Education and Training:
Prescriptions for Organizational Learning

R. Ryan Nelson

Decision and Information Sciences
College of Business Administration
University of Houston

ABSTRACT

The need to collectively understand systems, technology and one another in an IS environment has been increasing in importance for over three decades. It is the premise of this paper that the next decade will be marked by organizations who gain success through formal programs of organizational learning; programs that combine the virtues of education and training to enhance employee understanding of systems, technology, as well as each other. This paper has three primary objectives. First, to synthesize ideas from prior research and develop a model describing how IS-related learning impacts organizational processes and productivity. Specifically, aspects of both education and training are discussed with an emphasis on how they complement one another. Second, to examine the operationalization of IS-related learning via case analysis. The paper focuses on describing how the subject companies approach education and/or training. Third, to provide prescriptions for organizational learning based on ideas gleaned from the case analysis. Suggestions are made as to how companies should approach IS-related education and training.

1.0 Introduction

Throughout the evolution of information systems (IS) there has been an ongoing effort to understand the managerial issues associated with developing and integrating IS in an organization. Starting from Whislor and Leavitt’s article [31] on the predicted demise of middle management and continuing on to Nolan and Gibson’s stages [17] and Argyris’s espoused theory versus theories in action [2], there has been a profusion of research on how to deal with the problem of getting individuals to use information systems appropriately. Although a number of solutions have been forthcoming from such research, an expanded IS agenda has created a backlog of problems and opportunities in need of attention.

In an IS environment problems and opportunities often emanate from what might be classified as a bidirectional learning experience between the researcher and the manager [11]. Here, the term researcher is used to represent both IS theorists in academia, as well as IS personnel in the field; while the term manager implies the IS user community at large. Managers need to be knowledgeable about researchers; to understand what they are trying to do and why they try to do things the way they do. Researchers need to be knowledgeable about managers; to understand their particular problems, needs and attitudes [11]. Therefore, the need to understand one another is an important one, that should be felt by every member of the organization. Furthermore, it is the need to understand technology and how to apply it to organizational systems that further complicates the relationship between researcher and manager.

The need to collectively understand systems, technology and one another in an IS environment has been increasing in importance for over three decades. It is the premise of this paper that the next decade will be marked by organizations who gain success through formal programs of organizational learning; programs that combine the virtues of education and training to enhance employee understanding of systems, technology, as well as each other.

This paper has three primary objectives. First, to synthesize ideas from prior research and develop a model describing how IS-related learning impacts organizational processes and productivity. Specifically, aspects of both education and training will be discussed with an emphasis on how they complement one another. Second, to examine the operationalization of IS-related learning via case analysis. The focus will be on describing how the subject companies approach education and/or training. Third, to provide prescriptions for organizational learning based on ideas gleaned from the case analysis. Suggestions will be made as to how companies should approach IS-related education and training.

2.0 Organizational Learning

The facilitation of organizational learning is among the most important IS management issues, according to a recent survey of IS professionals [9]. Implicitly stated in the findings is that organizational learning contributes to the acceptance and usage of IS technologies throughout the organization. Similarly, other research suggests that most IS failures stem from a lack of user acceptance rather than poor technical quality [15].

The integration of technology usually requires
that a variety of organizational members (see Figure 1) perform a wide range of tasks. For these tasks to be carried out effectively, participants must have certain knowledge, skills, and background information [32]. Zmud [33] categorized six general areas of required knowledge, as follows:

1. Organizational overview; including objectives, purpose, opportunities, constraints, internal and external functioning.
2. General IS knowledge; including hardware and software concepts, IS potential, organizational IS policies and plans, existing IS applications.
3. Technical skills; including methods and techniques required to perform IS-related tasks.
4. Organizational skills; including interpersonal behavior, group dynamics, project management.
5. Target organizational unit; including objectives, purpose, functions, resources, links with other internal and external units, problems.
6. IS product; including purpose, design, required procedures, impacts on individuals.

An extensive program of learning must consequently be carried out that provides personnel with the education (knowledge) and training (skills) each requires. This learning should not be a one-time event; rather, an organization-wide program should exist on an ongoing basis that is supplemented as needed for any IS project.

2.1 IS-Related Education and Training

Cox and Snyder [14] emphasize the importance of a bidirectional learning experience within the context of systems analysis and design while delineating between the terms education and training:

Although most systems analysis and design models emphasize training, few acknowledge the importance of education. We wish to differentiate between these.

Training traditionally involves instructing the users or operators in the technical features or operational procedures of a specific system. On the other hand, education is broader. It should provide:

1. Users with a general knowledge of systems methods, equipment, software, and communications features and capabilities.
2. Systems analysts with a broad knowledge of the target system's functions so that the user's needs may be better satisfied.

A corporate information center newsletter said it this way:

If you have a problem understanding the difference between education and training -- How would you like your kids in school to have sex training?

Given the distinction between education and training, organizational learning programs (i.e., programs utilizing Zmud's knowledge areas described above) can be subdivided as represented in Table 1.

In general, education teaches problem-solving approaches while focusing on the ability to reason abstractly. Training, on the other hand, provides the tools (i.e., skills) for implementation of problem-solving approaches while focusing on the ability to work concretely.

Furthermore, it is important to note that education and training are important for both IS professionals as well as the end-user community at large. To this end, separate but related programs of learning should be developed for the two constituencies. While each group will have its own required level of expertise, all six categories described in Table 1 represent areas of required knowledge for IS professionals and end users alike.

2.1.1 Education

Research and development efforts in the field of IS have largely ignored educational processes. Since the 1960's, researchers have been asking the question: Why don't managers make better use of the computer? An early hypothesis blamed a lack of education on the part of many top and middle managers concerning how best to use computers and computer-generated information in decision making [8]. The same study concluded that the computer can have a significant positive impact on the organization if the firm provides adequate computer-related education for both middle and top management. Despite the obvious importance of IS education, there has been little previous empirical research in this area. In 1972 Heany stated the following: "Our journals are filled with articles on other things, mainframes, fancy display devices, file structures, easy to use languages, etc.. Apparently, they are the critical components" [34]. Only recently has the state of academic and practitioner awareness toward the potential impact of IS education efforts begun to change.

Currently, there seems to be a movement to create more formalized educational programs - programs that link the overall mission of the organization to the integration of IS technologies. As stated by a partner within the big eight accounting firm, Touche Ross and Company:

The fundamental purpose of a business is to make a profit by providing goods or services. In order to achieve this goal, every individual in the company needs to understand and articulate the organization's mission statement. IS managers need to know the business objective to ensure that
The IS department promotes the corporate mission. The link between IS and the corporate mission is most visible in the recent movement toward building an "IS architecture." As the term architecture implies, this process is designed to first construct a blueprint of the organization's existing IS environment (i.e., applications, data and communications facilities) and compare the blueprint to the organization's business model (i.e., a model of how the organization operates as a business). It is through this process that management can become more knowledgeable about their company's IS operations and IS can become more knowledgeable about the "macro business" they operate within. Furthermore, strategic planning for the business can now operate in consonance with strategic planning for IS. In essence, the process of building and maintaining an IS architecture becomes the bidirectional learning process described at the onset of this paper.

Nolan and Mulryan [22] discuss the critical need for undertaking an architecture program and describe the growing number of "architecture positions" being established in the client organizations of Nolan, Norton & Company:

Architecture is a key component in the strategic planning process of companies preparing for the 21st century. It requires that information technologies be structured as a technical foundation which helps business strategy to be implemented. Architecture differs dramatically from the traditional project-oriented applications planning carried out in the DP era; it is much broader in scope, in organizational impact, and in process. Nevertheless, planners from information systems departments are being appointed as Architects, and are being charged with initiating their companies' Architecture programs. An informal survey of our clients reveals that over 70 percent have established Architecture positions, and many are in the process of setting them up.

2.1.2 Training

In a survey of 21 organizations Zmud and Lind [34] found that training sessions for end users were considered one of the most effective linking mechanisms in ensuring success of end-user computing. However, based on interviews with 100 end users from 20 companies, Nelson and Cheney [21] concluded that training seems to be taken for granted - an occurrence often mentioned, yet seldom acted upon. In each case, interviewees stated, time and time again, how important they felt training was to the successful integration of systems. Paradoxically, most organizations devote few formal resources to IS training. In general, companies were found to be "spending" less than 2% of their IS resources (human and financial) on training end users [21].

The importance of training in job performance is well grounded in the disciplines of organizational behavior, social and educational psychology. [20, 28, 19, 26]. Ability moderates the effect of motivation on performance (i.e., for a given level of motivation, performance can increase with increased ability) [12]. At high levels of ability, however, motivation can cause even higher performance levels to be obtained [19]. In their field study of end users, Nelson and Cheney [21] found that:

1. Computer-related training is positively related to computer-related ability.

2. Computer-related ability is positively related to use of computer resources.

Based on these findings, organizations are urged to invest resources to train employees whose job performance is a function of their ability to use IS technology effectively.

In a recent survey of 31 IS managers, Cheney [10] attempted to determine the current skills requirements of IS professionals. The survey indicates that in addition to the continuing need for "traditional" skills such as systems design and programming, IS personnel will require additional functional expertise and people-oriented skills. These additional skills will be needed to deal with the newly acquired consultancy aspects of IS positions (e.g., positions designed or redesigned to facilitate end-user computing). These findings seem to indicate that the training of IS professionals should address all three categories described in Table 1; i.e., IS product, technical, as well as organizational skills.

Since the early 1980's, literature on the subject of end-user computing (EUC) has devoted a fair amount of attention to the development of IS training programs. Indeed, the growth of EUC is one of the significant phenomena of the past decade in the IS management world. For example, Benjamin [5] states that by 1990 75% of all CPU cycles at the Xerox Corporation will be in the hands of end users. Other studies on Quaker Oats [13] and IBM Canada [16] cite similar results. Benson [6], as well as Rockart and Flannery [27] address portions of their individual research efforts toward end-user training. In each of Benson's 67 end user interviews, the interviewee was specifically asked what additional training he/she needed or wanted, and what training he/she felt was needed by company managers to make better use of computer technology. "A significant number of them expressed interest in further training for themselves, usually with the provision that it would not be too demanding on their time and that it would be financed by their employer. Furthermore, it is interesting to note that six of the seven top managers interviewed named upper management training as a primary need" [6]. Over half of those interviewed by Benson reported being "self-trained," while only 15 percent said they received computer-related training by the company which employed them. Nelson and Cheney [21] reported similar findings.
Rockart and Flannery [27] made several recommendations for the development of an effective end-user training program. These recommendations included:

- in-depth training in end-user languages and capabilities for the more "professional" end-user programmers.
- brief, "how-to," example-based training for the nonprogramming and command-level end users who desire to know only as much of an end-user language or user system as they need to perform a few tasks of importance to them.

2.2 A Conceptual Model for Organizational Learning

Figure 2 presents a conceptual model for organizational learning derived from the literature on IS-related education and training. Four different relationships between the model components are depicted (and numbered). A brief description of each relationship follows.

(1) The symbiotic relationship between the IS and "overall" business environments should represent the foundation for programs in organizational learning, particularly in the form of education. For example, both the existing and future states of the organization (as described in the business model) should be represented in the IS architecture (as described in the blueprints of applications, data and communications). The business model and IS blueprints should then serve as an educational tool for both IS and top management.

(2) The portfolio of IS-related education and training programs have a direct influence upon an individual's IS-related ability/skills. As mentioned earlier, Nelson and Cheney [21] found that computer-related training is positively related to computer-related ability. Sein, Bostrom, and Olfman have proposed a framework of the end-user training process that emphasizes the importance of trainee characteristics in the learning process. Their experiments [30, 23, 7] have shown that "not only do these characteristics influence training outcomes by themselves, they also interact with the training methods. It is, therefore, essential that individual differences be considered in designing training methods" [7, p. 134].

(3) An individual's IS-related ability, in interaction with the collection of his/her other individual characteristics, have an impact on that individual's acceptance of IS products and technologies. For example, a user's ability to use a software product will determine both (a) how he/she uses that product, as well as, (b) his/her attitudes and/or perceptions regarding that product.

(4) Finally, acceptance of a product or technology should determine to some extent how productive an individual will be on the job (i.e., assuming product-job relevance). Productivity here is shown to be a function of effectiveness (e.g., quality) and/or efficiency (e.g., outputs divided by inputs).

In conclusion, the summation of individual productivity from throughout the organization should directly correlate with the firm's "bottom line": not to mention any synergistic benefits that might accrue. Therefore, one might deduce from Figure 2 that enhancing a firm's programs of learning will lead to an increase in the firm's profit margin.

3.0 Case Studies

The topic of organizational learning is well suited to investigation using the case research approach for the reasons cited by Benbasat et al. [4]. First, the researcher can study an IS phenomenon in a natural setting and generate theories from practice. Second, the case method allows the researcher to answer "how" and "why" questions, that is, to understand the nature and complexity of the processes taking place. Third, a case approach is an appropriate way to research an area in which few previous studies have been carried out.

To reveal how organizations are approaching IS-related learning, two companies were selected for case analysis. Both companies were selected based on their relatively advanced posture towards either education or training.

The following two sections highlight information gleaned from interviews with top management, IS personnel and end users. Section 4.0 will provide further discussion, as well as a synthesis of the organizational approaches toward education and training.

3.1 Texas Air Corporation

Texas Air Corporation (TAC) was formed in March of 1980 as a holding company engaged in the air carrier business. Since 1980, TAC has become the world's largest airline company through the merger of Texas International Airlines (the predecessor of TAC) and Continental Airlines, as well as, subsequent acquisitions of New York Air, Frontier Airlines, People Express, and most recently, Eastern Airlines.

Net income for 1986 was $72.7 million on sales of $4.4 billion; with average growth rates of 62.1% and 47.7% respectively since 1982. In 1986, a total of 65,820 people were employed through the Texas Air Corporation and its subsidiaries.

Today, TAC is headquartered in Houston, Texas and operates via three major subsidiaries: Continental, Eastern, and System One Corporation. System One, which serves as the information systems (IS) area within TAC, was formed by merging CCS Automation Systems (formerly the IS area within Continental) with EAI Automation Systems (formerly the IS area within Eastern). System One is also headquartered in Houston, Texas and bills its systems as collectively making up...
the third largest information processing unit outside the U.S. government.

TAC's goal-oriented approach toward organizational learning can be summed up in one word: integration. In the aftermath of the mergers and acquisitions, integration has become the foremost thought on everyone's mind. Which applications, systems and personnel will be continued and in which geographic location?

Top management within the three subsidiaries has adopted the IS architecture approach toward education described within section 2.1.1. To this end a staff of four employees (IS architects), who report to the Vice President for Planning within System One, have been assigned the responsibility of building and implementing a corporate wide (i.e., TAC-wide) IS architecture.

Figure 3 represents the model being used by the group to guide their mission. To operationalize the model a series of steps have been undertaken as described below.

Step 1: Develop a workable and agreed upon definition of architecture. Top management needs to develop a conceptual understanding of what will become the organization's architecture program. In TAC it was primarily a case of getting everyone to speak the same language.

Step 2: Identify architecture stakeholders, and get them to buy into the process. TAC gained success at this stage by identifying a highly visible project, with a high probability for success, to serve as a prototype for the architecture process. Following a successful implementation, the prototype then served as a marketing tool for other stakeholders within the corporation.

Step 3: Take inventory. Again, based on the consolidation of various applications, systems and personnel from several distinct organizations, top management needed to know what they (TAC) had in terms of hardware, software, databases, etc. Two members of the architecture group embarked on a rigorous fact-finding mission. Traveling throughout Eastern, Continental and System One they were able to document the inventories at a fairly high level within each subsidiary. These inventories were further summarized and forced into three "baseline blueprints": applications, databases, and communications.

Step 4: Formulate a "business" model. As stated earlier, TAC is primarily in the business of transporting people. To accomplish this objective the organization is subdivided into three functional areas: marketing, operations and support services. The business model serves to represent the major activities (subelements) of each of these functional areas and how they interact with each other. The business model is an accurate reflection of how both Eastern and Continental do business.

Step 5: Translate the business model into IS strategy. In step 5 TAC evaluates how well the existing IS operation (i.e., applications, databases and communications) address the needs of the organization as set forth in the business model. Consequently, it is through this process that IS strategy is aligned with that of the organization.

Step 6: Develop a blueprint for the future. Based on the evaluation conducted in step 5, plans are drawn up for the future. Modifications, additions and/or deletions are made to IS operations within the three subsidiaries.

Through the process described above, TAC has been very successful in achieving the bidirectional educational relationship called for at the beginning of this paper:

- Top management becomes cognizant of what IS is accomplishing.
- IS understands what business their supporting, and
- To some extent, they each understand themselves better.

TAC has not been successful, however, in disseminating this knowledge to lower levels within all three subsidiaries. TAC lacks the infrastructure to channel the information gathered through the architecture process down to middle and lower levels of management. Furthermore, such an infrastructure is necessary for the continuing flow of inventory information from the bottom-up. Perhaps this is an area where TAC can benefit from the approach taken by the Georgia Power Company.

3.2 Georgia Power Company

Georgia Power Company is an investor-owned electric utility serving 57,200 of the state's 59,000 square miles with an estimated population of over 5,100,000. Georgia Power Company was incorporated under the laws of the State of Georgia on June 26, 1930. Originally, the company began in 1883 as the Georgia Electric Light Company of Atlanta and was formed primarily to provide lighting for the city. The Southern Company is the parent firm for Georgia Power, as well as three other state utilities.

Today, Georgia Power Company is engaged in the generation and purchase of electric energy and the distribution and sale of such energy to some 1.4 million customers in all but six of the state's 159 countries. Georgia Power Company sells energy
at the retail level to over 60 communities and at the wholesale level to 39 rural cooperative associates through the Oglethorpe Power Corporation.

Net income for 1986 was $610.6 million on sales of $3.5 billion; with average growth rates of 24.7% and 10.2% respectively since 1982. A total of 14,773 people were employed at the Georgia Power Company in 1986.

A relatively large proportion (34/182 - 19%) of the IS staff at Georgia Power have training the users of information systems listed as part of their job description. These “newfound duties” are due to the reorganization of IS services through a decentralization along functional lines.

IS-related training at Georgia Power can be best described via three tiers or layers of support, listed from top to bottom: Client Services, Client Support and Application Development. Client Services, the only “centralized” (core) portion of the IS function, consists of two subareas of specialization: (1) the Data Base area which supports IDMS and NOMAD activities, and (2) the Information Center which basically supports microcomputer applications. Training facilities within the Client Services areas include one room of VM terminals (for microcomputer instruction). Client Services is responsible for the distribution of both corporate IS policy and “know-how,” knowledge of IS operations, to the seven Client Services groups located within each of the seven functional areas (e.g., personnel, finance, etc.). In actuality, these seven groups serve as small, decentralized Information Centers which serve advisory/consultant-type roles to the end users within their functional area. These end users make up the bottom layer within the distribution process called Application Development, where the user actually does the development of his/her own applications. One Georgia Power employee described the IS reorganization as: “IS used to crank out the programs, now it cranks out the knowledge and the user area cranks out the programs.”

What Georgia Power’s program of learning lacks, however, is means of exchanging knowledge at the upper levels of the organization. Furthermore, although they addressed the training portion of Table 1 relatively well, Georgia Power was not disseminating general IS knowledge nor an understanding of the corporate mission. Perhaps this is an area where Georgia Power can benefit from the approach taken by Texas Air.

4.0 Prescriptions for Organizational Learning

Based on the cases of Texas Air and Georgia Power described above, combining their two approaches to organizational learning would serve to provide a much better coverage of the six knowledge areas described in Table 1. TAC’s architectural method of education would be much enhanced by a distributed infrastructure along the same lines as the one used to disseminate IS-related training at Georgia Power. Similarly, the institution of the architectural method employed by TAC would serve as a means of educating personnel within Georgia Power in such areas as the corporate mission.

The prescribed elements for a complete program in IS-related learning within medium/large size organizations would consist of the following:

- Top management awareness; because such a program will not only require the commitment of organizational resources but the participation of top management itself, the joint backing of the CEO and CIO is required.
- IS-related education; a knowledge accrual system needs to be established that taps into such areas as the corporate-IS strategic plan, existing IS applications, and departmental IS operations on a continuing basis (e.g., the architectural method of TAC).
- IS-related training; an in-depth training needs assessment needs to be conducted for both IS and end-user personnel. Only when the organization knows “who needs what” can an effective program be established for such areas as organizational skills, technical skills and IS product-related skills.
- Organizational learning infrastructure; a vehicle for both horizontal and vertical learning needs to be developed to ensure the proper movement of knowledge within the organization (e.g., the infrastructure of Georgia Power).

Figure 2 represents how these four prescriptions can collectively impact a firm’s bottom line. They provide the means to move from corporate-IS strategy formulation toward enhanced individual, departmental and ultimately organizational productivity.

5.0 Discussion

This paper suggests that organizational success is increasingly dependent upon effective programs of organizational learning; programs that combine the virtues of education and training to enhance employee understanding of systems, technology, as well as each other. Based on the experiences of two companies who have been at least partially successful in the dissemination of IS-related knowledge, prescriptions are made to help impact organizational productivity.

In developing the conceptual model (Figure 2) it became apparent that organizational learning is a complex subject, shaped by a variety of variables and events. This complexity is seldom reflected in the theory, research, or practice in the field of information systems. The result is likely to be that the researcher develops an oversimplified view of the use of education and training as integrative tools, and that the IS manager overlooks some possible strategies or some variables which will interfere with his/her
attempts at implementation. Therefore, both the model and prescriptions developed within this study need to be linked with other research, tested and expanded.

As noted earlier in the paper, the topic of organizational learning is well suited to investigation using the case research approach. One future research direction might be to pursue a more in-depth case analysis on one or two companies. Companies within similar industries, yet found to approach organizational learning differently, could be compared and contrasted in terms of successful/unsuccessful experiences. Possible research questions might include the following:

- What is the role of organizational learning (e.g., education and training) in centralized versus decentralized organizations?
- What impact do interunit dependencies have on the need for education?
- Is there a relationship between education/training programs and/or a corporate infrastructure and the employee knowledge base.

In conclusion, the concepts and prescriptions proposed in this paper should provide a basis for future work in the area. IS-related learning should gain an increasing amount of attention within both research and practice due to its potential impact on organizational success.

REFERENCES


Table 1: IS-Related Education and Training

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Figure 1: Educational Integration Between IS and End-user Personnel
Figure 2: A Conceptual Model for Organizational Learning