Globalization Issues in Information Systems Education: Toward a Collaborative Multischool Systems Analysis Experience

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AUTHOR'S COMMENTS

The paper is even more relevant now *than when it was originally published due to the ever-increasing impact of advances* in *information technologies and the* wide *application of electronic commerce. It is expected that,* in *the future, virtual teams wal be responsible for a greater portion of project development than traditional teams. The concept of the virtual team assumes work accomplished collaboratively in high-performance environments without regard to geographical locations. Consequently, there is an obvious need for* IS *educators to proactively adjust and realign our curricula to properly respond to these challenges.* We *must expose students to the opportunities of working in cyber-team environments and developing associated skals and competencies neces- sary to prepare them to meet the high standards of collaborative performance required from industry.* One *method of accomplishing this goal is through virtual-team projects.* Thus, *we are currently in the process of using a collaborative software tool, such as TeamWave, to jointly analyze and design certain components of an* IS *student project in which the project teams from two institutions are separated by a distance of some* 100 *maes. Waliamj. Tastle july* 24, 1998

ABSTRACT

The *problems and complexity associated with globalization directly impact the Information Systems* curriculum, *especially with respect to the for- mation and management of teams of systems analysts. Though it is not feasible, nor desirable, to provide instruction to* IS *students in how to relate to all cultures when confronted with team membership whose occupants possess differing skills, cultures, and beliefs, a suitable experience can be given to students in the Systems Analysis* class. *Extending beyond the usual set of well-defined, unambiguous in-class problems is the external "real- world" problem in which complexity and ambiguity reign in problems stretching beyond traditional borders and into the global marketplace.* To *pro- vide the Systems Analysis and Design class with a simulated experience of working in the global environment we have utilized actual problems from the commercial, governmental, manufacturing, and nonprofit industries.* To *experience these situations and provide for the development of* some *expertise in dealing with these problems, students are placed into teams and given the responsibility for problem solving to the satisfaction of the industry principals. Two types of student teams are identified: homogeneous or single school teams, and heterogeneous (dyad or triad) school teams. Homogeneous teams share common instruction, a common body of knowledge, and inter-team commitment and accountability, while heterogeneous teams find incompatibilities in their basic* level *of shared and unshared knowledge,* CASE *tools, methodological approaches to problem solving, com- mitment to solving the problem, and team accountability. Homogeneous team experiences are useful in establishing team work habits and allowing students the opportunity of dealing with known personalities, and heterogeneous teams extend that experience to include opportunities involving unknown individual personalities, intra-team commitment and accountability, and the pressure of deriving an acceptable solution regardless of obstacles.* We *suggest this experience can be used to satis- portions of sections 2.4,2.10, and* 3.7 *in the IS'95 Model* Curriculum.

INTRODUCTION Globalization is one of the most powerful and pervasive influ- ences on nations, businesses, workplaces. communities and lives of the late 2Oth century. Kanter [19951 claims that organizational success in the economy of the 21st century will only come to those organizations whose goods and services meet world class stan-

dards and which can compete in the global marketplace. Others concur lIves, et.al. 1996; Mitroff 1987; Hammer and Champy 1993] and suggest that American business must increasingly and effec- tively compete in a global environment in which extreme inter- connectedness, flexibility, innovation, quick response, and focus on process rather than task, is a fundamental feature.

Is this just more hype, an opponunity to publish more books and papers, or should IS educators pay heed to this latest impetus? To be sure, the problems and issues of globalization in the organization are not new, for John Naisbitt [1982] presented them more than a decade ago. He recognized the change from a national economy to a world econom}; from hierarchical performance to performance by network. Katzenbach and Smith [1993] concur with this assessment and indi- cate a trend that most work in modem organizations will be accom- plished by high performance teams. The use of teams to solve com- plex problems clearly outperformed individuals acting alone or in larger organizational groupings, especially when performance required multiple skills, judgements, and experiences [Katzenbach and Smith 1993]. Funher, team-based collaborative processes allow panies who see different aspects of a problem to constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible, to resolve conflicts, to enhance commitment, and to construct and advance shared understandings, meaning-; and visions [Gray 1989; Gause and Weinberg 1989]. Team performance, however, may be hampered across cultures. For exam- ple' in a recent study [Robey and Rodriguez-Diaz 1989] reponing on an implementation of a system across cultures in Panama and Chile, the critical elements which led to project failure were cultural incom- patibility and the lack of shared meaning-; among the members of the responsible teams. Certainly, the level of complexity increases when the conteXt of domain is global. **In** response to the question we raised above, the response is a definite "Yes, we ought to pay heed to the influence of globalization on the IS curriculum."

The training of IS graduates for employment in multinational corporations has seemingly not been sufficiently addressed by the 15'95 proposed curriculum for information systems programs, although there exist several elements in the body of knowledge which lend themselves to the placement of global concerns, specifi- cally sections 2.4 Organizational Behavior, 2.10 Interpersonal Skills, and 3.7 Project Management. Cenainly, employment in multina- tional companies implies that problems which very likely will be directed towards our IS graduates are large, very complex, and evo- lutionary in the sense that the original problems or views of problems will expectedly change during that ponion of time during which the requirements analysis is conducted. The latter point is one which we (as systems educators) address in the typical software engineering and systems design courses, that of designing a solution and then implementing it in a human activity system. The solution, though it might appear as ideal in a classroom environment, hardly seems to satisfy the needs of such a project if it was derived from an ongoing business; this lack of success in the business environment is addressed in the form of system upgrades. The upgrade of a real-time, dynamic human activity system requires, by definition, that the solution be, at best, on the trailing edge of current needs. Such a characteristic may well be endemic to systems design.

ISSUES FOR INFORMATION SYSTEMS EDUCATORS

As business, industry and government refocus and reinvent themselves to meet the trends towards globalization and team-based high performance organizations and its corresponding requirements and challenges for the llst century, how must the IS academic envi-

ronment evolve to be proactively dynamic such that its curriculum is equally relevant? Also, what types of learning experiences must we fashion to effectively meet the demand for globalized team based high-performing IS professionals? To be sure, the 15'95 Model Curriculum is a giant step in the right direction; its design as a min- imum guideline by its authors allows for the fine tuning of an IS cur- riculum to serve the unique needs and resources of each school.

The problem of attempting to solve very large systems in an active, real-time environment, is, however, a continuing dilemma which we feel has not received a sufficient quantity of stud>, The academic pro- jects assigned in a typical systems analysis class are well defined, anifi- cially constrained, and fully known [Tastle and Dumdum 1994] .Thus, any project given in the classroom environment is at best a highly con- trolled simulation of the complexity involved in the real world.

This requires us to address the issue of how we can provide a collaborative learning environment for information systems stu- dents when they share a single classroom and the problem(s) are academically determined. The authors have successfully addressed this problem over the past six years within the context of the Systems Analysis and Design course and are expanding the class- room situation such that a multinational "experience" can be derived within the limited confines of most academic institutions. Furthermore, the 15'95 Guidelines clearly argue (page 5) that

"Graduates need to be able to interact more effectively with clients and to work more effectively in teams. They need more depth of technical knowledge in dealing with a wider set of technology. These changes dictate an increased level of resources in terms of hardware and software, more knowledgeable faculty and improved pedagogy."

Implied within this charge is the presence of a set of qualities or competencies which should be present in all IS graduates, par- ticularly in view of globalization.

The issue of competencies in IS education has been previously established [Tastle and Dumdum 1994; Dumdum and Tastle 1996] as being apponioned into three overlapping components: technical, conceptual and interdependency competencies. Technical compe- tence is defined on two levels: (1) "tools" competency which involves a knowledge-base of various hardware and software products at a rea- sonably sophisticated level of detail; and (2) "transformative" compe- tency which involves the ability to apply information technology as a trans formative force for shaping, supponing, achieving, and main- taining strategic corporate initiatives [Hamer 1990; Poner 1996] such as the rapid development and deployment of quality products and services [Morgan 1988], the reengineering of business processes [Hamer and Champy 1993] , and the overall performance improve- ment of the organization [Sprague 1993, in Longenecker 1995].

Conceptual competencies consist of specific mind sets and con- ceptual skills. According to Kanter [1995, 1983] , some mind sets are more restrictive than others. For example, she contrasts an "integra- tive" mind set to a "segmentalist" mindset to approaching problems. To be integrative, a vital key to innovation, is to be willing "to move beyond received wisdom, to combine ideas from unconnected sources, to embrace change as an opponunity to test limits...to see problems as wholes, related to larger wholes, and thus challenging established practices rather than walling off apiece of experience and

preventing it from being touched or affected by any new experi- ences." In contrast, to be segmentalist is to companmentalize actions, events, and problems in keeping each piece isolated from others, thus seeing problems as narrowly as possible, independently of their context, and independently of their connections to any other pr9b- lems [Kanter 1983]. In a later work, she funher contrasts two other mind sets: a cosmopolitan or global mind set and a local mind set [1995]. She asserts that cosmopolitans are "comfonable in many places and able to understand and bridge the differences among them, possess ponable skills, and a broad outlook." In contrast, while some people are widely traveled, their mind sets remain parochial, such people being referred to as possessing "local" mind sets [1995]. Conceptual skills include, among others, re framing problems to create innovative solutions, translating vision into action steps, dealing with multiple stakeholders representing conflicting interests, and managing change, complexity and ambiguitr

Interdependency competency, within and across corporate and ethnic cultures as required by a global view, consists of two parts: (1) the ability to build bridges and alliances among various stakeholders [Morgan 1988] and (2) the ability to actually collaborate in high per- fonnance teams to deliver world-class results [Katzenbach and Smith 1993]. The first accents the need to be able to establish and maintain personal and/or professional "connections" -the best relationships - so that one may have access to the resources of other people and organizations [Kanter 1995]. The second signals the ability to col- laborate with team members to explore, evaluate, and arrive at shared meanings and understandings, identify a common purpose, establish perfonnance goals and approaches, and to productively translate mission into high quality results. This competency is not as strongly emphasized in past and present IS curricula for it is expe- rientially based, and industrial/commercial/governmental/non-prof- it professorial experience is usually the exception in the average IS depanment. The 15'95 guidelines state that IS graduates should have skills in three levels (see page 5 and 7 of the 15'95 Guidelines), and these map very nicely into our three competencies.

We have begun a process whereby our students have devel- oped an appreciation for, and greater knowledge of the challenges involved in the problems of team-based high-perfonnance demands emanating from the Systems Analysis and Design course (longenecker 1995, section 95.7].

CLASSROOM VERSUS INDUSTRY EXPERIENCE

The available cases for classroom experiences are replete in the plethora of systems analysis textbooks for each textbook has its own collection of case studies, projects, learning experiences, etc. Each case is usually complete and unambiguous, as one would expect from any well designed project, but this is exactly the type of prob- lem that the graduates will not experience, though the knowledge learned and the experiences derived from these academic problems are, of course, better than no project experience at all.

Over the past twelve years we have established a network of con- tacts in the industrial, commercial, nonprofit, and governmental sec- tors of our surrounding counties and can now relatively easily find problems composed of a suitable degree of complexity and ambigu- ity such that we bring into our classes an "actual" experience.

Typically we panition the semester into two blocks. The first block comprises the first 1/3 to 1/1 of the course and is devoted entirely to a very compressed and demanding presentation of tradi- tional concepts of analysis and design. Most of the material contained in texts are covered in very rigorous fonnat. It should be mentioned that an equally rigorous course in database theory and application is a prerequisite for the systetnS analysis course. This nontraditional sequencing of courses has provided the students with the knowledge necessary to more adequately focus on the design methods and not to be sidetracked with excursions into database theory We have found this sequencing to be very beneficial. Funher, small abbreviat- ed problems, such as traditional case studies, are assigned as team projects. More recently we have found that assigning students a known functional area (i.e., the borrowing of a book from the college library) to analyze has yielded a successful experience. Students are usually reluctant to ask questions when first confronting a corporate president or manager and consequently use the instructor as the questioning initiator. In time, the students take control over the investi~tion, but they do feel unsure of themselves. We have sought to reduce this feeling of insecurity and have succeeded in large pan through the analysis of on-campus depanments with which our stu- dents already have established a comfon level.

Academic Projects Typically, our first project might be the analysis of the advance reg- istration process, one in which each student already has an intimate knowledge, or so they believe when first presented with the problem. A representative of the Registrar's Office leads a very detailed discus- sion of the process about which the students quickly discover they actually know very little. The resulting entity-relationship, functional, and data flow diagrams are created by teams, corrected by the instruc- tor, and discussed in class. It is also during this time that the students are introduced to a CASE tool. Our experiences with CASE tools is such that neither of the authors wish to discuss the shoncomings or merits of the several tools we have experienced in the past, but it is perhaps notewonhy to comment that the recent packaging of student version CASE tools with the systems texts seems to be a step in the right direction, although that step is arguably a small one. The ability of students to use their own computers to create diagrams and the concomitant data dictionary is very useful.

Another project which has met with varying degrees of success is the analysis of the campus security depanment. Other than the reg- istration of cars most of our students have had little contact, so a meeting with the director of one of our college's security depanment (a fonner FBI agent) invoked a considerable measure of stress on the students, though they are better able to enter into discussions and have developed some degree of confidence in themselves and their knowledge. These projects are analyzed from the traditional struc- tured analysis point of view and/or the object-oriented perspective.

Real-World Projects Additional projects have involved the college library operations and business aspects of the college, and through each experience, the students' ability to apply systems concepts is enhanced. Around mid- semester the ~real" project is presented and discussed. This initiates the second block and focuses the remaining course on the analysis

and design of a very complex and ambiguous project located outside of campus, though classroom lectures and laboratory exercises con- tinue but at an abbreviated rate. The location of a project off-campus is not to imply that suitable projects cannot be found within the col- legiate environment, for some of our colleagues are able to supple- ment their systems courses with projects from within the college, but external to the academic arena. The main project is usually located about an hours' travel time from the college so that the students can- not arbitrarily travel to their client at whim but rather, must careful- ly plan out their time and be prepared to take maximum advantage of their opponunity to meet with client officials. This limitation is anificially imposed on the stUdents, but we know it is imponant for IS graduates to be able to express themselves succinctly and com- pletely so we have deliberately legislated this constraint.

Past projects have included: the analysis of a golf course oper- ation; a Fire Marshall's permits and registration system; a local area network operation, usage, and redesign for a nonprofit organiza- tion; a patient registration system for a regional health care facili- ty; a Treasurer's Office for a governmental subdivision; a police depanment; a coun system; and another fire depanment. Waiting for the next class is a problem involving a public electric utility.

Deficiencies These projects have been addressed only by students working in teams from the same college, so their experience has been entirely lim- ited to mutually known CASE tools, solution concepts, and an overall shared knowledge base. Students working on these projects have the safety of knowing that all members of their team have the same knowl- edge and will be seeking to analyze and design solutions in a very sim- ilar manner, and that is the main problem with this approach: students are not introduced to problems and opponunities which emanate from being able to work with others who possess different views, experi- ences, and knowledge. One could perhaps argue that the presentation of a suitable miXture of readings and exercises could allow the students to develop a similar level of expenise. We agree that a similar theoret- ical knowledge could be derived in this manner, but the opponunity of interaction with another student group is the dominant reason (though not the only one) for this approach.

MULTI-SCHOOL COLLABORATIVE ACADEMICALLY SIMULATED ENVIRONMENT (MCASE)

To provide a means by which an MCASE experience might be provided to our students, we have identified a four process method: faculty collaboration, single school student teams, dyad school student teams, and triad school student teams.

Faculty Collaboration The motivation for this work began in 1992 as a panel discus- sion at Muhlenberg College as pan of the Eighth Annual Eastern Small College Computing Conference [Fisher 1992] when it became evident that many panel observers were interested in find- ing ways of bringing realism into the systems analysis classroom. It was generally agreed that the use of textbook cases lacked vinually all of the ambiguity associated with real projects, and both authors echoed their successes moving outside of the classroom. We contin-

ued assigning external projects to our systems classes, carefully monitoring their success and the students reactions to the experi- ences, and have found that these ambiguous and complex problems have motivated our graduates to seek employment with companies concentrating in the field of analysis and design, and have, almost exclusively; not sought employment as programmers or software developers. A computer scientist could easily argue that this is not a desirable service. We argue, however, that a programmer/analyst requires one to be first a competent analyst and second, a proficient programmer. We also note that almost half of our graduates go on to advanced studies in the specialized area of analysis and design, either directly after receiving their Baccalaureate or as pan-time stu- dents while they work in their profession.

Single School Student Teams The second phase, that of single school or homogeneous stu- dent teams, has been successfully conducted on both campuses. The problems of transponation, excessive instructor time both in identifying projects and scheduling meetings so that the instructor would be present with every team, is quite demanding. Students who complete these projects complain that the work load is exces- sive and that the instructor demands are enormous, but at the con- clusion of the course when the final reports have been written and the presentations given to the corporate managers, the students reflect over a well earned dinner and recognize the extent of their learning -and the fact that they now have been exposed to a non- trivial professional systems experience -and have proudly sur- vived it. This demanding experience has been an asset to each stu- dent, whether seeking entry into graduate school or employment.

Within the single school, students view the real-world problem as a critical pan of the course, and hence view it as pivotal to mak- ing the traditional Systems Analysis and Design course stronger. They reflect greater pride in their work and strive substantially more to complete the analysis as vigorously, accurately; and professional- ly as their capabilities allow. Their commitment to excellence and dedication to detail is frequently first discovered here. One-founh of each class regularly admit that the project motivated them to new heights of excellence, for this is frequently the first time that a goal was more than merely the completion of a class assignment. While students.may play the grade game with aplomb, when confronted with strangers who are depending upon them to solve their prob- lems, students do rise to the occasion. They continue to show pro- found commitment to each other and held one another accountable for their ponion of the overall study to a standard that is higher than that which the instructor had established. (We defend our individ- ual standards as being reasonable for a specific class and a panicu- lar project, realizing that students ought not to be held to the same standard as experienced professional analysts.) When a goal is established, one to which all accept ownership, the degree of learn- ing that occurs, and the quality of work that ensues, is profound.

Dyad School Student Teams The third phase, that of dyad school student teams, is beginning in Spring 1997 with the scheduling of the separate analysis courses to run concurrently on both campuses. A problem of sufficient com- pl~xity and ambiguity has been identified residing in a company locat -

ed about midway between the two campuses (the distance of separa- tion is just over two hours by car over a four lane highway), We are changing neither syllabus nor instructional methodology for we seek to determine how a collection of students from different colleges, using different texts, and taught by different instructors, will approach the solution to a nontrivially ambiguous problem when they are thrust together. The approach can occur in two ways: teams may be composed of students from the individual schools (homoge- neous teams) assigned to solving the same aspect of the overall prob- lem, or the teams may be mixed by school (heterogeneous teams). We feel that the latter will, of course, more closely approximate the real- world experience we seek, but we also recognize the difficulty of stu- dents traveling to discuss and analyze their assignments. We are con- sidering the use of list servers and teleconferencing to allow for the creation of mixed groups. If we deem this experience to be success- ful, a nearby third college (a university) will be invited to panicipate.

In a manner similar to that of the single school experience, we expect our two schools to exhibit an even stronger degree of com- mitment and accountability towards the completion of the shared project, for we expect that it will be perceived as something of a competition between schools, not unlike the competition between company teams. If it is possible to mix the teams, a stronger sense of commitment and accountability towards the satisfying of the client's problem is expected to be identified.

Triad School Student Teams

Upon the successful conclusion of the dyad team experiment, we anticipate the addition of another school to the MCASE expe- ri~nce, a major University center supponing an MEA in MIS. The student mix will then become about as close to that of a multina- tional work environment as is reasonably possible. This will be a very imponant pan of the experiment for the difficulties of coor- dinating the students of three schools are expected to be expo- nentially greater, and we currently have no knowledge that the consequent student experience will be wonh that effon. This experience should allow us to determine the relative imponance of dyad versus triad teams, from which recommendations for future IS curriculum guidelines may be secured.

The dyad and triad school experiences are the subjects of other pape.rs.

CONCLUSIONS Multinational corporations seeking to compete in the market- place have acknowledged the need to address systems problems from a global perspective. Problems are substantially more complex and require the services of teams of analysts, teams whose compo- sition is heterogeneous with respect to education, frameworks, methodologies, knowledge of CASE tools, experience, culture, social and personal behavior, beliefs, and vinually every other attribute, but who must nonetheless work together to solve the cur- rent problems. As IS educators, it is our responsibility to provide some guidance and training to our students to help prepare them for this formidable task, but it is unreasonable to expect that we should provide the training necessary to accommodate students being able to work with every type of individual in any global envi- ronment. Such an undenaking would be unreasonable if not inap-

propriate for the classroom. However, we can provide them with some experience and insight into the "global" analysis team envi- ronment by providing students the opportunity to address real world problems first as competing teams and second, as partners with students from other schools. The inter-school project strength- ens section 2.4.2 Cultural diversity, 2.4.3 Group Dynamics, and 2.4.4 Teamwork, leadership and empowerment, as outlined under section 2.4 Organizational behavior in 15'95, as well as portions of 2.10 Interpersonal Skills, and 3.7 Project Management.

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