

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

**William J. Tastle**

Dept of Mathematics and Computer Sciences Ithaca College  
Ithaca, New York 14850

**U.Rex Dumdum**

Dept of Business and Managerial Science Marywood College  
Scranton, Pennsylvania 18509

## 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 will 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 skills and competencies necessary 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 miles. William J. Tastle July 24, 1998*

## ABSTRACT

*The problems and complexity associated with globalization directly impact the Information Systems curriculum, especially with respect to the formation 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 provide 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, commitment 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 satisfy 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 influences on nations, businesses, workplaces, communities and lives of the late 20th century. Kanter [1995] 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 [Ives, et.al. 1996; Mitroff 1987; Hammer and Champy 1993] and suggest that American business must increasingly and effectively compete in a global environment in which extreme interconnectedness, flexibility, innovation, quick response, and focus on process rather than task, is a fundamental feature.





Is this just more hype, an opportunity 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 economy; from hierarchical performance to performance by network. Katzenbach and Smith [1993] concur with this assessment and indicate a trend that most work in modern organizations will be accomplished by high performance teams. The use of teams to solve complex problems clearly outperformed individuals acting alone or in larger organizational groupings, especially when performance required multiple skills, judgements, and experiences [Katzenbach and Smith 1993]. Further, team-based collaborative processes allow companies 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, meanings; and visions [Gray 1989; Gause and Weinberg 1989]. Team performance, however, may be hampered across cultures. For example in a recent study [Robey and Rodriguez-Diaz 1989] reporting on an implementation of a system across cultures in Panama and Chile, the critical elements which led to project failure were cultural incompatibility and the lack of shared meanings; 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 1995 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, specifically sections 2.4 Organizational Behavior, 2.10 Interpersonal Skills, and 3.7 Project Management. Certainly, employment in multinational companies implies that problems which very likely will be directed towards our IS graduates are large, very complex, and evolutionary in the sense that the original problems or views of problems will expectedly change during that portion 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 21st 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 1995 Model Curriculum is a giant step in the right direction; its design as a minimum guideline by its authors allows for the fine tuning of an IS curriculum 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 study. The academic projects assigned in a typical systems analysis class are well defined, artificially constrained, and fully known [Tastle and Dumdum 1994]. Thus, any project given in the classroom environment is at best a highly controlled 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 students 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 classroom situation such that a multinational "experience" can be derived within the limited confines of most academic institutions. Furthermore, the 1995 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, particularly 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 appositioned into three overlapping components: technical, conceptual and interdependency competencies. Technical competence is defined on two levels: (1) "tools" competency which involves a knowledge-base of various hardware and software products at a reasonably sophisticated level of detail; and (2) "transformative" competency which involves the ability to apply information technology as a transformative force for shaping, supponing, achieving, and maintaining 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 improvement of the organization [Sprague 1993, in Longenecker 1995].

Conceptual competencies consist of specific mind sets and conceptual skills. According to Kanter [1995, 1983], some mind sets are more restrictive than others. For example, she contrasts an "integrative" 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 opportunity to test limits...to see problems as wholes, related to larger wholes, and thus challenging established practices rather than walling off a piece of experience and





preventing it from being touched or affected by any new experiences." In contrast, to be segmentalist is to compartmentalize 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 problems [Kanter 1983]. In a later work, she further contrasts two other mind sets: a cosmopolitan or global mind set and a local mind set [1995]. She asserts that cosmopolitans are "comfortable in many places and able to understand and bridge the differences among them, possess portable 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 ambiguity.

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 performance 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 collaborate with team members to explore, evaluate, and arrive at shared meanings and understandings, identify a common purpose, establish performance 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 experientially based, and industrial/commercial/governmental/non-profit professional experience is usually the exception in the average IS department. The 1995 guidelines state that IS graduates should have skills in three levels (see page 5 and 7 of the 1995 Guidelines), and these map very nicely into our three competencies.

We have begun a process whereby our students have developed an appreciation for, and greater knowledge of the challenges involved in the problems of team-based high-performance 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 problem 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 contacts in the industrial, commercial, nonprofit, and governmental sectors of our surrounding counties and can now relatively easily find problems composed of a suitable degree of complexity and ambiguity such that we bring into our classes an "actual" experience.

Typically we partition the semester into two blocks. The first block comprises the first 1/3 to 1/2 of the course and is devoted entirely to a very compressed and demanding presentation of traditional concepts of analysis and design. Most of the material contained in texts are covered in very rigorous format. It should be mentioned that an equally rigorous course in database theory and application is a prerequisite for the systems 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. Further, small abbreviated 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 investigation, but they do feel unsure of themselves. We have sought to reduce this feeling of insecurity and have succeeded in large part through the analysis of on-campus departments with which our students already have established a comfort level.

**Academic Projects Typically, our first project might be the analysis of the advance registration 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 discussion 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 instructor, 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 shortcomings or merits of the several tools we have experienced in the past, but it is perhaps noteworthy 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 department. Other than the registration of cars most of our students have had little contact, so a meeting with the director of one of our college's security department (a former 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 structured 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 continue but at an abbreviated rate. The location of a project off-campus is not to imply that suitable projects cannot be found within the collegiate environment, for some of our colleagues are able to supplement their systems courses with projects from within the college, but external to the academic arena. The main project is usually located about an hour's travel time from the college so that the students cannot arbitrarily travel to their client at whim but rather, must carefully plan out their time and be prepared to take maximum advantage of their opportunity to meet with client officials. This limitation is artificially imposed on the students, but we know it is important for IS graduates to be able to express themselves succinctly and completely so we have deliberately legislated this constraint.

Past projects have included: the analysis of a golf course operation; a Fire Marshall's permits and registration system; a local area network operation, usage, and redesign for a nonprofit organization; a patient registration system for a regional health care facility; a Treasurer's Office for a governmental subdivision; a police department; a county system; and another fire department. 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 limited 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 knowledge and will be seeking to analyze and design solutions in a very similar manner, and that is the main problem with this approach: students are not introduced to problems and opportunities which emanate from being able to work with others who possess different views, experiences, 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 expertise. We agree that a similar theoretical knowledge could be derived in this manner, but the opportunity 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 discussion at Muhlenberg College as part of the Eighth Annual Eastern Small College Computing Conference [Fisher 1992] when it became evident that many panel observers were interested in finding ways of bringing realism into the systems analysis classroom. It was generally agreed that the use of textbook cases lacked virtually all of the ambiguity associated with real projects, and both authors echoed their successes moving outside of the classroom. We continue-

ued assigning external projects to our systems classes, carefully monitoring their success and the students' reactions to the experiences, 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 part-time students while they work in their profession.

**Single School Student Teams** The second phase, that of single school or homogeneous student teams, has been successfully conducted on both campuses. The problems of transposition, 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 excessive and that the instructor demands are enormous, but at the conclusion 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 survived it. This demanding experience has been an asset to each student, whether seeking entry into graduate school or employment.

Within the single school, students view the real-world problem as a critical part of the course, and hence view it as pivotal to making 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 professionally as their capabilities allow. Their commitment to excellence and dedication to detail is frequently first discovered here. One-fourth 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 problems, students do rise to the occasion. They continue to show profound commitment to each other and held one another accountable for their portion of the overall study to a standard that is higher than that which the instructor had established. (We defend our individual standards as being reasonable for a specific class and a particular 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 learning 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 complexity and ambiguity has been identified residing in a company located -





ed about midway between the two campuses (the distance of separation 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 (homogeneous teams) assigned to solving the same aspect of the overall problem, 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 students traveling to discuss and analyze their assignments. We are considering the use of list servers and teleconferencing to allow for the creation of mixed groups. If we deem this experience to be successful, a nearby third college (a university) will be invited to participate.

In a manner similar to that of the single school experience, we expect our two schools to exhibit an even stronger degree of commitment 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 experience, a major University center supporting an MEA in MIS. The student mix will then become about as close to that of a multinational work environment as is reasonably possible. This will be a very important part of the experiment for the difficulties of coordinating the students of three schools are expected to be exponentially greater, and we currently have no knowledge that the consequent student experience will be worth that effort. This experience should allow us to determine the relative importance 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 papers.

**CONCLUSIONS Multinational corporations seeking to compete in the marketplace 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 composition is heterogeneous with respect to education, frameworks, methodologies, knowledge of CASE tools, experience, culture, social and personal behavior, beliefs, and virtually every other attribute, but who must nonetheless work together to solve the current 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 environment. Such an undertaking 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 environment 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 strengthens 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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ISSN 1055-3096