

The Unrecognized Learning: Preparing Pakistani IS/IT Graduates for a Career

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Abstract

Pakistani IS/IT academicians generally lack vital piece of information for both industry and students i.e. information about the career choices and field experiences of their graduates. This information needed to equip Pakistani IS/IT graduates with the knowledge of the overall context in which they will develop their professional careers. Using a survey instrument, this study explores the field experiences of Pakistani IS/IT graduates. The study found that Pakistani IS/IT graduates seriously lacked knowledge of their profession and a clear picture of their place in it. Pakistani IS/IT educators must keep themselves abreast of continually updated information about the employment destinations and field experiences of their graduates to guide their graduates to have attainable goals and expectations and to receive favorable treatment from the employers. This valuable but largely un-recognized part of the IS/IT education in Pakistan is transferred to the students via teacher-student interaction in an informal way.

Keywords

IS, IT, HRM, career development, career strategy, career path, MIS

Introduction

There is an acute shortage of labor in IS/IT industry of Pakistan and employers finding it increasingly difficult to recruit and retain IS/IT professionals with the appropriate skills. Pakistan produces half of its annual requirement of IT professionals per year (Sameer Sabir et al. 2010). As a consequence, graduates with appropriate skills are frequently considered to have particularly favorable career opportunities. The national and business success around the globe is increasingly dependent on IS/IT. As a consequence, the effectiveness of university education and training is becoming especially important.

The rapidly changing technology and corresponding increased demand for new technology skills raises the question about capabilities of universities to inculcate in their students the technical and related knowledge that will equip them to perform IS/IT related jobs [(Lee & Trauth, 1995), (Marilyn L. Wilkins and Cheryl L. Nolltt, 2000), (Khoo 2012)].

In Pakistan, a large part of student-teacher interaction involves the transfer of formal knowledge and skills. The assessment of quality of courses by Pakistani IS/IT educators has always been focused on the choice of subject matter, and the relevancy of the curriculum with the curriculum of the foreign universities. Very little attention has been paid to the curriculum fit with industry/employer needs and the effectiveness of teaching specific skills. An important dimension of the IS/IT educator's role i.e. the role of university courses in transferring general and contextual knowledge to IS/IT students and preparing them to make informed career decisions is almost always ignored.

An important resource for the new graduates' is the knowledge of profession and developed sense of professional ethics. This information is typically transferred informally. In this informal transfer of knowledge, students gain information from their educators about suitable jobs

and professional ethics, career expectations, work styles, and general industry characteristics. It is a very important but an often unrecognized part of the IS/IT education in Pakistan. Both the students and the industry heavily depend on this informal transfer of knowledge. To conduct this aspect of education well, IS/IT educators of Pakistan need a clear picture of the short-term and long-term employment destinations of their students, the development of their IS/IT careers, and their job experiences. This study aims to examine the career destinations of Pakistani IS/IT graduates and their career building experiences years after graduation.

Literature Review

A review of academic literature on IS/IT careers provide three basic themes about IS curriculum and IS graduate experience.

The **first theme** focuses on fit between IS curriculum and employer needs of particular skills in the labour market [(Trauth et al. 1993); (Haworth & Van Wetering 1994); (D. M. S. Lee et al. 1995); (Kuraś et al. 1999);(Landry et al. 2000); (Snoko & Underwood 2001); (Foskett 2003), (Marilyn L. Wilkins & Cheryl L. Nolltt 2002); (Thomas N. Janicki et al. 2004), ,(Llorens et al. 2010), (Khoo 2012). Analyzing four different groups of IS professionals (i.e. IS managers, end-user managers, IS consultants, and IS professors) for skills requirements of future IS professionals, (Trauth et al. 1993) found that there exists an “expectation gap” between industry needs and academic preparation that needs to be filled by mutual efforts of both academia and industry. Analyzing how well academic programs prepare there is graduates for the business world, (Haworth & Van Wetering 1994) suggested redesign of IS curriculum to meet the diversity in IS practice. (D. M. S. Lee et al. 1995) analyzed USA MIS professionals and industry and identified that the skills and knowledge required for the IS professionals is changing rapidly along multiple

dimensions. They argue that these changes will likely lead to different career paths with differing emphasis on the multi-dimensional knowledge and skills for IS professionals. They argue that a generic curriculum to meet all educational needs of all future IS professionals is not enough and educators must adopt a clear vision of the IS career choices they are preparing their students for. They also emphasize the development of a curriculum that has more relevance, depth, and breadth in accordance to needs of each specific IS program. (D. M. S. Lee et al. 1995) empirical work is supported by (Kennan et al. 2008) empirical work that shows employers are seeking an ever-increasing number and variety of skill sets from the new employees. (Lash & Sein 1995) also argue that IS curricula should be divided into specialized divergent streams to meet the changing nature of professional practice. (Gupta & Wachter 1998) further supports this idea by suggesting the introduction of a capstone information systems course to enhance graduates competence in team work, communication, and creativity, and an understanding of business functions. (Kuraś et al. 1999) analyzed the polish IS curriculum and found that determining employer expectations and comparison against a model IS curricula was needed to align the polish IS curriculum with polish industry needs. (Landry et al. 2000) found that IS academics perceive themselves as preparing students for four predominant jobs i.e. system analyst, database analyst, network administrator, and application developer. (Snock & Underwood 2001) provided a comparison of generic attributes desired by employers and by academics. Study found that graduates gave higher rating to attributes of team participation and the commitment to further learning and intellectual development. Oral and written communications were rated significantly more important than a comprehensive knowledge of IS. (Foskett 2003) using documentary analysis, participant observation, and informal interviews of the major stakeholders, contrasted the process of curriculum development within the foundation IS degrees programs with established models of

curriculum development in higher education, and in the workplace. The study found that the curriculum development process in each shared a common goal of widening participation and the development of skills. (Marilyn L. Wilkins & Cheryl L. Nolltt 2002) , using a survey of Information Systems professionals in United States, reported that participants ranked systems knowledge relating to the entire organization and overall business knowledge higher as compared to the advanced IS applications. Participants ranked soft skills, such as teamwork and collaboration, planning and leading projects, presentation delivery, and writing skills, critical for success in the IS profession. (Thomas N. Janicki et al. 2004) conducted an employer survey for their job-hiring expectations and found that programmers and network specialist topped the list of anticipated hiring. Studying Spanish IS industry and curricula, (Llorens et al. 2010) found that a gap existed between the expectations of the IS industry and IS curriculum. (Khoo 2012) suggested a career skills oriented approach to enhance the IS curriculum to update it with the advances in information systems (IS). The literature on this theme raises important issues for IS educators by addressing the hidden part of IS curriculum and socialization of IS/IT students into the professional culture of a developed country but it doesn't address the same in the context of a developing country such as Pakistan.

The **second theme** focuses on the recruitment and hiring of IS/IT professionals into professional careers. (Ferratt et al. 1999) showed that retention practices e.g. various forms of compensation, team environments, career development and planning etc. were perceived significantly more important by firm where IS staff retention was considered a serious concern than firms which were less concerned about recruitment or retention of IS staff. This study however points to another important issue of firm disinvestment which may arise due to staff mobility. Therefore IS educators and firms need to help IS graduates develop a long-term perspective on their em-

ployment needs over several year. (Ferratt et al. 1999) work is supported by (Aken & Michalisin 2007) and (Glenn Lowary. et al., 2006). (Aken & Michalisin 2007) shows that some significant reasons for a decline in the enrollment in MIS degree programs in USA were perceived lack of jobs for MIS graduates, confusion over the variety of computing degree programs, disinterest in MIS careers, and MIS programs which fail to prepare students adequately for careers in MIS. They also argue that once employers began actively recruiting for MIS graduates, the declining enrolment in MIS programs due to misperceptions of the job prospects will diminish in the programs which respond to industries' needs. (Lowry et al. 2006) shows that significant of various retention measures adopted by firms to retain IS graduates varies between IS graduates/professional and the firm. Fringe economic rewards are of relatively less importance than working conditions to IS professionals. Simply paying more to retain entry level IS&T employees may create more problems than it solves. Instead, a proactive consciousness and integration of Work Environment, Internal Relations, and Tangible Rewards characteristics as conditions of employment may ultimately provide a greater incentive for staff to accept and remain in employment with a given organization rather than economic, or hygiene factors.

This **third theme** focuses on perspectives about IS career of IS graduates [e.g., (Cale Jr., Edward G & Mawhinney, Charles H 1991); and (Mawhinney et al. 1999)] and professionals [e.g., (Dengate et al. 1990); (Igarria & Greenhaus 1992); (Igarria et al. 1994), (Huang 2008)]. Few studies have investigated the experiences of IS graduates themselves when they enter the professional workforce [(McLean et al. 1994); (Young & Keen 1998);(Turner & Lowry 2001); (Ballou & Huguenard 2008)]. However, very few studies have investigated the perspectives about IS career of IS graduates and professionals in the context of a developing country such as Pakistan. This is a neglected area which needs more attention. The work place requirements are

changing. In this context, a developing country needs to develop a clearer vision of IS/IT graduates' career paths and workplace experiences. This will be beneficial for both IS/IT graduates and professionals. (McLean et al. 1994) analyzed the discrepancy between IS/IT graduates' pre and post-employment preferences and expectations of IS/IT profession. They reported that the graduates exhibited a 'reality shock' because of higher expectations in a wide array of areas involving job characteristics e.g. relationship development, sense of accomplishment, autonomy, economic benefits, equity, career development etc. Except the experience of supervision and teamwork, which they found better than expected, expectation in all other aspects of work fell short of their expectations. The graduates' short-term career orientation was linked with their opportunity to undertake some challenging work, which allowed development of relationships, and salary and benefits. The long-term career orientation was linked with their 'bread and butter issues' such as income, benefits, career advancement and stability. The findings of this study points to an important issue i.e. need to form realistic expectations in undergraduate IS/IT programs so that the discrepancy between the immediate post-graduation expectations and long term goals of IS/IT graduates can be addressed. (Young & Keen 1998), surveyed university graduates of computer science and IS over a period of twenty years to investigate the initial post-graduation employment period in order to identify what training and support the graduates believed they received during their first job and what challenges they had encountered. They argued that initial employment is highly influential and shapes graduates' long term careers. Provided the high importance of this early IS career phase, IS educators need to prepare their students for this early phase. Young and Keen also identified many factors contributing to the career progression of IS graduates. These factors included opportunity and responsibility, formal training, performance appraisal, career counseling, and matching of expectations. Investigating atti-

tudes towards employment incentives and conditions, (Turner & Lowry 2001) surveyed Australian IS students and practitioners and found that both were more attracted by a friendly work environment, supportive superiors, and perceived promotional opportunities and gave less importance to economic benefits (such as provision of travel opportunities and other fringe benefits). (Huang 2008), analyzing the career orientations of IS professionals in Taiwan, reported that while the career orientations of IS professionals had stayed stable over time the IS professionals tended to give high importance to organizational stability as the most important career anchor and gave least importance to technical competence.

It can be concluded therefore that a successful IS career in IS may depend not only on the specific content of the IS curriculum tailored to meet industry requirements but also on a variety of factors in the workplace including opportunity and responsibility, formal training, performance appraisal, career counseling, and matching of expectations.

In Pakistan, there is a serious lack of data on IS graduates, students, and their employment destinations. The situation reflects a general lack of analysis of graduate issues and higher education generally in Pakistan. Available data sources do not clearly describe students and graduates specifically in IS/IT programs. The categories used commonly combine a variety of course types including IT, computer science, Business administration, and Engineering. As a generalization, Pakistan's schools produce approximately 7500 IS graduates per year (Asia Pulse 2011). Total number of IT professionals employed in Pakistan in 2010 was 110,000 ((Sameer Sabir et al. 2010). The salaries of IT professionals in Pakistan are approximately 30% lower than those in India with call center workers earning about \$12 per day and starting software engineers pulling in US\$5,000 (PKR 300000 approximately) or so annually ((Daily Times 2008). While the level of employment and average salaries of these graduates is above the national average

they are not substantially higher. We can infer from this fact that IS graduates do not have an indomitable position in labor market. In order to do well, they will need access to career advice and development opportunities just like other graduates do. The available statistics provide some indication of the employment rate and level of jobs that IS/IT graduates secure after graduation, but it does not reveal much information about the nature of those jobs or the graduates' experiences. In order to enhance academic practice and help educators in providing career advice to graduates' we need a more detailed picture of graduates' actual career experiences and their expectations of professional employment.

Literature cited suggests that understanding of the early career experience of IS graduates can help the studies of the retention and recruitment of graduates and the development of IS curricula. Such understanding can help develop a more integrated approach to IS/IT curriculum development and professional development that includes employer needs and industry changes. IS/IT graduates need a variety of skills and knowledge on their jobs besides technical skills. The lack of literature on the employment experiences of IS graduates in a developing country such as Pakistan needs to be redressed in order to understand better the IS career path and to provide guidance to IS educators.

Research Design

Research Instruments

The study investigated the career development of employed IS/IT graduates. The study investigated the nature of the jobs the graduates held, the work environment, and their career aspirations and plans.

The study used a convenience sample limited to a desired population to obtain data. In research, it is sometimes difficult or even impossible to select a random or systematic nonrandom

sample. In such case, (Fraenkel & Wallen 2005) acknowledge that researchers may be forced to use a convenience sample to obtain data. Members of the accessible population were 300 IS graduates of four fields of study (Business administration, Engineering, IT, Computer Science) of Bahria University, Karachi. All graduates had completed their bachelor degrees in 2000 or after and were 35 years old or less at the time of the survey. A questionnaire having both open and close-ended questions was sent to this sample during 2011. All the respondents to the survey were employed full time. The mean salary for the employed graduates was PKR 22,000.

Employment and factors in employment decisions

Survey questions explored the most important factors in job decisions, the satisfaction level in current employment on these factors, current work environment, and the plans for the future in next ten years time. Graduates were asked to identify the factors they considered most important in making job choices. Table 1 shows the most frequently listed factors and the percent of graduates who listed these issues. Graduates were also requested to rate their level of satisfaction with their current employment on these same factors. Table 1 indicates the percent of graduates who expressed satisfaction and dissatisfaction with their current job for each factor.

The high priority given to use professional skills and develop oneself indicates the strong orientation of IS/IT graduates to advancement in their profession. The figures also suggest a significant majority was dissatisfied with their current employment on these dimensions. The dissatisfaction with salary is consistent with the mismatch between seeing IS/IT as a career with handsome salaries and the reality at the workplace. This finding is also consistent with the findings of (Mahmood & Schömann 2003). The high priority given to the potential for self-employment suggests that graduates are looking for options to do something at their own. The

least frequently listed factors in job decision-making included: the status of the organization, and flexible working hours.

Professional work environment

21% graduates considered their colleagues and supervisors not helpful. 8% reported that they faced language bias on the job. 26% reported that they faced no problems on the job, their co-workers and supervisors were helpful, and they felt welcome in their employment. An important negative aspect of their work environment was that over half the graduates believed (or suspected) that the best work was unfairly distributed, that promotion was not based on merit and that the best way to get ahead was to network with the right people.

Almost all of the graduates did not believe that their supervisors gave them career advice, introduced them to key people in the organization, or gave encouragement. What could be the true reason for these views is difficult to say but it does suggest that this mismatch needs to be addressed. It also indicates graduates' need of career and professional employment counseling both before they take their first jobs and afterwards. 13% reported that performing tasks and responsibilities, which are not professional or related to their training, doesn't frustrate them. A significant minority reported that the distribution of best work in their organization is unfair but it doesn't cause frustration to them. This is an interesting finding which merits further investigation.

On Job duties

Graduates were asked to perform many duties that were not strictly professional activities or related to their training. This was the source of frustration to almost all of them because they believed that they were not being taken seriously and their skills were not sufficiently recog-

nized. Some graduates mentioned their colleagues and supervisors were not helpful on the job and they weren't taken seriously enough as colleagues. This was observed in both large and small public/private organizations though it was more prominent in public organizations.

One reason of the mismatch between graduates' expectations and workplace realities can be graduates' own lack of experience in the workforce but that mismatch also occurs in case of graduates' with many years of experience. Some of this mismatch seems to stem from employers' uncertainty about what skills the graduates possess and how best to deploy those skills.

A common complaint of graduates across the board was that they find it difficult to get access to the kind of work tasks which will develop their skills and gain them recognition in the workplace. Some graduates mentioned that this is due to the widespread culture of rewarding only few privileged people in the organization while some believed this practice is a typical culture everywhere in Pakistan.

Orientation to work

All graduates generally described themselves as highly motivated and optimistic to succeed in their chosen field and pursue their professional development. Some mentioned they will be switching to another career from IS/IT because they think there aren't good salaries offered in IS/IT profession. Understandably graduates' were interested in good salaries and favorable employment conditions. But this is not their main concern. Their ability to use their professional skills, opportunities to develop themselves, and interesting and simulating work are of much greater concern to them. Perhaps as a result, all the graduates mentioned that they readily accepted the salaries offered to them without bargaining for a higher pay. At the same time it gives an explanation of the dissatisfaction of the graduates on job with high salaries. All graduates mentioned that they expected salary increases over the next one or two years. Almost all gra-

duates mentioned that the job they took was the type of job they wanted to get when they graduated. Most of the graduates mentioned their satisfaction with their current jobs. Dissatisfaction was mainly due to the workloads and performing non-interesting duties.

Opportunities of further training and career enhancement

IS/IT graduates put a high value on opportunities for further training and career enhancement. When asked what a graduate needed to do to progress in their job or profession, all mentioned formal training. The respondents who mentioned training as a source of career advancement, mentioned internships, workshops, seminars, and industry visits as the type of training they would like to have. But they had no specific plans as to what should be the balance between these various types of training opportunities. They appeared to respond to supervisors' suggestions without articulating why particular training will help them. The availability of training for graduates' was varied. Foreign qualifications were seen to be very important because of the high recognition of the courses. These findings suggest that even where graduates have a positive orientation to formal post-graduation training, they may be uncertain what kind of training to pursue or how to undertake it. They are largely dependent on employers to suggest and arrange formal training, although most of the employers do not all the employers have the ability to meet this need.

Long-term career development

Despite their high motivation towards the IS/IT profession, most graduates mentioned uncertainty about how to achieve their career goals and even where they wanted to go in the long run. Most had a defined career horizon of ten years or less. Most of the graduates were explicitly

interested in moving into management positions or starting their own business as consultants. However, there was considerable ambivalence and uncertainty about their career paths.

Most graduates mentioned that they didn't have a definite career strategy. They generally believe that career success comes mainly from hard work. All mentioned further training but none had made any specific plans. Almost all believe that networking and impressing the right people is the key to success. All of them were concerned as to how they might develop a career strategy.

More than 50% respondents said they didn't receive any advice on choosing their careers. Some received the advice from a variety of people including family, friends, and seniors. None of them had formal mentors. Work colleagues were somewhat problematic as sources of advice because they were busy or lacked good knowledge. The quality of the career advice the graduates received was generally not very high.

Self employment

Keeping in view the increasing outsourcing of IS/IT and pressures for IS/IT professionals to operate as self-employed consultants, a significant interest in this prospect of career development was expected by the graduates. Many graduates mentioned they did raise independent consultancy or self-employment as part of their career plans, either long or short term. This is consistent with the high priority given to self-employment in the earlier part of study. Self-employment was seen as a specific response to the trend in the industry to outsource and hire consultants. One possible inference from this finding could be that even committed, professionally employed graduates have difficulties position themselves in professional workplace. A superficial assessment of their career prospects is encouraging, but a closer analysis suggests that despite the fact that graduates are optimistic, energetic and committed to their careers, they need

more knowledge about careers in IS/IT and better continued access to people who can provide this knowledge.

Future Prospects

When asked where they see themselves after 10 years, more than half of the graduates reported that they will be working for another organization. 13% reported that they will be switching to another career from IS/IT, 43% said they will work as consultant. 17% said they will be working as managers. 4% said they will use their degree to do something else. It is interesting to note that only 13% believe they will be in a different occupation within the next ten years. 13% believed they will be running their own business. It is an intriguing finding given the high priority given to self-employment in the survey responses.

The survey findings indicate that graduates are serious about pursuing their professional careers. They have a strong orientation to skills development and further training but are not entirely happy with career development opportunities available and income. A significant majority appears highly mobile and will likely be making significant career decisions. A dominating majority of students do not have good access to on-going, expert career advice.

CONCLUSION

There is evidence of high career uncertainty among IS/IT graduates in Pakistan. The findings suggest that graduates may have higher expectations of interesting and stimulating work, career advice, support, opportunities for career advancement, and compensation than appears to be offered by employers. There is a wide mismatch between what the workplace actually holds in it and the graduates' expectations. Graduates' appear to have non-clear, un-realistic expectations. As a result, they are at risk of not only having unattainable goals and expectations but also of re-

ceiving unfavorable treatment from the employers. IS/IT educators in Pakistan cannot shape the workplace but they can give their students knowledge to help them survive and prosper. Their goal should be to prepare students for a long term career, not just for their first job. Even though it's a small-scale and preliminary study, findings clearly indicate that Pakistani IS/IT graduates have a need for general and specific long-term career advice which employers merely provide. There can be many reasons. May be because they don't know or they cannot take a wider perspective. Most of the graduates' are not established and open to possibilities of taking up different career options. That demonstrates the need for access to continuing career information and advice. University IS/IT faculty is an important source of information to students about more than just the core content of the courses they teach. They must provide their students with an insight of what it is like to practice in a professional occupation, how to conduct oneself in a job, what to expect on entry to the workforce and how to develop a career in IT. In general, IS/IT educators in Pakistan fail to provide this information to their students. This information is valuable but is a largely un-recognized part of the IS/IT education in Pakistan. In a rapidly changing professional workplace, IS/IT educators must keep abreast of continually updated information about the employment destinations and experiences of their students. This knowledge would help IS/IT academics prepare their students for the realities of the workforce and help them liaise more effectively with the industry.

Table 1: Most Important Factors in Job Selection

Most frequently listed considerations in job choice	Percent listing issue	Percent satisfied	Percent dissatisfied
Salary	43	44	56
Interesting and simulating work	30	32	68
Friendly work environment	34	56	44
Opportunities to use professional skills and develop my-self	60	32	68
Status of the organization	4	68	32
Potential for self-employment	60	24	76
Flexible working hours	21	28	72

References

- Aken, A., & Michalisin, M. D. (2007). The impact of the skills gap on the recruitment of MIS graduates. *Proceedings of the 2007 ACM SIGMIS CPR conference on Computer personnel research: The global information technology workforce*, SIGMIS CPR '07 (pp. 105–111). New York, NY, USA: ACM. doi:10.1145/1235000.1235025
- Asia Pulse. (2011). Pakistan needs 15,000 fresh IT graduates per year to meet demand: PASHA. - Free Online Library. Retrieved June 14, 2012, from <http://www.thefreelibrary.com/Pakistan+needs+15,000+fresh+IT+graduates+per+year+to+meet+demand%3A...-a0250615342>
- Ballou, D. J., & Huguenard, B. R. (2008). Personal and situational predictors of IS professionals' career choice satisfaction. *Proceedings of the 2008 ACM SIGMIS CPR conference on Computer personnel doctoral consortium and research*, SIGMIS CPR '08 (pp. 50–57). New York, NY, USA: ACM. doi:10.1145/1355238.1355250

- Cale Jr., Edward G, & Mawhinney, Charles H. (1991). Student perceptions of information systems careers: Misconceptions and declining enrollments - Tags: COMPUTER science -- Vocational guidance. *Journal of Research on Computing in Education*, 23(3), 434.
- Daily Times. (2008). Daily Times - Leading News Resource of Pakistan - Pakistan among top countries for offshore outsourcing: Gartner. Retrieved June 14, 2012, from http://www.dailytimes.com.pk/default.asp?page=2008%5C01%5C05%5Cstory_5-1-2008_pg5_10
- Dengate, G., Couger, J. D., & Weber, R. (1990). Motivational characteristics of Australian information systems personnel. *Aust. Comput. J.*, 22(3), 77–88.
- Ferratt, T. W., Agarwal, R., Moore, J. E., & Brown, C. V. (1999). Observations from “the front”: IT executives on practices to recruit and retain information technology professionals. *Proceedings of the 1999 ACM SIGCPR conference on Computer personnel research*, SIGCPR '99 (pp. 102–112). New York, NY, USA: ACM. doi:10.1145/299513.299628
- Foskett, R. (2003, September). Employer and needs-led curriculum planning in higher education: a cross-sector case study of foundation degree development. Retrieved June 13, 2012, from <http://www.leeds.ac.uk/educol/documents/00003182.htm>
- Fraenkel, J. R., & Wallen, N. E. (2005). *How to Design and Evaluate Research in Education with PowerWeb* (6th ed.). McGraw-Hill Humanities/Social Sciences/Languages.
- Gupta, J., & Wachter, R. (1998). A Capstone Course in the Information Systems Curriculum. *International Journal of Information Management*, 18(6), 427–441. doi:10.1016/S0268-4012(98)00033-4

- Haworth, D. A., & Van Wetering, F. J. (1994). Determining Underlying Corporate Viewpoints on Information Systems Education Curricula. *Journal of Education for Business*, 69(5), 292–295. doi:10.1080/08832323.1994.10117702
- Huang, C.-F. (2008). A longitudinal and comparative study for career orientations dynamics of information systems professionals. *International Journal of Business and Systems Research*, 2(1), 52 – 66. doi:10.1504/IJBSR.2008.018120
- Igbaria, M., & Greenhaus, J. H. (1992). Determinants of MIS employees' turnover intentions: a structural equation model. *Commun. ACM*, 35(2), 34–49. doi:10.1145/129630.129631
- Igbaria, M., Parasuraman, S., & Badawy, M. K. (1994). Work experiences, job involvement, and quality of work life among information systems personnel. *MIS Q.*, 18(2), 175–201. doi:10.2307/249764
- Kennan, M. A., Willard, P., Cecez-Kecmanovic, D., & Wilson, C. S. (2008). IS Knowledge and Skills Sought by Employers: A Content Analysis of Australian IS Early Career Online Job Advertisements. *SSRN eLibrary*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1168044
- Khoo, B. K. S. (2012). Towards A Career Skills Oriented Undergraduate Information Systems Curriculum. *International Journal of Information and Communication Technology Education*, 8(2), 1–19. doi:10.4018/jicte.2012040101
- Kuraś, M., Grabowski, M., & Zajac, A. (1999). Changing IS curriculum and methods of instruction. *SIGCSE Bull.*, 31(3), 36–39. doi:10.1145/384267.305843
- Landry, J., Longnecker, H., Haigood, B., & Feinstein, D. (2000). Comparing Entry-Level Skill Depths Across Information Systems Job Types: Perceptions of IS Faculty. *AMCIS 2000 Proceedings*. Retrieved from <http://aisel.aisnet.org/amcis2000/119>

- Lash, P. B., & Sein, M. K. (1995). Career paths in a changing IS environment: a theoretical perspective. *Proceedings of the 1995 ACM SIGCPR conference on Supporting teams, groups, and learning inside and outside the IS function reinventing IS*, SIGCPR '95 (pp. 117–130). New York, NY, USA: ACM. doi:10.1145/212490.212590
- Lee, D. M. S., Trauth, E. M., & Farwell, D. (1995). Critical skills and knowledge requirements of IS professionals: a joint academic/industry investigation. *MIS Q.*, 19(3), 313–340.
doi:10.2307/249598
- Litecky, C., Aken, A., Ahmad, A., & Nelson, H. J. (2010). Mining for Computing Jobs. *Software, IEEE*, 27(1), 78–85. doi:10.1109/MS.2009.150
- Llorens, A., Llinàs-Audet, X., Ras, A., & Chiaramonte, L. (2010). The ICT skills gap in Spain: Industry expectations versus university preparation. *Computer Applications in Engineering Education*, n/a–n/a. doi:10.1002/cae.20467
- Lowry, G., Turner, R., & Fisher, J. (2006). The Contribution Of Employment Satisfaction Factors To Recruiting, Retaining And Career Development Of Information Systems And Technology Professionals. *Review of Business Information Systems (RBIS)*, 10(1), 137–150.
- Mahmood, T., & Schömann, K. (2003). *On the Migration Decision of IT-Graduates: A Two-Level Nested Logit Model* (CIG Working Paper No. SP II 2003-22). Wissenschaftszentrum Berlin (WZB), Research Unit: Competition and Innovation (CIG). Retrieved from <http://ideas.repec.org/p/wzb/wzebiv/spii2003-22.html>
- Marilyn L. Wilkins, & Cheryl L. Nolltt. (2002). Critical Skills of IS Professionals: Developing a Curriculum for the Future. *Journal of Information Systems Education*, 11(3-4). Retrieved from <http://jise.org/Volume11/Pdf/105.pdf>

- McLean, E. R., Tanner, J. R., & Smits, S. J. (1994). The career outlooks of I/S professionals. *Proceedings of the 1994 computer personnel research conference on Reinventing IS : managing information technology in changing organizations: managing information technology in changing organizations*, SIGCPR '94 (pp. 46–56). New York, NY, USA: ACM.
doi:10.1145/186281.186293
- Sameer Sabir, Tania Aidrus, & Sarah Bird. (2010). Pakistan: A Story of Technology, Entrepreneurs and Global Networks. *MIT Sloan Teaching Innovation Resources (MSTIR)*. Retrieved from <https://mitsloan.mit.edu/MSTIR/GlobalEntrepreneurship/Pakistan/Pages/default.aspx>
- Snoke, R., & Underwood, A. (2001). Generic Attributes of IS Graduates. *Journal of Global Information Management*, 9(2), 34–41. doi:10.4018/jgim.2001040104
- Sumner, M., & Yager, S. E. (2008). An investigation of preparedness and importance of mis competencies: research in progress. *Proceedings of the 2008 ACM SIGMIS CPR conference on Computer personnel doctoral consortium and research*, SIGMIS CPR '08 (pp. 97–111). New York, NY, USA: ACM. doi:10.1145/1355238.1355260
- Thomas N. Janicki, Douglas M. Kline, J. Art Gowan, Jr, & Robert Konopaske. (2004). Matching Employer Needs With IS Curriculum: An Exploratory Study. *Information Systems Education Journal*. Retrieved June 13, 2012, from <http://isedj.org/2/21/index.html>
- Trauth, E. M., Farwell, D. W., & Lee, D. (1993). The is expectation gap: industry expectations versus academic preparation. *MIS Q.*, 17(3), 293–307. doi:10.2307/249773
- Turner, R., & Lowry, G. (2001). Why Did You Choose This Job? Comparing Career Motivators of IS Students & IS Practitioners. *ACIS 2001 Proceedings*. Retrieved from <http://aisel.aisnet.org/acis2001/61>

Young, J. F., & Keen, C. D. (1998). Potential Information System Professionals: Initial Post Graduation Appointment Experiences. *Australasian Conference on Information Systems* (Vol. 2, pp. 709–720). Presented at the Proceedings of Ninth Australasian Conference on Information Systems. Retrieved from <http://ecite.utas.edu.au/15362>