Addressing IT/IS Personnel Shortfall: Some PBL Students' Findings and Recommendations

Kam Hou VAT
Faculty of Science & Technology
University of Macau, Macau
Fax: (853) 838-314
fstkhv@umac.mo

ABSTRACT

This paper describes students' learning using the problem-based learning (PBL) approach to the study of undergraduate Information Systems (IS) analysis and design. Specifically we employ the case of under-employment in Information Technology (IT) workforce in the increasing realization of today's digital economy. We attempt some analytical interpretations of the IT personnel shortage as it is being much discussed currently by the different sectors of our information industry. Meanwhile, we render our students' suggestions in IS design to attract and retain IT talent through examining the issue of organizational culture, particularly the portion related to human resources (HR). The paper also looks into the virtual organizational frameworks with which IS-designers can model different organizational behaviors for maximum competitive advantage. We conclude by outlining our organization modeling efforts, which should help transform an organization's environment, goals, and processes, in terms of typical IS-efforts to enhance the performance of our IT workforce.

KEYWORDS

Problem-Based Learning (PBL), Virtual Organizations, Organization Modeling, Performance Improvement

INTRODUCTION

With the advent of the digital economy, the calls of IT personnel shortage, have been voiced from different sectors of our industries [1, 35]. Nowadays, many sectors are often shorthanded, devoting time to the recruitment process, and then finding the right person for the position and having him or her leave in less than a year or so. It is reported [33] that today's IT supply and demand imbalance, is due to various factors. These include the following: effective IT utilization being labor-intensive, requiring lots of skilled people; escalating IT-related needs and opportunities currently creating a market imbalance with demand continually outstripping supply; rapidly changing technologies rendering skills sets obsolete almost overnight; an expansion of external service providers competing with in-house IT resources. This paper looks at students' learning after injecting this real-world situation into our education of IS analysis and design in undergraduate curriculum. So that our students could start appreciating how typical multi-national corporations are trying to make sense of their IT personnel mobility, and to develop strategies to improve recruitment, retention and retraining of their IT workforce. Our students' interpretations based on literature reviews and interviews conducted among a selected group of Software Engineering and IS professionals, attempts some possibilities of IT talent mobility diagnosis, action intervention, and reflective solution, which may be useful to the industry to attract and retain IT talent. Meanwhile, we render our perspective on the reorientation of the organizational culture [12], especially those relating IT and HR, which is considered as highly critical for a competitive recruitment and retention (R&R) process of desirable IT personnel [10, 23]. The paper concludes by investigating some virtual organization frameworks [3, 11, 20] which should help transform the organization's environment, goals and processes, in terms of enhancing the performance of our IT workforce. This is done through crystallizing the fundamental beliefs and assumptions that underlie each of the strategic choices the organization has to make regarding its R&R policies and practice.

THE PBL MODEL OF INVESTIGATION

The notion of PBL is based on the premise that students learn more effectively when they are presented with a problem to solve rather than just being given instruction [26, 27]. Pedagogically, students have to identify and search for the knowledge they need to approach the problem. When applied to the course setting, PBL could be decomposed into several stages of activities, which help develop in students, self-directed learning and problem-solving skills while they interact, discuss and share relevant knowledge and experience.

- *Problem Analysis Stage.* Students, divided into small groups and assigned a facilitator, are respectively presented a problem without any instruction given. They generate ideas about possible solutions to the problem based on what they already know. They then define what they need to know by identifying the key learning issues and formulate an action plan to tackle the problem.
- *Information Gathering Stage.* A period of self-directed learning follows. Students are responsible for searching for relevant information. They are largely engaged in just-in-time learning as they are seeking for information when their need to know is greatest.
- *Synthesis Stage.* After a specified period of time, students reconvene and reassess the problem based on their newly acquired knowledge. They become their own experts to teach one another in the group; they use their learning to re-examine the problem. In the process, they are constructing knowledge by anchoring their new findings on their existing knowledge base.
- *Abstraction Stage.* Once the students feel that the problem task has been successfully completed, they discuss the problem in relation to similar and dissimilar problems in order to form generalizations.
- *Reflection Stage.* At this stage, students review their problem-solving process through conducting a self- or peer-evaluation. This phase is meant to help students' meta-cognitive ability as they discuss the process and reflect on their newly acquired knowledge.

Essentially, PBL revolves around a focal problem, group work, feedback, class discussion, skill development and final reporting. The instructor's role is to organize and pilot this cycle of activity, guiding, probing and supporting students' initiatives along the way so as to empower them to be responsible in their own learning.

IT WORKFORCE'S CURRENT STATUS

Our students discovered that today's opportunities for utilizing IT in organizational work continue to expand, especially in those areas concerning the Internet. The globalization of electronic commerce is increasing and is contributing to a worldwide shortage of IT talent. The turnover rate among IT professionals is increasing. We are witnessing the occurrence of a tight IT labor market. Talent IT workers enjoy a mobility previously not experienced. Better offers constantly come their way, and often they accept these offers and leave behind frustrated and betrayed information systems (IS) managers. It is understood that the reasons IT professionals choose to work for an organization or leave it for another vary as much as their professional skills and personalities and organizations' cultures and IT functions [1]. The question is how we can do a better job of attracting and retaining the IT talent we need. We believe that every organization has its own culture, its own history, and its own set of beliefs and assumptions about the length of relationship it wants with its IT professionals, and the needs IT professionals will seek to satisfy during their tenure with the company. And people recruited and hired need to fit with the IT culture and beliefs about the type of people the organization wants. Yet, the more companies are able to tailor the R&R strategies and practices to the beliefs and assumptions about today's IT professionals that a company holds, the better they should be able to hire and keep the IT talent needed [30]. It is convinced that companies need their share of the best possible people, but the issue is how to derive the befitting IT recruiting practices for the organization. So that they attract people who not only can do the job technically but who will feel they fit with the organization's culture and values. And this brings us to the idea of what the company's value proposition is for the IT talent to be acquired.

THE ORGANIZATION'S VALUE PROPOSITION FOR TODAY'S IT TALENT

An important learning issue our students put forward is that companies today have a marketing challenge ahead, and they need to position themselves in the hiring marketplace in the form of their value proposition. The people whom they decide to recruit will have lots of other possibilities in front of them. Stokes [33] mentions the following ingredients to cook up the specific value proposition: company reputation, visibility, and vision; work environment, emphasizing concern for the individual; compensation levels and creative packages; training and education opportunities; performance-based culture; and

availability of new technologies. It can be observed that many of these elements involve both the IT and HR policies and practices. Organizations must examine their own beliefs and assumptions regarding IT professionals, their needs and interests.

IMPROVING THE IT HIRING PROCESS

An example of reflective learning rendered by our students in understanding organizational IT hiring process, could be summarized by the following questions. Do they believe IT people are scarce resources who can provide value to the organization in a long-term period, or for only a limited number of years, or just in the short run? What kind of IT workforce do they want? How long do they want people to stay? What kind of turnover do they want or are they willing to live with? What professional and personal needs do they expect their IT employees to satisfy? What are their expectations of them, and what should their expectations be of the companies? How prepared are they to deal with career planning issues? How will their assumptions and beliefs influence the IT R&R policies and practices? The important questions we discovered through our interviews also point to the following. In what ways are IT and HR currently partnering in our organizations to improve IT recruitment and retention? How might such partnering processes be improved to sell the potential candidates on the idea that coming with your organization is in their best interest? It is believed that unless and until organizations are willing to clarify their basic HR approaches to IT hiring, they are going to reinforce the idea that an IT shortage exists, because they are going to face considerable difficulty filling their openings. Currently, many HR departments are reinventing themselves with electronic resume receiving, tracking, and decision-making. And many IT departments now have their own dedicated HR resources as well as procedures that may be different from those followed by other staff and line departments.

ADDRESSING THE ROI ISSUE OF IT

Another impressive finding elaborated by the student groups is the new-hire IT salaries escalating in many organizations. And it is learned that many chief executive officers (CEOs) have expressed frustration with what they perceive to be an unclear relationship between rising IT costs and overall corporate productivity. The issue of return-on-investment (ROI) for IT's human capital seems to be a topic of increasing interest [6, 14]. Organizations are compelled to consider the bottom-line effect of employee performance, but the question is how to build pathways that link specific human resources objectives to operational improvements and corporate financial gains. Meanwhile, it is believed that the most cost-effective long-term solution to the talent deficit lies in helping each person to become more productive [33]. Management is often charged with the task of figuring out how to invest in human productive potential. That is the issue of human performance improvement. The pioneer work performed by Nobel laureates Schultz [29] and Becker [2] has laid the foundation that it is people, with their ability to learn, who offer the greatest potential for organizational success. The value of human performance has also been empirically demonstrated to yield higher rates of return than physical capital [19, 31, 32]. To understand how to assess the value of human capital, Jac Fitz-enz [6] mentioned the use of a corporate human capital scorecard. Essentially, value adding starts with the enterprise's goals, flowing down through the business units in the form of economic results via some well-devised HR activities. The cycle starts with the processes having to do with the planning, acquiring, supporting, developing, and retaining of human capital, which is organized in the HR department and transferred into various operating units. There it is invested and applied to tasks and processes along with other resources. As performance improvements (in customer service, product quality, and/or productivity as measured in unit cost terms) are realized, value (economic effects) ensues. When this is viewed as a continuous recycling process, this should ultimately lead to profitability and other enterprise goals such as reduction in expenses.

MINDING THE ORGANIZATIONAL CULTURE

Among the many issues presented and discussed among the PBL student groups stands the issue of organizational culture. It is now generally agreed that all organizations, irrespective of size, have a culture, whose impact on organizational performance is enormous [17, 18]. According to Schein [28], organizational culture can be defined as a pattern of basic assumptions invented, or discovered by a given group as it learns to cope with its problems of external adaptation and internal integration. It is the way people in the organization tend to behave as they go about their work. Typically, this pattern must have worked well enough to be considered valid, and the correct way to perceive, to think, and to feel in relation to the organizational problems. Through the cultural influence, there are prevailing norms, expectations, and rewards that support or discourage specific behaviors. There also arises an underlying set of beliefs representing the key values of this culture, which influences many important organizational issues related to effectiveness such as quality, teamwork, innovation, decision-making and flexibility [12]. The question is how best to align the organization's strategy, culture, and supportive infrastructure to achieve and maintain competitive advantage in the global business environment. When applied to today's

hiring wars of tight IT talent, the issue is how to create specific organizational alignment between IT and HR for such concerns as:

- *Reflective Diagnosis*

What do we make of our organization's beliefs and assumptions about the length of relationship we want with our IT professionals, and the needs they want to satisfy while they are in our employ? Do we need to question or change those beliefs and assumptions? What changes or improvements in our IT/HR policies and practices do we believe need to be made? How might both IT and HR be involved? What factors will help the organization achieve these changes and improvements? What factors will hinder it from achieving them? What can we do, personally, to help bring about needed changes and improvements in our organization's IT HR R&R policies and practices?

- *Action Intervention*

Based on our answers to the foregoing questions, how different would the hiring process be in terms of the following reminders in IT R&R policies and practices? If it is intended to pursue a particular candidate, are we prepared to describe the company in terms that will demonstrate to the candidate that the company can satisfy his or her motivations? Also, people doing the hiring must understand what the organization is looking for. He has to realize that a candidate, who looks good to his or her organization, will probably look good to other organizations. Hiring managers should have as much autonomy and flexibility and as little hindrance in the hiring process as possible. When a person is found appropriate to the hiring organization, there should be the least possible delay in making an offer, given favorable reference checks.

MODELING ORGANIZATIONS FOR PERFORMANCE IMPROVEMENT

An important remark from one PBL group has been: "The challenges of change in business today are indeed unavoidable. They are driving the need for organizational transformation in different aspects such as strategies, policies, structures, processes, systems, and people." Indeed, managerial discretion in the design, development, and deployment of organizational variables has become even more critical than in the past. Today's managers often have to design structures across organizational boundaries, engineer processes into strategic capabilities, develop individual competencies into a learning organization, align information technology with business strategy, and integrate the disparate pieces that constitute the organization. Managers are becoming organizational architects. They craft these arrangements to bring about congruence among the enterprise's structure, processes, systems, work, people and performance. Our organization modeling efforts start from understanding the following organizational variables taken from organization theory [4, 5, 24] for managerial alignment:

- *Strategic vision.* This involves the mental picture of what the organization has to do in order to survive in business;
- *Structure.* This deals with how tasks are divided and coordinated by means of specialization and integration, decentralization and centralization, and formal patterns of relationships between groups and individuals;
- *Processes.* These define and measure sequences of steps, activities, and methods that produce a specified goal, result, consequence, or output for a particular internal or external customer or market;
- *Systems.* These entail the procedures for budgeting, accounting, and training that make the organization run, as well as a particular set of procedures and rules, policies, devices, guides, and practices designed to control processes in a predictable way;
- *Competence.* This concerns the way managers manage, the way employees are selected, placed, oriented, developed, and rewarded, and the skills of both managers and employees;
- *Culture.* This involves the patterns of basic shared assumptions, beliefs, attitudes, expectations, and values as revealed in everyday work performance and practices.

Simply put, an organization is a sum-total of some formal arrangement that houses the interaction of the structures, processes, systems and people of the enterprise. It is created and designed by managers to enhance the interface between humans and the work the enterprise sets out to accomplish. According to [20], organization modeling entails understanding, analyzing, designing, and communicating the most relevant parts of the organization and how they fit together. And these have become the responsibilities of today's organizational managers. Their new roles include [7, 8, 9, 16, 25, 34] identifying derivative management philosophies in terms of the core organizational constructs such as designing structure, engineering processes, developing people, leveraging information technology, facilitating learning, and changing the whole (strategy, structure, process, people, culture). It is believed that through alignment on all such constructs, organizations should be able to harness

the individual value-added aspects to compete more successfully in the global marketplace, including the hiring wars of tight IT talent.

THE VIRTUAL ORGANIZATION MODEL

The notion of virtual organization, according to Mowshowitz [22], could be considered as a set of principles for managing goal-oriented activity based on a categorical split between task requirements and their satisfaction. In this formulation, the virtual organization model makes explicit the need for dedicated management activities that explore and track the abstract requirements needed to realize some objective while simultaneously, but independently, investigating and specifying the concrete means for satisfying the abstract requirements. It can be expressed as a framework for accommodating dynamic changes in both requirements and available services in an organizational and technological setting, in which the means for reaching a goal are continually and routinely evaluated in relation to explicit criteria. That way, management could ensure that requirements are satisfied as appropriately as possible. It is believed that this idea could be applied to the setting of IT personnel shortfall to facilitate the R&R policies and practice and to motivate the participants involved to reflect on organizational goals. Typical key figures include the chief information officer, and directors of IT strategic planning, applications development, technical services, client services, and human resources.

Practically, our students' virtual organization modeling efforts follows the four basic management activities [21], which depend on separating requirements from satisfiers. They include: a) formulation of abstract requirements (e.g., requests for IT talent from a tight labor market); b) tracking and analysis of concrete satisfiers (e.g., recruiting, retaining, and reskilling IT personnel); c) dynamic assignment of concrete satisfiers to abstract requirements on the basis of explicit criteria (e.g., renovating HR policies, or improving compensation packages to attract and keep our IT talent); d) exploration and analysis of the assignment criteria associated with the goals and objectives of the organization (e.g., perform organization modeling to determine criteria for optimizing performance). Principally, the virtual organization approach exploits the advantages of switching through dynamic assignment of available services to requests according to explicit criteria. This is a many-to-many mapping of requests to services that changes over time. For example, a request for IT talent to fulfill the requirements of shifting IT functions, might be handled by recruiting new IT talent, retraining old IT personnel, outsourcing IT freelancers, creating virtual positions, or partnering with business affiliates in the form of virtual team work. It is believed that by performing suitable experiments in organization modeling to align the various organization variables as mentioned in the preceding section, we could arrive at some explicit criteria for organizations to switch systematically based on explicit formulation of specific goals. We believe that the organization's ability to switch should allow for high degree of flexibility and responsiveness in improving resource utilization, strengthening managerial control, and achieving cost-effective processes. A relatively workable form of organizational relationship in response to the IT personnel shortage, which is considered as an instantiation of the virtual organization model, is the concept of *virtual team* [13]. It is basically a temporary network of independent departments, groups or people linked (often through advanced IT) together to share skills, costs and resources. It is formed to fill a void, where tasks arise that are not covered by the fixed organizational structures of the organization. The idea of a virtual team designates an abstract requirement for a group of individuals that collectively possesses the required capacity. In principle, many different groups might have the requisite mix of skills and could play the role of concrete satisfiers in a particular task. The organization's ability to distinguish between requirements and satisfiers makes it possible to switch from one group to another as conditions demand. This arrangement of virtual team provides the flexibility a business needs to compete effectively.

THE CHALLENGES OF E-HR

An interesting recommendation put forward by our PBL groups for organizations to deal with the increasingly dynamic business environments and to respond with high-speed adaptation is E-HR, representing the electronic transformation of the HR functions through Web enablement. According to Karakanian [15], E-HR is the overall HR strategy that lifts HR from the HR department and isolated HR activities, and redistributes it to the organization and its trusted business partners. Essentially, its premise is that HR should act as the service broker as opposed to the provider. And the variety of HR-related services, include candidate search, survey data, and various function-specific expert services. Presumably, E-HR demands dedicated HR homework; executive participation; excellent appreciation and use of technology, including a well-developed and integrated human resources management system (HRMS) acting as the HR data and business rules backbone throughout the enterprise intranet. Also the HRMS should connect to HR service suppliers and business partners via an extranet and links to the Internet via HR portals. Though the disclosure and the cross-organization movement of HR data is still a critical issue and

must be managed very carefully, it is believed that the concept of HR service broker will soon become more of a reality than it is today, with the advent of E-business.

CONCLUSION

In this paper, the author has presented the PBL student-groups' findings in the topic of IT personnel shortfall in the course of studying IS/IT-based system analysis and design. Specifically, the paper has rendered perspectives on how we could adapt real-world problems into typical course development. The findings illustrate what PBL students could understand in managing the problem of talent deficit, through possible improvements in organizational transformation for IT workforce. This is also slightly expanded in the issue of organizational modeling following the virtual organization model. Further, we singled out the example of E-HR as an emerging form of organizational transformation in response to the E-business era brought about by the digital economy. It is apparent that there is no definite and clear-cut answers to the IT personnel shortage problem, but it is convinced that what have been discussed here represent some requirements analysis efforts and could serve as some reflective items for organizations to rejuvenate their possible solutions. More importantly, our students have exercised their initiatives in the PBL cycle of analysis, research, and reporting activities in learning how to become self-directed work teams of IS/IT personnel.

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