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Addressing Skill Gaps by Onboarding IT Graduates into the Workplace

CAPSTONE REPORT

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Abstract

This annotated bibliography focuses on the premise that providing comprehensive onboarding programs upon hiring new IT graduates will significantly improve job performance, retention, and satisfaction for employers and graduates. The author identifies the issue, noting categories of skills that IT graduates need to improve. A description of best practices of onboarding programs and how they can help fill skill gaps is provided. Finally, a literature review identifies the best practices for IT graduate onboarding programs.

Keywords: onboarding IT, entry level jobs technology, IT applicants, IT hiring, software developers, skills gaps, hiring, onboarding Information Technology, employee selection, IT personnel, IT Staffing, job skills, Information Systems, IS professionals, IT professionals, Information Technology, onboarding IS, computer software, engineering, staff orientation, workplace learning, and *computer science graduates.*

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Introduction to the Annotated Bibliography

Problem

New graduates that are hired into the workforce often have skill gaps that have been attributed to the differences between what skills are being taught in undergraduate programs and what skills are actually needed on the job (Begel & Simon, 2008; Wickramasinghe & Perera, 2010). The skill gaps, while prevalent in many undergraduate programs, are even more apparent in jobs that require Computer Science (CS) or Information Technology (IT) skills (Lutz, 2013). These skill gaps have led to career stunting and problems in the retention of new graduates (Stackpole, 2013). If the employers are unable to bridge the gaps from new graduate to full-functioning employees, then employers will be forced to terminate the employment of employees who exhibit these skill gaps or deal with long periods of unproductivity from these employees on the job (Stackpole, 2013). Employers are then left to deal with instability and frequent turnover in their organizations, as well as a lack of quality which directly affects the "ability to maintain their strategic and financial competitiveness" (Simon & Jackson, 2013, p.52).

> An IS competency is created when processes and structures are applied in non-transparent and inimitable ways to combinations of IS resources, to develop specific abilities for accomplishing IS-related organizational tasks. IS competencies are, therefore, embedded in organizational processes and business routines. Recent IS research has converged on the conclusion that IS competencies positively influence organizational performance. (Tarafdar, Gordon, & Elsevier, 2007)

Employers have reported many gaps in important IS competencies when hiring new graduates. These gaps include working knowledge of database management, information management, network/infrastructure, cybersecurity, IT support, data analytics, web

design/development, application development, storage/data backup, and cloud computing, to name a few (Legier, Woodward, & Martin, 2014). It is important to note that technical skills are just one of the gaps employers report in IT graduates. Additional skill gaps are in the areas of communication, collaboration within a team setting, time management and organization, management of ambiguity in job tasks, and understanding overall how the workplace functions (Begel & Simon, 2008).

Even more problematic is the fact that over the long term the lack of skills seen in new graduates could potentially cause employers to become less interested in hiring graduates directly out of college (Wickramasinghe & Perera, 2010). A change in hiring patterns could prove detrimental for both the employer and the potential employee because it would leave graduates in a Catch 22 situation where the new graduate needs experience to get hired for a job, but cannot find a job to gain the experience (Lutz, 2013).

Purpose

The purpose of this study is to identify the best practices for the successful onboarding of new graduates into Information Technology positions. New graduates often have large skill gaps that significantly hamper their productivity and their success as new hires (Begel & Simon, 2008). The focus of this literature review is on the onboarding process for new IT graduates once they have been hired by employers. The need for strong IT workers will continue to grow as technology becomes more and more essential to organizations (Simon & Jackson, 2013). A comprehensive process to address skill gaps will ensure that both graduates and employers will be successful in their IT endeavors.

Research Question

Main question. How can employers' best use onboarding programs to close the skill gaps of new graduates in the IT field who are entering the workforce?

Sub-questions.   What are the characteristics of a good onboarding program? What does an onboarding program need to include to best suit IT graduates?

Audience

Human resource personnel and hiring managers need to understand the importance of building onboarding programs and what approaches to take within these programs so that new graduates can be more productive and skillful after being hired into their new positions. According to Stackpole (2013), "sixty-two percent of IT leaders said onboarding programs played extremely important roles in establishing a new hire's ability to be productive and add value, while 46% said they (onboarding programs) were extremely important tools for determining whether a new hire would be successful in the company long term"(p.3).   In addition, organizations that "regularly update their onboarding programs are likely in a better position to uncover and act upon industry indicators and employee trends" (Gaul, 2013, p.17).

These findings point to the need to provide training and documentation to employees that are tasked to build and maintain onboarding programs. Human Resource employees in particular can benefit from information that leads to successful onboarding programs for new IT graduates and that provides strategies for maintaining the content to keep the material relevant and effective. The information is of particular importance because,

despite unilateral agreement on the upside of onboarding, most companies have yet to prioritize programs or address onboarding in a way that truly works for IT roles. The

TEKsystems survey found that only 12% of IT leaders and 13% of IT professionals rated their onboarding programs as extremely effective. (Stackpole, 2013, p.3)

IT managers who hire new employees in their departments will be tasked with implementing key elements of the onboarding programs, and thus will benefit from research that informs the successful implementation of these programs.

Search Strategy

The University of Oregon Library's OneSearch keyword search is used to search for all fields. Additional searching of the computer science and business databases yields even greater results. Additional searches are conducted using Google Scholar. Google Scholar is used as a secondary search mechanism because the result sets are huge even when the search is extremely specific. The breadth of potential reference material makes it difficult to find references that best fit the narrow focus of the literature review. However, utilization of limited keyword searches provides the best results and helps to provide result sets that are narrow enough to enable the identification of relevant sources.

The approach to searching for citations includes reviewing reference lists on any relevant literature to see if these citations lead to relevant sources or provide additional keywords for additional reference searches. Searches for full text versions of documents using EBSCO Host provide many relevant references and help to augment keywords.

Search Engines and Databases

The following specific databases are utilized in searching for references:

- Academic Search Premier
- Business Expert Press
- Business Source Complete

- IEEE Computer Society

- EBSCO Host

- Factiva

- JSTOR

- Project Muse

- ProQuest

- Web of Science

Keywords

Keywords include *onboarding IT, entry level jobs technology, IT applicants, IT hiring, software developers, skills gaps, hiring, onboarding Information Technology, employee selection, IT personnel, IT Staffing, job skills, Information Systems, IS professionals, IT professionals, Information Technology, onboarding IS, computer software, engineering, staff orientation, workplace learning,* and *computer science graduates.*

Documentation Approach

Documentation is gathered during the research process and ported directly into Microsoft OneNote. All citations and abstracts are collected in a references section within the application, categorized by the following categories: skill gaps in graduates with an emphasis on IT graduates, general onboarding best practices, and elements necessary in onboarding programs created for IT graduates. Individual article PDFs are saved to Dropbox and links are copied to OneNote to aid in future review. Folders are created to manage resources that have been antiquated or removed during the literature review process and all relevant resources are housed in a file folder called Capstone Final References.

Reference Evaluation Criteria

Credible references are from scholarly sources that have been found authoritative, objective, of quality, current and relevant to the topic of onboarding IT graduates into the workforce (Bell & Frantz, 2014). The basis by which references were deemed credible consists of:

(a) Authority: The source is published by a company that is known for scholarly and quality publications and is cited by other articles or books, which shows that the author is considered authoritative for the subject matter.

(b) Objectivity: The authors exhibit no obvious bias or opinions and conclusions that are presented are backed by solid evidence.

(c) Quality: Articles are from peer-reviewed journals or recognized professional organizations and are free from spelling, grammar, or typographical errors.

(d) Currency: Sources are published between the years of 2004-2014. Any articles older than ten years were deemed not current.

(e) Relevance: The content of the sources is specific to the onboarding of IT graduates or furthers the understanding of onboarding IT graduates by offering useful and timely techniques for the onboarding process or establishing the skills challenges currently being faced by employers of new graduates.

Annotated Bibliography

The 15 references selected for the following Annotated Bibliography are organized in three categories. The first category defines the skill gaps in graduates, especially those in information technology, that are being reported by employers and graduates when new graduates are first hired into the workforce. The second category explores best practices for an onboarding program, regardless of discipline. The third category examines what elements make an IT onboarding program successful, including several case studies of IT onboarding programs that were found to be valuable to both employers and newly hired graduates. Each annotation consists of three elements: (a) the full bibliographic citation, (b) an abstract, and (c) a summary. The abstracts included are complete as published. The summaries include a general overview of the content, with emphasis on the three categories identified as relevant to the research topic: skill gaps in graduates with an emphasis on IT, best practices for an onboarding program, and elements for a successful IT onboarding program.

Skill gaps in graduates with an emphasis on IT.

Aasheim, C. L., Williams, S., & Butler, E. S. (2009). Knowledge and skill requirements for IT graduates. *Journal of Computer Information Systems, 49*(3), 48-53.

Abstract. This study examines the knowledge and skills required of entry-level IT workers as perceived by nearly 600 IT managers and workers from across the United States. In keeping with previous studies, the findings suggest that personal and interpersonal skills are the top rated skills with technical skills following closely behind. Organizational knowledge, particularly knowledge of primary business functions, is important, but less important for entry-level workers than technical skills. The findings

also suggest that possessing relevant work experience is more important for graduates seeking entry-level positions than having a high GPA. Implications of the findings for curriculum design, student advisement and job placement are discussed.

Summary. The article explores a survey the authors conducted on what necessary knowledge and skills are required by entry level IT workers based on the viewpoints of both IT managers and IT workers. The survey was delivered by email and consisted of a listing of thirty-two skills and traits that participants were asked to rank in order of importance. Skills were broken down into five distinct categories: (a) technical skills, (b) organizational skills, which included managerial and personal skills or traits, (c) interpersonal skills or traits, (d) experience, and (e) GPA. The survey determined that among the participants interpersonal and personal skills and traits were ranked the highest in terms of importance. The skills in this category include analytical and communication skills such as the abilities to orally present, write reports, problem solve, and work effectively with teams. The most highly rated skill discovered in the survey was honesty or integrity, which is a skill that academia cannot teach but rather is a part of the individual's essential makeup. Survey participants ranked leadership, entrepreneurial predilection, and the propensity to take risks as not highly valued in entry-level workers. The second most valued category among those surveyed represented technical skills, especially an understanding of IT trends, which indicates that graduates should be encouraged to read current articles and participate in professional organizations. Other IT skills that were valued among those surveyed include a foundational understanding of operating systems, telecommunications and networking, security, and related hardware.

These findings suggest that entry-level workers will be employed in more hands-on positions before moving into higher level jobs like application development.

Those surveyed indicated that while organizational skills in an entry-level worker are not as important as a whole, understanding primary business functions such as finance, accounting, management, and marketing will provide value for the worker when building a career within the organization. Finally, relevant work experience was surveyed as important in hiring entry-level workers and is considered more important than achieving a high GPA while in school. Internships were rated lower than actual on-the-job experiences by the participants, but were still highly valued in the survey.

The conclusions the authors drew from the survey included the need to manage student expectations of the jobs available to entry-level graduates, as well as the importance of learning soft skills and maintaining currency in IT knowledge both in and out of school. This article relates to the research topic because it specifically identifies key skills required of new IT graduates that represent potential critical skill gaps.

Begel, A., & Simon, B. (2008). Struggles of new college graduates in their first software developer job. *Proceedings of the 39th SIGCSE technical symposium on Computer science education* (pp. 226-230). New York: ACM. doi:10.1145/1352135.1352218

Abstract. How do new college graduates experience their first software development jobs? In what ways are they prepared by their educational experiences, and in what ways do they struggle to be productive in their new positions? We report on a "fly-on-the-wall" observational study of eight recent college graduates in their first six months of a software development position at Microsoft Corporation. After a total of 85 hours of on-the-job observation, we report on the common abilities evidenced by new software

developers including how to program, how to write design specifications, and evidence of persistence strategies for problem-solving. We also classify some of the common ways new software developers were observed getting stuck: communication, collaboration, technical, cognition, and orientation. We report on some common misconceptions of new developers which often frustrate them and hinder them in their jobs, and conclude with recommendations to align Computer Science curricula with the observed needs of new professional developers.

Summary. In this article, Begel and Simon explore how new college graduates fare in their first software development jobs. The study consisted of observing eight new software developers over eighty-five hours during their first six months of employment at Microsoft. During the study, the authors classified the common performance challenges the software developers had, including communication, collaboration, technical, cognition, and orientation. In addition, the study highlighted some misconceptions of the new developers, which hindered them in their jobs.

One of the communication challenges discovered during the study is the fact that the developers had trouble determining how and when to ask questions and whether to ask detailed or non-detailed questions. Collaboration issues that the authors observed included not knowing when to advocate for projects and accepting non-assigned work from other team members without question. Technical challenges for the developers included learning the tools the enterprise used for versioning and successfully unit testing their code with the tools and environments provided. In the cognitive realm the developers had challenges taking notes and applying knowledge that was communicated via training "haphazardly in an unstructured piecemeal fashion" (Begel & Simon, 2008,

p. 229). The new developers were found to be isolated from their teams and were

unaware as to whom to contact for certain issues and where to find these resources once

they did know. Ready access to training was not available even though Microsoft has a

mentorship program in place.

The developers also had significant misconceptions that hindered their success during the

first six months. They are: (a) in order to look good to my management I must do

everything myself, (b) I personally must fix any bug I see the right way even if I don't

have time, (c) documentation should or would be available, and (d) I can tell when I need

help on a problem. In conclusion, the study found that between the skill challenges the

developers faced and their misconceptions of what to expect in the workplace, the

transition between academia to the workplace was more difficult than anticipated for both

the developer and the employer. This study is relevant to the research topic of this

annotated bibliography because it describes the skills that graduates found they lacked in

the workplace during the first six months. Understanding the gaps helps determine what

skills to best address when building an onboarding program.

Downey, J. P., Friedman, W. H., McMurtrey, M. E., & Zeltmann, S. M. (2008). Critical skill sets

of entry-level IT professionals: An empirical examination of perceptions from field

personnel. *Journal of Information Technology Education*(7), 101.

Abstract. This paper provides an updated view of the importance of various skills and

traits for entry-level IT workers, as perceived by the IT industry, based on a web-based

survey administered to IT managers nationwide. The work presented in this paper is an

extension of two previous studies based on a survey conducted in 2006. A new survey

was conducted in 2010 that consisted of 48 skills and traits including personal and

interpersonal skills, as well as technical skills. This study finds that the top 12 skills and traits for entry-level IT workers are personal and interpersonal skills with honesty and integrity ranked most highly. The top 5 technical skills have not changed considerably in the past five years. They are operating systems, security, hardware, networking, and database, which have been part of the IT core curriculum for many years. Based on the analysis of the survey, several recommendations for curricula for IT-related degree programs are provided.

Summary. This article explores the skills that entry-level IT professionals need in order to enter the workforce according to the perspectives of IT employees who were working in the industry in 2008 when the survey was conducted. The study surveyed 159 IT field personnel from six participating organizations across multiple industries in the mid-southern U.S. The study was conducted by questionnaire for information the authors gleaned from an exhaustive review of the current literature on the subject of necessary skills for entry-level IT professionals. Sixty-seven percent of participants were males with an average of 14.7 years of experience in the industry. Of those surveyed 84% had a bachelor's degree with 20% additionally having a graduate degree. More than half of the respondents, 52%, did not have direct reports the other 48% consisted of IT employees with managerial responsibility, including CIOs/CTOs.

The answers of what the best skills are for an entry-level IT worker varied depending on the respondent's age, gender, tenure in the IT field, and management level. Gender in particular proved significant in determining the importance placed on various skills. The study confirmed that non-technical skills are very important for entry-level workers but

these results differed from other studies that were cited because they stipulated that technical skills are also very important for new IT hires.

The study's statistical data shows that problem solving, critical thinking, and team skills were the top rated skills and with relatively similar levels of importance. The fourth top rated skill, oral communication, was rated significantly less important than the top three skills. However, oral communication, creative thinking, and written skills were much more important than ethics and privacy. Lastly, database skills such as SQL and database design are ranked as significantly more important than programming languages by the respondents in the study. The technical skills voted the highest for entry-level IT professionals are database, languages, object oriented knowledge, web knowledge, and operating systems.

This article is relevant for the research topic of this annotated bibliography because it queries the IT industry to find out what skill gaps are being seen when hiring entry level IT professionals. Reviewing the listed skill gaps will help employers to anticipate these gaps in new graduates so that they can provide training or resources during the onboarding process to overcome them.

Legier, J., Woodward, B., & Martin, N. L. (2014). Reassessing the skills required of graduates of an Information Systems Program: An updated analysis. *Information Systems Education Journal, 11*(3), 79-89. Retrieved from http://isedj.org/2013-11/

Abstract. The study involves an updated analysis of the requirements of information systems graduates based on the status of the job market as well as the perceptions of 72 graduates over a four year period from an information systems program of a Midwestern university. Approximately one-third of the graduates were working in positions related to

technical support. Providing end-user support, installing software, managing information, and installing and maintaining computer devices/components were the top four tasks performed by the largest number of graduates. Research indicates that employers are looking not only for technical skills but also strong soft skills as competition increases at home and abroad. From a list of 18 technical and nontechnical skills, the graduates ranked thinking skills, personal characteristics, desire to learn, attitude and motivation, teamwork, and communication skills as the top requirements for success in the information technology field.

Summary. This article describes a study performed to research the skills required of information system program graduates and tries to answer the question of how successful graduates were in their professions after graduation. The study posed many questions, including what tasks graduates perform in the workforce on a normal basis and how well the graduates felt their degrees prepared them for working in the IT industry. The technical skills that IT executives stated were in demand in 2012 included: programming and application development, (b) project management, (c) help desk/technical support, (d) networking, (e) business intelligence, (f) data center operations, (g) Web 2.0, (h) security, and (i) telecommunications (Legier, Woodward, & Martin, 2014, p. 82) .
In addition, the authors found that

> the most significant soft skills needed for IT personnel should include (a)
> communication skills (verbal aptitude); (b) problem solving skills (especially
> problem definition); (c) greater facility with teamwork and collaboration; (d)
> ability to manage and motivate one's self; and (e) contextual knowledge of the
> work – why, whom, and when. (Legier, Woodward, & Martin, 2014, p. 83)

The study found that networking and IT support, including end user support, were the most prevalent job tasks after graduation. When asked to rate how well their college educations prepared them for the workforce, the ratings fell between 'somewhat prepared' and 'well prepared'.

This article is relevant for the research topic of this annotated bibliography because it tackles the skills gap question from both the graduate's and IT executive's point-of-view. Querying both groups allows the authors to glean information on what gaps are being seen by both groups and how successful current graduates are when they are newly introduced to the workforce. The careful review of the gaps found in the study will provide a foundation for an onboarding process that will be beneficial both to the graduates and their employers.

Simon, D., & Jackson, K. (2013). A closer look at Information System graduate preparations and job needs: implications for higher education cirriculum enhancements. *World Journal of Education*. doi:doi: 10.5430/wje.v3n3p52

Abstract. A historical review of the literature surrounding IS skill requirements was conducted for this study to provide the changes in IS over the past several decades. Providing a historical look at the literature will place into perspective the fact that the field changes rapidly, causing the need for the IS professional to also continuously change. The results of the investigation revealed that a consensus exists regarding the perceptions of the skills needed for the IS worker.

Summary. The article establishes the need for skilled graduates entering the IS (IT) field by demonstrating that skill gaps in graduates cause challenges for the organizations in both their financial and strategic competitiveness. A historical review of the industry is

described within the article aptly describing the changes that the IS/IT industry has encountered over the years and how these changes have contributed to the combination of skills that is needed in a successful IT graduate today. The article highlights one of the key components of the IS/IT field: technology is constantly changing and academic programs have had trouble keeping up with the needs of employers.

The authors recommend a frequent review of what skills are needed in the IS/IT profession and better communication between employers and universities. However, some of the skill gaps seen in graduates have been an issue for many years and have yet to be rectified by academic programs. Most of these gaps consist of the mandatory soft skills needed for an IT professional to be successful, including the ability to work in a team and communication skills.

This article is relevant for the research topic of this annotated bibliography because it describes why universities in the IT field have unique challenges providing training in the technical skills needed by their graduates and what skills IT graduates have needed historically in order to succeed.

Velasco, M. S. (2012). More than just good grades: Candidates' perceptions about the skills and attributes employers seek in new graduates. *Journal of Business Economics and Management, 13*(3), 499-517. doi:10.3846/16111699.2011.620150

Abstract. There is a common belief among university students that they have to study hard attempting to earn high grades because employers are targeting graduates with outstanding academic records. However, this idea does not seem to capture what is actually happening in organizations, as firms value more aspects related with personality and other personal qualities of young graduates. We present a case study of the hiring

process of recent university graduates to test these hypotheses. The methodology used follows a two-stage approach. Principal component analysis allows us to identify first key categories of skills and attributes that influence the selection process. Then, using econometric analysis, a matrix classifies them according to employer size and type, degree, position and industry. The results show that soft skills (personality and other qualities) are the most required attributes in the selection process. Good academic records only matter in the public sector.

Summary. The study utilizes perceptions by employees to understand what influences the recruitment and selection of new college graduates by organizations. The author illustrates that when a skill can be measured and credentialed, then the credential can indicate to employers that the graduate has the necessary skill for the position in a specific area. Good grades can signal to employers that the graduate was productive and successful in school and that those skills could potentially translate to the workforce, but still good grades still pale in comparison to personal attributes such as good communication skills, the ability to work on a team, or being hard working. Grades, in addition, were found to be used solely as an indicator of potential by employers and not emphasized during the recruitment and hiring process except in the public sector.

The study indicates that the levels of soft skills demonstrated by graduates were closely correlated with the graduates' majors; for example, a marketing major had far more soft skills training than an engineering (or technical) major. Oftentimes it is difficult for an employer to truly understand the extent of an employee's potential productivity. The author offers probationary contracts as an answer to this issue because these contracts provide the employer with the option to keep the employees who prove they have the

necessary skills while allowing the employer to winnow out employees who have been found to be unsuccessful in the positions.

This article is relevant for the research topic of this annotated bibliography because it emphasizes that the skills that students and academia consider the most important measurement of their educations provides only minimal advancement in the workforce. The article highlights some of the reasons why new hires are not successful in the workforce right after graduation.

Wickramasinghe, V., & Perera, L. (2010). Graduates', university lecturers' and employers' perceptions towards employability skills. *Education & Training, 52*(3), 226-224. doi:http://dx.doi.org/10.1108/00400911011037355

Abstract. The purpose of this study is to explore employability skills that employers, university lecturers and graduates value to bring to the workplace, when graduates are applying for entry-level graduate jobs in the field of computer science in Sri Lanka.

Summary. This article explores the results of a study on the skills that are valued by employers, university lecturers, and graduates when graduates are applying for entry-level jobs in the computer science field in Sri Lanka. For the purposes of the study the graduates were separated by gender. The study established four key groups for the study: male graduates, female graduates, employers, and university lecturers. Each group when given a list of employability skills prioritized them differently.

The article stipulates that there are three key elements to employability including the ability to procure employment, the ability to retain employment and move on to different roles within the organization, and the ability to gain new employment at another organization. Employability is dependent on many factors including knowledge, skills,

attitudes, an ability to harness knowledge and skills, and the presentation of employable

assets to employers. After honing this definition of employability, the authors

determined that there is a gap in the skill requirements of entry-level graduates employed

in Sri Lanka.

Jobs vary and graduates need to have the skills that will allow them to thrive in all

environments and provide the employers and employees with the best fit possible. In the

study there were discrepancies between what the respondent groups felt were the most

important skills upon graduation to procure employment. Male graduates indicated that

learning skills were paramount while female graduates chose self-confidence. Employers

indicated that problem solving was most important skill, while university lecturers

concluded that working as a team member was most significant. The authors point out

that their findings could be consistent globally as similar findings were noted in studies

performed in Australia and the UK.

This article is relevant for the research topic of this annotated bibliography because it

reveals the lack of understanding of what skills are needed for an IT worker to be

employable and shows that depending on what group the respondent belonged to the

prioritization of the skills that were needed changed. Onboarding programs will be more

effective if the program takes into account the differences in expectations and

prioritizations and works to align these discrepancies.

General Onboarding Best Practices.

Fayad, A. (2014, September). Why employers can't ignore onboarding with tech. *eLearn,*

2014(9). doi:10.1145/2666679.2664491

Abstract. The traditional onboarding process for new hires is broken, and with today's technology, there is no excuse for saying: "That's the best we can do".

Summary. This article describes the onboarding of employees utilizing technology as a medium, specifically eLearning. Onboarding, as defined by the article, is the training provided to an employee during orientation to ensure they understand the organization's work and culture. Onboarding is described within the article as being a critically necessary process in assuring the new hires will be successful in the company. According to the author, there are many advantages to onboarding in an organization. First, onboarding helps to assimilate employees into one connected workplace. Second, onboarding helps to retain employees by setting clear expectations of the organization. The article also describes advantages of using eLearning in the onboarding process. The first advantage is reducing costs for the organization by allowing one presentation to be recorded and used for months or years within the organization. The second advantage is helping to make employees more comfortable by allowing employees to learn independently for some of the onboarding process without constant face-to-face training, which can prove to be daunting.

The author describes some ways to incorporate eLearning into an organization's onboarding program. The first way is to ensure that all the key players are involved with and supportive of the process. The second way is to find an eLearning partner that will help the organization make the content interactive and accessible. An advantage of bringing in an expert is that the expert should be able to pinpoint the latest trends in technology and help the organization decide on the best content delivery system for their needs. The final recommendation to incorporate eLearning is to provide a vehicle for

continued interaction and engagement such as forums, chat rooms, or social networks that allow new hires to find more sources for information and to ask questions more globally within the organization.

This article is relevant for the research topic of this annotated bibliography because it describes both the importance of onboarding with an organization and describes one tool, eLearning, as a very effective way of onboarding in the workplace.

Ferri-Reed, J. (2013). Onboarding strategies to supercharge millennial employees. *Journal for Quality & Participation, 36*(2), 32-33.

Abstract. The article presents strategies for organizational leaders to manage millennial employees. It highlights the importance of learning to leverage the uniqueness of every age group. It outlines the characteristics of millennial employees including technologically savvy, extremely self-confident, and philanthropical. Organizations are advised to implement an onboarding program that can get new employees up to speed from day one.

Summary. The article describes the millennial generation of employees and their unique traits as they enter the job market. Millennial employees are described within the article as those employees that were born from 1980 to 1999. Some of the unique characteristics attributed to Millennials include that they are technologically savvy, more interested in work-life balance, hungry for feedback, collaborative, extremely self-confident, and philanthropically minded.

The article provides insight on how best to orient Millennial employees to the workplace. The suggestions listed in the article include participatory planning of the onboarding program by the employees, visual learning materials such as websites or videos, keeping

training sessions brief, automating the training process by utilizing technology, providing an opportunity for the content to be interactive, training in groups to allow for collaboration, ensuring that the materials connect with what is important to Millennials, and providing ways for employees to assess their progress within the program.

This article is relevant for the research topic of this annotated bibliography because it provides suggestions on what will work best with the Millennial workforce when onboarding them to an organization. The greater proportion of recent graduates are part of this generation and understanding the group will provide for more effective and efficient learning when they participate in onboarding activities.

Gaul, P. (2013). Onboarding has become a major priority in 2013, study finds. *T+D*, *67*(12), 17

Abstract. The article discusses a 2013 survey of human resource and learning and development professionals conducted by Impact Instruction Group, which found that 71 percent of the 90 respondents are upgrading their onboarding programs. It also reveals that 62 percent adopt a company-based intranet for their technology-based onboarding solutions. It offers advice on how companies can improve their onboarding programs, such as taking advantage of learning and development and uncovering employee trends.

Summary. The article describes findings related to trends in onboarding. In 2013, a survey of professionals in HR and training indicated that onboarding has become a significant priority for the majority of respondents. In addition, a majority of respondents were either in the process of making or considering moderate to major improvements to their onboarding programs. Trends also show an increase in the use of company-wide intranets and eLearning used in onboarding programs.

The article indicates that those organizations that actively update their programs are better able to handle both positive and negative changes within their industries. Some challenges affecting onboarding include lack of buy-in from leadership, lack of departmental accountability, inconsistency in onboarding procedures, and inconsistent budget dollars for onboarding training and improvements. The article points out that "onboarding is a process not an event" and in order to be successful, organizations should change their view on onboarding from an optional to a required component of the hiring process (Gaul, 2013, p. 17).

This article is relevant for the research topic of this annotated bibliography because it provides current information on the trends in onboarding within organizations. It also provides research that illustrates why onboarding programs are important and what changes in viewpoints and strategies are needed to make onboarding programs successful in organizations.

Polach, J. L. (2004). Understanding the experience of college graduates during their first year of employment. *Human Resource Development Quarterly, 15*(1), 5-23.

Abstract. A company's college recruitment practices, as well as its socialization processes for graduates once they have joined the organization, can be improved when there is understanding of college graduates' experience during the first year of employment. This study recorded the experiences of eight college graduates who were employed by a medical device manufacturer in the Midwest. Nine themes common to all participants are identified and grouped into three categories: work environment, friendship, and performance. Related research on college graduates and first-job experiences, Generations X and Y, job expectations, and new-hire socialization is also

reviewed. Recommendations are offered for consideration by the organization that employs the study's participants to improve college graduates' experience. Further research implications are also discussed.

Summary. The article's emphasis is on the experience for the new graduate. It is important for Human Resource professionals to understand new college graduates because graduates constitute a substantial part of the talent pool from which hiring is done. Surveys conducted among graduates that were new hires indicate that there was dissatisfaction expressed by new employees about how they were socialized to their organizations and the perceived menial level of work they were required to perform upon hire. Organizational socialization, as the term is used within the article, is the process where new hires are taught what is expected of them in a particular organizational role. The organization lacked needed cues for indirect communication needed for new graduates unfamiliar to the workforce. Some of the examples of indirect communication include unsaid expectations related to politics, goals, and performance.

During the course of the study three main categories emerged: (a) work environment, (b) friendship, and (c) performance. Graduates expressed surprise at how easygoing their work environments seemed in comparison to academic environments. But, they also voiced frustration with having to learn so much without any structure. Friendships are not the same in the work environment when compared to the academic environment, as most employees are focused on completing tasks and not on socializing. Graduates also expressed concerns about the lack of immediate feedback on their performance. In academia students receive frequent feedback in the form of grades to let them know how they are doing, but in the workforce feedback is not as frequent or unambiguous.

Graduates are also very aware of how little they are contributing when they first are hired and are very grateful when they can start contributing in quantifiable ways.

This article is relevant for the research topic of this annotated bibliography because it describes clearly a new graduate's experience in the first year of being hired and some of the challenges faced. Those responsible for creating successful onboarding programs should be aware of and address the challenges of new graduates to help them in the transition between academia and the workforce.

Elements necessary in onboarding programs created for IT graduates.

Freifeld, L. (2013). Bridging the skills gap. *Training, 50*(2), 16-21. Retrieved from

http://search.proquest.com/docview/1357565658?accountid=14698

Abstract. A skills gap threatens the sustainability of businesses around the world. And while a big part of the skills gap is a shortage of people skilled in the STEM (science, technology, education, and math) industries, there also is a gap in soft skills such as communication and advanced leadership skills. At its core, the skills gap is an education issue, believes Adam Wiedmer, Sourcing director, Seven Step RPO, a professional services corporation providing recruitment outsourcing solutions. While much of the skills gap solution burden may lie with employers, employees are not off the hook. Tracy McCarthy, Chief Human Resource Officer of SilkRoad, offers four key pieces of advice for employees: 1. Ensure you have good basic math, language, reading, writing, communication, and technical/computer skills. 2. Ensure you have, at minimum, basic employability skills: dependability, ability to get along with others, and problem-solving skills. 3. Reset your expectations.

Summary. The article describes the skill gaps employers are seeing in new graduates, including IT graduates; specific examples of skills gaps; and suggestions on what can be done to address the identified skill gaps. An IBM trend report in 2012 indicates that nearly half of the students and educators surveyed indicated major gaps in their institution's ability to meet the IT skills needed for graduates to be successful on the job. Employers need to understand what skills are needed for graduates to be successful with their organizations. Human resource departments should assess the current workforce and contrast it with their forecasted needs to provide a gap analysis for their organization. The author stipulates that the most vital expense a company can make is in their training department and that new hires should be selected based on their attitudes and aptitudes for the positions and not as much on particular skill sets. Another point of the article is that Human Resource departments need to partner with other business units in the organization in order to ensure that their training programs still remain relevant and productive. The best way to ensure that graduates have the skills needed for positions is to provide internships during the academic process.

In addition, an organizational investment to provide extensive free training materials for IT professionals helps to build skill sets of potential new hires, similar to the materials IBM provides through IBM developerWorks. IBM has had much success with developerWorks, with a reported four million developers accessing the materials provided each month. Another suggestion was that IT employees should be allowed to assess their own technical skills as many employees will strive for improvement and the practice helps to build a culture of self-awareness. Finally, any onboarding program should focus on communication, creative thinking, creativity, and collaboration and

include an understanding of learning styles and the traits of different generations of workers.

This article is relevant for the research topic of this annotated bibliography because it provides real world insight into how to assess skills gaps in graduates and build training programs to address them.

Gorman, M. F. (2011). A case study in effectively bridging the business skills gap for the information technology professional. *Journal of Education for Business, 86*(1), 17-24. doi:10.1080/08832321003663348

Abstract. A longitudinal study of information technology (IT) managers at a Fortune 200 company in the Southwest United States was conducted to assess the effectiveness of a training program at bridging the perceived business skills gap for IT employees. A needs assessment was carried out, resulting in a 4-module training program. The program was evaluated for its ability to meet specific business skills deficiencies. Student perceptions were measured both at the time each skill module was delivered and at the conclusion of the training program with an online survey of all participants. Based on these results, the authors propose business training for skills often lacking in technology professionals to bridge the gap between technical skills training and leadership training.

Summary. The article describes a case study of a training program developed by a company in the Southwest United States. The program was designed to provide IT employees with the most important missing business skills. The study, while based on a single organization, shows findings that are generalized and could be easily extrapolated for other organizations. The training program was based on a pyramid approach with technical skills forming the base of the pyramid; crossover skills, business foundations,

and business consulting as the middle tier; and a Corporate Leadership program at the top.

The program was created based on the perceptions of the CIO of the company, discussions with the organization's senior leadership and HR staff, as well as perceptions about the skill gap issues generalized in literature. The overall goal of the training program was to provide technological personnel with the business skills needed to build credibility with their end users. The training program included a variety of content including foundation topics from corporate finance to Excel spreadsheet skills. The study's effectiveness was measured by an exit survey given at the end of the program as well as a follow-up survey, which took place 1-4 years after the training was completed. The survey results showed that participants felt that the training was helpful in their present positions and positioned them for advancement within the organization. The survey showed that participants felt the training that focused on business skills was more helpful than the content that focused more on technological skills.

This article is relevant for the research topic of this annotated bibliography because it describes a case study of a training program that worked to bridge the skill gaps within an organization. Much can be gleaned from reviewing a working case study when building an effective onboarding program to address skill gaps in new graduates.

Johnson, M., & Senges, M. (2010). Learning to be a programmer in a complex organization: A case study on practice-based learning during the onboarding process at Google. *Journal of Workplace Learning, 22*(3), 180-194.

Abstract. This paper seeks to analyze the effectiveness and impact of how Google currently trains its new software engineers ("Nooglers") to become productive in the

software engineering community. The research focuses on the institutions and support for practice-based learning and cognitive apprenticeship in the Google environment. Design/methodology/approach: The study uses a series of semi-structured interviews with 24 Google stakeholders. These interviews are complemented by observations, document analysis, and review of existing survey and statistical data. Findings: It is found that Google offers a state-of-the-art onboarding program and benchmark qualities that provide legitimate peripheral participation. The research reveals how Google empowers programmers to "feel at home" using company coding practices, as well as maximizing peer-learning and collaborative practices. These practices reduce isolation, enhance collegiality, and increase employee morale and job satisfaction. Research limitations/implications: The case study describes the practices in one company. Practical implications: The research documented in the paper can be used as a benchmark for other onboarding and practice-based learning set-ups. Originality/value: This is the first research that gives insights into the practice-based learning and onboarding practices at Google. The practices are assessed to be state-of-the-art and the insights therefore relevant for benchmarking exercises of other companies.

Summary. This case study examines the effectiveness of the training program used to train new software engineers (or Nooglers) at Google. The study was conducted through interviews of twenty-four Google stakeholders, observation, document analysis, and review of current data. Google uses an onboarding process that includes recruiting and pre-start preparation, a two week training and orientation, online training, mentoring, on-the-job training and practice based learning. In addition, Google fosters a transparent performance management system that includes design and code reviews, a company

facing employee CV on the intranet, and the setting of measurable goals called OKRs or objectives and key results. Google engineers usually work in small teams to help build collaborative professional relationships or cognitive apprenticeships. The overall conclusion of the author is that Google's practices work well. However, part of that success is due in part to the organizational mindset and the opportunities given to new employees within the organization.

This article is relevant for the research topic of this annotated bibliography because it describes a case study of a successful training program used with new IT hires in Google. An understanding of the components that make Google's training program successful will help determine what should be included in an onboarding program for other new IT graduates.

Stackpole, B. (2013). Keep new hires from jumping ship. *Computerworld, 47*(18), 30-34.

Abstract. The article discusses the best practices by companies to retain staff, particularly in the information technology (IT) department. It cites as example the Technology Onboarding Program being implemented by Cox Communications for its IT hires. The opinion of TEKsystems' Rachel Russell on the best practices is also cited.

Summary. The article describes a new technology onboarding program created by several companies including Cox Communications and provides suggestions on how other organizations can start their own IT onboarding programs. The onboarding program at Cox Communications was implemented to alleviate challenges seen within the workplace such as the high cost of turnover.

Some elements suggested by the author include a Q&A with the CIO; an overview of the company's culture, business strategy and competitive landscape; an understanding of

roles within the IT organization; a discussion about IT's future goals within the

organization; descriptions of potential career paths within IT; a mentor program to pair

experienced employees with new ones; opportunities to socialize with co-workers at

events; oversea assignments to help build teams globally; and an understanding of how

the business functions. The primary focus of the program was to provide a

comprehensive program upfront, which allowed employees to become productive faster.

Employees were very positive about the program and as result after completing the

program were much more aligned and loyal to the company.

This article is relevant for the research topic of this annotated bibliography because there

is much to be learned from the best practices of successful existing onboarding program

for IT employees when building an onboarding program for new IT graduates.

Conclusion

One challenge for employers in the workplace is finding the right new talent for their open IT positions (Aasheim, Williams, & Butler, 2009; Freifeld, 2013; Wickramasinghe & Perera, 2010). Myriad skill gaps have been identified in recent IT graduates upon their entrance into workplace, which causes challenges for both the employers and the employees (Aasheim, Williams, & Butler, 2009; Downey, Friedman, McMurtrey, & Zeltmann, 2008; Gorman, 2011; Legier, Woodward, & Martin, 2014; Simon & Jackson, 2013). This annotated bibliography summarizes literature that addresses the question of how employers can use onboarding programs to address the skill gaps of new IT graduates entering the workforce. Sources have been selected that address the topics of skill gaps in graduates, with an emphasis on Information Technology graduates; general onboarding practices; and the elements that are necessary in onboarding programs designed specifically for IT graduates.

The issue of new IT graduates entering the workforce with insufficient skills has consequences for both employers and the graduates. Employers face the choice of terminating the employment of newly hired graduates who do not possess sufficient skills or enduring long stretches where productivity needs are unmet (Gorman, 2011). The graduates face frustration in jobs for which they do not possess the necessary skills and the potential of termination if they do not acquire the skills quickly enough (Polach, 2004; Simon & Jackson, 2013). This annotated bibliography explores literature to fully define the problem and offer potential alternatives as solutions.

Skill Gaps in graduates with an emphasis on IT

An in-depth review of the literature shows that there is a plethora of skills that are either missing or undeveloped when new graduates are hired (Aasheim, Williams, & Butler, 2009;

Begel & Simon, 2008; Gorman, 2011; Stackpole, 2013). While both technical and business skills are mentioned in the literature, sources agree that business skills are most lacking in new IT graduates (Aasheim, Williams, & Butler, 2009; Downey, Friedman, McMurtrey, & Zeltmann, 2008). The ability to work in teams and excel at communication and an understanding of the business needs within the organization all need to be developed in IT graduates (Aasheim, Williams, & Butler, 2009; Downey, Friedman, McMurtrey, & Zeltmann, 2008; Polach, 2004; Simon & Jackson, 2013). Other business skills that are considered critical for success in the workplace include honesty and integrity (Aasheim, Williams, & Butler, 2009; Downey, Friedman, McMurtrey, & Zeltmann, 2008).

Technical skill gaps are also noted as lacking among new graduates joining the workplace because the technological landscape is always changing and academia is not teaching the technical skills that employers need at the appropriate level of expertise (Simon & Jackson, 2013). Specific technical skills that were identified as important and desirable include operating systems, security, hardware, networking, and database (Downey, Friedman, McMurtrey, & Zeltmann, 2008). Understanding the skill gaps in new IT graduates will help employers make the best decisions with regard to their onboarding programs.

General Onboarding Practices

Results from a survey of professionals in HR and training indicated that the majority of respondents have made onboarding a significant priority, and most respondents were either in the process of making or considering moderate to major improvements to their onboarding programs (Gaul, 2013). Providing onboarding programs for employees has proven to be very effective in positively influencing the success of the new employees in the workplace (Gaul, 2013). Fayad

(2014) states that onboarding helps to assimilate employees into a connected workplace and helps employers to retain employees by setting clear expectations of the organization.

The literature review of general onboarding approaches finds many best practices that can be applied to any program. In general, it is important for employers to understand the unique traits of the generation of the employees that they are hiring (Ferri-Reed, 2013). In most cases new graduates belong to the Millennial Generation, and there are key ways to train Millennials that may prove to be more successful than traditional training methods. Millennials have grown up with technology, so infusing a training program with visual aids, interactive learning, and eLearning will help an onboarding program be relevant to new graduates (Fayad, 2014; Ferri-Reed, 2013).

Another key component for new graduates entering the work force is to understand the expectations in the work environment (Polach, 2004). Graduates need to be able to transition from the immediate feedback inherent in current academic grading systems to the periodic performance reviews that are common in the workplace (Polach, 2004; Velasco, 2012). Graduates also often lack the ability to deal with the ambiguity that is frequently required in the workplace. The professional culture is very different from academia and there are many unspoken expectations that new graduates find difficult to maneuver when they get their first jobs (Polach, 2004).

Elements necessary in onboarding programs created for IT graduates.

The final category in the literature review includes elements that are necessary to consider when building an onboarding program for IT graduates. IT graduates are steeped in technical studies within academia so they have a more pervasive need to procure business skills that may have been lacking in their studies (Aasheim, Williams, & Butler, 2009; Gorman, 2011).

Garnering these business skills, especially regarding team dynamics within the organization, will provide IT professionals with the ability to excel in organizations (Begel & Simon, 2008; Gorman, 2011; Johnson & Senges, 2010)

IT graduates have limited experience in working with others, which can be an opportunity for teaching new skills in an onboarding program. For example, Google has found success in providing mentor relationships and putting graduates in small teams during the onboarding process and while working on projects to help foster collaboration (Johnson & Senges, 2010). Most importantly, IT graduate onboarding programs need to emphasize that new graduates must take responsibility for their post-graduate skills, due to the constant nature of change in IT. Acquiring the valuable ability to continually pursue new knowledge and skills will help both employers and graduates to retain their competitive advantages (Downey, Friedman, McMurtrey, & Zeltmann, 2008).

Both employers and new graduates benefit when the graduates are provided with an onboarding experience that provides a seamless transition from graduate to fully functioning employee. The onboarding process will allow IT graduates to build their technical skills while learning content that will help to bridge their business skill gaps. Building business skills is of absolutely necessity for IT graduates to become truly successful in their careers (Aasheim, Williams, & Butler, 2009; Begel & Simon, 2008; Gorman, 2011). Onboarding also benefits graduates because they are provided with opportunities to understand the organizational cultures and the expectations they will encounter in their new positions (Polach, 2004; Stackpole, 2013; Velasco, 2012). Employers will enjoy more successful and well-rounded employees who will be able to contribute much more quickly to the goals of the organization (Begel & Simon, 2008; Gorman, 2011; Polach, 2004).

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