Training E-Commerce Support Personnel for Enterprises through Action Learning

Kam Hou VAT
Faculty of Science & Technology
University of Macau
University Drive, Taipa, Macau
(853) 3974-359
fstkhv@umac.mo

ABSTRACT

This paper describes an ongoing campus-based training experiment based on the Action Learning concept [24] to expose to undergraduate students majoring in Software Engineering, the increasing globalization of electronic commerce, so as to enable them to see through the quality required of today's Information and Communications Technologists (ICT). The experiment recruits students on a voluntary basis and covers training in the areas of WWW-based application development, and case studies of business models in electronic commerce. It is also expected that this experiment will lead to the development of special interest groups of students in the different technological and business aspects of the Internet-based organizations.

Keywords

Action Learning, Informal Study Group, Electronic Commerce.

1. INTRODUCTION

With the advent of the World Wide Web (WWW or Web) since the middle of the nineties (20th Century), it has been observed that students are increasingly fascinated by the variety of Web-based applications. In an endeavor to find the right approach to help Software Engineering (SE) undergraduates understand more of the Internet-based development amidst the already congested curriculum, the author has facilitated the formation of an informal study group (ISG) with a number of SE students with junior and senior status. The mission of this ISG is to explore the ongoing development of Web-based distributed applications of interest to the students. Only recently have we initiated the investigation of the globalization of electronic commerce (e-commerce or EC) through the text freely distributed over the Internet, by Westland and Clark [27].

SIGCPR 2000 Evanston Illinois USA

Nevertheless, the ISG has been continuously encouraging students' individual and group study of the topics and materials discovered over the Web. Students are often involved in practical software development projects according to their leisure schedules. It is believed that this arrangement could be another effective way to supplement our students' preparation in their future careers of being software professionals in the field of ICT. It should be noted that the ISG is selectively composed of students who have voluntarily demonstrated their wish and will to learn more on their own, besides our regular program of study. This paper is a description of what we have been doing to get the ISG students aware of the current advances in electronic commerce and to enable them to understand the personal quality, technical expertise and business insight they need in order to stay adaptive in this swiftly changing world of Internet-based technologies.

2. PEDAGOGY FOR ORGANIZATIONAL LEARNING

To facilitate the students' investigation of EC, and to understand the way organizations learn to improve themselves, we selected the 1998 Special Issues of *Performance Improvement Quarterly* (PIQ), on Action Learning [24] as our companion in the excursion of e-commerce among enterprises. Namely, action learning [6] is a voluntary, participant-centered, evolutionary process to solve real, systemic, and pending organizational problems in the workplace. Its central goal [9] is to increase the capacity of individual learners and the learning of the organizations they are associated with, to adapt to a rapidly changing environment. Revans [20], widely known as the principal pioneer of action learning, suggests that action learning is eclectic, cutting across many fields. It emphasizes action, reflection, the need for critical thinking and a climate of trust and authenticity. In particular, the learning component has primacy, with the real problem solving serving to fuel the learning process.

3. THE ISG GOALS AND COMPOSITION

The ISG recruits members through students' own social networks, and is offered normally to Software Engineering majors in their third and fourth years of study. The goals of the ISG include, among others, the following:

- to help students become WWW-literate, and to develop fundamental understanding of Internet-based distributed applications.
- to encourage students to formulate and express their views on the latest development of Information Systems (IS) or Information Technology (IT) infrastructure, through activities such as literature review, project experimentation, written work, oral presentations and group discussions.
- to raise students' awareness of the Internet impact on the business world and the computer industry, and the wide-spread focus of Internet technology as a major driver of corporate strategy and business re-engineering in electronic commerce.

Currently, our ISG comprises nine students, three from the senior class and six from the junior class respectively. Their declared interests include such areas as information system analysis, design and implementation, Web-sites design and construction, and distributed object-oriented application development through CGI-based or Java-based techniques, as well as graphical user-interfaces (GUIs) prototyping. Presently, we are also working out how to strengthen the ISG's fundamental expertise in UML (Unified Modeling Language), CORBA (Common Object Request Broker Architecture), and XML (eXtended Markup Language). Admittedly, our ISG is short of perspectives in business processes, management insight, as well as organizational and consumer behaviors.

4. THE ISG SELECTION CRITERIA

One of the longstanding goals in forming the ISG, on the part of the author, is to investigate how to promote situations where a person is motivated to learn, is engaged in the learning act, is willing to go to great lengths to ensure that learning will occur, and at the same time finds the learning process (not just the learning outcomes) to be satisfying and rewarding. According to [3, 22, 29, 30], this marriage between motivation and learning, has been well researched in the theory of self-regulation. And the author has been adopting the following reported attributes to select incoming students into the ISG: 1) they should find the learning goals interesting for their own sake and do not need external incentives (or threats) to participate; 2) they are able to monitor their own learning and are able to identify when they are having trouble; and 3) they should consequently take the necessary steps to alter their learning environment to enable learning to happen. It is expected that the ISG is full of those learning situations demanding creative higher-order thinking and a strong sense of personal commitment and engagement. Current trends in the design of interactive Web-based applications offer ample opportunities to support this type of learning.

5. THE E-COMMERCE INVESTIGATION BACKGROUND

It is increasingly obvious that e-commerce, conducted in and around the global marketplace, has presently become one of the most exciting trends in business. Yet, it has been observed that the long-term potential of e-commerce requires prudent contemplation and planning on the part of management. The formulation and implementation of e-commerce strategies, applications, and services involves many business issues that the traditional IS/IT department could not handle singly on its own [15]. Instead, the emerging consensus is to develop cross-functional teams composed of technical staff as well as "techno-illiterates" who may not know much about technology but who understand the core business. It is believed that such teams could integrate efforts and streamline cooperation among marketing, engineering, financing, and other functional departments to create business processes that are efficient, effective and responsive. To start the e-commerce excursion, our ISG has identified the following contexts for further exploration:

5.1 The Present Status of EC

According to the "three packeteers" [1], electronic commerce is initiated to construct better relationships among customers, producers, and suppliers. Its implementation uses networked resources (Internet plus WWW) to foster the exchange of business transactions in a more efficient and cost effective manner. These transactions involve purchasing and sale of goods and services among businesses (b-b), between businesses and consumers (b-c), and among consumers (c-c). It is found that today, b-b EC, often called the supply-chain transactions, takes up the lion's share of the EC spending [18]. B-c EC involves the direct purchase of products on the Internet, say, the purchase of books and entertainment in retailing. C-c EC is still in its infancy, but can be viewed as a sort of electronic garage sales. Functionally speaking, EC integrates WWW-based application programs, multimedia communications, network management, and security functions to facilitate business transactions. More importantly, EC incorporates information to support strategic business models – the trade of goods and services through electronic means over the Internet.

5.2 The New Trade Model in EC

With the emergence of the Web-based EC, multinational corporations (MNCs), need a new model for trade that addresses new requirements in the new Internet economy. It is found that the term "dynamic trade" [17] is often used to define the MNC's ability to satisfy current demand with customized response. Dynamic trade is expected to go beyond today's Web efforts, which extend traditional trade with easily available online data, and with customer self-service for simple inquiries like reviewing account history or checking order status. Instead, dynamic trade is meant to enable companies to maximize the lifetime value of a business relationship, through such value-added services as creating product and service bundles based on actual consumer preferences, and using transaction data to react to market changes. To meet competitive challenges, dynamic trade is really more than merely taking orders online. It principally changes the relationship between products and services, with the latter actually eclipsing the former.

5.3 The New Role of IS/IT in EC

It has been commented [18] that traditional IS/IT departments, have largely adopted an inward-looking perspective to cater to only the internal users of an enterprise, and MNCs must now work with a new externally focused business model like dynamic trade. This will inevitably present challenges to the internally focused IS/IT, often preoccupied with such goals as cutting costs and reducing risks. As digital economy develops, the emphasis will shift from dumping product information onto the Web pages to delivering customized services like buying assistance for consumers or proactive inventory management for business partners. It has been reported that one of the new roles for the IS/IT departments [4] is to involve in developing new commerce software which will help companies exploit the promise of dynamic trade by enabling firms to capture information, analyze it, and respond to customers in real time. In short, IS/IT technology personnel will need more integration specialists, project managers, and business liaisons to ensure that processes flow smoothly across both internal and external boundaries of the enterprise.

5.4 The Enabling Technologies behind EC

According to Coulson [5], EC has emerged from the convergence of several major information technologies and business practices such as the commercialization of the Internet, driven by the World Wide Web development. Among the principal technologies directly enabling modern EC are computer networking and telecommunications; client/server computing; multimedia, and hypermedia in particular; information retrieval systems; electronic data interchange (EDI); message handling and workflow management systems; groupware and electronic meeting systems; and public key cryptography. There is no doubt that such technologies will change over time. And EC sites require infrastructure planning, which allows their continuous upgrade over time rather than an expensive and complete overhaul owing to haphazard implementation. Likewise, an organization's system architecture will undoubtedly evolve into a complex arrangement. The term "mission-critical and 24/7" has become the status quo. This basically refers to anything considered vital to the operation of the organization with high availability systems. Such systems require special failure-recovery software, supporting non-stop operation, 24 hours a day, 7 days a week.

5.5 The Web-based Information Systems (WISs) in EC

According to Isakowitz, et al. [13], WISs represent the important information systems efforts geared increasingly toward exploiting the benefits of the Web platform. They are the systems that organizations and their clients use to conduct electronic commerce. Unlike Web pages designed largely for leisure browsing, WISs enable users to perform work, and is usually tightly integrated with other non-WISs such as databases and transaction processing systems. In WIS development, user participation is as critical as it is for traditional IS development. According to Dennis [7], WISs should be developed by using the same disciplined system development principles, rigorous business value assessments, and user-centered approaches that are required to build successful non-WISs. Meanwhile, WISs development is sufficiently different from traditional IS development in that it requires new approaches to software engineering. Examples include the Object-Oriented Hypermedia Design Method (OOHDM) [23], and the Relationship Management Methodology (RMM) [14]. In particular, since WISs have the potential to provide distributed computing environments among geographically dispersed coworkers, its requirements are quite different from those of conventional Web sites. These include [25], among others the following: 1) navigation structure designed to support specific work flow; 2) structured data model representing relationships among pieces of information; 3) features that enable users to process business data interactively; 4) support for distributed collaboration work style; and 5) strict link referential integrity for mission-critical tasks. Ultimately, it is believed that WISs could help companies demonstrate how their products and services differ from their competitors' by using standards for high-quality presentation. This would facilitate differentiation and enhance competitiveness.

6. THE ISG LEARNING MODEL

Prior to investigating the technical innovations of the Internet, including the e-commerce pheomenon, the ISG students are introduced to the following insight from Revans [19]:

In any epoch of rapid change, those organizations unable to adapt are soon in trouble, and adaptation is achieved only by learning – namely, by being able to do tomorrow that which might have been unnecessary today, or to be able to do today what was unnecessary last week. On the basis of the assumption that managers learn best by taking action and reflecting on the action, the following method of learning can be put forward [20]:

a) A number of managers get together at regular intervals to discuss a problem or challenge(s) they are facing in the workplace. The group, referred to as the "set" in action learning literature, usually has an expert resource person though the role of this person changes from model to model.

b) After discussing the problem, project, or challenge with the set and the resource person, the managers return to the workplace to take action. After a period of time, the set meets again to discuss progress to date, results achieved, and problems still to be resolved. The managers then return to the workplace to take further action.

c) The two phases of reflection/discussion and action continue to alternate throughout the life of the learning program.

To translate Revans' description of action learning for managers into terms applicable to the ISG students' exploration, the author has provided the following interpretations from problem-based learning (PBL) [2, 11, 21]:

1) Students are encouraged to perceive themselves as managers of their own in terms of time, material resources, and

complexity of the problems that can be handled one at a time by the group.

2) Students are made aware that initially they will not possess enough prior information to solve the problem at hand or to clarify the scenario immediately.
3) Students are challenged to construct a solution to an often ill-structured problem chosen according to some concrete, open-ended situations.
4) Students are reminded that they must identify, locate, and use appropriate resources, and ask questions referred to as "learning issues" on the various aspects of the problem. These learning issues help the ISG students realize what knowledge they require, and thus focus their learning efforts and establish a means for integrating the information they acquire.

It is expected that the ISG generally has to iterate through some relevant stages of activities: analysis, research, and reporting, with discussion and feedback from peers and the facilitator at each stage.

- *Analysis.* Throughout this stage, students organize their ideas and prior knowledge related to the problem, and start defining its requirements. This helps them devise a specific statement of the problem. Meanwhile, they are encouraged to pose learning issues, defining what they know and what they do not know. This helps them assign responsibilities for research, eliciting and activating their existing knowledge as a crucial step in learning new information.

- *Research.* Throughout this stage, students collect necessary information on specific learning issues raised by the group. They may conduct library searches, seek sources on the Internet, collect data, and interview knowledgeable authorities. More importantly, students teach themselves as they research their learning issues. It is intended that when they come to realize the complexity and texture of the problem, they may often see that information is a means to the ends of managing problems effectively.

- *Reporting.* At this stage, students report their findings to the group. Individual students become "experts" and teach one another. Subsequently, their discussion may generate a possible solution, or new learning issues for the ISG to explore further. Final solutions are constructed, and the facilitator's feedback should help students clarify basic information, focus their investigations, and refine their problem-solving strategies, besides addressing whether the original learning issues were resolved and whether the students' understanding of the basic principles, information, and relationships is sufficiently deep and accurate.

Indeed, a frequent formular [8] that action learning uses is L = P + Q + R: Learning (L) equals Programmed Instruction (P) plus Questioning (Q) plus Reflection (R). Here P represents the knowledge coming through textbooks, lectures, case studies, computer-based instructions, and others. This is an important source of learning but carries with it an embedded caution flag. Namely, P is all based in the past. Q means continuously seeking fresh insight into what is not yet known. This Q helps avoiding the pitfall of imperfectly constructed past knowledge. By going through the Q step first, we are able to determine whether the information available is relevant and adequate to our needs. It will also point to areas that will require the creation of new P. R simply means rethinking, taking apart, putting together, making sense of facts, and attempting to understand the problem. Following the use of this formula, action steps are planned and carried out with constant feedback and reflection as the implementation takes place. In short, what action learning can provide for the ISG is elevated levels of discernment and understanding through the interweave of action and reflection.

7. THE ISG TRAINING CONTEXT

The training acquired by the ISG largely depends on the problem selected. Criteria for selection might include: a) the problem is real rather than hypothetical; b) the problem is one for which an answer has not already been determined for the ISG; c) the problem is one that participants care about and feel will make a difference; and d) the problem is systemic rather than a purely technical problem. And it is intended that the ISG could be developed as a *self-directed work team* (SDWT) [8] through implementing action learning as a progression of phases:

First, in order to induce fresh questions from our ISG, we often place individual students in unfamiliar settings and have them work on unfamiliar problems. It is expected that when they ask fresh questions, they begin to unfreeze and reshape their underlying assumptions – a sort of transformative learning. Second, as assumptions come into questions, they are either confirmed, modified, or rejected. When the ISG ends up changing the texture of their assumptions, they then begin to create new mental models. These new models, together with the shifts in underlying assumptions which prompted them, cause assessment of the programmed knowledge (P) at their disposal. This causes the ISG to reject some of the "P" available and replace it with new "P". Subsequently, it is believed that the learning capacities and performance levels of the ISG could be enhanced by the renewal accompanying generation of new knowledge and questioning insight (Q). The SDWT, thus developed from the ISG, is striving to continuously upgrade their intellectual capital in terms of adapting to change and sustaining a competitive edge.

In addition, the training received by the ISG, can be defined as a planned learning experience designed to bring about change in an individual's knowledge, attitudes, skills, or behavior [28]. The transfer of training from the SDWT to the IS/IT profession, can be defined as the extent to which the changes in knowledge, attitudes, skills or behavior learned during the training, are applied by the participants in their actual job environments [12]. It is convinced that our ISG whose fundamental expertise lies in technical innovations, also requires competencies in the areas of interpersonal communications, teamwork, trust, conflict management, and leadership skills. These are nonetheless

important constituents of professional IS/IT personnel in any learning organizations.

8. THE ISG MANAGEMENT ASPECT

To help students work in team, it is designed that each SDWT be given (or matched with) a client to clarify the project, and to resolve ambiguities as they arise. And a project sponsor [16] (the facilitator in the ISG) is assigned to guide, motivate and provide feedback to the team. There is also a team leader selected from among the SDWT members on a per-project basis. The team leader, equivalent to the project manager, has to coordinate the team activities, and ensure effective team communications, while the team members have to help set the project goals, accomplish tasks assigned, meet deadlines, attend team meetings and participate in editing a document to be turned in at the end of the project period. To provide behind-the-scenes assistance to the SDWT, the project sponsor must be kept well informed of the project situation by the project manager, in the form of timely and accurate project data. At the end of the project, each SDWT member is required to make a presentation of their project involvement, and lead a forum to stimulate other students' discussion or criticisms. The SDWT also needs to submit the project document and if any, demonstrate the software product. In the process, the project sponsor has to be invited to participate in the SDWT team meetings to observe and give feedback.

9. LESSONS LEARNED

Presently, the ISG has a history of about fifteen months with three batches of students whose involvement have been respectively of duration, in months, from three to six to fifteen. The major contributions of the ISG, on the part of the author, lie largely in the acquisition of the experience in motivating and conducting group-based project work for students. The *informal nature* of the ISG bypasses rigid formality of the regular curriculum so that other pedagogy, say, action learning with PBL, in teaching could be experimented. Though the cardinality of students in the ISG is not many, and the diversity is relatively narrow, the ISG experience has directly helped the author re-design his approach in conducting college lectures. See [26] for more details. Yet, the technical contributions of the ISG in the various areas of the Web-based EC, remain to be seen in the students' final projects in their senior years. On the other hand, the students' responses to the ISG have been encouraging. Some comment that this is the way of study they have been expecting, but missing from schools for long. They enjoy the group dynamics of being accompanied by peers with similar quest for technical innovations. However, it has been observed that they also encounter discomfort to learn to learn, often in areas where their motivation to continue seems lacking. As the ISG facilitator, the author is still learning how to engage students in the types of activities that will take on their initiative and responsibility for their own learning, by contributing his knowledge and experience to their research of the problem, and translating the same into terms readily understood by them.

10. CONCLUSION

In this article, the author has outlined one approach to cultivate human resources for the IS/IT sectors required in the EC arena of the Internet Age. Action Learning is versatile in its application, and is useful on both individual and collective levels. It attempts to strike a balance between action and reflection. It can be either facilitator- or participant-led. This makes it an ideal approach for individual and organizational development. It is believed that the Action Learning method enables the ISG students to be active learners, with an understanding of how MNCs learn to improve themselves. As they determine what will be learned and how, they question, explore, explain, evaluate, and collaborate. The general process follows a simple cycle of examining real work issues, applying a process of questioning and reflection to the issues, taking action on the issues, and repeating the cycle. For the SDWT, this development is intended to enable individual members to move towards a more open, differentiated, and integrated perspective [10]: *open* means a willingness to experiment with different perspectives; *differentiated* means the ability to draw finer distinctions between concepts; and *integrated* means the ability to weave these differences into an increasingly complex whole. The resulting learning should be accumulative, connected and of benefits to any learning organization.

11. REFERENCES

[1] Aaron, R., Decina, M., and Skillen, R., "Electronic Commerce: Enablers and Implications," IEEE Communications, Vol. 37, No. 9, Sept. 1999, pp.47-52.

[2] Albanese, M., and Mitchell, S., "Problem-Based Learning: A Review of Literature on its Outcomes and Implementation Issues," Academic Medicine, Vol. 68, No. 1, 1993, pp.52-81.

[3] Butler, D.L., and Winne, P.H., "Feedback and Self-Regulated Learning: A Theoretical Synthesis," Review of Educational Research, Vol. 65, 1995, pp.245-281.

[4] Cameron, B., "Driving IT's Externalization," Jan. 1999; www.forrester.com

[5] Coulson, A., "Electronic Commerce: The Ever-Evolving Online Marketplace," IEEE Communications, Vol. 37, No. 9, Sept. 1999, pp.58-60

[6] Dean, P., "Editorial – Action Learning and Performance Improvement," Performance Improvement Quarterly (PIQ), Vol. 11, No. 1, 1998, pp.3-4.

[7] Dennis, A.R., "Lessons from Three Years of Web Development," Comm. ACM, Vol. 41, No. 7, Jul. 1998, pp.112-113.

[8] Dilworth, R.L., "Action Learning in a Nutshell," PIQ Vol. 11, No. 1, 1998, pp.28-43.

[9] Dilworth, R.L., "Action Learning – Setting the Stage," PIQ Vol. 11, No. 1, 1998, pp.5-8.

[10] Dixon, N.M., "Action Learning: More Than Just A Task Force," PIQ Vol. 11, No. 1, 1998, pp.44-58.

[11] Engel, J., "Not Just a Method But a Way of Learning," In D. Bould and G. Felletti (Eds.), The Challenge of Problem-Based Learning. New York, N.Y.: St. Martin's Press, 1991, pp.21-31.

[12] Holton, E.F., Bates, R.A., and Leimback, M., "Development and Validation of Generalized Learning Transfer Climate Questionnaire: A Preliminary Report," In R. Torracco (Ed.), Proceedings of the Academy of Human Resource Development Annual Conference. Baton Rouge, LA: Academy of Human Resource Development, 1997.

[13] Isakowitz, T., Bieber, M., and Vitali, F., "Web Information Systems," Comm. ACM, Vol. 41, No. 7, Jul. 1998, pp.78-80.

[14] Isakowitz, T., Stohr, E.A., and Balasubramanian, P., "RMM: A Methodology for the Design of Structured Hypermedia Applications," Comm. ACM, Vol. 38, No. 8, Aug. 1995, pp.34-44.

[15] Kalakota, R., and Whinston, A.B., "Electronic Commerce: A Manager's Guide," Addison Wesley 1996, pp.1-29.

[16] Kerzner, H., "Project Management: A Systems Approach to Planning, Scheduling, and Controlling," 4th Edition, Van Nostrand Reinhold 1992, pp.16-17, 524-583.

[17] Leif, V., "Dynamic Trade," May 1998; www.forrester.com

[18] McCarthy, J.C., "The Social Impact of Electronic Commerce," IEEE Communications, Vol. 37, No. 9, Sept. 1999, pp.53-57.

[19] Revans, R., "ABC of Action Learning," Kent, England: Chartwell-Bratt Ltd., 1983, p.11.

[20] Revans, R.W., "Sketches in Action Learning," PIQ Vol. 11, No. 1, 1998, pp.23-27.

[21] Ryan, G., "Student Perceptions about Self-directed Learning in a Professional Course Implementing Problem-Based Learning," Studies in Higher Education, Vol. 18, 1993, pp.53-63.

[22] Schunk, D.H., and Zimmerman, B.J. (Eds.), "Self-Regulation of Learning and Performance: Issues and Educational Applications," Hillsdale, N.J.: Lawrence Erlbaum Associates, 1994.

[23] Schwabe, D., Rossi, G., and Barbosa, S., "Systematic Hypermedia Design with OOHDM," In Proceedings of the ACM International Conference on Hypertext '96 (Washington, D.C., March 1996).

[24] Special Issues on Action Learning, Performance Improvement Quarterly (PIQ), Vol. 11, No. 1-2, 1998.

[25] Takahashi, K., "Metalevel Links: More Power to Your Links," Comm. ACM, Vol. 41, No. 7, Jul. 1998, pp.103-105.

[26] Vat, K.H., "Teaching Software Psychology: Expanding the Perspective," To appear in the Proceedings of the ACM Thirty-first Technical Symposium in Computer Science Education (SIGCSE2000), Austin, Texas, Mar. 8-12, 2000.

[27] Westland, J.C., and Clark, T.H.K., "Global Electronic Commerce: Theory and Case Studies," MIT Press, 1999. (http://www.global-ecom.org/)

[28] Wexley, K.N., and Latham, G.P., "Developing and Training Human Resources in Organizations, 2nd edition, New York, N.Y.: Harper Collins, 1991.

[29] Zimmerman, B., "A Social Cognitive View of Self-Regulated Academic Learning," Journal of Educational Psychology, Vol. 81, 1989, pp.329-339.

[30] Zimmerman, B., "Self-Regulated Learning and Academic Achievement: An Overview," Educational Psychologist, Vol. 25, No. 1, 1990, pp.2-17.