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Critical IT Project Management Competencies:

Aligning Instructional Outcomes with Industry Expectations

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ABSTRACT

Academic computing curricula generally focus on teaching the specific technological skills expected of new graduates in their disciplines. Yet when it comes to hiring these graduates, behavioral skills (also called soft skills) such as communication and personal integrity are almost always rated as being more important than the technological skills. This mixed-method research project adds to the understanding of skill expectations required for new hires by providing information from a global sample of project management professionals. Both the quantitative and qualitative results are in accord with the vast majority of the extant literature in that behavioral skills were seen as more critical than technical skills. Implications and recommendations for educators, curriculum developers, and prospective graduates are discussed.

KEYWORDS

Competency, Employer Expectations, Information Systems, Information Technology Industry, Information Technology, IT Education, Project Management Education, Project Management, Soft Skills

INTRODUCTION

The novelty we want is always close to the familiar. - Mason Cooley

Anyone who has spent significant time reviewing academic papers knows that one key criterion by which papers are evaluated is originality. Yet scientific advancement is based not only on novel Kuhnian paradigm shifts or unexpected empirical evidence, but also on the slower, more methodical delivery of results that validate (or possibly extend) prior research or evidence. One area in which compelling overlapping evidence has been accruing over the past decade or more is in the research into what kinds of skills employers are looking for in their entry-level computing employees. Some of these studies have looked at computing graduates in general, while others have examined just the more specialized sub-disciplines, such as software engineering (SE), information technology (IT), or information systems (IS).

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Previous studies have emphasized the need to bridge the gap in industry-university skill expectations in computing project management (hereafter referred to as IT project management), which is sometimes interpreted by the academic institutions as a call to teach currently fashionable technologies (Stevens & Norman, 2016). The urgency to bridge this gap is amplified by the fact that today's organizational growth comes with business and technical (IT-driven) process complexities. These complexities exist in the face of aggressive competition, which challenges organizations to seek appropriate IT-based strategic and tactical solutions that in turn, require appropriately skilled IT personnel. Similar to project management, IT project management is a complex activity that is conceptualized around the building blocks of individual and group relationships, individual and group cohesion, key performance indicators, and the identification and management of the sources of project failure (Cicmil, Cooke-Davies, Crawford, & Richardson, 2009). Industry tends to view IT project management as mainly a managerial activity (e.g., Maylor, Vidgen, & Carver, 2008), while academic departments tend to view it as mainly technical one (involving software development and testing) and often train students in project management based on a general framework provided in IT project management texts (e.g., Stellman & Greene, 2005). While this provides some (especially technical) project management skills, it might be deficient in terms of entry-level project participation skills.

Despite the abundance of literature on IT project management skills requirements, some unresolved questions still remain. To what extent does a university IT graduate fit into organizational business and process complexities that require IT solutions? How adequate are university IT project management courses in preparing computing students to meet industry expectations? What level of emphasis is placed on soft/behavioral versus technical skills in IT project management by the industries versus academic departments? This paper adds to the research in industry-university competency expectations by presenting the results of a quantitative and qualitative survey of employers on the skills required in IT project management. By understanding the critical project management skills from the point of view of actual project managers/team members, the study provides further impetus for the re-examination of IT project management programs offered by universities and colleges.

LITERATURE REVIEW

Academic computing disciplines have had, at times, an uncertain relationship with industry expectations. Well-established disciplines tend to have their own well-established academic curricula which helps inculcate the intellectual framework needed for success in the field (Becher & Trowler, 2001). Such disciplines often feel less need to align curricula with industry expectations. Younger disciplines tend on the other hand to have less rigorously defined academic architectures. These more recent disciplines will also be more likely to be interested in aligning themselves, at least to a certain extent, with employer expectations. This is especially the case for computing disciplines for which there is strong employer demand for graduates.

It is thus no surprise that there has been an ongoing effort by academic researchers to better understand employer expectations for computing graduates. These expectations (or desires) have generally been referred to as *skills*; and the assumption in this literature is that employability and, later, job success, are both dependent upon the constituent skills of the graduate. As such, many studies have been conducted to better ascertain the necessary skills, presumably so that computing curricula can be carefully fine-tuned or perhaps drastically altered to better satisfy employer needs.

Researchers in the field of IS have been especially interested in better understanding employer expectations of IS graduates. Whether it be by examining job advertisements (Todd, McKeen, & Gallupe, 1995) or by surveys of employers (Lee, Trauth, & Farwell, 1995), research in the 1990s revealed what at the time was a bit unexpected: that there was an "expectation gap" between what university IS programs delivered and what employers wanted from new graduates (Trauth, Farwell, & Lee, 1993). Subsequent research in the first decade of the 2000s endeavored to discover the nature of this gap (Downey, McMurtrey, & Zeltmann, 2008; Gallivan, Truex, & Kvasny, 2004; Kim, Hsu,

& Stern, 2006; Wilkins & Noll, 2000). Specific gaps in technological knowledge, such as database processing, web design proficiency, and network security, were identified by these studies. Downey et al. (2008) emphasized "the importance of technology, both IT proficiencies and in the IS core knowledge areas" to employers (2008, p. 359). This point has been reiterated in subsequent employer studies (Aasheim, Shropshire, Li, & Kadlec, 2012; Janicki, Lenox, Logan, & Woratschek, 2008; Jones, Leonard, & Lang, 2016). Of particular interest to this paper, one of the key and continuous gaps identified by employers in the expected technological knowledge of IS graduates has been project management (Janicki, Cummings, & Kline, 2013; Kim et al., 2006; Plice & Reinig, 2007; Simon & Jackson, 2013; Stevens, Totaro, & Zhu, 2011).

These (and other studies) also identified another expectations gap between IS education and employers. Over and over again, researchers discovered that while employers certainly valued and expected specific technological skills, they also valued certain non-technical skills, often higher than the technical ones. Many researchers (Havelka & Merhout, 2009; Saulnier, 2017; Stevens et al., 2011) have thus differentiated between "hard skills", such as knowledge, expertise, and specific technological know-how, and "soft skills", such as creative thinking, personal integrity, self-motivation, and communicative abilities. Studies of employer expectations of employees in general have long identified the importance of soft skills (Maes, Weldy, & Icenogle, 1997; Robles, 2012). While hard skills are important when initially hiring an IS graduate, over time, it appears that employers value soft skills, especially communications and critical thinking, more highly than hard skills (Aasheim, Williams, & Butler, 2009; Karanja, Grant, Freeman, & Anyiwo, 2016; Stevens et al., 2011).

Given that IS as a discipline is arguably defined by its attempt to provide graduates familiar with business and organizational concepts, these results might not be surprising. Studies in the more technical disciplines of software engineering (Moreno, Sanchez-Segura, Medina-Dominguez, & Carvajal, 2012), computer science (Radermacher & Walia, 2013), and information technology (Aasheim et al., 2012; Waldrop, 2017) discovered essentially identical results: even in these technical fields, employers ultimately valued specific soft skills more highly than specific technical skills within that sub-discipline.

IT project management also has its own research into employer expectations. Müller and Turner (2010) used a complicated survey instrument to ascertain the intellectual, managerial, and emotional competencies of successful project managers. They concluded that critical thinking and communication were two of the top three competencies of successful project managers. Ahsan, Ho, and Khan's (2013) evaluation of job advertisements for project managers found soft skills were the most frequently cited necessary skill. Keil, Lee, and Deng's (2013) Delphi study of IT project managers discovered that communication was the most important skill for project managers, even more important than technical project management skills. Other studies have also concluded that soft skills are a key component of project management (Azim et al., 2010; Chang & Torkzadeh, 2013; Mtsweni, Hörne, & van der Poll, 2016; Pant & Baroudi, 2008; Ravindranath, 2016).

Interestingly, despite this near universal agreement amongst employers about the high value of soft skills, there have been few attempts outside of IS to adopt computing curricula to these findings. Model curricula tend to focus principally on addressing issues such as plugging technical gaps or covering new emerging technologies, and hope that soft skills will be acquired through a type of osmosis, that is, these soft skills will be instilled as part of the process of learning the technical skills within the various computing curricula. Weedon and Tett's (2013) research suggests, however, that specialist programs (for instance, any of the computing disciplines) do not necessarily develop soft skills and thus university curricula needs to explicitly address the issue of developing soft skills (Gibb, 2014; Kanabar & Kaloyanova, 2017; Saulnier, 2017).

In summary, there has been a great deal of research into the skills expectations that employers have of their new computing employees. While technical/hard skills are essential, soft skills are very frequently cited as being more important than hard skills in this literature. These findings have remained stable across time and across different computing disciplines. Interestingly, project management is

sometimes mentioned as an essential soft skill and sometimes as an essential hard skill. More work is needed as a consequence, to unpack employer expectations around IT project management. This study endeavors to contribute to this lacuna in the literature.

METHODOLOGY

Sampling

The initial sampling instrument was developed and piloted with system consultants in Canada. Items were revised based on their feedback, and the revised instrument was field-tested again to confirm that questions were understandable and captured the intended information. A convenience sample was drawn from professional contacts in Europe, Africa, and North America, and New Zealand. The online survey was distributed to one hundred and fifty potential respondents who were IT project managers and other employees, directly or indirectly responsible for IT projects. Some of these individuals forwarded the invitation to other colleagues involved in IT projects; thus, a total possible sample size was impossible to determine. Sixty completed surveys were considered valid and useful for analysis.

Instrument and Measures

Our final instrument (questionnaire) contained 24 survey items and was delivered through an online survey platform. The survey aimed to gather information on factors related to success and/or failure in project management. In Section A, the questionnaire collected demographic information from participants, including gender, years of experience in IT project management, primary role in IT project management, size of the organization in which they work, and information on the industry in which they work. Sections B and C collected information about project success, failure and risk factors and this information was analyzed as part of a separate study. Information about critical project management skills was gathered in Section D of the survey. Participants were asked to indicate which technical skills and behavioral skills they would expect from a student who has taken an IT project management course using a rank ordering from most important to least important. Participants were also asked to rate the entry skills of computing graduates hired into their project teams from very adequate to very inadequate, and lastly, they were invited to provide advice for universities offering IT project management courses.

Analysis

Demographic information obtained from the survey was analyzed through descriptive statistics, and a correlational analysis was used to examine how important factors relate to one another. Rank order analysis of means was used to investigate the critical value of the technical and behavioral skills, and a qualitative thematic analysis was used to capture the meaning of the open-ended questions regarding advice for university programming.

RESULTS

Participants

The researchers received 60 completed questionnaires which corresponds to an estimated response rate of 60%. Data from 58 respondents (79% male and 22% female) were considered useful for descriptive statistics and inferential and structural analysis. Demographic information is summarized in Table 1. About half of the respondents were from Canada (52.6%), and 12.3% were from the United States. The remainder (35.1%) were distributed across the England, Germany, Nigeria, Uganda and New Zealand. The majority of respondents (74.1%) had over four years IT project experience and performed typical project management roles, such as project manager/lead (36.2%) or project team

Table 1. Respondents' demographics

IT Experience (years); n = 58		**Role on IT Project; n = 58**	
Less than 1 year	10.3%	Project Manager/Lead	36.2%
1-3 years	15.5%	Project Team Member	41.4%
4-6 years	24.1%	Project Sponsor/Steering Committee Member	13.8%
7-10 years	12.1%	Other Project Support (technical/administrative)	8.6%
Over 10 years	37.9%		
Country /Region; n = 57		**Size of Organization; n = 58**	
Canada	52.6%	Very large: 5,000 or more employees	32.8%
United States	12.3%	Large: 500-4,999 employees	25.9%
Other (please specify)	35.1%	Medium: 100-499 employees	17.2%
		Small: 10-99 employees	10.3%
		Very small: fewer than 10 employees	13.8%
Industry			
Education	29.3%	Energy and Energy Service	8.6%
Health Care	3.4%	Financial Services	6.9%
Technology	32.8%	Government	6.9%
Other (please specify)	12.1%		

member (41.4%). Most respondents were from large to very large organizations (58.7%), especially in the educational (29.3%) and technology industries (32.8%).

The majority of the respondents indicated that most of the new IS/IT graduates hired in their organizations did not have adequate project management skills (see Figure 1). In this matter, the data replicates the findings of previous research (e.g., Kim et al., 2006; Plice & Reinig, 2007). This continuously-noted inadequacy should be a source of concern to institutions that produce IT/IS graduates, since it has remained despite continual changes and reforms in official ACM and IEEE computing curricula.

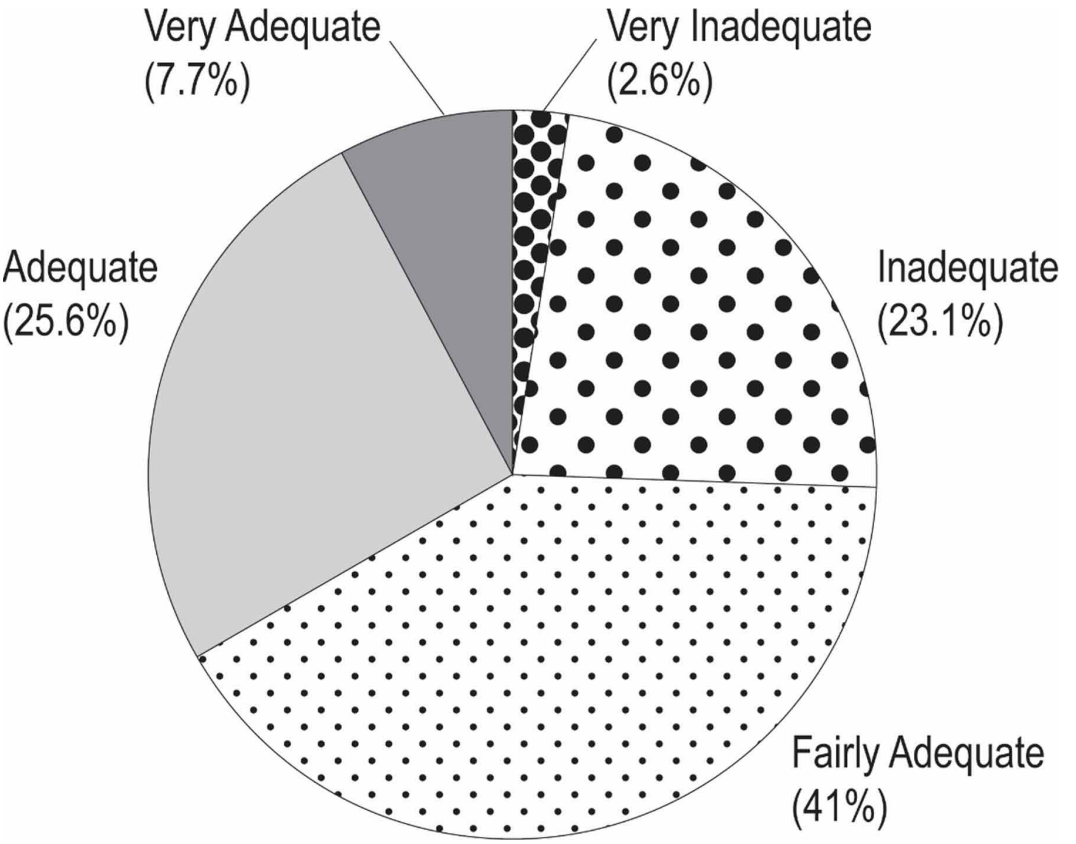
Relationship Between Technical and Behavioral (Using Case Mean of Skills)

The researchers examined the overall importance of technical and behavioral skills requirements for graduates of IT/IS programs using descriptive statistics, based on the mean of means of the skills requirements. The following skills were considered: a) Technical [knowledge of the application area, programming skills, project management body of knowledge skills, systems analysis skills, systems design skills]; and b). Behavioral [effective communication, leadership and motivation skills, negotiation skills, conflict management, problem solving].

Correlation Analysis

The analysis began with an investigation of paired item correlations, looking at the relationships between various demographic variables and IT project management skills. Results are shown in Table 2. There were, with only a few exceptions, no major indications of significant correlations between respondents' demographics and skills requirements. Organization size was significantly negatively correlated with PMBOK (Project Management Body of Knowledge) but positively correlated with the perceived importance of problem solving skills, while the complexity of the project was negatively correlated with the value placed upon the employee's domain knowledge. Interestingly, PMBOK

Figure 1. Adequacy of project management skills of new hires



skills showed a higher positive correlation with behavioral (leadership and motivation, negotiation, and conflict management) skills. Expectedly, systems analysis is significantly correlated with systems design, programming, and effective communications skills.

Table 3 indicates that on the aggregate, behavioral skills were accorded a higher level of importance ($\mu = 4.04$) than technical skills ($\mu = 3.61$). The researchers conducted a paired sample t-test (at 0.05 level of significance) on the paired differences between means of both the technical and behavioral skills requirements to determine if the difference in importance was statistically significant. The results indicate a statistically significant difference ($t = -4.156$; $p = 0 < 0.01$) between behavioral skills and technical skills requirements in that behavioral skills are seen as more critical than technical skills.

It is important to show how individual technical and behavioral skills compare in terms of their relative importance in the project management skills requirement matrix. Figure 2 uses a radar chart to compare the weighted means of all technical and behavioral skills. The skills requirements radar chart clearly points to behavioral skills (*problem solving* and *effective communication*) occupying the highest spots in terms of importance in IT project management/delivery.

Figures 3 and 4 isolate the technical skills from the behavioral skills (on a 5-point scale). They illustrate the weighted mean importance of each element of within their respective skill set.

Our survey covered project management risk factors, and the results of the risk factor analysis are presented in a separate paper. One of the popular risk analysis measures is the Process Failure Mode Effects Analysis (PFMEA). PFMEA is a structured analytical tool that identifies and evaluates

Table 2. Required skills and demographic correlations

	1	2	3	4	5	6	7	8	9	10
Required Skills										
1. Knowledge of App Area	1									
2. Programming	.127	1								
3. PMBOK Skills	.147	-.278	1							
4. Systems Analysis Skills	.133	.341*	.121	1						
5. Systems Design Skills	.050	.520**	-.173	.774**	1					
6. Effective Comm Skills	.176	-.239	.212	.374*	.179	1				
7. Leadership Motivate Skills	.146	-.044	.469**	.278	.064	.449**	1			
8. Negotiation Skills	.282	.001	.437**	.241	.184	.252	.687**	1		
9. Conflict Mgt Skills	.271	-.076	.445**	.378*	.262	.232	.206	.276	1	
10. Problem Solving Skills	-.117	.038	-.089	.279	.378*	.121	-.105	.196	.090	1
Demographics										
Years Exp	.222	.196	.191	.066	.311	-.292	.049	.279	.073	-.018
Org Size	-.042	.169	-.424**	.058	.217	.026	-.019	-.162	-.318	.333*
Complexity of Project	-.352*	-.009	.059	.073	.102	-.088	-.151	-.231	.242	.128
Proj Mgt Skills of Hires	-.028	.037	.030	-.259	-.098	.108	-.138	-.137	-.181	.057

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

the potential failures of a project, based on certain risk elements (Chen, 2007). PFMEA shows one important parameter: The Risk Priority Number (RPN), which is a measure that indicates the criticality of a risk element. The higher the RPN, the more critical the risk factor is (used when assessing risk in a project). Larger RPN values normally indicate more critical failure modes or risks. The Potential Failure shows the risk factors as in terms of: a). the probability of occurrence, the impact of the risk on the project, and the difficulty in detection. The product of these quantities (each rated on a scale of 1 [best] to 10 [worst]). The summary of the PFMEA analysis relating to six identified risk factors is presented in Table 4.

Our results show that the requirements/client relationship risk elements factor has the highest RPN, followed by the resource risk elements, which directly relates to the IT project team in terms of: knowledge of tools, management competence, and project team staff turnover.

Qualitative Results

In addition to providing numeric survey responses, participants were also asked to provide open-ended advice for universities offering IT project management courses. Following procedures outlined by Hahn (2008), raw data from this question were broken down into discrete meaning units (level one coding), and main ideas were isolated and identified (level two coding). These main idea units

Table 3. Technical skills and behavioral skills: Aggregate analysis

	Mean of Means	Standard Deviation	Standard Error Mean	t	Sig (two tailed)
Technical Skills	3.61	0.65	0.11	-4.156	0.002
Behavioral Skills	4.04	0.57	0.09		

Figure 2. Skills requirement Rader (using weighted means)

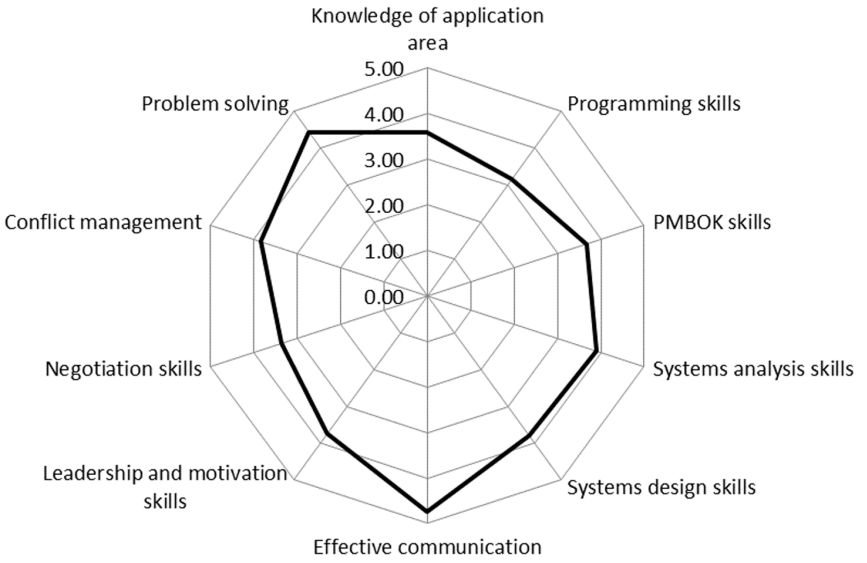
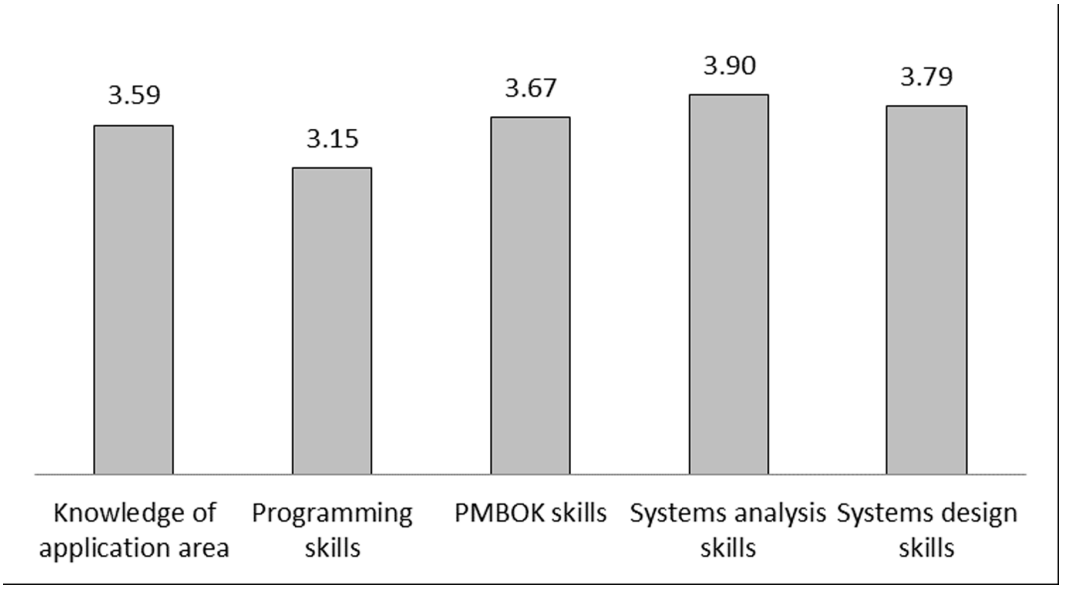


Figure 3. Weighted means of technical skills



were reduced further into groups (level three coding), resulting in five discrete thematic categories. In addition to these five themes, the data included 11 specific content suggestions aimed to improve university curriculum. The five thematic categories from the analysis were:

Figure 4. Weighted means of behavioral skills

Table 4. Summary of risk analysis

Risk Factor	Mean RPN
Organizational risk elements	239.98
Resource risk elements	262.35
Requirement/client relationship risk elements	299.48
Hardware or IT infrastructure risk elements	179.00
Project-related risk elements	224.83
Product-related risk elements	184.70

1. Students need to practice on real-life projects involving industry partners (12 items)
2. Students will benefit from hearing about real-life examples in the classroom (6 items)
3. Students need to learn soft skills including communication skills, client relation skills (7 items)
4. Students need to learn critical thinking skills (6 items)
5. Students need to demonstrate their learning in practical ways (3 items)

DISCUSSION OF RESULTS

Project management is a complex activity that requires a wide variety of technical and behavioral skills, but when it comes to hiring, industry practitioners often emphasize behavioral/soft skills as being more important. Data from this convenience sample of international IT professionals are in line with past research. The results show that on average, demonstrated behavioral skills are seen as more salient to the hiring process, presumably because technical skills can be more easily acquired through on-the-job training and/or industry experience (Saulnier, 2017; Stevens & Norman, 2016).

Among the technical skills investigated here, system analysis skills were ranked as most important, yet still were considered less important than effective communication skills, problem solving skills, or conflict resolution skills. These results support the conviction that IT project failures are mainly linked to the lack of requisite soft-skills for managing users and their requirements (Creasy & Anantatmula, 2013; Standish Group, 1995).

The importance of hiring employees with strong PMBOK and problem-solving skills was found to be significantly correlated with the size of the organization. In the case of PMBOK skills, the correlation was negative, suggesting that these skills were significantly less important for larger firms who seem to have built organizational knowledge, capacity, and structure for managing software and other projects. In case of problem-solving abilities, the positive correlation suggests that larger firms are linked with a need for more problem-solving skills. This result may suggest that smaller companies need to hire employees who can take on a variety of responsibilities, while larger corporations may hire individuals for more specialized roles. In addition, more complex projects tend to de-emphasize knowledge of the application area. Complex projects would likely require elaborate processes, coupled with best practices (such as Joint Application Development), which would put the pressure of knowledge of application areas on the domain experts on the project team. Despite these significant differences, overall these skills were still seen to be more important than their technical counterparts for all organizations regardless of size. These results are in line with a recent study conducted by Ebert, Kuhrmann, and Prikladnicki (2016) which also indicated that the emphasis on soft-skills is universal, irrespective of organizational size, industry, or location.

Despite the importance of these soft skills, results from this study indicate that new professionals are perceived to be lacking in this area. Participants in this study indicated that only a third of new graduates hired into their organizations had "adequate" or "very adequate" project management skills. This data is in line with past research (Kim et al., 2006; Plice & Reining, 2007) and should be of concern to post-secondary educators and to prospective graduates alike. Our results corroborate existing literature, which suggest that apart from risk relating to user requirements (Standish Group 1995), the resource risk factor (relating to the project team members competencies) is a major risk factor, which could greatly impact the ability to deliver on the project objectives (Wallace & Keil, 2004).

The results of the qualitative respondent data included advice for university programs to further emphasize "real life" practice and "real world" examples, develop the key client-relation skills of communication and problem solving, and incorporate practical demonstrations of technical and behavioral skills. The opportunity to learn and practice critical thinking as applied in industry was seen as a significant requirement. Increasingly this field requires agile critical thinking skills, an understanding of process as well as outcome, a need to demonstrate client skills and soft skills, and the ability for professionals to be self-motivated and adept at renewing their knowledge while working closely with people and systems.

University educators would be wise to consider this collective body of research while actively addressing the disconnect between industry's emphatic desire for soft skills and the typical post-secondary emphasis on technical skill acquisition through its undergraduate curricula. Most of the ACM-IEEE model curricula (ACM-IEEE, 2008; 2013; 2016) place significant emphasis on technical skills, with only a minor emphasis on time management and team management soft skills; other critical soft skills that are valued by industry, such as personal integrity, leadership, and communication, are rarely explicitly addressed by computing curricula.

Why is this the case? If behavioral skills are so important for employers, why isn't more of the typical project management curricula explicitly addressed to inculcating these skills? One explanation could be that several of these model curricula (except the IS 2010) tend to place project management in the project engineering body of knowledge, which emphasizes sound engineering principles in the management of projects. Only the IS 2010 model curricula (ACM-AIS, 2010) recognizes risk management and stakeholder communication management as essential skills in project management.

Project management requires effective team building skills, but most importantly, effective client relationship skills. As evidenced by this study and corroborated by past research such as Ravindranath (2016), Mtsweni et al. (2016), and, Stevens and Norman (2016), high value is placed on communication management (internal and external), problem solving, and conflict management/negotiation skills in IT project management and execution. These skills fall within the project management body of knowledge (Project Management Institute, 2013).

Addressing the soft skills expectations gap between the industry and educational institutions will likely require curricula and pedagogical solutions (Burns & Chopra, 2017; Kanabar & Kaloyanova, 2017; Radermacher, Walia, & Knudson 2014; Saulnier, 2017). While there has been a great deal of research identifying the importance of new employee soft skills for employers, there has been significantly less effort on systematically identifying how to create these soft skills within a university context (Gibb, 2014; Taylor, 2016).

A good starting point in this quest for curricula redesign would be the ACM-IEEE model curricula in various computing disciplines. Although it is commonly acknowledged that soft skills should be taught in IT project management courses, there is still an unanswered question about whether the required soft skills can effectively be taught by computing and engineering departments. Perhaps co-teaching IT project management with faculty from the business school might be one possible solution. Weedon and Tett (2013) report success using a dedicated course on soft skills acquisition. A service-learning component in the curriculum has been reported as another way to improve soft skills within a computing program (Carter, 2011). Interdisciplinary teams, in which computing students have to work together with non-computing students, might provide another way of improving soft skills without making larger-scale curricular changes (Carter, 2014; Yuen, 2015). When larger curricula flexibility is available, including general education or traditional liberal education courses outside the usual engineering or computing areas might be another way of engendering these behavioral competencies (Arenella, Davi, Veeser, & Wiggins III, 2009; Humphreys, 2013; Jones, 2005; Saulnier, 2017). Alternatively, universities could engage industry practitioners in co-teaching project management courses; research (Samuel, Donovan, & Lee, 2016) shows that industry co-teaching has the potentials of providing students with industry required soft-skills and improving employability of the students. Other pedagogical suggestions for improving soft-skills include the more frequent use of group projects (Pastel, Seigel, Zhang, & Mayer, 2015; Tewari et al., 2017), using more real-world case studies (Janicki, Fischetti, & Burns, 2016), and embedding project management principles (especially soft-skills) into programming paradigms such as XP, SCRUM and RUP (Usman, Soomro, & Brohi, 2014).

LIMITATIONS AND FUTURE RESEARCH

This study used a combined sampling process including a convenience sample drawn from professional contacts, and a purposive sample aimed to capture employees from organizations of varying sizes. This procedure provided rich data, but is not without its limitations. Given that the survey was distributed to individuals and then passed on through their contacts, the researchers were unable to calculate an accurate response rate. Furthermore, this sampling procedure means that this study did not have a representative sample of the IT population, and differences across countries of origin may limit generalizability. The researchers also take cognizance of the cultural, organizational, socio-economic differences among respondents in various countries, which could impact on data aggregation. This, coupled with the smallness of samples for each country, could affect the generalizability of results; however, the study provides a rich window into industry expectations, despite expected organizational and locational differences.

Future studies in this area may strive for a stratified, representative sample, drawn from one geographical area, or may wish to draw larger samples from multiple areas to allow for statistical comparisons between populations. Collecting more detailed demographic information about the

supervisory, managerial or hiring experience of respondents may also be of interest. With respect to the survey itself, future iterations may allow participants to add in their own items of interest when providing information on preferred behavioral or technical skills. While participants were invited through open-ended questions to provide this input, those suggestions were not ranked alongside the other items. This survey-bias could be reduced by including an "other" category which then could be included in the ranking process. The nature of this survey design also calls for an estimated retroactive-assessment of new-graduate skills (or perceived skills). Such estimations are prone to bias, and future investigations may look at capturing data immediately after hiring is complete. Such a study would allow for information to be collected from the new employee (self-assessment) as well as members of the hiring team. This approach would increase the validity of findings since it would include timely ratings from more than one source, provide an opportunity for investigation of inter-rater reliability, and allow comparison between self-ratings and observer ratings. Future studies should also consider analyzing the impact of IT project team competencies on project outcomes.

CONCLUSION

The evaluation of the critical competencies required for project management teams to be successful in the IS/IT context has highlighted an expectations gap between what employers of recent graduates expect them to bring to their career, and the actual skills those graduates have acquired while in university. The longstanding expectation of employers that graduates will come with fully-formed behavioral soft skills such as critical thinking and communication and the perceived lack of these skills in their new hires has not been fully resolved and continues to this day. The results of this study indicate there is value in revisiting this topic as the data highlight the persistence of this expectations gap. The analysis reconfirms the importance which employers place on hiring new graduates with strong behavioral skills (especially problem solving and effective communication), with less emphasis on the more technical skills. The results suggest that organizational size and project complexity impact on some skills requirements for IT projects. As organizations grow in size and engage in more complex projects, they harness existing knowledge, structures, templates, methodologies, and best practices for management of IT projects; thus, there is less emphasis on nuances of project management (as contained in PMBOK), and more emphasis on problem solving skills.

The continuing perception across several decades of a soft skills gap should motivate educators to re-evaluate how, or even if, those competencies are being developed in their students in the typical higher education computing program. The persistence of this soft skills gap indicates that these soft skills are not necessarily gained as part of the standard computing curricula, and computing educators could be more expansive in their approach to curriculum development and instruction to include other disciplines that have stronger behavioral components. This expansion could also include the increased use of real-world practice, industry-lead case studies, service learning integration, or additional liberal education components as other ways of inculcating these soft skills within a computing program.

Project management teams continue to be crucial to project success, and the skills and expertise of project team members are critical to functional project teams. There is work still to be done through revising computing curriculum to explicitly include additional opportunities to develop soft skills as a way to ameliorate the expectation gap issue, thereby improving IT graduate success when they enter project management teams in industry.

Ethics approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the Human Research Ethics Board of Mount Royal University, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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