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Undergraduates' Understanding of Skill-Based Learning Outcomes: Can e-Portfolios Help?

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Executive Summary

Context

In recent months, there has been much discussion in the media and among academics about the skills acquired by Canadian university graduates. The issues being raised are threefold. The first concerns the question of *whether Canada is facing a "skills gap"*. While the Conference Board of Canada (2013a) has argued that we definitely are (and that the long-term economic consequences will be severe), reports by economist Don Drummond and TD Bank indicate that the skills gap is largely a myth (TD Economics, 2013; Goar, 2013). Others have indicated that current discussions about a skills gap often lack an appropriate level of specificity, making it difficult to assess the merit of these arguments or to generate potentially necessary solutions (Weingarten, 2013).

A second and related issue concerns *the process by which young people should acquire job-relevant skills*. Though businesses lament the fact that new university graduates are not "job ready", many in the postsecondary sector agree with remarks published by Wilfred Laurier President Max Blouw, who indicated that training at this level of specificity is not the domain of universities. Instead, he argued, universities are charged with developing a collection of generic or transferable skills (e.g., communication, critical thinking, and teamwork), and job-specific training needs to come from employers when new graduates are hired (Blouw, 2013).

If universities are indeed responsible for fostering the development of transferable skills, then it makes sense to consider the third issue that is currently being debated; namely, *whether university graduates are developing the transferable skills that university administrators and faculty claim that they are*. This question has led to an ongoing discussion about whether and how best to measure such skill-based learning outcomes among university graduates (e.g., Council of Ontario Universities, 2013; Lalancette, 2013).

The Current Study

Taking this broad-based public discussion as a starting point, we argue that there is a fourth issue that can and should be addressed with regard to university-acquired transferable skills. This issue has students squarely at its centre and is associated with questions such as, *To what extent do university students understand what transferable skills are? How well are they able to connect their university learning experiences to the development of these skills? How well can they articulate their skill-based learning?*

To date, this student-centred perspective concerning the development of transferable skills has been largely absent in public discourse and in the broader research literature. We argue that this is an important oversight for at least two reasons. First, if undergraduates fail to understand the skill-based learning associated with their university experiences, then they will be less likely to recognize the important skills being developed through them. Second, from a pragmatic point of view, if students cannot articulate their skill-based learning and if they are unable to understand how it is fostered through their learning experiences then they will be at a disadvantage in leveraging these skills when they enter the job market. This is likely to be particularly true for undergraduates studying in disciplines in which there is no associated career path, with learning outcomes that have been predefined by a governing body (e.g., those studying general arts and science subjects).

Method and Results

Third- and fourth-year psychology undergraduates (N=142) from Brock University participated in this study. The first part of the present study offers some descriptive data that bear on the question of what undergraduates understand about the transferable skills gathered during their degree and their ability to articulate these skills. Specific research questions were:

- To what extent do undergraduates feel that skill-based learning outcomes (SBLOs) are being emphasized in their university courses?
- What SBLOs do undergraduates feel they have developed during their degree?
- How do undergraduates define some of the well-established SBLOs articulated by employers and university administrators (e.g., critical thinking)?
- How effective are undergraduates in providing evidence to support their acquisition of SBLOs?

Overall, we found that the students in our sample reported that their instructors were not emphasizing skill-based learning during their courses. In keeping with this finding, they also self-reported that they had thought relatively little about this aspect of their education. Asked to name ten skills they felt they had developed during their degree, many students focused on communication, as well as interpersonal and organizational skills. Far fewer mentioned critical thinking or leadership, a worrisome finding given the importance that potential employers often place on these two skills.

Students' definitions of five key transferable skills (communication, teamwork, leadership, critical thinking, research/project development) were also noteworthy. Broadly speaking, the definitions provided were of two types. The first, which we refer to as "what" responses, appropriately explained the competencies associated with the skill (i.e., what the skill is). Examples included such responses as "communication is about writing, speaking and listening", and we considered these to be appropriate definitions of the skills in question. Unexpectedly, though, a large proportion of student responses were unrelated to a definition of what the skill was and instead focused on how the skill should ideally be executed ("how" responses). For example, when asked to define communication, a common "how" response was that it needed to be clear and concise. Given these findings, we should not be surprised to find that the undergraduates in this sample had considerable difficulty when asked to provide solid evidence to support their skill-based learning. Even when provided with a template for their answers (students were asked to explain the learning experience, their actions that connected to the skill in question and the result of those actions), students struggled to provide good examples that gave clear evidence that they had developed the skill in question.

The second part of this study investigated whether exposure to a skill-based e-portfolio would impact on two outcomes that were believed to relate to an understanding of skills. The first was an evaluation of course-based assignments in terms of their relevance to the students' career path. The second was their ability to extract the most valuable learning experiences to be leveraged by a hypothetical psychology graduate applying for two specific jobs. Specific questions related to this part of the study were:

- Can a brief e-portfolio intervention designed to raise awareness about SBLOs assist students in seeing that university assignments foster transferable skills, and are therefore relevant to their career development? (school-based outcome)
- Can this intervention improve students' ability to identify key learning experiences that should be leveraged when applying for a job? (job-based outcome)

We hypothesized that students who were exposed to the e-portfolio prior to the outcomes would perform better on these outcomes than those who completed the outcomes before the e-portfolio. Contrary to our expectations, we found that the e-portfolio intervention (which included listening to a series of videos that introduced the concept of skill-based learning and completing a portion of a skill-based e-portfolio) did not have any impact on either the school- or job-based outcomes. We suggest that the most plausible reason for

this is related to the fact that an e-portfolio is more likely to be effective if it is developed over the course of the degree program. Its use in a "one-time only" situation such as this project (or, indeed, as a last-minute undertaking at the end of a degree) is unlikely to have the impact on student thinking that is necessary to see changes in the way that they view their course assignments, or their ability to effectively address questions that link students' skills to potential jobs.

Conclusions

Our findings suggest that while the students in the current sample had some understanding of the transferable skills that are developed over the course of the undergraduate degree, their ability to define and articulate their learning with respect to these skills was limited. We would like to stress that this overarching finding does not imply that these students have not learned these skills; our data cannot speak to this question. Instead, we believe that our findings highlight that the acquisition of transferable skills and the ability to articulate those skills may be separate, and possibly quite unrelated, constructs.

While there may be several explanations for our finding that students struggle to communicate their transferable skills, we believe that several points are important to consider. First, students' difficulty in this regard is likely linked in part to the fact that skill-based learning is not often discussed explicitly in university courses, which are typically focused on disciplinary content (Berdrow & Evers, 2011). Second, most university curricula are not structured in such a way that students have opportunities to think integratively about skills over the course of their degree (Huber & Hutchings, 2004). This is important because transferable skills such as teamwork and critical thinking often develop over multiple learning experiences, rather than within the boundaries of a single course.

How, then, might we go about improving undergraduates' ability to talk about the transferable skills of interest to employers? We believe that such improvements are most likely to occur with a "skills across the curriculum" approach, in which undergraduates are exposed to ideas and concepts related to skill-based learning throughout their degree program. Exposure will ideally begin early, in first or second year, and will be enhanced if all instructors discuss skills explicitly alongside the course content. To foster a deep appreciation of skill-based learning, however, those responsible for curriculum development need to build designated spaces into programs that allow students to reflect on how their skills are evolving through curricular and co-curricular experiences, and to evaluate their skill set in relation to that which they believe they will need in their desired career. Such spaces should occur regularly over the course of the degree, rather than during a single capstone course just prior to graduation. Preliminary research (Martini, 2013a) suggests that scaffolding may be necessary in the early stages of student learning to assist students in seeing connections between their learning experiences and the skills that are being developed. Such scaffolding may also be of some help in demonstrating how to think integratively about skill development: students may initially need help to see, for example, how their paid jobs and university coursework are building transferable skills in complementary ways. We believe that allocating places in the curriculum for such learning to take place has the potential to pay great dividends, as students would be in a stronger position to extract more from their significant learning experiences and would be better able to leverage their skill-based learning when entering the labour force.

Background and Literature Review

With both universities and the general public demanding greater accountability of universities, there has been an increased emphasis on undergraduate learning outcomes (Miller, 2008). While some of these outcomes relate to the acquisition of discipline-specific knowledge, many are commonly described as "generic" or "transferable" skills (e.g., critical thinking, teamwork) (Crebert, Bates, Bell, Patrick & Cragnolini, 2004). To this end, the postsecondary education (PSE) sector in several countries, including Canada, has set about articulating skill-based learning outcomes (SBLOs) that are in keeping with the attributes employers are increasingly demanding of university graduates (e.g., Conference Board of Canada/CBC, 2013b; National Association of Colleges and Employers/NACE, 2012).

While much of the literature concerning skill-based learning has focused on the opinions of academics and employers (Matthews et al., 2013), the present study addressed *undergraduates' perceptions* of SBLOs developed during their degree. Specific research questions included:

1. To what extent do undergraduates feel that SBLOs are being emphasized in their university courses?
2. What SBLOs do undergraduates feel they have developed during their degree?
3. How do undergraduates define some of the well-established SBLOs articulated by employers and university administrators (e.g., critical thinking)?
4. How effective are undergraduates in providing evidence to support their acquisition of SBLOs?
5. Can a brief intervention designed to raise awareness about SBLOs (explicit discussion of what SBLOs are, followed by completion of a skill-based e-portfolio) assist students in seeing that university assignments foster transferable skills, and are therefore relevant to their career development?
6. Can this intervention improve students' ability to identify key learning experiences that should be leveraged when applying for a job?

Articulating the Important SBLOs

The process of defining key learning outcomes has been the subject of great interest among national and institutional organizations concerned with PSE, particularly in the UK (National Committee of Inquiry into Higher Education, 1997) and Australia (Bowden, Hart, King, Trigwell & Watts, 2000). More recently, however, this trend has also spread to the US and Canada (American Association of Colleges and Universities/AAC&U, 2008; Miller, 2008; National Institute for Learning Outcomes Assessment, 2013; Ontario Council of Academic Vice Presidents/OCAV, 2007).

In Ontario specifically, community colleges have long recognized the importance of clearly articulating SBLOs: For the past decade, Ontario's colleges have required that all programs incorporate a set of 11 essential employability outcomes, regardless of whether they have a provincial program standard or external certification (College Standards & Accreditation Council, 1995; Ministry of Training, Colleges, and Universities, 2005). Universities have been slower to embrace the idea of SBLOs, though some (e.g., University of Guelph, 2014) have outlined institution-specific SBLOs that reflect their own unique academic priorities and values. It is possible that universities' slower progress in the area of defining learning outcomes stems from the fact that many degree programs (i.e., general arts and sciences degrees) are not training students for a specific career path that requires certification or accreditation. Instead, they aim to teach general, transferable skills alongside discipline-specific content with the goal of educating graduates for a variety of potential careers.

While the articulation of university-specific SBLOs has moved slowly, it is worth noting that some accrediting bodies have laid out degree-relevant learning outcomes for undergraduates in specific disciplines (e.g., American Psychological Association/APA, 2013), and that the Undergraduate Degree Level Expectations

delineated by OCAV (2007) have provided an important contribution to this discussion.

It is also worth noting that across provincial and international boundaries, many of the SBLOs articulated by postsecondary institutions share several common features and correspond well with the desired attributes articulated by employers (e.g., CBC, 2013b; NACE, 2012). Skills that are typically included on these lists of desired graduate attributes include critical thinking and problem solving, teamwork, leadership and communication. Research, technical and numeracy skills are also sometimes noted, as is an appreciation for global diversity.

These SBLOs – often referred to as "generic" or "transferrable" skills – typically describe things that a university graduate ought to be able to do. However, employers are increasingly expressing interest in self-management skills (e.g., CBC, 2013b), which Bridgstock (2009) has defined as being related to "the individual's perception and appraisal of themselves in terms of values, abilities, interests, and goals" (p. 37). Desired attributes in this category include such things as being adaptable in the face of rapid change, demonstrating integrity and being comfortable with uncertainty (CBC, 2013b).

Teaching Undergraduates about Important SBLOs

Though PSE researchers have noted the importance of transferable skills for graduates who are entering the job market (CBC, 2013b; NACE, 2012), there is some evidence that instructors do not typically discuss SBLOs in the classroom (Cranmer, 2006; Evers, Rush & Berdrow, 1998). This is not to suggest that instructors are unaware of the importance of transferable skills, or that they fail to create opportunities for skill development in their classes. Indeed, the greater emphasis being placed on work-integrated learning experiences attests to instructors' growing concern that students develop a career-relevant skill set (Sattler, 2011).

Instead, we argue that university instructors are more likely to *explicitly* communicate with students about course content than they are about the skills they are attempting to foster through course-based assignments (Evers et al., 1998; Light, Chen & Ittelson, 2012). We argue further that instructors often assume that SBLOs will be developed *implicitly* across the degree if appropriate learning experiences are built into the course structure (e.g., if a sufficient number of instructors within the degree program include group-based projects, then undergraduates will develop teamwork skills).

There appear to be at least two potential problems associated with this belief about "implicit" skill development. The first lies in the questionable assumption that learning experiences that have the potential to build skills (e.g., improve teamwork) will actually accomplish this goal. For example, simply providing a series of group-based assignments over the course of a degree without any explicit direction with respect to the factors that characterize optimal team functioning or the strategies that might be enacted when a team is not working well together may not result in the successful development of teamwork skills. Instead, students may simply feel frustrated with such assignments, particularly if they perceive that other group members are not doing their fair share or are not listening to their contributions (Michaelsen, Knight & Fink, 2004).

The second problem with the idea of implicit skill development is more closely linked to the consequences for undergraduates when they approach the labour market. Specifically, when instructors fail to make students explicitly aware of the skills that their assignments are intended to foster, it is possible that students will focus exclusively on how the assignment furthers their understanding of content and will miss skill development as an intended outcome (Cranmer, 2006; Evers et al., 1998). There are two potentially important implications of students failing to grasp the career-relevant skills that can be developed through their university assignments. One is that even if students develop the intended skill implicitly, they will have difficulties communicating this aspect of their learning to potential employers because they have not developed the language associated with skill-based learning. This is of particular concern, given that interviews with potential employers are rarely focused on the student's understanding of disciplinary content (which employers often assume), but instead

emphasize the skill set that the student is likely to bring to the organization.

The second implication of these circumstances is connected to student engagement. Specifically, when faculty members fail to make explicit the skill-based outcomes of their assignments, they miss the opportunity to demonstrate the long-term relevance of the assignment to their students, particularly those who are less engaged with the course content. While many university assignments are designed to facilitate learning outcomes related to skills that can transfer to a variety of work environments (Hagerty & Rockaway, 2012), students often fail to make the connection between the transferable skills being fostered by that coursework and their long-term career-related goals. Without this connection, assignments whose content does not obviously relate to one's personal goals may be viewed as irrelevant, reducing the likelihood of student engagement.

In contrast, making students explicitly aware of transferable skills can have significant benefits for students' educational experiences. For example, Hagerty and Rockaway (2012) examined the effects of modifying a content-heavy, entry-level engineering course to emphasize critical thinking skills. Without modifying course content, these researchers demonstrated that simply asking students to reflect on critical thinking skills in the context of their coursework improved student performance and attitude. Providing a link to a transferable skill such as critical thinking allows all students, even those who do not have an intrinsic interest in the course content, to see the relevance of their efforts to other situations in their lives.

Assessing Undergraduate Learning with Regard to SBLOs

Institutional Perspectives

In the context of individual university courses, the focus of assessment is typically on students' mastery of disciplinary content. In contrast, many of the SBLOs desired by employers (e.g., teamwork and leadership) are assessed rarely (if at all). When SBLOs are evaluated during courses (e.g., a essay as a reflection of written communication; a project completed by a small group as a reflection of teamwork), the emphasis of grading is usually placed on the finished product, with little or no reference to the process that lay behind it. For example, students who complete an essay typically hand in only the "final" version for a grade; it is relatively rare that they would be asked to submit a first draft for comments and then work to revise the paper before submitting a final copy. Similarly, when group work is required as part of the evaluation in a course, instructors rarely grade students' efforts or improvement over the course of a semester with regard to demonstrating leadership within the group or their ability to function well as a team.

Put another way, there is typically little effort to assess students' learning with regard to transferable skills across individual courses. This lack of information is even more apparent when we move beyond the boundaries of a single course and consider the degree as a whole. In universities, assessment of learning outcomes across the undergraduate degree was discussed only rarely before the mid-1980s. At that time, the PSE landscape began to shift, with major PSE stakeholders asking serious questions about whether students were learning what they should while completing an undergraduate education (Hutchings, Huber & Ciccone, 2011). Parents also wanted assurances that the tuition money being paid to universities would yield job-related benefits for their university-bound children. Perhaps even more compelling for university administrators was the fact that cash-strapped governments began making demands that universities demonstrate that students were indeed learning the skills that they would need to begin their careers successfully and participate productively in society.

While criticism about student learning at university continues (Arum & Roksa, 2010; Bok, 2006), the past 25 years have brought about important shifts in learning outcomes assessment. Several scholars have noted the initial resistance of university faculty to the idea of assessment and the basis for their concerns (e.g.,

Hutchings, 2010; Miller, 2012). Motivated by feelings of being excluded from the assessment decision-making process, a dislike of assessment methods being proposed, a mistrust of how the data might be used and, to a lesser extent, frustration about a lack of resources to carry out such evaluations (Kuh & Ikenberry, 2009), faculty railed against the assessment movement. As Miller (2012) has noted, however, time has brought greater – although by no means universal – acceptance of learning outcomes assessment.

PSE assessments of degree-level learning can be carried out at two levels. On a broad scale, evaluations can be carried out at the level of the institution itself (e.g., Ontario's Institutional Quality Assurance Process); alternately, regular assessments of student learning can also be embedded within disciplinary curricula as a means of evaluating learning within a specific degree program. The tools employed in such assessments are diverse (Astin & Antonio, 2012; Banta, Jones & Black, 2010) and may include standardized tests intended to evaluate generic skills such as critical thinking (e.g., the Collegiate Learning Assessment tool; Benjamin, 2008; Shavelson, 2009), rubrics that have been designed to evaluate both writing and other skills (e.g., VALUE rubrics; AAC&U, 2008), and institutional e-portfolios (e.g., the Diagnostic Digital Portfolio at Alverno College; Ehley, 2006).

With respect to timing, degree-level learning assessments can be undertaken just prior to graduation or at multiple times during the degree. In terms of the former, institutions may carry out testing at the end of a university program to ensure that graduates have mastered the skills necessary to be successful in a given field. This approach of administering "exit exams" was adopted by the Organisation for Economic Co-operation and Development when developing the Assessment of Higher Education Learning Outcomes (AHELO) feasibility project (Lalancette, 2013). The latter approach is based on the "value-added" conception of learning outcomes assessment (Astin & Antonio, 2012). In this framework, the central objective is to examine change in undergraduate learning outcomes, with change assessed at the level of the course, program or the entire degree. As such, assessments must be minimally carried out at the beginning and the end of a degree program. Interim assessments are also possible, depending on the resources available within the department or institution.

The value-added approach acknowledges that growth is to some extent dependent on the student's standing and characteristics when they enter university (Astin & Antonio, 2012). In his Input-Environment-Output (IEO) model of assessment, Astin (1991; Astin & Antonio, 2012) advocates for the idea that effective measurement of learning outcomes can only be achieved with the collection of longitudinal data that allow educators to assess students' skills upon graduation (the "output") while controlling for the effects of students' abilities and characteristics when they enter university (the "input"). He goes further, though, to suggest that even these data are not sufficient to properly answer questions about the effectiveness of PSE institutions. To be truly effective, data that speak to contextual factors (i.e., the "environment", or the types of learning experiences to which students are exposed) are also needed to allow assessors to establish the characteristics of the educational environment that allow students to learn. The National Study of Student Engagement (NSSE) is sometimes carried out to this end at Ontario universities, with institutions targeting both first-year and graduating students as participants. Though the NSSE does not provide a direct measure of student learning or outcomes-based mastery, it nevertheless assesses the extent to which students are engaging in a number of experiences that are believed to be important in fostering effective learning (i.e., the environment; Kuh, 2009).

Regardless of the approach taken, one of the overarching difficulties that departments and institutions face when attempting to carry out assessments of student learning is linked to student buy-in (Hosch, 2012). When students see such assessments as being unconnected to their degree or as having little personal relevance, it is difficult to engage them in the assessment process. Participation rates may be low when such evaluations are voluntary, and scores may not accurately reflect learning when students are not motivated to put forth a strong effort on the test. For this reason, some researchers have noted the value of incorporating student self-assessments into the evaluation of SBLOs across the degree program (Hutchings et al., 2011) and purposefully seeking students' perspectives on their learning (Matthews et al., 2013). The present study was aimed at moving in the latter direction by having undergraduates articulate their understanding of SBLOs and consider the university-based learning experiences that have promoted the development of some of these

important transferable skills.

Student Perspectives

The literature concerning assessment of undergraduate learning outcomes is dominated by the perspective of academics and institutions. In contrast, students' views about SBLOs (including their understanding of what SBLOs are and how they can be fostered through university experiences and then transferred to work-related environments after graduation) have been represented relatively infrequently (Matthews et al., 2013). Where student views of learning are documented, they often reflect the learning that has occurred in a single course, rather than across a degree program (APA, 2013). The lack of students' perspective about degree-based learning in this literature is noteworthy, given that students are in a unique position to provide information that speaks to the degree of concordance between the curriculum that is *enacted* by faculty and the curriculum that is *experienced* by students (Erickson & Schultz, 1992). To this end, the relative absence of student input makes it difficult to "say with any certainty whether students have learned what academics are teaching" (AAC&U, 2002, p. 18). This concern is particularly relevant with regard to students' acquisition of transferrable skills (e.g., critical thinking; communication), which tend to develop across the curriculum rather than within the boundaries of a single course (Yorke & Knight, 2006).

In one of the few studies that has examined student views about undergraduate skill development, researchers at the University of Guelph (Evers et al., 1998) carried out a longitudinal sequential study that included two cohorts of current students from five Ontario universities (both an *early university* cohort and *pregraduate* cohort) as well as three cohorts of graduates: those who were just beginning their careers (the *job entry* cohort; 6-18 months out of university), and those whose careers were more established, divided into two cohorts (the *job change* cohort, which had been working for 2 to 6 years and the *stabilized* cohort, which had been working for more than 7 years). The original five cohorts were recruited in 1987 and were followed for three years, with new participants recruited in each category during the subsequent two years (1988 and 1989). This design thus provides both within- and between-group points of comparison (Evers et al., 1998).

Each cohort was asked to self-assess on 17 skills, which clustered into four base competencies when subjected to factor analysis (Evers & Rush, 1996; see Table 1). Whenever possible, workplace managers also used the same instrument to provide skill-based assessments of members of the three employed graduate cohorts. Across cohorts, managers' ratings of their employees corresponded well with the graduates' self-assessments.

Table 1: Four Bases of Competence and Associated Skill Sets (Evers et al., 1998)

Base Competency	Associated Skill Set
Managing Self: Constantly developing practices and internalizing routines for maximizing one's ability to deal with the uncertainty of an ever-changing environment	• Learning • Personal organization/time management • Personal strengths • Problem solving/analytic
Communicating: Interacting effectively with a variety of individuals and groups to facilitate the gathering, integrating, and conveying of information in many forms (e.g., verbal, written)	• Interpersonal • Listening • Oral communication • Written communication
Managing People and Tasks: Accomplishing the tasks at hand by planning,	• Coordinating • Decision making • Leadership/influence

organizing, coordinating, and controlling both resources and people	• Managing conflict • Planning and organizing
Mobilizing Innovation and Change: Conceptualizing as well as setting in motion ways of initiating and managing change that involve significant departures from the current mode	• Ability to conceptualize • Creativity/innovation/change • Risk taking • Visioning

Findings from this research project suggest that these four base competencies may be hierarchically organized, with skills from Communication and Managing Self being necessary prerequisites for developing competence in Managing People and Tasks and Mobilizing Innovation and Change (Berdrow & Evers, 2011; Evers et al., 1998). Perhaps even more important, though, was the finding that employers believed there to be greater demand for the two base competencies on which students and graduates consistently rated themselves most poorly – Managing People and Tasks and Mobilizing Innovation and Change (Evers & Rush, 1996). Further, while there were clear developmental improvements in scores for all of the base competencies for the two cohorts of students (early and pregraduate), the increases in scores were much more pronounced for Communication and Managing Self. In contrast, students' assessment of their skills related to Managing People and Tasks increased to a much smaller extent over the course of the degree and did not increase at all among the three cohorts of graduates (job entry, job change and stabilized). Self-assessment scores on Mobilizing Innovation and Change did not differ across the five cohorts. While the authors initially suggested that university programs may have less of an influence on this set of skills (Evers & Rush, 1996), more recent work suggests that there may be a small subset of degree-based learning experiences that can enhance students' standing on this particular competency (Desmarais, Evers, Hazelden, Schnarr & Whiteside, 2013). In particular, serving as a student "peer helper" who is responsible for helping other students to optimize their experience at various stages of the undergraduate degree has been associated with higher scores on Mobilizing Innovation and Change (Desmarais et al., 2013).

Student Perceptions about the Experiences that Promote Skill-Based Learning

During the course of a four-year degree, undergraduates clearly have many opportunities to engage in experiences that will promote and develop their skill sets. Indeed, George Kuh (2008; Kuh et al., 2010) indicates that some PSE experiences are particularly powerful in terms of promoting positive learning outcomes. These experiences, which he terms "high impact practices", tend to be connected to student behaviours that are strongly associated with learning, including investing time and effort, experiencing diversity, interacting with faculty and peers about substantive matters, reflecting and integrating learning, and grasping the significance of learning through real-world application (Kuh, 2008).

What are these high impact learning practices? In an influential monograph for the AAC&U, Kuh (2008) outlined ten learning experiences that have been demonstrated to promote a high level of learning for all students. These include: first-year seminars, common intellectual experiences, learning communities, writing intensive courses, collaborative assignments, undergraduate research, global diversity learning, service learning, internships and capstone courses. Two years later, in an article published in the *Chronicle of Higher Education*, Kuh (2010) went further and argued that the paid work that undergraduates engage in over the course of their degree also has the potential to be an impactful learning experience.

The latter view is gaining increasing acceptance. While the focus with regard to skill-based learning has traditionally centred on university coursework or the formal curriculum, greater attention is now being paid to the importance of learning experiences that students have in the co-curriculum (i.e., student experiences that reside outside the boundaries of traditional degree-related courses). Such experiences might come from work-related endeavours (e.g., part-time employment, volunteer employment) or through extracurricular activities (e.g., participation in varsity sports or student government).

An important question, though, is whether students' perceptions of the university experiences that promote significant learning align with those of researchers. Research that speaks to this point is somewhat limited; however, Bass (2012) reported that when asked where their most significant learning occurred while completing their degree, undergraduates were far more likely to note their co-curricular involvement than the formal coursework that they had undertaken (Bass, 2012). In a very small study addressing the same point, graduating psychology majors (N=32) were asked to report on the ten most significant learning experiences that they had had during the course of their degree, with the ultimate goal of connecting these experiences to the transferable and self-management skills that they had fostered (Martini, 2013a). Results were largely in keeping with Bass' (2012) assertion: Only 30% of the significant learning experiences came from coursework that comprised the formal curriculum (specific examples often reflected Kuh's high impact practices, including undergraduate research, co-op placements, service learning courses and study abroad courses); in contrast, 19% came from paid employment experiences, 17% reflected volunteer work and 10% concerned leisure or extracurricular activities (e.g., travel, playing sports). One surprising finding in these data was the relatively large proportion (24%) of learning experiences that were eventually classified as reflecting "personal development". Such experiences do not seem to appear in published literature concerning significant learning during university but were often connected to students' relationships with close others. Examples included coming out as gay or lesbian to one's family and friends, abandoning the religious beliefs with which one had grown up, managing the death of a close friend, parent or sibling, and dealing with the tensions associated with living in shared accommodations. Not surprisingly, these learning experiences were often subsequently connected with the development of interpersonal and self-management skills.

Assessing Student Perceptions of SBLO Achievement

While institutional methods of assessing SBLO development are clearly important, it is equally important that students have the opportunity to self-assess with regard to their skill set (Hutchings et al., 2011). Ideally, such self-assessments would take place not only as students approach graduation, but at regular intervals over the course of the degree. One of the inherent difficulties associated with such a plan is that it requires a coordinated effort on the part of the faculty members responsible for delivering a particular degree program, as they would be called upon to create a series of agreed-upon "spaces" in the overall curriculum designated for this type of self-reflection. And while there are clearly institutions that have single capstone courses that serve this purpose (see Berdrow & Evers, 2011; Martini, 2013a), degree programs that promote skill-based reflection at regular intervals are rare.

Having said this, there are some key advantages for students when faculty members are able to develop a degree program in which student self-assessment of skills is a regular experience. Ongoing skills assessments may assist students in seeing where their strengths and weaknesses lie with regard to those SBLOs that they view as important to their long-term career aspirations. Going forward in the degree, such an understanding is likely to help undergraduates select learning experiences that will allow them to work on the skills that they value but in which they view themselves as needing further development. Regular self-assessment of skills is also likely to be useful in helping students familiarize themselves with the language associated with skill-based learning, which may prove beneficial when they are called upon to interview for a position after graduation and have to articulate their skill set in clear terms.

There are a variety of ways in which students can self-assess their generic and self-management skills. One method is to use a simple self-report scale or checklist (e.g., Evers et al., 1998) that documents key SBLOs. Another potentially useful form of assessment might take the form of short written assignments in which students are asked to reflect on their skills. This reflection can take place in a number of forms, including journal writing and thought papers (Bean, 2011). For example, journal writing has been shown to help individuals by enhancing reflection, facilitating critical thinking, expressing feelings and developing more focused thoughts and arguments (Bean, 2011). More recently, some Ontario universities such as Brock, Ryerson, and York have also implemented software (e.g., Collegiate Link) that allows students to track their co-curricular involvement and write reflections concerning the significance of such experiences. Building upon this research, the present study looks at the application of an electronic portfolio (e-portfolio) designed to help

students reflect on and articulate in writing the skills they have gained through their university experiences.

e-Portfolios

E-portfolios utilize technology as a means of facilitating meaningful reflection on the learning that has taken place over time (Barrett, 2007), and have been used in a variety of contexts, including assessment of learning in education and career development (Fitch, Reed, Peet & Tolman, 2008). The technologies and design decisions that produce e-portfolio tools can be usefully classified into *showcase portfolios* and process-based *workspace portfolios*. Showcase portfolios consider the product to be the primary purpose of the portfolio and are typified by collections of artistic works or presentations targeted towards an external audience such as an employer or course instructor. Process-based portfolios collect artifacts, reflections, feedback and related items and present data in specific methods to promote ongoing assessment and student reflection (Barrett, 2011).

These two types of e-portfolio map well onto the two purposes that lie behind their use. Barrett (2007) has noted that e-portfolios can be used as either an assessment *of* learning or a tool *for* learning. While e-portfolios are often used by course instructors as an assessment of student learning (i.e., a showcase e-portfolio), findings show that utilizing e-portfolios as a tool for learning (i.e., a process-based e-portfolio) is associated with more positive outcomes, such as higher student motivation and engagement (Barrett, 2007). Using an e-portfolio in this way also provides students with an opportunity to learn how to better articulate their experiences.

The present study utilized a skill-based e-portfolio as tool *for* learning. Specifically, this tool was designed to allow students to reflect on and identify the skills that have been developed through various experiences during their university career. The primary aim of this type of e-portfolio is to facilitate reflection on skills that have been acquired through various degree-related experiences, and to provide students with an opportunity to document these skills and list clear examples of how they were developed. Most importantly, the e-portfolio was designed to help students connect university experiences with the skills required in future career settings (Ford, Lumsden & Lulgjuraj, 2009).

While there are a variety of methods that could be used to facilitate meaningful reflection on the relevance of university experiences, the present study utilizes an e-portfolio for two primary reasons. First, e-portfolios facilitate reflection on specific aspects of experience. Students are asked to give specific examples of situations in which certain skills were developed, resulting in deeper processing about how learning experiences connect to skills. Second, the e-portfolio involves written reflection. Bean (2011) has noted that, in contrast to mental reflection, writing helps to both facilitate critical thinking and focus an individual's reflection in an organized fashion. An e-portfolio provides a systematic method by which students can reflect on and organize their experiences, thus allowing students to better understand their relevance.

Summary of the Present Study

The preceding literature review makes clear the importance of ensuring that students have a solid understanding of important SBLOs that are sought after by employers. The work of Evers and his colleagues (1998) in particular was important in documenting the degree of fit between students', graduates' and employers' ratings of specific transferable skills. The present study sought to extend this work by examining a separate but related issue. Specifically, we were concerned with examining the extent to which undergraduates *understand* transferable skills and their ability to *articulate* their skill set effectively. We were also interested in establishing whether completion of a skill-based e-portfolio would help students to see the skills being fostered through their learning experiences more clearly.

Method

Context of the Present Study

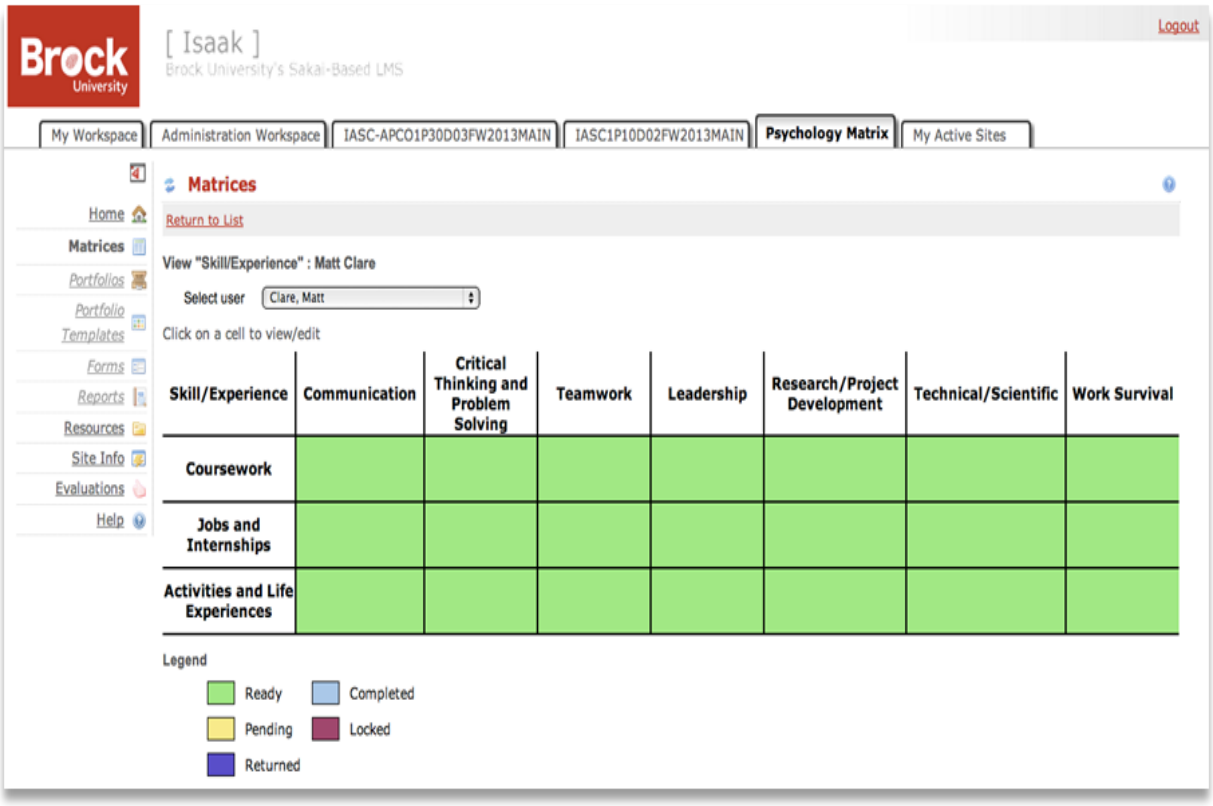
This study was carried out at Brock University, a mid-sized university located in southwestern Ontario. During the 2012-2013 academic year when this project was undertaken, there were nearly 17,000 Brock undergraduates (14,700 full-time) earning their degrees across six faculties (Humanities, Math & Science, Social Science, Applied Health Science, Education and Business). A further 1,600 students were pursuing graduate degrees.

All participants in this study were completing their undergraduate major in psychology at Brock. Psychology is the second largest department on campus, with 26 full-time faculty and almost 700 full-time equivalent students registered across all of its degree programs. A large majority of Brock's psychology students are enrolled in one of two four-year degree programs (four-year BA with honours; four-year BA with major); the remainder are completing a three-year BA pass degree.

Development and Structure of the LMS-Based e-Portfolio

The e-portfolio used in this study was designed in Sakai (Brock's learning management system; LMS) by staff in the Information Technology Services (ITS) department. Version 2.8 of the Sakai software includes the formally independent suite of portfolio tools known collectively as the Open Source Portfolio (OSP) suite. The OSP suite consists of seven core tools. Brock's LMS also includes the related Reports tool to review single cells across all participants. Student-facing tools include the Glossary, [Showcase] Portfolio tool and the Matrices tool. The remaining tools are involved in the creation of the portfolio framework in which students work. The specific Portfolio tool in Sakai's suite can be an important part of creating showcase portfolios; however, the nature of the information to be gathered for this study meant that it was more appropriate to design the e-portfolio in Sakai's process-oriented Matrix tool. The final e-portfolio consisted of a matrix with seven transferable skills (communication, teamwork, leadership, research/technical skills, critical thinking/problem solving and self-management skills) and three types of learning experiences through which these skills could be developed during the degree (coursework, work experiences and extracurricular activities) (see Figure 1).

Figure 1: Overall Structure of the e-Portfolio



When a student clicked on one of the 21 cells in the matrix, they were taken to a screen that asked them to provide detailed information about a specific learning experience that fit the parameters of the matrix cell (e.g., a learning experience in which critical thinking/problem solving skills were developed through coursework; see Figures 2 to 5). The information that students were asked to provide within each cell conformed to the STAR method of addressing behaviour-based interview questions (Brumm, Mickelson & White, 2006).

Behaviour-based interview questions require candidates to draw upon their behaviour during specific experiences to demonstrate competence with a particular skill (e.g., "Tell me about a time when you faced a challenging problem and explain how you solved it."). The STAR method of answering such questions involves providing the interviewer with information about the Situation/Task, explaining the Actions taken during that event and documenting the Result of these actions. To this framework we added one additional question that asked students to Reflect on the outcome of the situation and indicate what had gone well and/or what they might do differently if faced with this situation again.

Each of the cells in the e-portfolio was set up in this way to provide students with an organizational framework for thinking about their experiences that would be helpful during future interviews. Figures 2 to 5 show how information was obtained from students for each aspect of STAR-R within a cell. In Figures 2 to 5, students were completing the cell in which they documented an experience that helped them to foster critical thinking/problem solving skills in their coursework.

Figure 2: Describing the Situation/Task

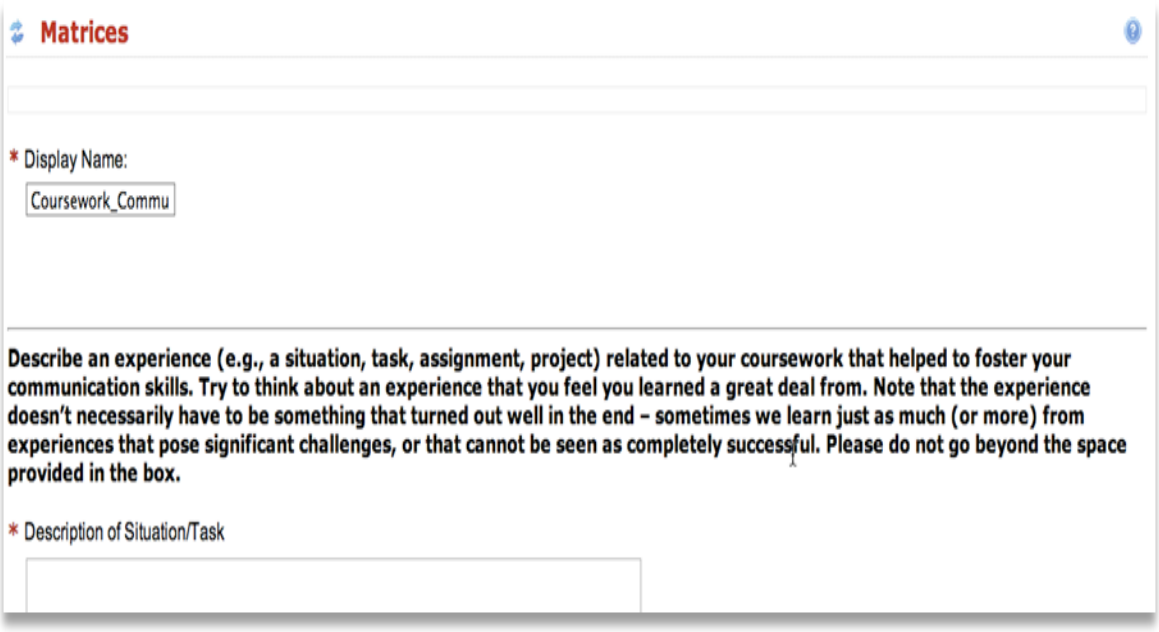


Figure 3: Describing the Actions Taken

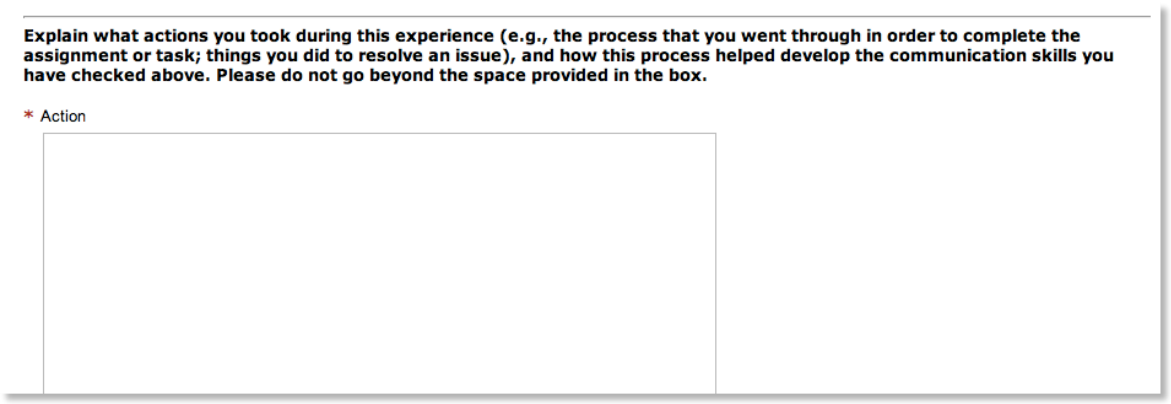


Figure 4: Describing the Results

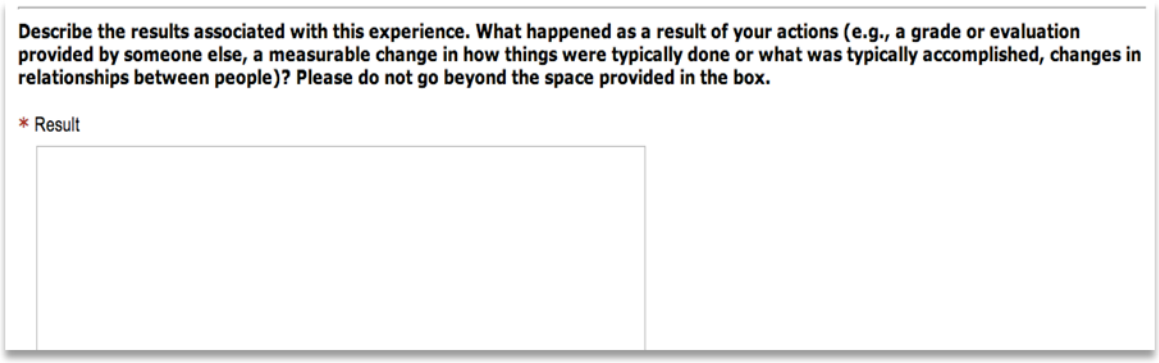
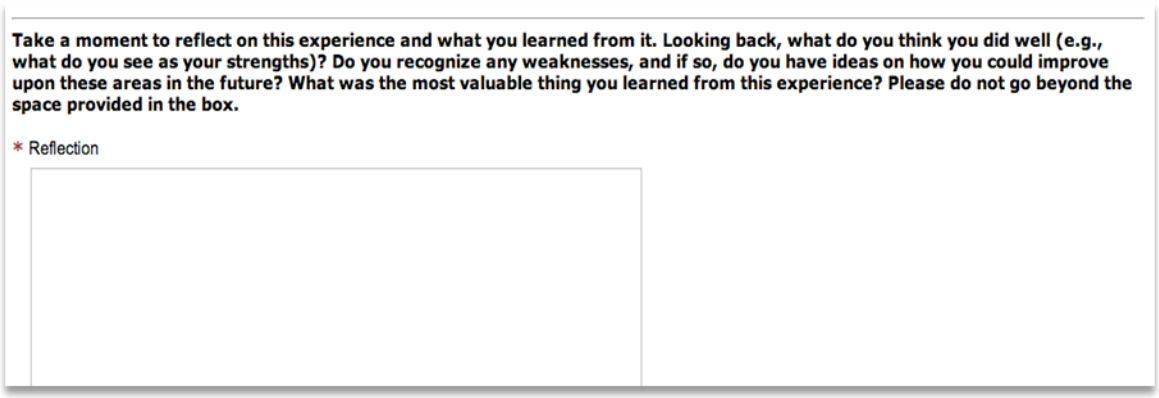


Figure 5: Reflection on the Outcome



Pilot Testing

Pilot testing took place during the summer of 2012 after the e-portfolio had been created in the LMS. To begin, four research assistants (RAs) tested the e-portfolio tool itself, independent of the rest of the study protocol. The RAs tested the tool by examining what happened when they filled it out in accordance with instructions, as well as what happened when instructions were violated (e.g., writing beyond the borders of a text box). Based on their experiences, some minor bugs were fixed and some small text-based errors were identified. Because of the design of the Sakai portfolio, both corrections needed to be implemented by the programmer in ITS.

After technical issues had been resolved by ITS, a second round of pilot testing took place. Four senior undergraduates who were not psychology majors completed the study protocol and provided information and feedback about issues such as clarity of instructions, ease of using the e-portfolio tool, and the time required for study completion. Based on their comments, some changes were made to clarify the content of videos and eliminate redundancy, and small mistakes in the materials were corrected. The protocol was revised and submitted to Brock's research ethics board, and clearance was granted in August, 2012. Recruitment for the study began in early September, 2012.

Participants

Participants included 141 psychology majors in the third (n=69; 9 males; 28 honours students) and fourth (n=72; 16 males; 23 honours students) year of their degree. The recruited students represented approximately 61% of eligible third-year and fourth-year students.[1] Students in the honours stream had a minimum psychology average of 77% going into their third year and 80% going into their fourth year.

Participants were recruited from core psychology courses (research methods in third year, capstone courses in fourth year) and received course credit for participating in the project. Some fourth-year students were registered in more than one course for which credit was being given. Those students who were registered in two courses and wanted credit for both, or who wanted the course credit but did not wish to participate in the study, were offered an alternative assignment to complete.

Procedure and Materials

Course instructors informed students about the study and instructions for participating were outlined in course syllabi. Interested students signed up for a convenient day and time to come to a lab and participate in the study. The lab housed five networked computers and the number of students participating at any one time ranged from one to five. Because the study was run online, students could arrive at the lab and begin at any time during the session that they had signed up for. The study typically took approximately 2.5 hours to complete (range 2-3 hours).

After participants had signed the consent form (see Appendix A), an RA provided an overview of the study procedure and then gave the student a set of headphones and a package of measures to be completed during the study. These measures were to be completed in accordance with instructions provided in a series of nine videos that were housed in Sakai. We opted to use videos as a means of providing students with information and instructions about the study so that we could ensure a standardized experience for all participants. The videos were screencasts created by the first author, with Powerpoint slides used to reinforce the central points being made in the audio voiceover. The screencasts included some explicit instruction about skill-based learning outcomes as well as instructions for completing the measures associated with that particular section of the study (see Table 2). No time restrictions were placed on students with respect to completing the measures after each video, though time for completion was expected to be approximately 2.5 hours.

The videos and the measures that accompanied them are described in Table 2, below:

Table 2: Description of Videos and Accompanying Measures

Video	Time (min:sec)	Brief Description of Accompanying Measures
INTRODUCTION		
Introduction to the Study • *Describes the types of learning experiences students have while at university (coursework, work-related, extracurricular)* • *Introduces the idea that transferrable skills can be fostered through these experiences* • *Explains the need to be able to*	6:00	No accompanying measures

[1] Based on estimates of approximately 115 majors in each of third and fourth year. Note that some students in third and fourth year (in terms of credits completed) were not taking any of the courses in which recruitment took place and would not have heard about the study.

Video	Time (min:sec)	Brief Description of Accompanying Measures
articulate skills during an interview • *Describes how e-portfolios help students become more cognizant of their skill set* • *Presents an overview of the study format*		
SET 1 VIDEOS		
Naming Skills • *Provides instructions for completing this portion of the study*	1:35	Students were asked to name 10 skills that they had developed during their university degree (see Appendix B)
Selling Skills • *Provides instructions for completing this portion of the study*	2:30	Students were asked to choose two skills from *Naming Skills* exercise and explain how they would leverage this skill when seeking employment (see Appendix C)
Defining Skills • *Introduces students to the idea that the university experience (curriculum and co-curriculum) are intended to teach skills as well as content* • *Displays the 7x3 matrix that comprises the Sakai-based e-portfolio, asking students to define five of the seven skills contained in it* • *Provides instructions for completing this portion of the study*	6:11	Students were asked to define 5 skills from the e-portfolio that are clearly articulated in the Undergraduate Degree Level Expectations and commonly sought by employers (see Appendix D): • *Communication* • *Critical Thinking/Problem Solving* • *Teamwork,* • *Leadership* • *Research/Project Development*
Introduction to STAR-R • *Explains each of the elements of STAR-R in detail* • *Provides a rationale for answering skill-based questions using this method* • *Provides instructions for completing this portion of the study*	2:24	No accompanying measures
Introduction to the e-portfolio • *Explains how to navigate the Sakai-based e-portfolio using screen shots* • *Provides instructions for completing this portion of the study*	10:24	Students were asked to complete 3 cells from the skill-based e-portfolio in Sakai (see Figure 1): • *Communication developed through coursework* • *Critical thinking/problem solving developed through coursework* • *Teamwork developed through coursework*
SET 2 VIDEOS		
School-Based Outcomes • *Provides instructions for completing this portion of the study*	1:49	Students were asked to read 4 assignments (taken from psychology instructor websites at various North American universities) that might be assigned in a typical psychology course (see Appendix E) Students then provided answers to questions about the following (see Appendix F): • *The assignments' relevance to the students' future career (scale of 1-7)* • *Why they believed that the instructor might assign such a project (open-ended)*
Job-Based Outcomes	2:20	• Students read a description of a

Video	Time (min:sec)	Brief Description of Accompanying Measures
• *Provides instructions for completing this portion of the study*		fictitious graduating psychology student (Julia Frankie) that included several experiences that she had had during the course of her degree (see Appendix G) • Students read two advertisements for jobs (taken from Workopolis during summer 2012) that this student might consider applying for (see Appendix H) • For each of the jobs, students indicated 3 of Julia's learning experiences that should be highlighted in a cover letter or interview for that job (see Appendix I)
DEBRIEFING		
Debriefing and Overall Assessment • *Provides instructions for completing this portion of the study* • *Thanks students for their participation*	1:57	Students were asked to answer several questions including (see Appendix J): • *Their evaluation of the e-portfolio* • *The extent to which skill-based learning had been emphasized in their university courses*

In order to test the effectiveness of the e-portfolio, students were randomly assigned to one of two groups. Both groups saw each of the nine short videos during the course of the study and completed the measures in accordance with instructions at the end of each of these videos. Further, both groups saw the introductory video first and the debriefing video last. The remaining seven videos were divided into two sets: Set 1 included the five skill-based learning videos (Naming Skills, Selling Skills, Defining Skills, Introduction to STAR-R and the e-portfolio) and Set 2 included the two outcome videos (school-based and job-based outcomes).

The order of presentation of the Set 1 and Set 2 videos differed for the two groups in this study. Specifically, after the introductory video, participants in the experimental group saw the Set 1 videos/measures followed by the videos/measures in Set 2 and the debriefing video. Those in the control group saw the Set 2 videos/measures after the introduction, followed by the Set 1 videos/measures and the debriefing. Within Set 1 and Set 2, the videos always appeared in the order documented above. This procedure allowed us to examine whether there were differences in student responses to the outcome measures (school-based and job-based outcomes) as a function of whether they saw the e-portfolio before or after completing those measures.

Results and Interpretation

The main analyses address the six main research questions that guided this study. Each of the questions is addressed in turn.

Question 1: To what extent do undergraduates feel that SBLOs are being emphasized in their university courses?

To address this question, we examined the data provided by students in the Overall Assessment carried out at the end of the study (see Appendix J). Students indicated that their instructors had placed little emphasis on the transferable skills being fostered by assignments in their classes. Perhaps not surprising, then, was the parallel finding that prior to taking part in the e-portfolio research, students had given relatively little thought to transferable skills in relation to their course assignments (see Table 3).

Table 3: Student Perceptions Regarding Course-Based Emphasis on SBLOs

Question	Mean	SD	Possible Range
To what extent have your courses/instructors emphasized the transferable skills specific assignments have been aimed at fostering?	3.09	1.18	1-7
Before today's study, to what extent had you thought about skill-based learning when completing your university assignments?	3.75	1.42	1-7

Note. N=141. Data related to the question about instructors' emphasis on transferable skills were positively skewed, owing to the fact that 65% of respondents (n=92) provided a score of 3 or less on the 7-point scale (range was 1-6).

Question 2: What SBLOs do undergraduates feel they have developed during their degree?

Answers to these questions were derived from the Naming Skills portion of the study (see Appendix B). During this part of the study, participants were asked to name ten skills that they felt they had developed during their time at university. Participants were told to think broadly and to include skills that might have been fostered by part-time/summer jobs, volunteer positions and extracurricular activities, as well as their university coursework.

The number of skills listed by students ranged from four to ten, with the majority of students (75%) providing ten skills. Ten categories of skills were extracted from the data provided (see Table 4). In addition to the ten skill categories, an additional category was created to reflect student responses that were more related to course content than to transferable skills. For example, when asked to name skills developed during the degree, some students provided answers such as "learning about the brain" or "better understanding of parent-child attachment".

Inter-coder reliability was established by having a second research assistant code 25% of sample (n=36). Cohen's kappa for the coding scheme as a whole was calculated as .87, indicating an acceptable level of reliability.

Table 4: Student Perceptions about Skills Developed during the Degree

Skill	Representative Category Exemplars[a]	Total # of Mentions in Naming Skills	% of Students with at least one Mention (Range)[b]
Leadership	• Leading a group • Teaching, training, coaching • Delegating • Managing others	80	43 (0-3)
Interpersonal	• Working in teams or groups • Conflict management • Taking direction from others • Asking for help when needed	155	76 (0-4)
Communication	• Oral (presentations, debates) • Facilitating discussions • Writing • Reading and comprehension • Listening	253	85 (0-6)
Critical Thinking	• Problem solving • Logic/reasoning skills • Critiquing ideas • Simplify and use information	116	62 (0-3)

Skill	Representative Category Exemplars[a]	Total # of Mentions in Naming Skills	% of Students with at least one Mention (Range)[b]
	• Critical evaluation of media		
Research/ Technical	• Execute studies • Research methods/design • Software (Word; SPSS) • Statistical analysis • Using the library	87	33 (0-3)
Academic	• Study skills • Writing multiple choice tests • Taking notes • Citation skills	24	15 (0-2)
Self-management: Organization	• Time management • Planning/goal setting • Prioritizing • Multitasking	211	88 (0-4)
Self-management: Other	• Adaptability • Cultural awareness • Assertiveness • Resourceful • Goal/task-oriented	224	65 (0-9)
Job-specific	• Fundraising • Work with special populations • Event planning • Interviewing • Customer service	103	47 (0-5)
Life	• Cooking • Managing finances • Using public transit	15	9 (0-3)

Note. N=141
[a] The full list of exemplars for each category may be found in Appendix K.
[b] Represents the number of times that the skill was mentioned within a single student's list of ten skills

Closer examination of the data derived from the Naming Skills exercise reveals that some skills were mentioned more frequently than others, suggesting that some SBLOs are more readily recognized by students. Specifically, a large proportion of students made at least one mention of organizational (88%), communication (85%) and interpersonal (76%) skills being developed. Somewhat surprising was the smaller proportion of students who identified the development of their critical thinking and leadership abilities (62% and 43%, respectively), given the importance that employers place on these skills (CBC, 2013b; NACE, 2012). On a similar note, it is noteworthy that some students appeared not to make a distinction between course content and skills. Specifically, there were a total of 28 responses related to content, provided by 19 different students. Given that the descriptive data suggest that instructors are not spending much time explicitly discussing skills, perhaps this finding is not surprising. However, given the importance of students being able to make such distinctions as they move into the workforce, it is important to address this issue.

Question 3: How do undergraduates define some of the well-established SBLOs articulated by employers and university administrators (e.g., critical thinking)?

In the Defining Skills portion of the study, participants were asked to define five key SBLOs: communication, critical thinking/problem solving, teamwork, leadership, and research/project development (see Appendix D). In an effort to get students to focus on the competencies associated with each of these SBLOs, they were asked to define the skill and, while doing so, consider what employers would be looking for if they listed that particular skill in a job ad.

An examination of the data suggested that for each skill, participants provided responses that focused either on competencies associated with the skill (e.g., communication can be defined in terms of its oral and written components) or in terms of adjectives that describe the competencies themselves, or the people performing them (e.g., communication can be defined as being clear and concise). The former is more in keeping with a true definition of the skill (i.e., "what" the skill is), while the latter category is better defined as a set of descriptors that suggest effective execution of the skill (i.e., "how" the skill should ideally be executed).

In this project, it was of primary interest to examine students' definitions of the skills under consideration, or the core competencies that they associate with these skills. As such, we were primarily interested in responses that addressed what the skill was ("what" responses) and for each of the five skills, all unique answers had their own category in the overall coding scheme (see Table 5). Inter-coder reliability was computed by having a second coder rate approximately one-quarter of the sample's responses for this task (n=32). Cohen's kappa for the scheme as a whole was .90, again indicating an acceptable level of reliability.

Table 5: Student Definitions of Key SBLOs: "What" Responses

Skill	"What" Response Categories (with exemplars)[a]	% of Participants Mentioning Category
Communication	• Verbal • Written • Listening/Understanding • Reading	31 21 21 1

Critical Thinking and Problem Solving	• Preliminary Evaluation and Process
	  ○ Gather information
	  ○ Listen to different perspectives
	  ○ Weigh arguments
	  ○ Anticipate and break down problems
	• Synthesis and Final Evaluation
	  ○ Find solutions
	  ○ Consider alternative solutions
	  ○ Choose between options
		58
		
		75

Teamwork	• Cooperation with Others
	  ○ Communicate with others
	  ○ Work toward a common goal
	• Managing Tasks
	  ○ Divide tasks
	  ○ Organize and work to a deadline
		95
		
		31

Leadership	• Managing Others
	  ○ Assess others' strengths and weaknesses
	  ○ Ensure people are 'on task'
	  ○ Provide guidance
	  ○ Identify people's needs
	• Managing Tasks
	  ○ Delegate tasks to others
	  ○ Ensure completion of tasks or projects
		79
		
		36

Research and Project Development	• Analysis
	  ○ Determine gaps in literature or current understanding
	  ○ Assess problems
	  ○ Develop a plan
	• Gathering Information
	  ○ Search for literature or other relevant information
		34
		
		34

Skill	"What" Response Categories (with exemplars)[a]	% of Participants Mentioning Category
	○ Read critically • Completion ○ Synthesize findings ○ Present findings	16

Note. N=140
[a] The full list of exemplars for each category may be found in Appendix L.

Though less emphasis was placed on responses that addressed effective execution of the skill (i.e., answers that addressed how the skill was best done, or "how" responses), these answers were nevertheless coded collectively for each skill. In other words, the primary coder counted the number of "how" responses each participant provided but did not make any effort to code the individual adjectives separately (see Table 6). Computing reliability for these responses, then, was simply a matter of examining the correlation coefficient between the frequency of "how" responses noted by the primary coder and the frequency provided by the person performing the reliability check. Across the responses provided by 32 participants for the five skills, the Pearson r was computed as .87.

Table 6: Student Definitions of Key SBLOs: "How" Responses

Skill	"How" Response Exemplars[a]	% of Students with at least one "how" Response	Mean Number of "how" Responses per Participant (SD, range)
Communication	• Professional • Respectful • Clear • Concise, succinct, parsimonious • Relevant, on-topic	69	1.04 (.86; 0-3)
Critical Thinking and Problem Solving	• Creative • Open-minded • Independent thinking • Efficient • Innovative	71	.89 (.73; 0-4)
Teamwork	• Open-minded • Goal-oriented • Respectful • Flexible • Patience • Receptive	56	.79 (.84; 0-3)
Leadership	• Persistence • Unbiased • Motivating • Goal-oriented • Able to deal with ambiguity	58	.85 (.94; 0-5)
Research and Project Development	• Creativity • Persistence • Organized • Understand research methods • Abstract thinker	53	.66 (.72; 0-3)

Note. N=140
[a] The full list of exemplars for each category may be found in Appendix L.

Taken together, the "what" and "how" responses provided by students provide some insight into how they think about some of the key transferable skills, and the data provided above underscore several noteworthy findings. The first was the unexpectedly large number of "how" responses. For each of the five skills under investigation, more than half of respondents provided a minimum of one "how" response, with some providing as many as five.

The large number of responses that fell into this category was surprising from the point of view that they do not directly address what the skills are and raise some questions about students' knowledge of the competencies that comprise larger skill categories that are of interest to employers. For communication and research/project development in particular, a sizable proportion of students (55% and 48%, respectively) did not provide *any* response that could be properly termed a definition of these skills (i.e., a "what" response). The pattern of responses for the other three skills was somewhat different, with a much smaller proportion of students failing to provide a "what" response (9% for critical thinking/problem solving; 4% for teamwork; 12% for leadership).

A second finding that emerged from these data concerned student "what" responses related to teamwork and leadership. Overall, students defined both of these skills in terms of task management and interpersonal relationships (cooperation with others in the case of teamwork, and managing others in the case of leadership); however, it was clear that the latter was much more salient to students than the former. While a large proportion of students identified competencies related to interpersonal relationships in their definitions of teamwork and leadership (95% and 79%, respectively), only 30-35% provided answers that defined these two skills in terms of task management.

Question 4: How effective are undergraduates in providing evidence to support their acquisition of SBLOs?

This question was addressed using data from both the Selling Skills (see Appendix C) section of the study and from the completion of the e-portfolio (see Figures 1 to 5). Results from each of these elements of the project are discussed in turn.

Selling Skills

During the Selling Skills section of the study, students were asked to select two of the skills they had noted in the Naming Skills exercise and to and explain how they would leverage each one when seeking employment, using specific learning experiences as examples. Table 7 documents the skills that students elected to work with in the Selling Skills exercise and demonstrates that some skills were selected more frequently than others for this task; namely organizational skills (60 mentions), communication skills (51 mentions) and interpersonal skills (38 mentions).

Table 7: SBLOs Selected for Selling Skills Exercise

Skill	Representative Category Exemplars[a]	Total # of Mentions in Selling Skills
Leadership	• Leading a group • Teaching, training, coaching • Delegating • Managing others	21
Interpersonal	• Working in teams or groups • Conflict management • Taking direction from others • Asking for help when needed	38
Communication	• Oral (presentations, debates)	51

Skill	Representative Category Exemplars[a]	Total # of Mentions in Selling Skills
	• Facilitating discussions • Writing • Reading and comprehension • Listening	
Critical Thinking	• Problem solving • Logic/reasoning skills • Critiquing ideas • Simplify and use information • Critical evaluation of media	24
Research/ Technical	• Execute studies • Research methods/design • Software (Word; SPSS) • Statistical analysis • Using the library	25
Academic	• Study skills • Writing multiple choice tests • Taking notes • Citation skills	0
Self-management: Organization	• Time management • Planning/goal setting • Prioritizing • Multitasking	60
Self-management: Other	• Adaptability • Cultural awareness • Assertiveness • Resourceful • Goal/task-oriented	31
Job-specific	• Fundraising • Work with special populations • Event planning • Interviewing • Customer service	23
Life	• Cooking • Managing finances • Using public transit	2

Note. N=141
[a] The full list of exemplars for each category may be found in Appendix K.

When coding the data from this part of the research, we evaluated the completeness of students' responses using the STAR method as our "gold standard" (see Appendix M for the coding scheme). All students completed this aspect of the study before being introduced to the STAR method of responding to skill-based interview questions. As such, we believe that responses to this question provide a useful window into undergraduates' ability to leverage examples that demonstrate their skill set without any specific training.

The three elements of STAR (situation/task, action, result) were coded as being present or absent (1 or 0, respectively) in each of the two student responses. Reliability was obtained by having a second coder evaluate 25% of the sample's responses to the questions that comprised this exercise (n=36). Cohen's kappa

was computed as .78.

For each student, responses for the two skills listed were collapsed and codes were summed together. We began with an overarching view of how complete each response was judged to be. Given that students could have scores ranging from 0 (if none of the three elements was present) to 3 (if each of the elements was present) for each skill they listed, their total possible score lay between 0 and 6 after we collapsed across the two skills. Descriptive statistics indicated that the actual range of scores was between 2 and 5, with a mean of 2.93 (SD=.92) out of a possible 6.

A more fine-grained analysis addressed whether students were more inclined to focus their responses on specific STAR elements. For each of the three STAR elements, students could have a minimum possible score of 0 (if that element was not represented in either of the two skills they listed) and a maximum possible score of 2 (if that element was represented in both of skills they listed). Descriptive statistics suggested that while students were very good at articulating the action element (meanaction=1.31, SD=.70, range=0-2), they were much less likely to supply context (meansituation/task=.81, SD=.80, range=0-2) or the results of their action (meanresult=.47, SD=.69, range=0-2). Whether this finding reflects a lack of motivation to provide a complete answer or a lack of awareness that more detail is required when trying to demonstrate mastery of a skill is unclear and requires additional research.

e-Portfolio

Students were asked to complete three cells of the e-portfolio during the course of the study. Specifically, they were asked to provide examples that demonstrated how their communication, teamwork and critical thinking skills had been developed during their coursework. Because the e-portfolio was set up in such a way that STAR-based responses were required (see Figures 2 to 5), we evaluated student responses based on the quality of the examples provided to support these three skills, as well as the quality of their reflections about those examples (see Appendixes N and O for the coding schemes).

Quality of examples was assessed using a 4-point scale that broadly assessed whether the answer was coherent and relevant to the skill that it was meant to demonstrate. The quality of the reflections was coded on a 3-point scale that evaluated the extent to which the student demonstrated that they had considered the actions and result associated with the example in terms of strengths and weaknesses, as well as how they might apply what they had learned from the experience to other situations in the future. Reliability was obtained by having a second coder evaluate 25% of the sample's responses to the questions that comprised this exercise (n=36). Pearson r was computed as .78 for the quality of examples and .82 for quality of reflections. Frequency data concerning the quality of examples and reflections are summarized in Tables 8 and 9, respectively.

Table 8: Quality of Examples: Percent of Students in Each Coding Category

Coding Category	Communication	Problem Solving	Teamwork
Benchmark	6	23	13
Emerging	51	49	43
Milestone	32	21	35
Capstone	11	4	7

N=139 to 141

Table 9: Quality of Reflections: Percent of Students in Each Coding Category

Coding Category	Communication[a]	Problem Solving[b]	Teamwork[c]
Benchmark	19	47	32
Emerging	47	34	48
Capstone	32	17	18

[a] *N*=140
[b] *N*=138
[c] *N*=139

Taken together, these data from the e-portfolio suggest that the quality of student responses was somewhat poor, with more than half of students falling in the "benchmark" or "emerging" categories for each of the three skills examined. Very few were classed as being truly excellent examples that were likely to impress an employer, and students appeared to have particular difficulty pointing to good examples to showcase how problem-solving skills had been developed through their coursework. Many of the responses provided by students fell into the "emerging" category, largely because they were vague and the various sections seemed disconnected from one another.

A key question that emerges from these data is whether students' responses truly reflect difficulties in articulating skills or whether the quality of their answers reflects a lack of motivation to complete this task. It is also possible, of course, that students' ability to articulate their skills orally (as they likely would during an interview) is better than their ability to express themselves in writing (as they did in the e-portfolio). Our current research is focussed on a closer examination of this question, and makes use of an online tool (Interview Stream) that allows students' oral responses to skill-based interview questions to be videotaped for coding purposes.

Question 5: Can a brief intervention designed to raise awareness about SBLOs (explicit discussion of what SBLOs are, followed by completion of a skill-based e-portfolio) assist students in seeing that university assignments foster transferable skills and are therefore relevant to their career development?

To address this question, we compared the school- and career-based outcome measures from the experimental group (in which participants completed the e-portfolio and then the outcome measures) to those of the control group (in which participants completed the outcome measures before the e-portfolio). We expected that the e-portfolio would raise students' awareness of SBLOs and how they can be fostered through their studies; thus, we expected that participants in the experimental group would indicate that the assignments they were evaluating were more relevant to their future careers.

Students were asked to read four psychology assignments that had been taken from the websites of North American universities (see Appendix E). These assignments included:

- A 10-page essay about particular regions of the brain, and an analysis of the impact of injury to those areas
- In a small group, the development of a Wikipedia page about some aspect of clinical or abnormal psychology
- In a small group, the creation of a commercial to sell a product, applying the principles of cognitive psychology
- Weekly written journal entries that connect course concepts to events in the student's own life

After reading each assignment, students were asked to indicate, on a 7-point scale, how relevant and valuable each one was in light of their future career goals. They were also asked to indicate, in an open-ended manner, what they felt the instructor's goal(s) would have been in giving the assignment to their class.

Preliminary Analyses

Responses to the questions assessing student perceptions of relevance and value were highly correlated within each of the assignments (Pearson r values ranged from .79 to .90; mean = .86), but not between assignments. As such, these questions were combined to create a single composite measure of perceived relevance for each of the four individual assignments (thus, four dependent measures in total). Descriptive statistics concerning the composite measures indicated no differences in perceived relevance across the four assignments (F=.94; p=.42). Overall, students found each of the assignments to be somewhat relevant to their future goals; none of the means differed significantly from the midpoint of the 7-point scale (all p's>.05; see Table 10).

Table 10: Students' Perceived Relevance for Individual Assignments

Assignment	Relevance Composite Mean	SD	Range
Journal	4.24	1.42	1-7
Brain Essay	4.25	1.57	1-7
Commercial	4.00	1.75	1-7
Wikipedia	4.29	1.63	1-7

Note: N=142

Potential covariates for the main analyses (i.e., whether the relevance ratings were affected by condition) included overall student average (assessed on a 5-point scale), whether the student was registered in the co-op stream, and the extent to which the student had made use of Career Services at Brock. Preliminary analyses indicated that none of these variables influenced any of the four measures of perceived relevance; as such, they were not considered in any further analyses.

Main Analyses

The experimental and control groups were compared on their responses to the perceived relevance composite scores for each of the four assignments. We had anticipated that the experimental group (i.e., students who completed the e-portfolio before the school- and job-based outcomes) would view the assignments as more relevant to their future career, given that prior completion of the e-portfolio might have been expected to elicit a greater focus on the transferable skills that can be developed by completing these assignments. Contrary to this hypothesis, no between-group differences were observed on any of the four dependent measures (all p's >.05), indicating that completion of the e-portfolio did not alter students' perception of the relevance of these course assignments to their career.

In terms of the qualitative data related to instructors' goals, student responses fell into eight broad categories that covered both course content and SBLOs (see Table 11). The primary coder coded up to three responses for each participant, though several students provided only one or two. Reliability for this coding scheme was calculated after a second research assistant coded the responses of approximately one-quarter of the sample (n=35) and Cohen's kappa was computed to be .88.

Table 11: Percent of Students Identifying Specific Instructor Goals for Assignments

Coding Category (with exemplars)	Journal	Brain Essay	Commercial	Wikipedia
Learn Course Content	**63**	**83**	**47**	**21**
Teamwork • Conflict resolution • Cooperation • Helping/supporting others • Build interpersonal skills • Understanding others	0	0	31	47
Communication • Oral communication • Written communication • Reading/comprehension • Providing feedback	11	34	29	51
Critical Thinking • Analytical skills • Apply information to new situation • Simplify information • Critiquing ideas	91[a]	33	69[a]	33
Research • Research methods • Use of appropriate sources • Citation skills/avoid plagiarism	0	34	2	29
Technical • Multimedia skills	0	0	8	8
Self-management: Organization • Multitasking • Prioritizing • Time management	2	0	2	1

Self-management: Other
• Learn to be:
  ○ Adaptable
  ○ Assertive
  ○ Professional
  ○ Open-minded
  ○ Reflective
  ○ Responsible
  ○ Imaginative
	22	11	32	19

Note: N=140

[a] In these cells, the vast majority of responses indicated application of information to new situations (n=85% for the journal assignment; n=75% for the commercial)

One of the noteworthy findings concerning students' perceptions of instructor goals for the four assignments was the relatively small proportion of students who spontaneously noted the various types of transferable skills, even when the parameters of the assignment would seem to have made them obvious. For example, two of the four assignments (commercial; Wikipedia) were set up in such a way to be carried out in groups, yet only a relatively small proportion of students (31% for the commercial; 47% for the Wikipedia assignment) spontaneously noted that the instructor's goals for the assignment would have been to foster their teamwork or interpersonal skills.

Similarly, all of the assignments required students to draw on an array of communication skills (e.g., oral, written, reading and, in the case of group-based assignments, listening); however, development of such skills was typically mentioned infrequently when students reported on instructor goals for the assignment (11%, 34% and 29% for the journal, brain essay and commercial, respectively). Interestingly, the proportion of

students who mentioned fostering communication skills was higher for the Wikipedia assignment (51%). Students may have been more attuned to the communication aspect of this project because of the "public" nature of the finished product.

Another noteworthy finding concerns the small proportion of students who noted that the instructor's goals would include critical thinking. Specifically, only one-third of students suggested that a desire to improve students' critical thinking skills might underlie the instructor's decision to assign the brain essay and the Wikipedia assignment. The proportion of students mentioning critical thinking as an instructor goal was much higher for the journal and commercial assignments (91% and 69%, respectively), though this result was driven almost entirely by students who mentioned that the instructor was trying to get them to apply psychological concepts and theory to a "real world" context. Only a very small proportion of students noted other instructor goals that might be subsumed under critical thinking (e.g., evaluating the relevance/reliability of information; synthesis of information). Given the prominence that academics place on this skill as a central and defining goal for a university education, it is interesting that relatively few students spontaneously mention it as a goal that underlies the assignments that they might see over the course of their degree.

Question 6: Can this intervention improve students' ability to identify key learning experiences that should be leveraged when applying for a job?

In this portion of the study, students were asked to read a short passage that documented several key learning experiences (curricular and co-curricular) undertaken by a psychology student (Julia Frankie) who was approaching graduation. Participants were then shown two Workopolis ads for entry-level jobs suitable for psychology graduates and were asked to indicate which three of her experiences Julia should leverage when applying for the job.

We collaborated with Brock's Career Services in both developing this exercise and devising a method by which to assess student answers. Based on our discussions, we opted to include one job ad in which the skill set was laid out in fairly explicit terms (RCC Institute of Technology; see Appendix H) and a second in which the skill set was more implicit and would require students to think carefully about the skills that would likely be needed to succeed in the job (Excel Society; see Appendix H).

We approached the data in two ways. First, we examined whether there were differences in the experiences selected as a function of condition (i.e., whether the student was in the experimental or control condition). Next, we contrasted student priorities about the main experiences to be emphasized with those noted by career development professionals in Brock's Career Services department. We expected that the e-portfolio would raise students' awareness of SBLOs; thus, we anticipated that participants in the experimental group would be more likely to provide answers that coincided with those of career development professionals.

For both of the jobs considered, there were no meaningful differences between the two conditions in regards to the learning experiences that students felt should be prioritized in an application. If we consider the top four experiences listed by each group, they are exactly the same (though the groups ordered them slightly differently) (see Tables 12 and 13).

Table 12: Learning Experiences to be Emphasized in RCC Job Ad, by Condition

Experience	Number of People in Each Condition Listing the Experience in their Top 3	
	Experimental Condition	Control Condition
Psychology Major	16	20
Created a Budget Sheet for Roommates	21	19
Working for Brock Smart Start (orientation program for incoming students)	22	32
Volunteering at Niagara Children's Development Centre	23	18

Table 13: Learning Experiences to be Emphasized in Excel Job Ad, by Condition

Experience	Number of People in Each Condition Listing the Experience in their Top 3	
	Experimental Condition	Control Condition
Psychology Major	36	40
Babysitting	30	19
Team Leader at High School Camp	18	22
Volunteered at Niagara Children's Development Centre	37	48

We also examined all participant responses concerning the top three experiences that Julia Frankie should highlight in relation to the three experiences that were selected by two senior staff members in Brock's Career Services department (see Table 14).

Table 14: Career Development Professionals' Views about Learning Experiences to be Prioritized

RCC Institute of Technology	Excel Society
Bronze Foundations in Leadership	Bronze Foundations in Leadership
Working for Smart Start (orientation program for incoming students)	High School and Haliburton camp experiences
Volunteering for Brock's Fall Preview Day and Spring Open House	Working for Niagara Children's Development Centre

Career Services staff pointed to the value of the leadership training described in the profile, as well as some of the most relevant work-related experiences that the fictitious student had undertaken. Students in the study also identified relevant work experience for both job ads but were more likely to include Julia's degree major and relevant personal experience (e.g., babysitting, creating a budget sheet for roommates to use to track expenses) than her leadership-promoting activities when generating their lists of the three most important experiences to leverage (see Tables 12 and 13, above).

It should be noted that there really are no wrong answers in this exercise; the real question is the extent to which students understand which of their experiences are likely to be most valuable in the eyes of an employer. For example, both ads indicated that the job would be suitable for people with a psychology degree, and in both cases students indicated that the nature of Julia Frankie's degree should be included in the top three things to emphasize when responding to the ad. Furthermore, the experiences that were linked

to Julia's personal life could reasonably be seen as relevant to the jobs under consideration: The development of a budget sheet for Julia's roommates would address the organizational and record-keeping skills demanded in the RCC ad, and her babysitting experience would be applicable to the child-centred position at the Excel Society.

What is at issue, however, is whether these are the *most* important experiences to emphasize in an application. Career Services professionals were more apt to prioritize job-relevant experience over those more closely connected to Julia's personal life (even those that might reasonably be connected to the skills mentioned in the ad). Moreover, these professionals were less likely to consider a relevant degree to be something that deserved to be prioritized. Instead, they were more likely to focus on transferable skills that they know to be valuable across work settings (e.g., leadership skills). Interestingly, neither job ad specifically mentioned leadership as a necessary qualification for successful applicants. While professionals are more likely to recognize this to be a skill that employers will value, the skill is nonetheless more difficult for newly graduated applicants to demonstrate in a concrete way. They therefore implicitly recognize that Julia's Foundations in Leadership course credentials need to be showcased, as this is something that will likely set her apart from other people applying for the job.

Limitations of the Present Study

The findings from this study should be considered in light of some of its limitations. First, the sample represents a relatively narrow slice of the undergraduate population at a single Ontario university. It is possible that students from other disciplines at Brock or other universities would not demonstrate the pattern of results that we have observed here. The data available, however, suggest that these findings may not be atypical, at least from undergraduates studying in general arts and science programs. For example, a follow-up study conducted at Brock used many of the same measures with students in other disciplines and found very similar difficulties articulating transferable skills (Martini, 2013b). Other researchers have also noted similar difficulties among students asked to define skills, particularly those that are more abstract (e.g., critical thinking; Phillips & Bond, 2004).

A second limitation of this work lies in the fact that some students may not have been particularly motivated to expend a great deal of time or energy on the tasks that comprised this study. Student motivation has been previously cited as an important determinant of validity in studies aimed at assessing learning outcomes (Hosch, 2012). In particular, it has been noted that assessments that are not incorporated into the existing curriculum may be viewed by students as unnecessary and irrelevant to their program of study. As a consequence, they may not put forth their best effort when completing the assessment measures. While motivation must be cited as a potential limitation, we will add that we have no particular reason to believe that students in this sample were unmotivated while completing this study. Indeed, most students took between 2 and 3 hours to complete the study (which was the expected time commitment, based on RA completion times during pilot testing). Further, students indicated on their final evaluation (using 7-point scales) that the session had been helpful in giving them some broad skill-based terms to organize their learning ($M = 5.72$; $SD = 1.11$) and clarifying what the skill-based terms meant ($M = 5.58$; $SD = 1.13$).

In spite of students indicating that they thought it was useful, we did not find that the e-portfolio had any impact on the school-based and job-based outcome measures in this study. It may be the case that, although students reported that the project had provided important information about skills, the characteristics of the research simply did not allow for sufficient impact in terms of student learning in this regard. Perhaps the study protocol (which included listening to recordings and individual completion of the e-portfolio) was too passive, and students would have benefitted from greater interaction with others (e.g., having discussions about how skills had been fostered during students' own learning experiences). It might also be the case that students needed more time in order to properly consider their responses to the questions being asked. Additional time might have allowed them to write fuller definitions of the five transferable skills that included more "what" responses, for example, or to select better examples of skill development to write about in the e-

portfolio. Having said this, we believe that the responses elicited from our participants are perhaps a relatively accurate reflection of the information that they would spontaneously call to mind when faced with a potential employer asking behavioural interview questions. Without a great deal of time to formulate an answer, students would likely have to rely on their existing and fairly rudimentary understanding of transferable skills. Without prior instruction, students would also have to make quick decisions about which of their experiences to highlight, and our findings suggest that the examples that first come to mind are not necessarily the best at showcasing their abilities.

Though we do not have data to substantiate it, our opinion is that for true value to be derived from an e-portfolio it must be developed over the course of the entire degree program. Its use in a 'one-time only' situation such as this project (or a 'last minute' effort at the end of a degree) is unlikely to have the impact on students' understanding of transferable skills, their knowledge of how these skills are fostered by curricular and co-curricular learning experiences, or their ability to articulate those skills in job-relevant settings (Light et al., 2012).

Conclusions and Future Directions

Overall, we found that the students in our sample reported that their instructors were not emphasizing skill-based learning during their courses and, in keeping with this finding, that they had thought relatively little about this aspect of their education. Given that the list of desired learning outcomes associated with degree-level programs in Ontario is comprised mainly of transferable skills (OCAV, 2007), it is noteworthy that this aspect of their education seems to be somewhat invisible to undergraduates.

Our data suggest that students do understand what transferable skills are. Asked to name ten skills they felt they had developed during their degree, many students focused on communication, as well as interpersonal and organizational skills. However, far fewer mentioned critical thinking or leadership, a fact that is worrisome given the importance that potential employers often place on these two skills. Moreover, the findings from this study also suggest that while students can name transferable skills, their understanding of the competencies associated with those skills is limited. Their definitions of five key transferable skills (communication, teamwork, leadership, critical thinking, research/project development) focused to a greater extent on describing how each skill should ideally be executed and did not convincingly demonstrate that they understood the competencies associated with these skills. We would like to stress that this finding does not imply that these students have not learned these skills; we do not believe that our data can speak to this question. Indeed, we would like to emphasize the importance of considering that the *acquisition* of transferable skills (as measured by Evers and colleagues (1998), for example) and the *ability to articulate* those skills (as measured in the present study) need to be considered as separate, and possibly quite unrelated, constructs until such time as there are data to demonstrate otherwise.

Given these findings concerning skill-based understanding, it is perhaps not surprising that undergraduates in this sample had considerable difficulty when asked to provide solid evidence to support and showcase their skill-based learning. Even when provided with a template for their answers (in the e-portfolio, students were explicitly asked to explain the learning experience, their actions that connected to the skill in question and the result of those actions), students struggled to provide good examples that would give clear evidence that they had developed the skill in question. The fact that their self-reports suggest that they had not thought a great deal about skill-based learning may help to explain why their spontaneously derived answers were not exemplary.

How Do We Improve Students' Understanding of Skill-Based Learning?

In keeping with some of the ideas presented in Evers et al. (1998), the psychology department at Brock University is in the early stages of implementing a "skills across the curriculum" approach to improve students' awareness of SBLOs. Begun in 2012, the various elements of this program will continue to be rolled out over the next 18 months. Ideally, this approach includes several components, many of which should be implemented in the early stages of the degree (i.e., first and second year). At this time, we believe that students need to be made aware of transferable skills that are of importance to their university (e.g., OCAV, 2007) and their discipline (e.g., APA, 2013), as well as the competencies that underpin these skills. This initial introduction to skills is intended to provide a guiding framework for thinking about the skills being developed in subsequent curricular and co-curricular experiences. It also introduces them to the language that is associated with skill development, which will facilitate their ability to discuss this aspect of their learning with potential employers.

Second, students should be given the opportunity to self-evaluate their skills at the outset of their degree and asked to provide examples of learning experiences to substantiate any claims toward excellence (Berdrow & Evers, 2011). Ideally, they would receive feedback about the quality of their examples, both in terms of their suitability to share with an employer and in terms of the manner in which they had been documented (e.g., Does the student do an adequate job of making connections between the experience being described and the skills that it is supposed to demonstrate? Does it include all the elements of STAR?). Students should be encouraged to develop the habit of reflecting on their important learning experiences, addressing questions about what went well, what could have been improved, and what they might do differently if faced with the same situation in the future.

Third, students need to begin thinking about the skill set that is associated with their chosen career path, even if this is only in very general terms, at the beginning of the degree. In this way, they will have a head start in terms of evaluating their existing skill set in relation to that which they are likely to need when they graduate and can begin to consider the types of learning experiences that will foster the skills they feel they will require, but in which they see themselves as needing improvement.

Fourth, undergraduates need to understand how the array of learning experiences available to university students (both curricular and co-curricular) can enhance transferable skills in complementary ways. Such an approach is likely to assist students in thinking integratively about their experiences, rather than considering them to be unconnected (Huber & Hutchings, 2004). By way of example, many undergraduates indicate that they have part-time jobs in the retail, hospitality or service sectors (Martini, 2013b). When asked about the skills developed through these experiences they often cite teamwork, noting that employees have to step in to help one another when things are busy in order to provide an optimal experience for customers. It is helpful to remind students at this stage that the group-based projects often assigned during university courses can also foster teamwork in complementary ways to their part-time jobs. More specifically, while the teamwork that they describe in their jobs is often directed at ensuring that well-defined, pre-existing processes work smoothly, the teamwork that occurs in course-based assignments is often also directed at the creation of a final product (e.g., a group presentation or paper). Moreover, the course-based projects further develop teamwork skills because they often require students to engage in negotiation (while the details and parameters of the final product are being finalized) and conflict resolution (when all members of the group cannot agree), two elements of teamwork that seem less likely to occur in the context of well-established processes in their workplace.

A "skills across the curriculum" approach requires that skill-based learning be continually emphasized after these early learning experiences. Over the course of the degree, then, faculty members would ideally speak explicitly about the skills being fostered through the learning experiences in their courses. Such a process reinforces the importance of the skills and provides a continuous reminder to students about how skills are linked to coursework. Further, students need to revisit their existing and desired skill sets at regular intervals

during their degree. Doing so ensures an ongoing evaluation of the concordance between the two and continued consideration of the learning experiences most likely to develop their skill set in desired ways.

It is during the middle stages of the degree that we believe a process-based e-portfolio might be of greatest utility to undergraduates, though it is important that such a tool be easy for instructors to manage. To that end, it is disappointing that the OSP suite of tools in Sakai requires a large amount of interaction between single instructors and ITS programmers to implement otherwise small changes to Matrices. This impedes faculty members' ability to integrate portfolios into their teaching. The Sakai community is actively working on a more malleable Karuta portfolio tool that would address some of these issues through a more instructor-friendly interface.

Even with good technology, though, an e-portfolio is only likely to be useful to students if there are designated spaces in the curriculum that focus on its development. Data from our overall assessment of the e-portfolio (see Appendix J) support this assertion. Using a 7-point scale, participants strongly agreed that an e-portfolio would add value to their degree (M= 5.94; SD = 1.13) and would better prepare students for entry into the job market (M= 6.16; SD = .90), but also noted that they would only be somewhat likely to use such a tool themselves (M = 4.40; SD = 1.58). These data are important to consider, given that there are a number of Ontario universities considering the implementation of e-portfolios. They suggest that the mere development of e-portfolio tools are unlikely to have a major impact on students' understanding of skills because, in all likelihood, voluntary completion will not be a priority for students who are often busy juggling coursework and part-time jobs. If they are used at all, they will likely be left until the last year of the program (just as visits to Career Services often are), rather than being updated regularly throughout the degree program. Used regularly through the degree program, however, e-portfolios have the potential to function as a repository for artifacts and reflections that might otherwise be forgotten as the student approaches graduation. It may further serve the function of helping students to see their own personal and professional development from the early to later stages of their degree.

In the final stages of the degree, students need the opportunity to bring their curricular and co-curricular learning experiences together and consider the development of their skills across the degree. In particular, they need to think carefully about those skills most likely to be desirable in their chosen field in relation to their own skill set. One way to facilitate this process is through a designated capstone course (Berdrow & Evers, 2012), which might include the completion of a showcase e-portfolio (i.e., one that extracts key information from among the artifacts and reflections accumulated across the degree, and focuses on the specific transferable skills that the student wishes to highlight to potential employers; Peet et al., 2011).

We argue that this type of "skills across the curriculum" program, when enacted alongside courses that provide a strong foundation in disciplinary content, has an excellent chance of ensuring that students graduate from university having benefitted maximally from their curricular and co-curricular learning experiences. Adopting a developmental approach to skill acquisition also makes it more likely that students will be better prepared to discuss their transferable skills in relation to appropriate and powerful examples of their learning, and will render them more confident as they make the transition from university to the labour market.

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