Industry partners responded in the questionnaire that communication skills were the most important skill 27% of the time. Many of the industry partners were or had been a part of accreditation processes and agreed that other skills were not assessed but needed to be a part of the curriculum. "*How to approach problem solving. Learning to pay attention to details and being detailed oriented. Learning to develop good writing skills*".

Industry partners also commented on the need for school to create a basic understanding of all of these skills and that by teaching the fundamentals to these professional skills graduates would be more successful more quickly in the workplace. "*Basic learning skills which can then be taken into the industry and adapted to solve more complex problems*". During the focus group, the industry partners also recognized that technical skills were just as important as the professional skills, but that they could recognize students that had these skills from the time they started working with them. "*Industry expectations: attitude, attendance, willingness to be flexible and get involved in a new task when needed. Self-leadership and not lowering their standards to the lowest common denominator but working to reach a high professional standard*".

In the focus groups, faculty did not agree with industry partners in that faculty believed that, with an accelerated program, students did not have time to practice these additional skills; rather, that the workplace was the best place to learn and practice these skills. In the faculty focus group, one-third of the group had workplace integrated learning (WIL) opportunities for students where they could practice real-world situations and skills. Even with case studies and simulation learning, students do not often understand how the skills transfer from these mock situations to be used in other courses or in industry.

> *These skills are not the easiest to practice and learn, when using mock situations some students find it challenging to really take the scenarios seriously. Usually after the students have gone on their first practicum/fieldwork placements, it is easier to see and understand the situations.*

Student Readiness

During the focus group, many faculty members discussed the personal growth needed between high school and post-secondary education programs. Condensed programs, high expectations, and skill sets that do not necessarily include professional skills were mentioned.

> *Written and oral communication seem weak or underdeveloped. Time management can be a problem. Paying attention to details, following instruction as well as giving instruction. Many students are young and are in a developmental stage. Other students are international and their backgrounds weak.*

Students commented that 62% of the time they were not prepared for the programs they were in. They cited differences in experiences, culture, and language, and different levels in understanding from other students hindered their own learning in class. Some students felt that many of their classmates did not have the skill sets required to be successful in their programs. They reported that in group work assignments many of the students just floated through on their work. Many of the English as additional learners (EAL) did not often understand the professional skill needed to be successful, but were "fine" with the technical skills.

> *One of the challenges in the program I have just started is the inability to perform at my skill level. I think an easy way to allow students to achieve their full potential in these or any other classes would be to provide them access to accelerated avenues of learning. Opportunities to prove their conceptual knowledge earlier to move forward.*

Faculty discussed student motivation and self-perception upon entering post-secondary education as a significant inhibitor to learning professional skills. In the questionnaire, 13% of faculty members reported that students themselves were their own barrier to learning.

> *A lot of barriers are there due to the learners are not having the motivation or initiative to keep pushing. Learning how to learn… we ask and explain to students that 'What they put in, is what they will get out of this whole experience.*

Finally, industry and faculty commented in the questionnaire and the focus groups on technology usage in the classroom and in the workplace. Students identified technological literacy as the second and third most important skill needed for them to be successful. Industry responded that technology changes quickly, but human systems in the workplace do not. Significant

technological software changes are long drawn-out processes and students think because they can "text" they know how to use technology. Faculty focus group comments agreed with industry in that they believed that students rely too much on technology and when it fails, they do not have the skills to solve a problem. As one faculty member stated, "*Technology allows students to be lazy and not improve their communication and analytical skills*".

Opportunities for the Inclusion of Professional Skills in a Technical Program

The exploration of opportunities for the inclusion of professional skills in the curriculum were exclusively explored in the questionnaire and focus groups for all participants. Opportunities were indicated by all participant groups reflecting on the current state of the program. Industry partners were not asked about opportunities, but rather, what areas they could best support.

Students reported that more than 70% of the time faculty expertise was the key to their success in the program. Several factors to student success were noted as instructors with a willingness for personal connection; instructors with connections to industry; instructors with extensive industry experiences; instructors who care about them as students; instructors who are available.

> *Instructors with experience in our field of study, encouragement to network and emphasis on adaptability and flexibility towards things that are out of your control*"; "*Teachers are very accessible and available for one-on-one support. Teachers really care about the success of each student and will go the extra mile to help out in any area requested.*"; "*Instructors go above and beyond to ensure every student understands the majority of the concepts*"; "*We have flexible instructors who understand our priorities, and are willing to help at any time with questions or concerns students may have.*

Students also responded that 23% of time one of the strengths of the program were the curriculum. The labs, WILs, capstone projects, and the philosophy of theory and practice support student learning and involvement.

Finally, multiple students commented on the support the institution provides outside the classroom, which include tutors, additional learning coaches, classes specialized in communications, student executive, and industry mentors. In the focus groups, students discussed the need to seek help outside of the classroom when concepts were difficult, they got behind, or they had some personal difficulty. They discussed the student association support for students to understand the policy and procedures of courses if something had gone "sideways".

Faculty Expertise

Although faculty had discussed and commented that faculty expertise was a barrier to teaching and incorporating professional skills into the curriculum, the focus group commented that they were also the greatest strength for the current inclusion of the skills they do teach in the classroom. The time barrier to add more curriculum was limiting, but when they had the opportunity, they provided ways for students to learn these skills. Two focus group members discussed that while they were teaching, sharing their experience in industry was their way to engage students in the conversation and practice of these skills.

> *Attempting to get involvement and buy-in by requiring students to practice these success strategies, by assignments, leading and showing the skills in practice. By telling them about the skills, by showing how and what industry uses to vetted potential job candidates, and many other strategies*.

Focus group members began the deeper discussion on the techniques they used to embed professional skills in their everyday teaching. Each member discussed their ideas for inclusion including rubrics, practical examples, and through group discussions.

The focus group identified that faculty expertise in the area of professional skills was a barrier, but that there were other faculty members whose expertise did include professional skill building. Faculty did recognize that their expertise came from their experiences in industry and that if they could translate those experiences into the curriculum they would be able to teach skills to students.

Curriculum

Industry partners responded that curriculum development was the number one way to expose students to these skills. Their interpretation of assistance was in the software they could provide to train on along with the "experiential stories" they provide. They also suggested that they could provide more practicum or capstone access to gain more experience.

Faculty reported that 39% of the opportunities that exist to teach these skills existed in the design and delivery of the curriculum. The comments consisted of the ability to provide applied opportunities from the theory work to a lab or capstone or practicum type of opportunity.

Faculty reported that using industry machines, tools, software, settings, and case studies allowed students to integrate their learning from the classrooms into real-world experiences. The remaining 3% of the comments focused on the whole program design and how it was constructed to teach theory hand-in-hand with practice opportunities. In the focus group, one faculty member stated that he was a part of the redesign of the program and each course was mapped back to the

program outcomes to ensure each outcome was either directly or indirectly related to the skills graduates would need once they have completed the program.

Technological Support

Students and faculty members commented on the positive use of labs, textbooks, institutional platform, and library resources as additional supports to learning. In the focus groups, students identified the additional learning opportunities as extremely helpful when they had time to use them. All of their courses were blended and many of the courses were designed with immersive additional learning on the institutional platform. Students from the survey identified that technological literacy was both the second and third most important skillset to have before entering the workforce.

Faculty, students, and industry partners agreed that there were easily identified opportunities to increase professional skill development by increasing access to tutor support and institutional opportunities to interact beyond the classroom. Although faculty expertise was identified as both a barrier and an opportunity, faculty members reported that their skills and knowledge from their industry experience when used in the classroom guided students to learning about professional skills in a deeper and more meaningful way. Program development from a holistic perspective provided students and faculty members with the insight to see how curriculum connected to professional skills and courses aligned to identify program outcomes. Finally, technological support in labs, software, and immersive platform use increased the opportunities for students to "practice" professional skills in alternative settings other than the classroom.

The Model of Professional Skill Development in Technical Education Programs

As a result of this research study, the following model: *Professional Skill Development in Technical Education Programs* was created to provide direction for the inclusion of professional skills in the curriculum design process for technical programs. Central to this model: *Professional Skill Development in Technical Education* Programs (See Figure 1) is the consideration that: (1) program outcomes are diverse and will require stakeholder input to determine both technical and professional skills in program development; (2) barriers to the inclusion of professional skills in a technical program include: identification, time to develop, use of technology (such as a LMS) for support, the development of assessments, and instructors' expertise in professional skill subject matter; and (3) best practices of program design and evaluation for the acquisition of knowledge to be transferred and skills developed.

This integrated approach is specific to diploma programs but could be expanded for use in other programs such as apprenticeship programs, certificate programs, and degree programs. Therefore, the overall purpose of this model is to have the stakeholders involved in the development process identify the specific professional skills that are relevant for graduates of that program.

Elements of the Model

The key elements of the *Model of Professional Skill Development in Technical Education Programs* include: (1) input from stakeholders regarding the professional and technical skills requisite for graduate success in the workplace; (2) the development of professional and technical outcomes in technical programs using affective, psychomotor, and cognitive domains; (3) the alignment and coherence of program delivery embedding professional and technical skill development and supports for teaching professional skills; (4) the recognition and development of

graduate outcomes specific to the program; and (5) evaluation of the program outcomes from stakeholders: students, faculty, and industry. This model provides the opportunity for maximizing stakeholder consultations and evaluations for the successful integration and dissemination of professional skills in a technical education.

Program Development

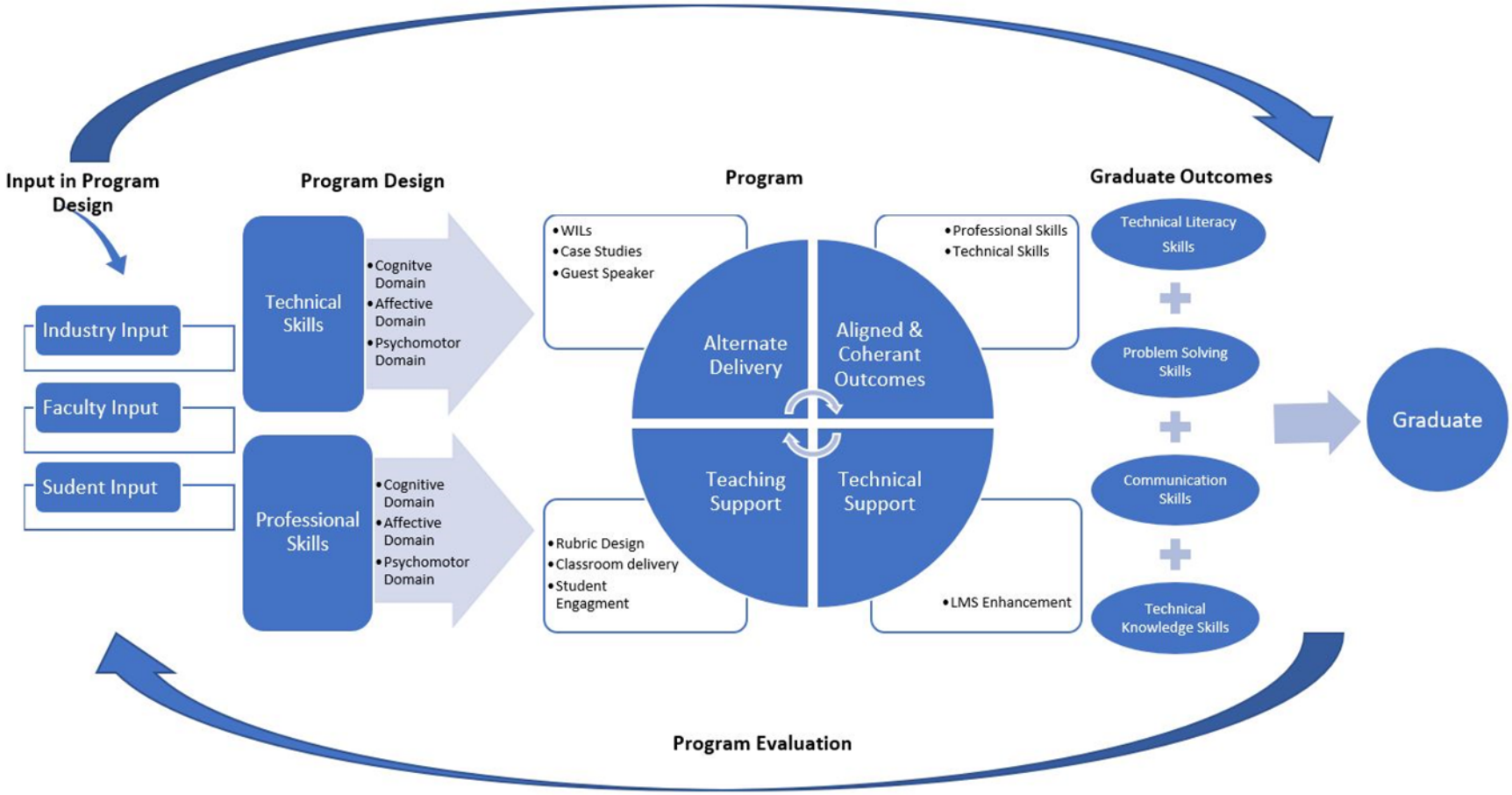
Development of courses would include taxonomy in the affective, psychomotor, and cognitive areas for both the technical and professional skills outcomes. Recognizing that learning outcomes for each course would correlate with overarching program outcomes. Assessments would include both sets of skills and relate to course outcomes and skill attainment.

Program Delivery

Program delivery would support the design of courses from a technological perspective, a pedagogical perspective, and an evaluation perspective. Support for professional and technical skills development could be embedded inside of the learning management system (LMS) where faculty members could provide exemplars, supports for students, and demonstrations to support and facilitate students' learning. Experts in design and delivery of professional skills could train and develop technical skills educators and support the creation of appropriate rubrics for assessing both the curriculum content and the professional and technical skills components of courses. Individuals in supportive roles, such as learning strategists, tutors, and faculty development specialists, could be conversant in professional skill development and could also support the development of professional skills with students outside of the classroom environment.

Figure 1:

Model of Professional Skill Development in Technical Education Programs



In addition, Workplace Integrated Learning (WIL) opportunities, alternate learning strategies, immersive learning opportunities (such as virtual reality and 360 filming), and industry speakers could provide students with a reinforcing message regarding the importance of professional skill development.

Implications

The study findings related that there is an increased need to connect technical and professional skill opportunities and formal development in curriculum and two-year education programs to provide all students with a well-rounded portable educational experience and increased opportunities for employment. Although there is some agreement across stakeholders regarding importance of individual professional skills, the focus on problem solving, decision-making, communications, and analysis can be decided when looking closely at specific occupations. Each group had significantly different reasoning as to why those skills were important for employers, including the need for students to be work-ready upon graduation, which is different for faculty who believe students need skills to be organized and successful to complete school. Students did not identify skill sets in alignment with the other study participants except for problem solving. Student perceptions regarding professional skills focused on creativity, change, and technological skills.

Significant barriers to inclusion in curriculum were identified as time constraints of faculty members to add to the already heavy curriculum that needs to be taught. Second, that faculty lacked the expertise to teach the "softer" skill set. Third, that the curriculum was not designed to address these types of skills in a two-year program. Fourth, that students themselves were not prepared to learn these advanced skill sets after high school.

From a wider perspective, the opportunities mirrored some of the barriers in that participants recognized that many of the professional skills were supported throughout special programs and supports around the institution. It was recognized as well that faculty other than technical faculty had tremendous expertise and that they could teach the students these skills in addition to technical teaching. It was also identified that curriculum design experts could design the courses to embed these skills into the curriculum so that they are a part of what instructors are teaching. Finally, it was recognized that the technological support, such as the learning management system, could provide additional materials on the subject matter for students to review and practice.

This study also demonstrated that there was an overall appreciation for professional skills and that they should be either "taught" or "learned" both in school and in the workplace. The identification of which skills and where were heavily disagreed upon. Faculty participants agreed that it was beneficial to add these skills but lacked a clear direction as to which skills and how. Industry participants from this study agreed that many of these skills should be assessed in school, but also built upon in industry. Finally, students identified skill sets that were not in alignment with either faculty or industry, except for problem solving.

Professional skill sets were ranked and identified as having varying importance from students, faculty, and industry. A recent study on professional skills identified that there were "substantial differences in perceived competencies, with the largest deviations relating to emotional intelligence, professionalism, and leadership skills" (Matsouka & Mihail, 2016, p. 323). This study suggested that companies need to identify what soft skills were needed to be effective within their organization, but also that education should regard students as future employees, and consequently, identify the skills they will need to be successful.

The findings from the research were the barriers experienced by all stakeholders regarding the inclusion of professional skills in the technical education program. The identification of these barriers included four significant reasons for the barriers: (1) time constraints for faculty members to add materials when the program is condensed into two years; (2) faculty self-identified themselves as lacking the expertise in the "softer skills" in order to teach these; (3) current design practices did not allow faculty to include industry expectations into how they were teaching; and (4) all three stakeholders groups identified that students did not exhibit the necessary professional skills to be successful in higher education and several stakeholders indicated that they believed it was due to a lack of exposure during prior learning in education. Industry influence in education and the inclusion of professional skills are critical and technical skills are not sufficient in developing students into contributing members of a profession (Kermis & Kermis, 2010).

The participants identified multiple opportunities that would suggest numerous ways to be successful regarding professional skill inclusion, these included: (1) the addition of institutional supports for students outside of the classroom; (2) faculty expertise in professional skill development; (3) current curriculum design processes; and (4) technological support for skill development. The proposed ideas can coincide with the learning needs of the student, the faculty member, and the industry in which they will eventually work. It should be noted that several barriers to inclusion were also opportunities for inclusion, just viewed from a different perspective.

Conclusion

In summary, inclusion of professional skills within the design and delivery of a two-year technical education requires connection between all stakeholders to better build capacity and strength for graduates entering work. Students will benefit from the knowledge of their faulty members and the expectations of industry partners. Additionally, planning the curriculum from the

start of the program would greatly benefit the faculty member and student with enhanced learning outcomes and skills that can be transferred from industry to industry across a lifetime.

Professional skills are complex and can be difficult to teach and assess; therefore, the identification of specific skills by multiple stakeholders may provide an integrated approach to establishing which skills are needed for which profession. The ultimate goal of education is to provide graduates with both the technical and professional skill development needed to be successful in their first and last career choice.

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