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Work-integrated learning (WIL) in information technology: An exploration of employability skills gained from internships

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Work-integrated learning (WIL) in information technology

An exploration of employability skills gained from internships

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Abstract

Purpose – The purpose of this paper is to analyze 86 information technology (IT) internship postings to discern the extent to which the intended outcomes matched professional standards for four-year IT programs.
Design/methodology/approach – The researchers text mined specified skills from 86 internship postings and compared them to the competencies outlined in the ACM/IEEE Body of Knowledge.
Findings – Results indicated that students can expect to gain experience and exposure to both technical and general competencies. Though research and policy relating to technical fields have emphasized professional competencies such as teamwork, communication, and professionalism, this analysis suggested that the internship postings greatly emphasized technical skills at the expense of general competencies.
Research limitations/implications – The most frequently occurring competencies suggest future research opportunities for considering contextual factors of internship sites. The researchers conclude with implications for using text mining as a tool for comparing internship intent vs outcomes as well as suggestions for policies, standards, and curricula worthy of further exploration.
Originality/value – Employers, educators, and professionals agree that internships offer a promising means to link course content and practical workplace skills, especially in technical fields like IT. However, less clear are the ingredients of effective IT internships.

Keywords Information technology, Competencies, Internships, Employers, Employability skills, Work-integrated learning

Paper type Research paper

Work-related learning (WIL), an activity that integrates academic learning with its application in the workplace, enables students to acquire practical skills and experience through their engagement in real work tasks and environments (Billett, 2009; Poppins and Singh, 2005). WIL includes internships, externships, and simulated work experiences and is more widespread in information technology (IT), internationally and when compared with other science and mathematics disciplines (Pilgrim and Koppi, 2012). WIL is growing because it is considered to be one of the most effective methods of gaining permanent employment by offering prospective employers concrete examples of practical workplace skills (Gault *et al.*, 2000). While employers are reputed to rely on internship participation as a positive candidate indicator (Cannon and Arnold, 1998; Schmutte, 1985), in reality, there is less than a 15 percent difference in received job offers between individuals who had

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completed an internship and those who had not (National Association for Colleges and Employers, 2014). This type of experiential learning has the potential to have significant impact, but employers and participants must intentionally work toward quality integrated interactions, consistent with concepts of academic engagement (Weng *et al.*, 2010).

Researchers and professionals have specified the importance and necessary components of WIL. In their general standards for internships, the Council for the Advancement of Standards in Higher Education (CAS) (2014) described internships as "an integral part of a college education" (p. 2). CAS standards specify that what distinguishes an intern from a volunteer is the deliberative form of learning that takes place, which is shaped by experiential pedagogy (CAS, 2014). Additionally, there is a degree of supervision and self-study that allows students to learn by doing and to reflect upon that learning in a way that achieves certain learning goals and objectives through assessment feedback for immediate improvement and learning goal refinement (Sweitzer and King, 2014). Finally, the student, the student's institution, and the placement site share in the responsibility to ensure that the balance is appropriate and that the learning is of sufficiently high quality to warrant the effort, and possibly include academic or course credit (Inkster and Ross, 1995,1998; Hesser, 2014).

Policymakers have agreed that the merits of quality WIL experiences center on two main concepts: high-impact practices and applied learning that complements classroom learning (National Association of Colleges and Employers (NACE), 2011). In relation to high-impact practices, Kuh (2008) indicated that several requirements must be met in order for an internship to be highly impactful:

(1) it should be developed so that considerable time and effort are geared towards purposeful tasks and require decisions that deepen students' investment in beneficial activities and involve their academic program;

(2) the experience should help students build substantive relationships (with faculty, staff, other students, coworkers, or supervisors) who share intellectual interests;

(3) it should offer opportunities for students to work on intellectual projects with people who are different from themselves;

(4) it should provide continuous formal and informal feedback;

(5) tasks should allow students opportunities to integrate, synthesize, and apply knowledge to new situations; and

(6) the experience should allow students to deepen their sense of selves and who they are becoming (Kuh, 2008; O'Neill, 2010).

In confirmation, Keller (2012) phenomenologically reconstructed internship experiences of 19 undergraduate students and conducted interviews on five faculty members and five employer representatives about their observations regarding student internships. Results suggested that when internships are carefully selected, strategically designed, and properly implemented they can embody Kuh's (2008) six elements of high-impact practices as they are effortful, build relationships, engage across differences, include feedback, apply learning, and prompt reflection.

The second concept of offering a quality internship involves applied learning that complements the curriculum of the intern's academic program. Similar to Kuh (2008), NACE (2011) guidelines indicated that internships serve as a form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development in a professional setting. While most agree that quality internships promote integrated academic and professional learning, many do not discuss the exact skills that students should expect to learn as a result of their professional work experiences or whether those experiences are aligned with their academic program.

The purpose of this study is to explore the written intent of employers and suggested employability skills to be learned by students by analyzing internship postings in the field of IT, and determine the extent to which the competencies extracted from the job postings align with the technical and general competencies outlined in Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE) (2008) body of knowledge (BOK) for four-year IT programs. Internship postings from various employers to one academic institution were used to answer the following research question:

RQ1. Which competencies do IT internship postings suggest students will receive as a result of their experience?

To answer this question, in this paper we first review select literature of studies in IT education, experiential learning and then specifically, internships. We then present the methods and describe the data analysis methods and coding of competencies by using the Association of Computing Machinery and the Institute of Electrical and Electronics Engineers (hereafter, ACM/IEEE) BOK. We conclude with a description of the findings, a discussion of the internship analysis, and next steps for research.

Literature review

Gap between IT career preparation and the IT workplace

A major function of institutions of higher education is to develop students' employability (Evers *et al.*, 1998). Employability is not only how well knowledge and skills attained from school can be applied to the workplace (Pool and Sewell, 2007; Kumar, 2007), but also confidence in one's own professionalism and ability to exercise valued non-technical interpersonal "soft" skills (Adecco Group, 2017). Employers value soft skills such as discernment, critical thinking, written and verbal communication, and the ability to collaborate when hiring recent college graduates (Hughey and Hughey, 1999; Association of American Colleges and Universities and HR Associates, 2015).

Employability is developed prior to graduation, when pre-professional students assume the persona of a positive, confident, skilled employed individual while pursuing academic endeavors (Jackson, 2014). Researchers have also indicated that IT students who gain employability skills have higher self-efficacy and academic integration (Weng *et al.*, 2010).

The gap between computing and technology employers' expected skill sets and students' actual skill sets are widening (Career Builder, 2014). In response, Hunt *et al.* (2011) called for IT education to evolve, even absent a market imperative: "[E]merging information technologies are also requiring a new breed of IT professional – a person who understands the needs of the business as well as IT" (p. 5). These unmet demands require IT educators to prepare students for careers, not just jobs, in a highly dynamic field and to place great emphasis on innovation (Downey *et al.*, 2008). Experts have reinforced the idea that graduate success in the workplace is an important measure of institutional effectiveness (Cabrera *et al.*, 2005).

Technology education and experiential learning

The pace of technological change demands that students be educated with an ideal IT curriculum that is flexible enough to adapt to a dynamic IT environment and is provided by educators who remain adept at innovative technology advances. This fleet approach requires that educators remain vigilant of the needs of all stakeholders, including students, communities, and employers (Brewer *et al.*, 2006) and may include all types of instruction such as face-to- face direct instruction, collaborative learning, distance learning, and experiential learning. Experiential learning includes internships, externships, apprenticeships, service learning, and/or mentoring set in real-world situations.

Experiential learning impacts. In experiential learning activities, educators integrate work-based experiences into the curriculum design as well as build specific courses around extra-classroom opportunities (Carpenter, 2003); connecting the real world directly to the classroom forms an important bridge between theory and practice in the professional education classroom (Bartz and Calabrese, 1991; Kingma, 2011). Cantor (1997) reinforces the broader impacts of experiential learning, citing service opportunities for students as safe platforms to apply classroom learning to real-world situations and to expand community relationships with potential employers, civic leaders and others. Mpofu (2007) indicated that learning outcomes in a service-learning context exceeded that of classroom instruction "for tasks requiring critical thinking and application of skills" (p. 51) and provides career clarification, higher grades, and an opportunity to self-assess skills and abilities within context and establish a framework for networking (Howery, 1983; Jackel, 2011; Markus *et al.*, 1993).

In the USA, experiential learning is a hallmark of two- and four-year colleges, providing a "mix of learning activities and awards that is the informal market-based cousin to the more highly regulated European apprenticeship systems" (Carnevale *et al.*, 2011, p. 5) that affords career exploration with an academic focus that features applied learning and occupation-specific skills. Further, "earning while learning" (Geel and Backes-Gellner, 2012, p. 313), or the engagement in industry-related occupations while in school, results in lower unemployment trends, decreased job search duration, relatively higher wages, and increased job responsibility once employed in a career-focused occupation.

Types of experiential learning. The US Department of Education defines experiential learning as "all programs that are designed to expand the setting of learning experiences beyond the traditional school environment to occupational and community settings [using] planned experiences […] to promote cooperation between traditional educational institutions and business, industry, labor, government and community groups to support learning" (Miller, 1982, p. 3).

Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). Characteristics of experiential learning include active learning, student-based perspectives, subjective experiences, personal growth, and participative learning that includes evaluation and reflection (Kolb, 1984). Most experiential learning activities are either classroom-based (e.g. instructor demonstrations, multiphase group projects) or industry-based (e.g. job shadowing, service learning, and internships). Capstone projects exhibit promise for educational situations that lack abundant industry collaboration but require a great deal of preparation and oversight (Gorka *et al.*, 2007).

Internships

Studies show that employers express concerns with the job readiness of graduates in IT-related disciplines, noting that students or graduates who are highly skilled in technical competencies often lack valuable general workplace competencies or soft skills (Galloway *et al.*, 2014; Venables and Tan, 2009). In the curriculum guidelines for undergraduate computing programs, the ACM/IEEE specify four main ways to incorporate soft skills that employers desire into undergraduate computing curricula: non-technical skill courses, capstone projects, team projects, and internship programs (Makasiranondh *et al.*, 2011). Researchers examined the potential value of internships for undergraduate IT students from the perspective of three main stakeholder groups: students in computing disciplines, IT employers, and postsecondary academic institutions (Galloway *et al.*, 2014; Ralevich and Martinovic, 2010; Venables and Tan, 2009).

Potential benefits of internship programs. Research has found that computing and technology-related WIL offer students the chance to develop soft skills in a workplace environment and allow them to gain hands-on experience with the IT skills they have learned in

school (Vairis *et al.*, 2013). Through internships, students also have the opportunity to develop career goals and to determine if they feel well suited to a particular job before they enter the workforce, therefore becoming more employable once they graduate (Shoenfelt *et al.*, 2013; Vairis *et al.*, 2013). Lee *et al.* (2014) also found that new IT professionals perceive internship experience as highly valuable when entering the workforce.

Similarly, research suggests that employers benefit from internship programs because student interns are likely to be familiar with the latest technologies and to offer a fresh, unique perspective (Galloway *et al.*, 2014). Additionally, in a related phase of this assessment examining IT employer needs, the employer interview participants spoke favorably of internships for students, agreeing that internship experience is especially valuable for teaching soft skills or general competencies such as communication and organizational knowledge. Furthermore, academic institutions that provide internships are well positioned to offer a curriculum that meets the needs of the industry and students seeking to increase their employability (Ralevich and Martinovic, 2010).

Challenges in providing internships. Other studies suggest that although internships are a means of increasing employability, students who already exhibit desired workplace competencies are more likely to secure an internship position than students who could use the internship experience to develop business or soft skills (Chillas *et al.*, 2015).

Employers expect interns to be immediately productive workers as opposed to inexperienced students requiring training (Chillas *et al.*, 2015), which seems to be inconsistent with the notion that internship experiences should allow students the ability to apply academic or theoretical concepts they have learned to new and different environments and provide an opportunity for learning. In addition, Ralevich and Martinovic (2010) report that some employers are unwilling to offer internship opportunities due to potentially high immediate costs (e.g. administrative, training, or insurance costs), and there may be a conflict between students' expected wages and the reality of their positions.

Although program administrators may realize the benefits of internship provision for students' employability, employer recruitment needs, and program competitiveness, academic institutions in rural areas may experience difficulty in finding industry placement opportunities for students (Elarde and Chong, 2012). Further, internships in academic settings are often administered by a separate, dedicated department distinct from the academic program's department. This may be beneficial for each department because of the time-consuming nature of generating and fostering industry partnerships and placing students, but the lack of input from specific academic departments may cause students to be placed in ill-fitting positions (Ralevich and Martinovic, 2010). Vairis *et al.*'s (2013) report on an internship program in which departmental internship committees exist within the broader internship department, which may allow for better placement.

Method

In this mixed method exploratory study, we explored internship postings for the technical and general competencies students were expected to acquire in the internships. We then used text mining to extract key concepts and compared the competencies to the ACM/IEEE BOK to determine the extent to which internship experiences contained educationally valuable components.

Data collection and sample

During January 2015, a total of 166 internship postings between July 1, 2014 and December 15, 2014 were collected from the Florida State University (FSU). FSU's Career Center database was used to extract posted internship opportunities. Of the 166 internship postings collected, there were 82 unique postings because some of the postings were used to recruit

students from two or more programs (i.e. computer science, computer engineering, and IT). In the cases where the same posting was used for two or more programs, those postings were removed and only a single instance was maintained for analysis. The internship locations advertised consisted of 20.5 percent to be conducted in Florida area, 70.5 percent out of the state of Florida, and 9 percent were for internships to be conducted abroad. In total, 37 employers were represented in the job postings analyzed.

Data preparation

The collected internship postings lacked standard formatting, and some postings provided incomplete details. For example, one internship posting offered two lines of information about the internship without specifying any technical or general competencies. Such postings were excluded from this analysis. The general introduction and the summary of job position, education requirements, location and contact information were removed from all the postings (Gurusamy and Kannan, 2014).

A refined version of the text mining process (McClure *et al.*, 2015; Karl *et al.*, 2015) was used to analyze ACM/IEEE IT BOK guidelines contained within the 2008 curriculum guidelines to internship postings. Python programming language, through use of Natural Language Toolkit, was deployed during the text mining process to remove duplicate files, channel searches in required sections, conduct spell checking and tokenization, and extract skills by removing stop words. The mined texted was further refined to extract specific technical and general skills using the concept of tokenization (Vijayarani and Janani, 2016). Tokenization is an act of breaking up sentences into segments such as words, keywords, and other elements, which are called tokens. These tokens can be individual words or phrases. In the process of tokenization, some characters, like punctuation marks, are discarded. Unigrams (one word) and bigrams (two words) were extracted from internship posting text files. Bigrams were extracted from text in order to identify certain words like "problem solving" or "interpersonal skills," which would otherwise make no sense if single words were considered. The tokens were used to map all IT skills and general competency skills to the specific competencies in the ACM/IEEE codebook and the skill frequencies were calculated.

For instance, a learning outcome of the knowledge unit, Information Assurance and Security, requires students to "explain the relationship between threats, vulnerabilities, countermeasures, attacks, compromises and remediation" (ACM/IEEE, 2008, p. 77). In order to scan the corpus of internship postings, the learning outcome begins in sentence form and broken down by individual word using the tokenization process. Stop words, in this case "between" and "and," are removed. Stemming is then performed to break down words into roots, whereby "explain" becomes "expla" to capture various suffixes such as explain, explains, explanation, explaining in the text mining process. The final keywords then directly match the learning outcomes found in the ACM/IEEE BOK in their most stripped form. The process is also repeated as many times as necessary until all of the required knowledge units (and learning outcomes) are analyzed and descriptive statistics, such as word frequencies, are generated.

Data analysis

From the sample of internship postings, we identified the core IT competencies a student could potentially gain from hands-on experience during time spent in the internship. We built a customized codebook from the latest ACM/IEEE IT curriculum guidelines (2008) to annotate the core IT job competencies in terms of general and technical competencies. This codebook is based on the knowledge units and topics or contents presented in the ACM/IEEE IT 2008 undergraduate curriculum. The codebook includes 13 technical competencies and 10 general competencies. Table I depicts an example of a coding using the ACM/IEEE IT 2008 curriculum for IT fundamentals.

ID code	IT fundamentals competencies
ITFa1	Explain how the components of an IT system interrelate
ITFa2	Explain how and why complexity occurs in IT
ITFa3	Manage complexity in an information technology environment by applying best practices and using appropriate technologies and methodologies
ITFa4	Describe the role of the IT professional as the user advocate
ITFa5	Explain why life-long learning and continued professional development is critical for an IT professional
ITFa6	Explain why adaptability and interpersonal skills are important to an IT professional
ITFa7	Explain the difference between a concept and the possible representations of that concept: for example, the relationship between information and data
ITFa8	Illustrate the use of information and communication technologies to solve problems as an IT professional
ITFa9	Explain why the IAS perspective needs to pervade all aspects of IT
ITFa10	Explain how organizational context is influenced by and impacts the development and deployment of IT systems
ITFb1	Outline the history of computing technology, the internet, and the World Wide Web
ITFb2	Explain how computing and society impact one another
ITFc1	Explain the relationship between IT and related and informing disciplines
ITFd1	Explain how and to what extent IT has changed various application domains
ITFd2	Explain how IT has impacted the globalization of world economy, culture, political systems, health, security, warfare, etc.

Table I.
ACM/IEEE curriculum standards IT fundamentals technical competencies

The process of developing the Curriculum guidelines for undergraduate degree programs in IT (ACM/IEEE, 2008) is highly inclusive with over 30 experts directly involved in focus groups to contribute towards the development and refinement of the guidelines. Validity was established by ACM/IEEE through the review and editing of three public drafts from 2003 to 2008 by academic scholars and practitioners.

Results

Technical competencies observed in internships

Table II details the frequency of different technical competencies identified from the internship postings.

As Table II shows, web systems and technologies was the most frequently identified competency in the internships advertised during this period. Specifically, out of 363 technology competencies identified from internship postings, the frequency of web systems and technologies was 103 (28.3 percent).

Technical competencies	Frequency (%)
Web systems and technologies	103 (28.3)
System integration and architecture	58 (14.6)
Information management	41 (11.3)
Systems administration and maintenance	38 (10.47)
Human computer interaction	29 (7.98)
Programming fundamentals	22 (6.06)
Platform technologies	19 (5.23)
Integrative programming and technologies	17 (4.7)
Information assurance and security	12 (3.3)
Networking	12 (3.3)
Computer engineering – embedded systems	6 (1.67)
Computer science-algorithms	4 (1.1)
Math and statistics for IT	2 (0.55)
Total	363 (100)

Table II.
Frequency of observed technical competencies

General competencies observed in internships

In addition to technical competencies, the analysis also identified general competencies from the internship postings. Table III indicates the frequency of different general competencies identified from the internship postings.

As Table III indicates, professional communications was the most frequently identified competency identified in the internships advertised during this period. Specifically, out of 114 general competencies identified from internship postings, the frequency of listing professional communications was 25 (21.9 percent).

Discussion

Our aim on this study was to answer the question of which competencies IT internship postings indicated students would receive as a result of their experiences. Researchers have concluded that IT education must be agile and dynamic – for this reason, no formal curriculum can impart all of the necessary competencies students require for workplace success (Galloway *et al.*, 2014).

Internships have been positioned as a valuable counterpart to classroom learning, but these experiences can vary widely in their structure, content, and usefulness (Chillas *et al.*, 2015).

Managers and students agree that internships should be intentionally structured to extend and complement the curriculum (Metso and Kianto, 2014).

This analysis of internship postings found that students can expect to gain workplace experience and an exposure to both technical and general competencies, which is consistent with previous research. Although much of the literature emphasizes the professional competencies (teamwork, communication, professionalism skills, etc.), this analysis found that the internship postings greatly emphasized technical competencies over general competencies. From the 82 posts analyzed, 363 technical competencies were identified but only 114 general competencies were mentioned.

Web systems and technologies was the overwhelming most frequently identified technical competency on internship postings. An analysis of the postings indicated that the share of this competency was 15.3 percent, while a sampling of BS in IT curriculum analysis in other studies listed the share of the competency at 12.43 percent (Ambavarapu *et al.*, 2015; Ma *et al.*, 2015).

According to the ACM/IEEE 2008 IT curriculum guidelines that served as the codebook for this analysis, this knowledge area "covers the design, implementation, and testing of web-based applications including related software, databases, interfaces, and digital media. It also covers social, ethical and security issues arising from the Web and social software" (Lunt *et al.*, 2008, p. 123). Web system specific technologies like HTML5, CSS, JavaScript, JQuery, PHP, XML, ASP and AJAX were identified from internship postings. Even though

General competency	Frequency (%)
Professional communications	25 (21.9)
Teamwork concepts and issues	20 (17.54)
Business fundamentals	18 (15.78)
Problem solving	13 (11.4)
Self-management	11 (9.64)
Accountability	9 (7.89)
Interpersonal skills	5 (4.38)
Creative thinking	4 (3.5)
Flexibility	3 (2.63)
Customer service	6 (5.26)
Total	114 (100)

Table III. Frequency & percentage of observed general competencies

course technologies like HTML5, CSS, JavaScript, PHP were covered as part of curriculum, technologies like ASP, AJAX, JQuery were not part of BS IT curricula.

Our finding that professional communications was the most frequently occurring general competency is consistent with previous studies that identified positive employer and new professional perceptions of internships' ability to foster necessary communication skills, but this competency occurred at a much lower frequency than most technical skills.

In summary, the internships analyzed provide an opportunity for students to work on various technologies that are not covered in curriculum. However, the results of this study also suggest that the examined internships strongly emphasized technical skills and appeared to focus little on general competencies, or soft skills; general skills are challenging to teach in a classroom environment, yet employers expect new professionals to have them (Hunt *et al.*, 2011).

However, our results suggest that IT program administrators should not rely solely on employer-designed and driven internships to provide opportunities to build general competencies.

Implications for further research

The findings of this study present several areas for promising research.

Internship context and management. A notable finding was the role of internship context and management in the presentation of an internship opportunity. This analysis found that the internship postings available to students demonstrated varying levels of context and details. While some posts provided information about the organization as well as sections detailing what the intern could expect to learn by including specific statements as to the skills that would be enhanced during the internship experience, some posts contained no organizational information and provided a bulleted list of applications (as opposed to technologies or skills) that the intern would potentially work with (e.g. "Excel, PowerPoint, Word") and a similarly brief list of tasks (such as "budgets, schedule, tasks, meetings"). Previous research has emphasized the importance of accurately matching students to internships that are related to their interests and future career goals (Ralevich and Martinovic, 2010), so students relying on these postings to acquire an experiential learning opportunity may not have access to adequate information when seeking an internship to meet their specific needs.

Another consideration as part of internship management is how an organization prepares for, obtains internship host sites, conducts, implements, and evaluates the internship experience. In a study of IT undergraduate students' perceptions of their internship experiences, students identified issues in their institution's internship process, including:

- the process by which students identify, select, participate in, and evaluate an internship varies widely from institution to institution;
- often, departments and the institution have conflicting policies on how internships are managed;
- requirements for a successful internship are rarely specified by programs or internship hosts;
- the degree to which faculty are engaged and participate in the internship varies considerably from institution to institution; and
- formal evaluation of the degree to which the internships accomplished state objectives or resulted in the desired outcomes rarely occur (Mardis *et al.*, 2015).

Thus, there are many situational factors from the college/program, the institution, participating students, faculty, internship hosts, and others that can affect the success of the internship beyond the competencies to be gained; the results of this study suggest that an examination of contextual and managerial factors area is fertile for further research.

Accuracy of internship descriptions. While this study captures the literal diction of the analyzed internship postings, it does not capture figurative meaning or contrast between the postings and what students experience in internships. The extent to which the internship experience matches the internship posting is an area for future research to discern the extent to which internships present an opportunity to learn or develop IT employability skills or competencies. For example, to what extent do employers who seek leadership and communication skills from their interns really provide an avenue or opportunity for that competency to be developed? Similarly, studies to assess student expectations of internships from the reality of these experiences using pre- and post-mixed methods may provide deeper understanding of the underlying elements necessary to create high-impact internships.

In this study, we also learned that students may develop competencies during internships, which may go above what is taught in their academic program's curricula. However, this is contrary to definitions of internships suggesting the importance of applying learned concepts to the internship. Should the internship present new knowledge beyond what is taught in class? And if so, how do we modify learning concepts to include theoretical concepts with practice, when the practice is learned first? Understanding the extent of alignment between the competencies that are learned in internships and those of academic technology programs would reveal much more than differences between what is being learned in each of these environments, but also the extent to which academia is aligned/misaligned with the needs of the industry.

In situ and concurrent examinations of internship experiences. Even the same internship description, context, and management approach can result in very different student experiences (Kaela and Shauna, 2008). Internships studies must go well-beyond analysis of postings and utilize much more robust designs and in-depth engagement. For example:

- interviews or surveys with internship students can help determine the student factors that led to obtaining one internship rather than another and the degree to which the student obtained the advertised skills and knowledge;
- interviews or surveys with internship host site advisors can provide information as to the host site's perception of the "success" of the internship – what aspects of the internship "worked" or did not "work;"
- ongoing evaluation of the internship process by the college/institution through a range of techniques (logs, observation, focus groups, surveys, etc.) can assist in determining the degree to which postings are helpful in promoting successful internships and how these posting might be better constructed to benefit both the student and the host site; and
- ethnographic examinations of internships as experienced by different genders and social groups as well as in differing locales may contextualize the student internship experience through diverse lenses.

In short, analysis of postings, while useful, provides only a beginning approach to study how internship experiences help students meet educational and workplace needs.

Limitations

Limitations of this study include the inconsistent and sometimes incomplete nature of the internship postings. Further, postings often describe ideal situations that can be altered by the reality of job logistics, job site resource limitations, and the ability of the institution to effectively oversee the program. The findings also have limited generalizability because the study used a convenience sample of 82 unique internship postings from one institution's career center and focused solely on the field of IT. Therefore, the rankings of technical and general workplace competencies may change in future studies as they are affected by the discipline studied,

institutional ability to support an internship program, and the specific needs of an institution's geographic region. This analysis of internship postings can only suggest the important competencies a student learns in the internship period in the computing technology programs offered by FSU. Nevertheless, this study provides a unique approach for assessing the extent to which internship postings align with accepted guidelines for designated program or disciplines.

An additional limitation is that this is a fairly homogeneous sample of internship postings: 35.3 percent of the internship positions were based on web development opportunities, biasing the competencies identified toward this area. Also, internships are just one of the four types of experiential learning identified, and do not represent the entirety of the experiential learning environment nor the impact of other elements of a program's curriculum. The extent to which institutions maintain adequate internship records, post internship opportunities in a central location, or institutional guidelines used to decline internships from being posted should also be taken into consideration.

Conclusion

In this study, we sought to identify competencies that students could expect to receive as a result of their WIL experiences, particularly the extent to which those IT internship postings included technical vs non-technical (or general) competencies. While the researchers concluded that the postings focused predominantly on technical skills expected and to be developed, they also found that the postings included less emphasis on general competencies that are key to workplace success. We conclude that this juxtaposition raises a number of compelling areas for consideration and future research including the need to explore contextual factors for internships (e.g. organizational culture, paid vs unpaid positions, interns' resource support available from the host site and/or the college, competency of the internship manager at the institution and at the host site, and many more) may also be of importance to help IT program faculty and employers to match internship requirements or practices to the needs of students and employers. Ultimately, understanding the information in and information lacking from internship postings is a first step to understanding the extent to which these position descriptions can help students, faculty, and employers meet their learning and workplace goals and ensure that the postings reflect what actually will happen during the internship experience.

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