AC 2011-563: ACADEMIC PREPARATION IN A CO-OP PROGRAM AS A CAREER ENHANCEMENT TOOL FOR INTERNATIONAL ENGINEERING GRADUATES

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Academic Preparation in a Co-op Program as a Career Enhancement Tool for International Engineering Graduates in Canada

Co-operative education programs in North America have their origins in engineering schools, beginning with the University of Cincinnati in 1906, and in Canada, at the University of Waterloo in 1957. Today, Canada provides one of the most widely developed co-op models in the world, with over 80,000 co-op students enrolled in 83 Canadian institutions in 2009[1]. A co-operative education program is defined here to include one or more paid work terms that post-secondary students fulfill as part of their studies. Participating in co-op programs has been shown to offer numerous benefits related to career advancement in the engineering profession[2] [3] [4] [5], including the acquisition of both technical and non-technical skills. However, despite the early and enduring relationship between engineering schools and co-op programs, some groups continue to be underrepresented in engineering education and practice. In terms of its ability to attract those from under-represented groups, including women and Aboriginals, the profession lags behind others, including law, medicine and dentistry. In addition, international engineering graduates (IEGs) face barriers in having their foreign credentials recognized and achieving full entry into the Canadian labour market[6] [7] [8] [9] and thus also remain under-represented in the engineering profession.

In North America, an aging population along with increasing immigration has created greater diversity of employees within the workplace, a trend that is likely to continue[10]. Currently, Canada receives 200,000 – 250,000 immigrants a year[11], an increasing percentage of whom are holders of postsecondary qualifications[9]. Immigrant professionals undergo challenging adjustments not only to a new society, but also in finding work in their respective fields. IEGs face similar obstacles to women in their efforts to integrate into the engineering profession in terms of being outsiders to established professional networks. The challenges IEGs face, however, are complicated by cultural and language based differences, often manifest in unfamiliarity with formal and informal professional processes (e.g. licensing) and practice norms, and thus leading to isolation and failure to achieve licensure in their newly adopted countries. [6] [8] [9] [12]. In addition to language differences, real or perceived discrimination becomes another barrier for immigrant professionals, including IEGs, seeking employment[9]. Furthermore, depending on the country of origin, the ease with which relevant work can be found varies. Professionals emigrating from English-speaking countries, including the United States and the United Kingdom, typically face fewer obstacles in having their credentials recognized and integrating into the workplace than those from other parts of the world[13]. Paradoxically, the Canadian need for immigrant professionals to contribute to the economy remains unmet due to the difficulties that internationally educated newcomers experience.

In Canada, registration (licensure) with the engineering regulatory body (or engineering association) is a legal requirement to practice professional engineering. Each Canadian province or territory has an engineering association that regulates engineering practice in its jurisdiction. Engineers Canada, the national federation of provincial regulators, works to ensure consistency between provincial registration requirements, as well as inter-provincial mobility of licensed professional engineers.

Canada is a signatory to the Washington Accord, an international agreement that establishes reciprocity in professional engineering licensing processes between signatories to the Accord, which include the United States and United Kingdom. However, most immigrants to Canada do not originate from Washington Accord countries. For these immigrants, the traditional pathway to licensure in engineering consists of a review of all prior engineering credentials by the engineering association and an assignment of confirmatory exams to be administered to the candidate by the provincial engineering regulatory bodies. The confirmatory exams are assigned from the applicant's engineering discipline and represent technical subject matter typically found in the last two years of an undergraduate engineering degree program in Canada. Data from the engineering association and IEGs themselves report the process to be time-consuming, costly, and having a high attrition rate. Additionally, IEGs perceive the additional requirement of completing one year of Canadian engineering experience to be eligible for licensing as largely unfair[14]. While few published studies exist on the adaptation of immigrant engineers in Canada, pronounced feelings of isolation and marginalization have been anecdotally reported among IEGs engaged in the traditional licensing route[12] [15] [16]. With increasing immigration and a higher proportion of immigrant professionals entering Canada, governments are urging all professional regulatory bodies to develop alternative licensing pathways that are time-effective, fair, transparent, and consistent. These priorities have recently been formalized in legislation which established legislation and offices of a provincial Fairness Commissioner in two Canadian provinces, including the setting for this study, to ensure immigrant professionals have reasonable access to regulated professions.

Formal recognition of foreign credentials, resulting in professional licensing, has been identified as a critical enabler of career development in IEGs[8] [14] and is accepted within the profession as a necessary credential for career advancement and mobility. However, little research to date has examined the nature and impact of cooperative education on the integration of IEGs into the Canadian engineering profession, more specifically regarding how such programs can facilitate soft skill competencies deemed so critical to engineering success. Soft skills encompass non-technical professional skills used in everyday engineering practice and are critical to career development. These competencies include not only the skill itself, but also the norms and values inherent in the North American manifestations of concepts of, for example, teamwork or communication skills. As such, a conjecture is that soft skills may include a distinctly cultural component in which immigrant professionals need to develop competency, for career success. This paper presents data from a larger study investigating the influence of cooperative education programs on the career paths of IEGs, what can be done to capture their positive effects from educational, professional and societal standpoints, and how such programs can positively impact the career development of all under-represented groups in the field.

Background and Setting

Among the many theories regarding the low numbers of women and under-represented groups in engineering, one of the most potent explanations centers on the role of cultural capital, and more specifically how it manifests itself within engineering. Cultural capital, first formulated by French sociologist Pierre Bourdieu, refers to the different sets of cultural and linguistic competencies that individuals learn by way of socialization and which are influenced by the class location and other aspects of the social position of their family[17]. These competencies are

assigned certain social values and status in accordance with what the dominant class labels as the most valued cultural capital and are a major force in the construction and transmission of gender, race, and class stratification. Hence like economic capital, cultural capital tends to be controlled by, and serve the interests of, the most powerful class in society[18]. Examples of distinctive cultural knowledge include skills, manners, norms, and dress[19].Linguistic capital is a more specified form of cultural capital which refers to mastery of and relation to language, and encompasses subtleties of accent, grammar, spelling and style. Within the engineering profession, linguistic capital encompasses language fluency (vocabulary, grammar, syntax) but also includes understanding of the tacitly understood norms of professional communication, for example written letters and email, interacting with colleagues and supervisors, communicating with clients, and navigating conflict situations[16].

Closely related to cultural capital is the notion of social capital which can be defined as "the ability of actors to secure benefits by virtue of membership in social networks or other social structures"[20]. Social capital is the accumulation of resources based on networking and social relationships that translates into an individual's access to employment, mobility through occupational ladders, and entrepreneurial success. At professional and managerial levels, social networks are important in allowing members of the group access – and in preventing non-members access – to information and advancement opportunities. Through informal networks, individuals are able to learn about the predominant organizational culture and become known in a broader context than is usually afforded by everyday workplace interactions. Exclusion from these networks is particularly detrimental when an individual is a minority surrounded by a dominant culture that he or she does not fully understand.

Within engineering, both at the academic and professional levels, the notions of cultural and social capital take on particular significance for women and under-represented groups. Both groups are historical outsiders to what has been termed the 'culture of engineering' – the pervasiveness of largely male, white and privileged patterns of values, norms, and interactional styles in engineering that emanate from the military origins of the profession[21][22] [23]. As a result of their accumulated advantages which include hands-on tinkering and a societal approval for their fascination with technology, young men receive positive socialization experiences for a career in engineering. Through time, male engineers adept at the dominant culture, cultivate an interactive style that involves aggressive displays of technical ability, self-promotion and self-confidence.

In contrast, women and under-represented groups historically have faced significant barriers to penetrating the culture of engineering and achieving professional success due, at least in part, to their lack of access to and acquisition of valued forms of cultural and social capital[21] [22] [23]. Similar obstacles exist for immigrants from racial and ethnic backgrounds different from the dominant culture. For example, Friesen[12] [16] examined experiences of international engineering graduates enrolled in a program to assist in their integration into the engineering profession in Manitoba. She found that their outsider status in terms of cultural knowledge and lack of access to engineering networks within Canada were larger obstacles to achieving professional integration than were their technical competencies as engineers.

Increasingly the value of non-technical professional skills alongside technical proficiency has been stressed as seminal to success in the engineering workplace. Several studies have documented the value of cooperative education programs in terms of both academic and employment related outcomes, highlighting the professional benefits for participants [3] [19] [24]. Researchers argue that the structure of such programs provides students with organizational and cultural experiences that facilitate mastery in such areas as oral communication, professional ethics and working in multidisciplinary teams in forms or styles that are recognized and rewarded by the profession. Thus, students who participate in engineering co-op programs in a North American setting become conversant not only with the knowledge of their discipline, but also with culturally appropriate conventions for communicating that knowledge.

Cooperative education work experiences may also provide a head start in helping the engineering student establish patterns of mentorship and networking, which also have been deemed pivotal to engineering success. For both women and under-represented groups who are effectively outsiders to the culture of engineering, such experiences yield promising potential for career development. Follow-up interviews with women participants from Ingram's 1997-1998 study who began working as in engineers-in-training (graduate engineers) revealed that cooperative education, internship and summer employment programs played a significant role in boosting their self-confidence, assertiveness and sense of belonging in the profession [25]. Subsequent research [26] [27] highlights the experiences of practicing women engineers who benefited from an investment in the development of social capital as well as those who lacked such opportunities and the career deficits they perceived as a result.

More recently, in an industry-based study of male and female practicing engineers at four Manitoba companies [5], Ingram, Bruning, and Mikawoz found in their mixed methods investigation that while male and female engineers both reported benefits from educational work experience with their current employers in the form of cooperative education, internship and/or summer work programs, women's professional gains appeared to surpass the men's. Women with prior work experiences with their current employers rated their mentor's knowledge of the business/profession higher than those women without that experience and it was rated higher than men's similar perceptions [28] [5]. Data point to a growth in self-confidence, increased mentoring opportunities, and the development of social capital among female engineers, particularly those who had participated in prior work experience programs with their current employers. In-depth interviews with women revealed that through such experiences, their opportunities to invest in mentoring and networking increased significantly and contributed to their potential for advancement [4].

These results suggest that educational work experience programs may allow women the opportunity to 'scope out' their potential employers early on and cultivate soft skills through mentorship and networking. Thus, early exposure to the culture of the organization may lead to more informed, strategic decisions on key players, improving women's opportunities for integration into the culture of engineering. Building on these results which speak to the influence of educational work experience programs on the career development of women in engineering, we explore the potential for similar outcomes for international engineering graduates. By focusing on IEG participants' perceptions of a cooperative work term component as one aspect of a university-based qualifications recognition program in which they were enrolled, we sought

to learn how IEGs incorporate this information to achieve a fuller and more successful integration into the engineering profession, as well as what barriers still lie ahead.

The site for this study was the Internationally Educated Engineers Qualification Program (IEEQ) at the University of Manitoba. The University of Manitoba is a research-doctoral institution, offering degrees in civil, mechanical, electrical, computer and biosystems engineering to an undergraduate enrolment of approximately 1100 students. Developed in 2003, IEEQ is a qualifications recognition program that provides an alternative licensing pathway to IEGs and is recognized by the provincial engineering association, the Association of Professional Engineers and Geoscientists of Manitoba (APEGM) as leading to IEGs' professional registration in Manitoba. It was the first such program in Canada until 2007, when Ryerson University began offering a similar initiative. The IEEQ program responded to the need for a more time-effective, alternative licensing pathway with lower attrition rates to the traditional confirmatory exam pathway. In addition, a major motivation was to address the subtle, yet equally pervasive problem of social isolation reported by IEGs particularly in the form of a lack of access to engineering support networks, as well as to incorporate some form of labour market entry that the confirmatory exam pathway lacked[12] [15].

International engineering graduate applicants to the program, who are initially assessed by the provincial regulator, APEGM, and assigned five or less confirmatory exams, are eligible to apply to IEEQ as an alternative to confirmatory exams. They are also required to meet specific English language competency requirements and participants should be either permanent residents or Canadian citizens. The 12-month, full-time program is comprised of eight months of senior-level engineering courses, followed by a four-month engineering work term. The objective of the coursework is to confirm technical competency in the IEG's respective engineering discipline; the objective of the engineering work term is to gain Canadian professional experience and to begin to build a professional network. In addition to coursework and a work term, IEEQ also includes an explicit and ongoing focus on cultural orientation, language development, and professional networking opportunities. The work term is comparable to a cooperative education program in that IEEQ staff coordinate the placement of students into the engineering workplace where they fulfill a paid work term providing them with a Canadian engineering employment experience. Once participants successfully complete the IEEQ program, they are eligible to register with APEGM as engineers-in-training, placing them at a level commensurate with students graduating from an accredited engineering program offered at a Canadian university[12]. Upon a further demonstration of four years' engineering experience, of which three years can be pre-immigration (non-Canadian), IEGs are eligible for full registration (licensure) as a professional engineer or P.Eng.

Methodology

The purpose of this exploratory, qualitative study was to discover what IEGs identify as enabling and disabling factors within their co-op experiences relative to their longer-term career development in order to inform beneficial practices regarding the integration of IEGs into the professional workplace. The experiences of a single intake of IEEQ program participants during the academic year 2009-2010 were explored using data collected through focus groups, co-op work term reports, and program documents. With permission from the program director, who is

the third author of this paper, the first two authors who were the primary researchers approached the class of 23 students at the end of the academic term in April 2010 and informed them of the goals and intent of the study, inviting their participation. A focus group meeting was held with seven students who accepted the invitation just prior to beginning their co-op work term and then a subsequent meeting was held four months later, at the completion of their work term. One participant had not secured a placement until just prior to the second focus group meeting. Of the remaining six students, three were enrolled in electrical and computer engineering, one from mechanical, and two from civil engineering. In terms of country of origin, three were from the Philippines, one from China, one from Pakistan, and one from Algeria. They ranged in age from mid-twenties to early forties, and they had been in Canada from one to two-and-a-half years prior to starting the program in September 2009. The group consisted of five males and one female. The settings for their co-op work terms were varied and ranged from private consulting and manufacturing companies to public sector utilities.

Focus groups were also held with cooperative work-term employers of the participants for the purposes of gaining insight from an employer's perspective on both possibilities for and obstacles to IEGs' integration into the profession. Through an email invitation, four of the six engineering supervisors agreed to participate, and this meeting was held towards completion of the co-op work term. Focus groups are loosely structured gatherings of 4-12 people who engage in a discussion guided by the moderator. The primary advantage of a focus group is the ability for discussion to expand beyond the preconceptions of the researcher(s) and to provide data about key issues important to group participants[29].

Co-op work term reports from IEEQ participants fulfill a written requirement of the IEEQ program and are submitted to the program director upon completion of the work term. They describe the nature of the work carried out and are also a reflective account from the student's perspective of how the term fulfilled their professional and personal goals. Four of the six participants submitted co-op reports for our analysis. This study complied with the university's ethics review process ensuring respondents' anonymity, confidentiality and opportunity to withdraw without penalty, and was approved by the university's human ethics committee. Each participant in the research group has been assigned a pseudonym. For the purposes of this paper, we are reporting on preliminary results from data collected primarily from the first focus group session with students and from the course syllabus and required text for the course "Practicing Professional Engineering in Manitoba" (PPEM), a compulsory course in the IEEQ Program. The course text was consulted to follow up on participant references to the text content in the first focus group. Reported themes were supported by data from transcripts of the second focus group held with students and student work term reports.

Data from the focus groups was transcribed and together with co-op reports, this material was entered into NVivo, a qualitative data management and analysis software program, for coding, evaluation, and analysis. Both members of the research team independently coded the data and an open, unstructured coding approach was used in which codes were developed based on the concepts emphasized by participants through their comments and questions. The researchers then compared coding categories and discussed their interpretations until they reached agreement on themes. The next phase of coding was more analytical and the constant comparative method was employed to allow detailed findings to emerge in a clear and systematic manner[30]. Evidence was

examined for both common themes and differences across and between data files. In addition, focus group transcripts and a manuscript of this paper were returned to interview participants for review and comment through the process of member checking[31].

Results

During the first focus group session with IEEQ participants, the notion of cultural adjustment for IEGs to the Canadian work context was a pervasive theme. Much of the discussion focused on issues such as differences in communication styles with those in authority, levels of assertiveness in workplace interactions, and accepted notions of how to relate to mentors. Nonetheless, participants referred to receiving significant preparation for these potential challenges in their co-op placement through the IEEQ program and particularly through the PPEM course. The course was developed specifically for the IEEQ Program by the program director, who continues to deliver the course. Consistently, participants in the study referred to the course as "Marcia's course," referring to the program director. In addition to other objectives, the course helped participants identify and understand how cultural differences may become evident in the workplace and in business practices in engineering as well Canadian concepts in engineering law and engineering ethics. Students read and discussed an assigned text entitled *Managing Cultural Diversity in Technical Professions*[32]. Therein the author describes notions of high and low power distance, individualism, risk aversion, and context as they apply to the technical professions cross-culturally. Having been recently sensitized to these concepts through the course, the participants educated both researchers on their significance during the first focus group meeting and then used the language of the text to talk about their cross-cultural workplace communication experiences during their co-op placements in the work term reports and second focus group.

Laroche's[32] and Laroche and Rutherford's[10] work on the challenges faced by immigrant technical professionals in adapting to North American work cultures provides value in understanding the obstacles faced by IEGs in the engineering workplace. Derived from Hofstede's (1980) extensive study on categories of cultural comparisons, Laroche[32] applies these categories to the technical workplace in North American settings, providing the caveat that cultural generalizations cannot accurately explain individual situations, which are mediated by personality and organizational culture. The first category refers to power distance, which is a continuum indicative of the relative psychological space between individuals holding different levels of power in an organization. The 40 countries included in Hofstede's study spanned a continuum where at the low power distance end (low hierarchy), individuals strive for a highly democratic and interdependent society and at the high power distance end, society is organized in steep hierarchies with individuals holding clearly defined roles. Power distance dictates unwritten rules of appropriate behaviour and interaction specific to the given culture and affects how employers and employees relate. For example, in general, highly participative or low power distance cultures such as North America will expect high initiative from employees to begin and carry forward tasks with minimal initial instruction and ongoing guidance. In contrast, in highly hierarchical or high power distance cultures more representative of South America and Asia, employees will work only within a scope clearly defined by the superior. Here employees will know that going beyond the scope without prior instruction or approval to do so would be a sign of insubordination and disrespect.

Hofstede's distinction between individualistic versus collective societies offers a second category that further explains differences in behaviours and potential for misunderstanding[32]. In highly individualistic societies such as the United States and Canada, the individual is seen as the focal point of social relations. Society's priorities are thought to be best supported when rights and responsibilities are embedded at the level of the individual. Thus, individualistic cultures value personal accomplishment, autonomy, independence, and individual rights. In contrast, in highly collectivist societies such as Asia and South America, for example, the group (family, organization, tribe, political party, etc.) is seen as the focal point of social relations and the rights and responsibilities of the group outweigh those of the individual. Thus, collectivistic societies value the identity with, accomplishments of, and loyalty to the group. In engineering practice, information sharing is often mitigated by one's cultural position on the individualism – collectivism continuum. In the former environment, information is shared and provided on an as-needed basis; in a collectivistic context, information is shared extensively beyond those directly impacted by or in need of the information. This cultural continuum can be very evident in one's expectations of teamwork in engineering practice.

Two further categories are the continua of risk, ranging from cultures that are risk tolerant to cultures that are risk-averse (Hofstede, 1980), and context, ranging from high context and low context cultures[32]. Risk aversion and tolerance relate to the comfort level in a society towards the unknown. In highly risk averse societies, rules, structures, and norms are developed to moderate the level of uncertainty in daily realities whereas in risk tolerant societies, adventure into unknown terrain is tolerated with its accompanying mistakes or tangents. Rather than representing rigid rules, risk tolerance and aversion are nuanced behaviors in varied situations. In engineering practice, for example, one's risk tolerance determines the amount and precision of information required to move forward in decisions. Finally, context determines how people approach communication and personal interaction or rapport. In high context societies, people attend to the circumstances and cues around the message whereas in low context societies, the message itself is important with little attention paid to surrounding details. High context individuals will require relationship building and personal interaction as a preamble to conducting business, while low context individuals will often consider such endeavours to be wasted time, preferring to get right to the point with a colleague or client.

Building on these categories, Laroche[32] and Laroche and Rutherford[10] demonstrate that for immigrant professionals, adaptation to the workplace of their adopted country can be accompanied by potential for misunderstanding and miscommunication. Because cultural expectations differ on one or more of these continua, expectations and behaviors that are highly appropriate in one cultural context may be considered highly inappropriate, unprofessional, or incompetent in the North American context. In practice, differences in cultural frameworks may translate into lost opportunities for immigrant professionals, which could deter career advancement.

In an analysis of the barriers described by health care professionals from non-Western nations adapting to the Canadian organizational culture, Austin[33] describes a 'double culture shock' whereby there is a continuous negotiation on the part of newcomers not only to the country, but to the norms and practices of their profession. "Misunderstanding regarding critical Western-

democratic assumptions implicit in health care (such as partnerships vs. paternalism, interdisciplinary team work vs. hierarchical directives, and individualistic vs. collectivist ideals) may significantly compromise quality and pose unacceptable risks for both the professional and the patient" (p. 136) [33]. The culture shock experienced by non-Western educated health professionals results in feelings of anxiety, helplessness, or withdrawal, which may manifest in ways that are interpreted by those in dominant positions in the Canadian health care structure as incompetence, inexperience, or lack of initiative. Austin's study illustrates the potential for misunderstanding that can damage immigrants' self concept, professional practice, and possibilities for career advancement.

In the first focus group meeting, participants voiced their expectations regarding the upcoming work term experience, couching many of their concerns in terms of cultural and communicative differences between their home countries and Canada and how these might manifest themselves on the job. Three participants from the Philippines, which ranks as one of the most hierarchical countries in the world in terms of power distance[10], drew attention to some critical communication differences. Maria remarked,

> Yeah, like in Asia you call 'Sir, Madam.' Here, you're just like
> 'Hey ___ how are you doing?' There it's like 'Hi Sir, good
> morning.'

Another Filipino classmate, Carlos similarly noted how the two cultures approach work tasks in terms of supervisory directives and how much risk an employee is expected to take:

> And when it comes to work, North Americans are not very detailed
> when giving instructions. They will let you do what you think is
> right, yeah. Because if you are dealing with a high power, it's just
> like following […] their instructions, just doing what they want
> you to do, and you don't have the chance to give your ideas.

Participants were already making the link between more formalized communication patterns in their home countries and their ability to assert themselves and come across more confidently in the North American workplace. As Maria stated,

> I'd like to add like in terms of cultural [differences], I still have
> some thoughts on speaking up or challenging the manager. Like
> once he asked something, I still will ask 'how do you want it to be
> like?'....in terms of cultural [differences], because I'm younger and
> we grew up that we don't challenge our elder people, we just listen
> and we just we just do what they say…I just need more confidence
> really in speaking up and presenting ideas.

Her observations were confirmed by Carlos:

> Yeah, we came from the same country, so yeah that's how we do
> it. We have this respect on the elder people […] also we expect

more that, they know more than us, that's our perception…So yeah, that's what I'm confused until now - how to be assertive but not overdoing it.

Despite constraints associated with coming from cultures with higher power distance, participants demonstrated optimism about being able to navigate the cultural challenges that lay ahead. Much of their optimism was grounded in the preparation they attributed to the IEEQ program and from taking the PPEM course taught by the IEEQ program director during their eight-month academic term which they had just completed. As Manuel put it:

We know for a fact that we are technically very capable, just like we are. We are putting ourselves [out] just like a bird: we cannot fly without any air, so IEEQ's really our air so that we could fly.

Samir and Carlos stated outright that the PPEM course was extremely helpful. Samir noted, "The Marcia course that was, that one was very, very, very helpful for me." He elaborated that he might not have finished the IEEQ program had it not been for that course. Both the course content and the instructor were credited with supporting the students. Carlos noted the usefulness of course content in informing his interpersonal communication skills:

I believe that I am more prepared right now than eight months ago because as I go back, I see a difference in how I integrate with my workplace. I learned lots of things in Marcia's class. So now, I know how to deal with my workmates, and I really understand now how to adjust to them because in my workplace we're almost as I call it United Nations because we are very very much culturally diverse.

In addition to being sensitized to cultural differences through the PPEM course and text, participants also articulated a sound understanding of the role of mentorship and networking in helping to establish a successful engineering career in Canada. Manuel asserted the value of this kind of relationship:

Mentorships are really important I guess for all of us, especially when we are engineers from other countries, just like a father guiding his children, right? I mean basically you know what's right or wrong. But we need some guidance from the elder ones.

While participants did not yet identify having formed informal mentorships, through the PPEM course the program director referred to a formal mentorship program offered by a provincial industry association of consulting engineering companies. At least one participant, Samir, enrolled in the program which provided him with invaluable knowledge on the profession:

They have a mentorship program, so I applied for it; they assigned me a mentor. He was extremely helpful, extremely, yeah really extremely helpful. He helped me a lot, and he was a very very

good reference for me, even for my job now. He was an excellent reference. So he helped me in the technical side. Like he really opened my eyes, and that helped or his assistance helped me to take personal decision[s] in my professional life...I had with [him] one session each month, and that was very, very helpful.

Samir's recent experience with mentorship in Canada contrasts sharply with how mentorship plays out in his home country:

For example, our culture of a mentor in Algeria, if you apply for a mentor and there is a mentor for you, he will do everything for you, even he will fill the form for you, so that's [how] we come with this idea here. So if you, if you are still thinking like this…He will decide even in your place, he will say 'take this and don't do that,' so you will do it, which is really not the case here.

The experience was worthwhile; Samir described adopting interactional behaviours that were more conducive to a positive North American situation. For example, he took initiative and came prepared to all meetings, unlike an internationally educated engineer friend of his who assumed a mentor would have an unlimited amount of time to chat over coffee:

When I went there I prepared two sheets of paper of questions: What's this; what about this, and this, and this. I gave [my mentor] the list to help me. Like, I showed him what I want, and he said okay I can help with this. But he will not, make decisions for you, and he will not tell you "do this and do this and do this" ... Yeah so if you take from his time, say one hour, it's really a lot of his time. Just the fact that he's volunteering and he gave you one hour he's willing to help you.

Samir came from a high power distance, high context culture in which long, informal conversations about issues not directly related to work would be considered appropriate, and where the initiative in the conversation would rest with the senior individual. His narrative illustrates that in a short period of time, he had made the shift to planning for a focussed, efficient meeting in which he showed appropriate initiative in the North American low power distance, low context environment.

Similarly, participants reported the PPEM course offered a head start on the networking process. A single class was devoted to the topic, and guest speakers including professors and others external to the university came in and allowed IEEQ students to interact and exchange information. Subsequently, a provincial engineering industry association and the provincial regulatory body held formal networking dinners in which IEEQ students were invited to attend. Those participants from the research group who attended described it as a beneficial experience in career development. As Carlos noted,

> Yeah because before, before I tried to apply for jobs but no one's calling me for interview like that. But when I attend the networking [event], I met lots of engineers there and we exchanged email addresses, telephone numbers, and then I started emailing them that 'I'm new here in Canada, I'm looking for a job that would open to me the engineering field here in Manitoba,' and I explained to them my situation, my background and even my resume. And then one replied in an email and he told me that there's an opening but I will also undergo the same process as the other applicants, so I applied.

The topic of networking sparked lively discussion in the first focus group. Maria gestured with animation as she said "Here is my card" indicating her recent efforts at a workplace young professionals networking meeting in trying to promote herself. Samir shared his experiences of networking through volunteering with a local food bank where he was first connected to the IEEQ program. Manuel and Carlos also appeared adept at using informal networking as a means to career development, reporting how they as classmates shared information on an advertised permanent engineering position. Both had been interviewed for it and at the time of our first meeting, were waiting for a response from the company. Asad described another type of networking through the Internet whereby he communicated with classmates from his home country who also immigrated to Canada and apprised him of job opportunities.

Two participants of the original focus group, however, seemed to have missed the opportunity for mentorship mentioned in class and discussed by Manuel and the others in the session. In addition, neither of these participants contributed to the discussion on networking. In attempting to understand their divergent experiences, we revisited the data, considering also the observation notes and the second focus group transcript. One characteristic in common which differentiated these two from the other participants was their lower English language fluency at least in oral conversation, relative to their focus group peers. When the issue of employability and the value of the IEEQ program from the employers' perspective was raised in the first focus group session, Dimitri suggested that success in co-op placement was related to other factors than having completed the IEEQ program and Qiang felt his engineering specialization was difficult to match given the available co-op positions within companies. Dimitri had just begun his placement at the time of the second focus group and although Qiang reported a satisfactory co-op experience, he indicated that he had no mentor in his placement. These experiences stand in contrast to the overwhelmingly positive ones shared by the other participants and are important to consider when reflecting on the influence of the co-op program on the career paths of IEGs.

Discussion and Conclusions

The primary research question addressed in this study explored what IEGs identify as the disabling and enabling factors within their co-op experiences, relative to their long-term career development. In discussing their expectations regarding the co-op placements, focus group participants identified challenges they perceived they would face in adapting to a Canadian workplace environment. These challenges however were not linked directly to the co-op term nor to the IEEQ program overall; rather, they represented situational realities faced by IEGs seeking

work in a new country. More specifically, as their comments illustrate, the most profound obstacles they expected to encounter were those that relate to cultural norms and interactional styles unique to the North American workplace. Clearly, in terms of cultural capital and more specifically linguistic capital, as evidenced by differences in greetings and interactional styles, participants were highly aware of their lack of facility in these more subtle, yet influential areas of career development. Furthermore, Laroche[32] and Laroche and Rutherford's[10] application of Holfstede's distinctions between high and lower power distance cultures, individualism vs. collectivism, risk aversion vs. tolerance and high and low context cultures received significant support through this study. As the excerpts from the first focus group meeting reveal, IEGs approach the Canadian engineering workplace with established forms of cultural knowledge that in many cases differs dramatically from the dominant culture.

Nonetheless, despite these potential constraints, enabling factors were found which were linked directly to the IEEQ program, and particularly the PPEM course. For example, the exposure participants received to cultural concepts through the course text and the opportunities to engage in mentoring and networking even prior to their co-op placement appear to have provided many with a head start in the development of social capital, an equally significant counterpart to cultural capital in developing engineering career success. The enriched benefits of academic preparation prior to the co-op work term have been recently pointed out by Fifolt and Searby [34] in terms of establishing the beginnings of soft skill training and mentorship exposure.

Moreover, being part of a program in which they could safely discuss differences and feel supported by their instructor and program staff and peers, may help to ameliorate feelings of isolation and marginalization reported by Friesen[12] [15] among IEGs involved in the traditional licensing pathway. Implied in the data was that an *awareness* of cultural differences and expectations – as a precursor to developing competency in the cultural expectations and norms of the Canadian engineering profession – was an enabling factor in the co-op work experiences and ongoing career development, mediated directly through their participation in the IEEQ Program. Thus, while women and IEGs as under-represented groups in engineering can both benefit from soft skill development opportunities and access to mentorship and networking, there is an important distinction between the two groups that this paper highlights. Internationally engineering graduates, unlike women undergraduates, are engineers with prior work experience in their home countries. Thus, it is not the lack of soft skills that is an issue for immigrants; rather, it is the unfamiliarity and/or lack of fluency with the Canadian expectations or manifestations of these soft skills.

A few limitations of this study should be noted. First, this paper offers findings from a preliminary analysis of data from primarily the first of two focus groups with a small number of IEEQ students and thus should not be generalized to others beyond this scope. Similarly, the experiences expressed by these study participants may not reflect common experiences of IEGs in similar programs. Perhaps those that volunteer for focus groups are also those who show above average initiative in other areas such as work settings as well. Accordingly, the awareness of cultural differences as they impact the workplace and of mentorship and networking in Canadian work contexts as reported by this group may not be shared by other IEEQ students. Conducting one-on-one follow-up interviews with study participants could investigate the singularity of these perceptions and provide a richer understanding of the professional immigrant

experience in adjusting to the Canadian engineering environment. In addition, conducting more focus groups with other IEEQ participants could reveal themes that were not evident with this group. Finally, given this paper was based on a pilot study, more research will need to be conducted to substantiate the exploratory data. Such research could focus on the depth of understanding that emerged from this initial study.

As demographics and economic realities continue to affect the engineering workplace, effective communication and other soft skills are increasingly valuable as noted by other researchers[8] [35] [36]. Furthermore, addressing both the need for immigrant professionals to contribute to the economy and the underrepresentation of professionals such as immigrant engineers in the field seems attainable given the promising reports of most of the IEEQ students who participated in this study. Academic preparation in a co-op program that provides IEGs the opportunity to develop social capital through explicit instruction in cross cultural differences, mentorship and networking may be one successful avenue in reducing the barriers IEGs face in securing relevant professional employment.

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