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Practicum-Education Experiences: Post-Interns' Views*

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The practicum component in undergraduate education across all professions (identified by various terms such as 'internship,' 'field education,' 'clinical experience' or 'co-op education') is typically rated by pre-baccalaureate students as the most important phase of their entire professional preparation. In this investigation, which formed one segment of a broader cross-Canada study, a group of post-practicum Engineering students from one Canadian university (who had just completed an internship with engineering firms) identified the most positive and the most negative aspects of that practicum experience. The authors compared these students' responses with those reported by post-practicum students from two other professions: Nursing and Teacher Education. Several positive aspects were identified by all three groups of students, such as: developing their professional competence and technical skills, increasing their personal self-confidence, and gaining real-world experience. Some of the negative aspects that all three cohorts mentioned were: receiving unsatisfactory internship placements, experiencing inadequate mentorship, and being assigned unproductive work tasks. The authors contend that practicum organizers across all professional fields should exchange with one another and examine such student data. The student voice provides a valuable dimension to the program-enhancement process, the ultimate goal of which, is to improve the 'experiential learning' phase of professional pre-training in all fields.

Keywords: practicum; internship; experiential learning; field education; co-operative education; cross-disciplinary collaboration; student voice

INTRODUCTION

IN THIS PAPER, the authors summarize one portion of a larger, federally-supported, multidisciplinary research-project. The large study is examining the future state of the clinical or practicum phase of undergraduate education for the professions in Canada [1, 2]. However, in this present report, the authors synthesize the findings from that smaller part of the study conducted in 2006–2007, which was a survey of third and fourth-year Engineering students from various departments, who were completing their respective Bachelor of Science in Engineering (BE) programs at one Western Canadian university. The survey consisted of two simple questions, soliciting their views of the most positive and the most negative aspects of their Engineering internships that they had just completed. The authors related these findings to pertinent research in the recent literature, and they also compared and contrasted the Engineering students' responses with those solicited from post-practicum students in two other professional disciplines, namely, Nursing and Teacher Education.

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BACKGROUND TO THE STUDY

There is a looming shortage of adequately trained professionals in all fields, not only in Canada [3–5], but on a global scale [6, 7]. Society has determined that its post-secondary institutions should fulfil the mandate of preparing its engineers, teachers, foresters, health-care professionals, and social workers; but it also demands that the schools, which provide that training, should be held accountable for the quality of their educational performance. A key component of many professional undergraduate education programs has been the compulsory *clinical* or *practicum* or *internship* phase, in which pre-certified students are mentored as they develop their professional knowledge, skills, and values [8, 9].

However, Engineering is different, because in most Engineering disciplines, the four-year experience requirement for professional licensure is normally gained after students graduate. In fact, most jurisdictions place a limit of 6 to 12 months of pre-graduation internship or co-operative education experience that can be counted toward the required pre-licensure engineering experience. That is, Engineering internships and co-op education programs are not credited as part of students' academic records toward the Engineering degree, but only toward the later professional designation. On the other hand, teachers and nurses must complete the compulsory practicum phase, before they can receive their baccalaureate degrees and professional certification.

In any case, the foundational premise upon which all of these practice-based programs are based is that authentic and deep learning occurs when prospective professionals work at solving real-life problems encountered by actual practitioners in the field [1, 10, 11]. Historically, the practical components of these professional programs allowed students to spend a period of time in an actual practice-setting under the joint mentorship/supervision of both a practicing professional in the field and a university- or faculty-based advisor, who assisted the field-based personnel in the mentoring process [12].

With respect to professional pre-service education across the professions—including Engineering—the Carnegie Foundation [13] recently established a series of studies investigating the current state and future advancement of undergraduate professional-education programs. With respect to Engineering education, Silva and Sheppard [14] identified innovative strategies recognized to be effective in enhancing the teaching/learning process—such as expanding hands-on learning curricula, maximizing student-centered learning, and increasing cooperative-education opportunities. In 2006, Sheppard [15] further suggested that there needed to be a better connection between the academy and the professionals in the field ('negotiated agreements and partnerships between stakeholders on expectations and responsibilities,' p. 18). In this relationship, both stakeholder groups would collaborate to assist all students to consistently experience more authentic Engineering practice by learning to apply academic/theoretical principles to solve real-world problems from the field.

Of the 87 articles the authors retrieved from a recent online literature search related to the topics of engineering internship, cooperative education, or workplace learning, 23 (26%) of those articles dealt specifically with the positive aspects of the programs; three references (3.5%) specifically addressed negative aspects; three (3.5%) described both positive and negative features; and 58 articles (67%) discussed other topics connected to these practicum programs. These figures suggested either that the strengths of Engineering practicum experiences far outweigh their weaknesses, or that there may have been a deficiency in adequately identifying and addressing the negative facets of this experiential-learning phase of pre-service education.

Students' views of their professional education

An increasing number of universities in both the United States and Canada have been soliciting undergraduate students' views of their university experiences, gathered by means of the annual *National Survey of Student Engagement* (NSSE). Institutions have collected this student feedback in order to assess and improve the teaching and learning processes on their respective campuses [16]. Similarly, this interest in attending to the voice of students with respect to program assessment has emerged across Europe, as shown by initiatives to solicit undergraduate students' views regarding course impact at their institutions [17].

Higher education institutions in Australia have also been demonstrating leadership in this process by seeking to improve undergraduate professional programming, in that they began reporting on this initiative 12 years ago [18]. Several Australian universities have actively solicited and welcomed the perspectives of students, as part of the formal assessment of the entire undergraduate educational experience [19]. These institutions have deliberately incorporated these student data in program-improvement decisions [20].

In the literature search for this present research project, the authors identified three key sources of students' views regarding their practicum programs across the professions. Post-practicum students identified certain strengths and weaknesses that they saw simultaneously existing within their practicum or internship programs. One source reporting this 'positive/negative duality' was research regarding clinical education in the health sciences [21, 22]. Another source was recent research on practicum education in non-health-science disciplines [23]; and a third source was a body of research conducted several years ago regarding students' reports of both positive and negative aspects of the practicum in teacher education [8, 24– 26].

A general theme regarding the clinical/practicum component that ran through all of this literature was that students *in all* professions highly valued the hands-on learning they experienced within the practicum milieu but, at the same time, they indicated that certain adjustments were needed in order to improve this experiential-learning segment of their pre-service preparation. These recommended improvements often dealt either with resolving problems connected with human relationship/personality factors, or with ameliorating certain program/organizational difficulties.

The engineering internship

Engineering faculties in Canada and elsewhere typically provide students with an optional practi-

cum or internship experience, in which students earn a salary [7, 27, 28]. Several benefits of such Engineering internships have been identified for students, such as: applying and broadening their personal, professional, and technical knowledge and skills; developing 'foresightedness, sophistication, self-confidence, analytical competence, creative imagination, perseverance, and managerial skills' [29]; confirming their future career paths; and building professional relationships with peers, faculty, and employers. Rompelman and De Vries [30] confirmed these findings with their research on students in international internships.

These researchers also indicated that potential problems with Engineering internships could generally be averted if organizers would take certain precautions, which Peura et al. [27] had originally identified nearly 40 years ago. At that time, they advised practicum administrators to: (a) align assigned tasks with student developmental levels; (b) establish well-defined internship policies, procedures, expectations, and assessments; (c) employ a clear mentoring process delivered by adequately trained/prepared supervisory personnel; and (d) provide the necessary materials/equipment/resources to support students' projects.

On the basis of the authors' recent review of literature related specifically to this practical portion of undergraduate Engineering preparation, they have advanced the following propositions with respect to students' perspectives regarding their practicum/internship experiences.

1. Cooperative education and work placement internships provided benefits for all participants: for students [33, 34]; for employers [31, 35]; for faculties of engineering [32, 36], and for community organizations [37].
2. Although the number of research reports that identified positive aspects of Engineering internships far outweighed the number that discussed the negative features (by a 4:1 ratio), the former did specify occasional limitations in some practicum programs, such as: (a) certain administrative/organizational deficiencies [38]; (b) social/cultural concerns for international interns [39]; (c) questions of ethical conduct and fairness of treatment [40]; (d) a need to prepare mentors (faculty and field-based) to better integrate theory and practice throughout the entire undergraduate program [41]; and (e) a developmental lag in certain non-technical skills among some interns [42].
3. Although there was overall satisfaction with the internship process in undergraduate Engineering education, there were also calls to consider innovative strategies to enhance future practicum experiences, as suggested by the following authors. Sheppard [15], for instance, has recommended providing more problem-based learning, establishing improved communication between faculties and the field, and providing student practice in developing professionalism and ethical/moral behavior. Witt et al. [43] have suggested that students should also master non-technical skills (e.g., communication, team-development, problem-solving); Lee and Hung [44] and Lyons [45] have called for faculties to offer compulsory rather than optional internships; and Johnston [46] has proposed that Engineering students should experience interdisciplinary internships that involve legal and public policy issues, in order to become familiar with the juxtaposition of technology and politics in routine work.
4. The authors noted a conspicuous absence in the literature of topics related to the mentorship or supervisory process during the internship. However, the research was clear that students' mentors/supervisors did have a profound impact (either positive or negative) on the former's learning in the internship setting, and possibly on their future careers.

The authors contend that mentors in the clinical phase of all professional education should receive adequate preparation to implement a sound mentoring approach based on certain research-based principles, such as: providing 'personalized' supervisory instruction/guidance as required in each situation; encouraging mutual respect among all participants; listening to students and giving them effective feedback; serving as positive role models for students to emulate; providing peer support; acknowledging students' past experiences and their developing autonomy; and maintaining collaborative interaction [9].

METHODOLOGY

In 2006–2007, the authors administered an online print survey to 63 post-internship students from the faculty of Engineering at one Canadian university, who had at that time recently completed their internship or work experience programs with a variety of engineering employers from their respective disciplines. The survey posed two questions: *What for you was the most positive aspect of your practicum or internship experience?* and *What for you was the most negative aspect of your practicum or internship experience?* The authors followed all ethical procedures required by the university, and both the surveys assured student anonymity and confidentiality. No demographic data were permitted to be collected

Thirty-three students responded to the on-line survey (and two email reminders), which yielded a total return-rate of 52%. The authors used a mixed-method approach to analyze the written responses, by incorporating both qualitative and quantitative processes. They first collated and categorized the students' comments, then searched for emerging patterns and themes, using the constant comparison technique of analytic induction [47]. During this inductive analysis, they

continuously examined and re-examined the data, noting distinctions, observing for similarities and differences, and searching for regularities and/or common patterns or themes for both the positive and the negative categories [48]. Then, they quantitatively synthesized individuals' narrative responses to the two questions, by tabulating the total number (and percentages) of responses that fit into each emerging sub-category.

FINDINGS

In this section, the authors provide samples of students' comments to illustrate the key themes that emerged from the survey data. It was noted first, moreover, that almost every respondent from Engineering—as did the respondents from both Nursing and Teaching—identified both positive and negative aspects about their practicum experiences. However, the proportions of Engineering students' comments for each of the negative sub-categories were smaller than those for the positive aspects. This finding corresponds with the results that the authors identified in the Engineering-education literature, cited above, which tended to emphasize the positive facets of the work experiences more than the negative ones. By contrast, both the literature on Teacher- and Nursing-education and the preliminary results from the authors' recent research on the pre-service practicum appeared to identify a higher proportion of negative aspects reported by post-internship students [1, 2].

Positive aspects of the engineering internship

The authors classified the positive responses into the following five sub-categories, which they illustrated with typical comments written by respondents.

1. *Development of conceptual/technical knowledge/skills.* Sixty-four percent of the respondents rated most positively the opportunity they had to expand their disciplinary knowledge and skills. Two illustrative comments of this theme were: 'I applied the concepts I learned in school and strengthened them,' and 'I made good use of my engineering skills, and gained a lot of skills in communicating with other engineers and operators.'
2. *Gaining work experience.* Nearly half (48%) of the respondents wrote that the most positive facet related to the opportunity to participate in actual engineering work. Two sample comments were: 'I worked for an oil and gas company and had numerous opportunities to work hands-on in the field and learn how equipment is constructed,' and 'I liked getting practical experience and gained a taste of what I would be doing as an engineer in the real world.'
3. *Promoting future employment.* The third most positive aspect identified by 36% of the post-internship students was the advantage they gained in networking with professionals in the field and thereby helping secure a position after graduation. Two typical responses reflecting this theme were: 'It was positive to create a network of engineers and potential employers,' and 'I worked for an organization that hires graduates, and is known for hiring their past interns.'
4. *Developing self-confidence.* The fourth most positive feature was the satisfaction they gained in seeing an increase in their personal confidence. Illustrative comments in this category were: 'I gained significant confidence by the end of the internship experience,' and 'I have proof that I am as good as I thought I was. Going through school can make it easy to start to think that you're the same as everyone else you go to school with, and that it's going to be a super competitive market once you graduate. But my internship experience showed me that a good work ethic and common sense still rules.'
5. *Earning a salary.* Nine percent of the respondents referred to the fact that in the practicum they could earn money while learning. For instance one student wrote 'The money was good and the people I worked with were very nice,' and another stated 'I gained valuable experience while earning income.'

Negative aspects of the engineering internship

We identified six negative features of the Engineering internship from our analysis of the students' survey responses. In this section, we enumerate these sub-categories and provide illustrative comments for each.

1. *Receiving poor mentorship.* The most negative aspect of the internship experience identified by 25% of the engineering students was related to inadequate mentorship. Comments illustrating this theme were: 'The worst part was there was a lack of guidance and instruction;' 'Once in a while there was a lack of mentorship due to everyone's heavy workloads;' 'I was very inexperienced and I often found that people did not take the time to explain things to me unless I asked very specific questions. I also was not given very much responsibility, so I feel I did not learn as much as I could have;' 'The most negative part was 'the sink or swim' mentality of the company. They understood that students didn't know everything, but that didn't stop them from forcing me to take on projects that I wasn't ready for and did not have the proper skills to complete, simply to see if I handled the situation. Right before the whole project would go up in flames, they would finally step in and provide the missing data or the help I required;' and 'I needed to change mentors part way through my internship, because the individual I was with was not prepared to take the time to teach me. They left part way through my intern-

ship for a month long trip and then moved to a different group. It was a frustrating part of my internship experience.'

2. *Having unproductive assignments.* Twenty-two percent of the respondents wrote that the most negative aspect of their internship was that they felt they had been assigned too many un-motivating tasks that did not effectively promote their professional learning. Sample comments from this category were: 'There was a lack of interesting work for the first month;' 'I didn't have enough work to do;' 'It was the similarity of many of my projects;' 'Although everyone was eager to help you when you needed it, it was a very disorganized office, which made it very difficult to actually learn anything related to engineering;' and 'There was not enough engineering related work. The people assigning work to the interns gave too much photocopying and busy work, instead of giving a real learning experience.'

At this point in the discussion, the authors interject to draw attention to one key factor that warrants consideration when examining practicum-students' negative impressions of their experiences. This point relates to each student's unique stage of maturity and/or level of development, with respect to his/her then-existing professional and personal competence and confidence.

Previous research on adult career development indicated that learners progress through clearly identifiable phases or levels of readiness, as they are professionalized into their respective work roles and responsibilities. For example, in Engineering, Andrews [49] described this maturation process among beginning engineers; while in nursing, Benner [50] observed in her clinical-education research with student-nurses that they typically progressed through a hierarchy of five developmental stages ranging from novice to expert. Similarly, with respect to Teacher Education, other researchers [51–53] identified a series of overlapping developmental steps that teacher-candidates typically encountered as they advanced in their professional growth.

On the one hand, many mentors believe that their protégés should learn not to complain or to blame others when difficulties inevitably arise, and that they must struggle to negotiate their way through these situations Yet, on the other hand, research on effective supervision and mentorship has also shown that if/when mentors receive appropriate training to help them adjust their supervisory styles to match the specific developmental needs of their protégés, then many of the mentor–mentee conflicts that are felt to be normal (e.g., 'We had a personality clash,' 'She is just plain ignorant,' or. 'He is so stubborn/intransigent') are actually caused by supervisory negligence and can be averted [54].

3. *Prolonging the program.* A third negative category that 16% of the students identified was that by participating in the internship, they had to extend the time-to-completion of their degree programs. Typical comments, here, were: 'I disliked adding an extra year onto my degree;' 'The only negative aspect I can think of is not being able to graduate with many of the people I started school with; however, this is very minor;' 'I could have graduated and been making much more money by the time it was all over;' and 'It meant I had to put off graduation. I can't wait for graduation.'
4. *Returning to campus.* Thirteen percent of the respondents reported feeling disgruntled with having to return to university to continue their classes. Illustrative comments were: 'I have found how much I enjoy working in the industry, and I am not as eager to attend school;' 'It was that I went away from school for 16 months, and then had to get back into regular school habits;' 'The change from working to school classes again was not so much negative as it was difficult;' and 'Coming back and applying for scholarships did not yield the same result after being away for a year that I thought it should. I did not think that my average was properly calculated after returning from internship.'
5. *Encountering unprofessionalism.* Six percent of the students reported that witnessing negative conduct among company personnel was the most distasteful part of their internship. Comments illustrating this theme were: 'There was a lot of office politics, which I found quite disheartening;' 'There was a lack of organization on the part of the division of the company I worked in. It felt as though they were hiring students for the sake of hiring students, instead of actually filling a specific role in the company;' and 'There was a fair amount of favoritism between employees and this seemed to be present with other employees whom I talked to.'
6. *Being placed in unsatisfactory positions.* Six percent of respondents reported disliking their internship placements. One student wrote 'I did not like having to relocate, then to having to return to the city;' and another stated 'It was negative being stuck in a small town for 12 months.'

Comparing engineering with nursing and teacher education

When the authors compared and contrasted these results from the Engineering-students' survey with the findings from the Nursing and Teacher Education cohorts, they found several similarities and differences. The differences, as expected, were related to the obvious content variations among the three disciplines; their respective bodies of distinct subject matter; and to particular organizational features unique to each field. For example, Engineering faculties in Canada make provision for their undergraduate students to parti-

cipate in non-compulsory internship or cooperative-education programs, in which the students are encouraged to seek paid employment with Engineering firms or organizations for one term or longer during their four-year program.

In these optional practice-based programs, pre-baccalaureate students gain paid work-experience in their field, and are mentored as they seek to develop/improve their professional and personal skills. Nursing and Education students, by contrast, are required to enrol in (and pay tuition for) a series of field-based practicum courses (with no salary remuneration) as part of the pre-service professional training.

There were several positive aspects of these practicum experiences that were identified by the post-practicum students in all three professional programs. The key strengths were that the clinical session or internship provided students with: (a) a setting where they engaged in the 'real-world' of professional practice in their respective disciplines; (b) an opportunity for them to apply the theory they learned in their campus coursework to the daily routines encountered by practitioners in the field; (c) a time to develop and/or refine their own professional competence and self-confidence; and (d) a locale where they felt welcomed by more experienced colleagues into the ranks of the organization, and began the process of becoming socialized into the culture of the profession.

By contrast, key negative aspects identified by the post-practicum students from *all* three fields regarding their practical-learning experiences were: (a) receiving inadequate mentorship from their mentors/supervisors (b) being assigned an inordinate number of trivial or irrelevant tasks; (c) experiencing a disjuncture between their campus-based coursework and field-based experiences; and (d) encountering various problems regarding the administration, organization, or delivery of the internship program.

CONCLUDING COMMENTS

These findings, taken in the context of the relevant literature both from Engineering education and from the broader research related to the practicum in the professions, have confirmed four key points. First, post-internship students in all three professions readily identify similar sets of strengths and weaknesses characterizing their practicum programs. Second, these students can provide reliable evidence about the daily operations of the practice-based programs. Third, the value of students' judgments has not only been validated by previous research within their respective fields, but the authors believe that these data have potential to help inform practicum-administrators' program decisions across the professions.

A fourth element prominent in the data from the three fields was related to mentorship problems or inadequacies. One mentorship model that has shown promise in resolving many of these supervisory issues mentioned by the respondents was *Contextual Supervision* [54–56]. Other writers have encouraged interested practicum personnel to consider employing the Contextual Supervision model within their internship programs, in order to help reduce or remove some of the mentoring deficiencies that were identified in the students' feedback reported in this present article [57].

In conclusion, the authors of the present study concur with Borg and Gall [58], who asserted two decades ago that research subjects are as important as researchers are, with respect to interpreting outcomes of studies in which they participate. However, a crucial issue at stake, here, is that practicum-education organizers in all professional fields should seek ways to exchange the type of interdisciplinary data and their implications that were reported in this article. In the authors' view, the time is overdue that internship/practicum leaders from all professions, should not only collaborate in conducting such research, but should actively share their findings—both *inside and outside* the traditional boundaries of their fields.

Such has been the purpose of this article.

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