Developing IS Competence During Cross-Cultural Collaboration in Ad Hoc Virtual Teams: A Tale of One Case Analysis Project

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Abstract

As information technology continues to transform the work place, developing business-relevant skills through traditional classroom instruction becomes increasingly more complex. Globalization of the business environment leads to the need for increased ability to collaborate on projects across borders. One technological application which may be able to combine students' need to develop information technology competence with their need to adapt to a culturally diverse environment is the Internet. This paper describes a case study that was used to investigate the viability of using the Internet as the means of group communication on a case analysis project for geographically-dispersed groups from different cultures. Results to-date indicate that the students' technological competence with respect to the Internet has been enhanced, their general perception of the importance and value of communication media has been changed, and the group dynamics traditionally applied in case analysis appear to be affected. Specifically, a deep sense of trust, cooperation and cohesiveness appear to be missing while the groups appear to enjoy the opportunity for direct interaction with a different culture.

1: Introduction

As information technology continues to transform the work place, developing business-relevant and information systems skills through traditional classroom instruction becomes increasingly more challenging [4, 5, 7, 22, 41, 42]. Not only is computer and information systems literacy a fundamental expectation for all college graduates [27, 31, 40], but computer applications have also rapidly become a medium through which learning occurs [14, 25, 32, 36]. Computer Aided Instruction (CAI) [24, 25], distance learning [33, 45, 46], computer-mediated collaborative teams [2, 13, 28] and virtual classrooms [19, 20], are examples of efforts to meaningfully incorporate technology into the educational experience. However, these efforts have met with mixed results and often require the use of expensive hardware or software applications. While well-funded universities can afford the expense, many other institutions cannot.

Information technology has also helped globalize the business environment [18, 42] which, in turn, has introduced the need to develop an increased awareness of different cultures and business practices. Cross-cultural awareness and the ability to collaborate on projects with individuals from other countries are highly desirable nowadays [8, 12, 15, 29, 38, 44]. Therefore, efforts to bring direct cross-cultural experiences to the classroom offer unique opportunities for students to develop a needed edge for future success in the work place.

The Internet is one burgeoning technological application that may effectively combine students' need to develop technological competence with their need to adapt to a culturally diverse environment [1]. With its estimated 13.5 million users and interactive services such as Telnet (remote log-in), FTP (file transfer protocol), and the Web (hypertext data searching) [35], the Internet represents a relatively inexpensive computer-based network offering worldwide communication and information access to universities. While electronic communication links between universities have existed for many years [17], full understanding of how they can best be used in the classroom has not yet emerged [34]. The current study investigates the viability of using the Internet as the means of communication for culturally diverse groups in geographically dispersed classrooms. Specifically, the project attempts to answer the following question: Can the Internet provide a convenient means to increase appreciation of cultural diversity while enhancing students' computer literacy and the ability to participate in ad-hoc virtual teams?
2: Objectives of the project

To further explore the educational opportunities possible with the Internet, three research objectives were derived from the general research question at issue.

2.1: Technical perspective

From a technical perspective, the Internet represents a computer application with a common point of reference to students. Due to the proliferation of computer applications, students are familiar with some applications while ignorant of others. Consequently, establishing a basis for assessing or developing a standard of computer literacy becomes problematic. For example, forcing students to learn and use dBase IV when they own and use Paradox or Access (the database packages their employers support), introduces a sense of arbitrariness to the learning experience. On the other hand, allowing knowledge of any software package to pass as evidence of computer literacy requires professors to be proficient in all applications in order to make an accurate determination of whether a given student is truly literate in one.

The Internet is a computer application that all students could benefit from learning and one that might provide a common basis for establishing and determining computer literacy. The Internet offers similar basic features to any set of students, and to be effectively used, it requires varying degrees of proficiency with computer and information technology. Hence, one objective of the project was to determine how well the Internet performs as a tool for communication, information acquisition, and decision-support.

2.2: Behavioral perspective

From a behavioral perspective, the Internet represents a support device for developing interpersonal relationships and building teams for collaborative work. While face-to-face and voice communication options are not widely available with standard Internet technology, it is not clear that these are absolutely essential for effective team development and performance [30]. With the popularity of electronic discussion groups increasing [17] and the emergence of a new form of electronic communication specific to the Internet [39], another objective of this investigation is to explore how effective the Internet can be in cross-cultural collaboration and team building. Previous research by Knoll and Jarvenpaa [23] and Lind [26] offers promising preliminary results in this area.

2.3: Cognitive perspective

From a cognitive perspective, the Internet represents a way to encourage different types of learning. The types of learning expected in this project were:

- **integrative/critical knowledge building**, whereby the students consolidate diverse facts from a variety of sources by analyzing and organizing them into a conceptual framework provided by the instructors.
- **attitudinal changes**, whereby the students acquire appreciation of and interest in the Internet resources,
  electronic communication and cross-cultural interaction issues.
- **double-loop learning** [3] whereby the students acquire the ability to question and reshape their rules of reasoning on their own.

Because technology has increased the dynamism and complexity of the work place, students can no longer rely on formal educational techniques to provide them the knowledge and reasoning skills they will need for long-term success [10]. Rather, they must develop skills to learn when and how to adapt more effectively. Given that the Internet provides access to a wealth of knowledge, information, and data with no established “instruction book” validating or verifying its value, students are offered a chance to explore, locate, validate, and verify concepts on their own with minimal intervention from the instructor. Consequently, another objective of this investigation is to determine how willing and able students are to “embrace” the Internet as a learning tool.

3: Methodology

The methodology selected to investigate the above research questions was a case study. Because one of the study’s researchers was teaching a Management Information Systems (MIS) class to Polish MBA students in Warsaw, and the other was teaching a similar MIS class to American MBA students in New York, the opportunity to explore the educational potential of the Internet in a multicultural environment arose. A case study approach was chosen over a more experimental effort because neither professor wished to deny students an experience with the Internet or to limit their opportunities of gaining useful knowledge from a case analysis project. Either or both of these actions would have been necessary to maintain proper control for experimental approach.

The study was conducted using the research framework presented in Table 1. The Cross-cultural Collaboration and Learning in Virtual Teams framework was developed based on Electronic Meeting System as Information Processing System [6]. Elements of the framework and details of the study are outlined below.
Inputs | Collaborative Process | Outputs
---|---|---
Individual Factors | Communication | Learning
Cultural Factors | Information | Collaboration
Virtual Team Factors | Decision | Making
Task | Instruction | IT

Table 1. Cross-cultural Collaboration and Learning in Virtual Teams research framework

3.1: Individual factors

Individual factors are the skills and traits brought by each individual to the study: gender, age, expertise, attitude, beliefs, expectations, motivation.

The 27 Polish MBA students who participated in the research were enrolled in a one and a half credit MIS elective course, while the 23 Americans were in a three-credit MIS core course. There were 20 females and 30 males, ranging in age from 21 to 44 years. The Polish students were younger, with an average age of 23 as compared to the Americans who averaged 29 years. Cumulatively, Poles had less business experience than the Americans, but they all had international experiences. The Poles were fluent in at least three languages, including English, which was the language of instruction in their MBA program.

The students’ PC experience ranged from few months of usage to 15 years. Only 10 percent of the project participants used the Internet prior to the project. However, they all had prior team project experience, and more than 85% of them enjoyed participating in groups.

Performance incentives to ensure earnest participation included a grade for the project which accounted for 30% of a final grade and a dinner to the group(s) that performed best. Student demographic data are presented in Table 2.

<table>
<thead>
<tr>
<th>Country/Student characteristics:</th>
<th>Poland N=27</th>
<th>America N=23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (% female)</td>
<td>48%</td>
<td>30%</td>
</tr>
<tr>
<td>Average Age</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>Average PC experience</td>
<td>3 yrs</td>
<td>6 yrs</td>
</tr>
<tr>
<td>Enjoys participating in groups</td>
<td>85%</td>
<td>87%</td>
</tr>
<tr>
<td>Has prior experience with Internet</td>
<td>15%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Table 2. Demographic data

3.2: Cultural factors

Cultural factors include attitudes, values and norms that reflect cultural heritage and social indoctrination. Schein [37] defines culture as a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid, and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (p.12). The set of basic assumptions includes beliefs regarding the human nature, and human relationships. Hofstede’s [21] research indicates that the set of basic assumptions regarding the nature of human relationships— in particular the individualist versus the collectivist approach to work and accomplishment of a common goal— accounts for the greatest variance in work goal priorities. Hofstede’s work indicates that North Americans tend to be individualists. Eastern Europeans, on the other hand, tend to be collectivists.

Another factor that might be considered in studying cross-cultural collaborations is language. Although this study’s participants differed in their native languages, language was not a factor, since all the Polish students were fluent in English.

Yet another factor might be the level of sophistication of the national/organizational IT infrastructure and the resulting attitude toward technology. While most US universities have had a reliable on-ramp to the Internet since the 80’s, majority of the Polish universities gained access only in the beginning of the 1990’s utilizing an old and unreliable telecommunication infrastructure. This
factor has contributed to a general skepticism among the Polish population regarding any form of electronic communication.

3.3: Virtual team factors

To address the behavioral research questions, virtual teams were formed. Virtual team factors are the properties of the team that affect group interaction, which include group size, gender, proximity, group history and cohesiveness, group norms and their objectives, as well as time differences.

Two to three students from the American graduate MIS class were placed into teams with two to three students from the Polish MIS class. Some of the groups contained only one gender type while others contained a mixture. Otherwise, group formation was an arbitrary process so that any differences would most likely be dispersed evenly among the groups. A total of 11 groups was formed with four to five students each. Each group was presented with the same objective, had zero history and was working asynchronously. There was a six-hour difference in time between the two geographic locations.

Students had group pictures taken early in the project and exchanged them with their virtual teammates to alleviate some of the uncertainty and apprehension.

3.4: Task

To provide the basis for exploring the technical research perspective, a task was developed to facilitate Internet communication, information acquisition and decision making. The groups were charged with developing a formal analysis and generating recommendations concerning an MIS-oriented case from Harvard Business Publishing. All students were provided a copy of the case and given identical instructions for developing analysis. In addition to the traditional case analysis, students were asked questions regarding the current business situation of the company and regarding a similar IT implementation in Poland (see Table 3). The additional questions required the students to gather information from outside sources and to exchange information since the competence to answer the additional questions was distributed within the groups.

3.5: Instruction

The instructional factors are the approaches, activities and materials utilized prior to and during the project to assist the students with the successful completion of the task. They include prior to the project:

* opportunities to practice on a similar assignment

Using the HBS Phillips-66 case, all the accompanying readings and additional materials, analyze the case according to the guidelines presented below. Be sure to do the analysis twice -- once for the year of the case - Phillips 66 then ... and a second time for 1995 - Phillips 66 ... now.

**Guidelines for written case analysis:**

1. Objectives of the organization
2. Decision problem
3. Key relevant facts
4. Alternative courses of action
5. Decision criteria
6. Analysis of the alternatives in view of decision criteria
7. Recommendation
8. Implementation and results
9. Interesting points

In your analysis, be sure to answer to the following questions:

**Phillis 66 then...**

1. What has been the role of IT in supporting Wallace's organizational transformation?
2. How has the system influenced organizational structure, management controls and decision making in the company?
3. What other impacts has the system had on Phillips 66 and its employees?
4. Evaluate the EIS implementation.

**Phillis 66... now**

5. How's Phillips 66 doing today?
6. What is or should be their strategy in 1995? Explain.
9. Explain how you would measure the value-added from the newly introduced IT?
10. What incentive and rewards, if any, would be necessary for successful introduction of the above suggested IT into the organization?
11. How would your answer to the above question differ, if any, if the company was located in Poland?

**Table 3. Case analysis guidelines**

- Internet tool usage exercises
- electronic communication and socialization skill exercises
- cross-cultural sensitivity instruction
- time management instruction and during the project:
  - incentives, rewards and coercion mechanisms for accomplishing the intermediate steps in the task
  - instructional materials available
  - technical support provided

To facilitate the exploration of the research question from the cognitive perspective, relatively little structured
The faculty regulated the project as little as possible, encouraging the students to explore Internet on their own and to locate a variety of information. While the American students spent varying amounts of class time communicating over the Internet (ranging from a few minutes to an hour depending on when discussion/lecture of the day’s topic was finished), the Polish students completed the project totally outside of class.

The instructors acknowledged and solved problems outside of class for the Polish students and in class for the Americans. A knowledgeable technical support staff member was available to the Polish students while the Americans had little technical support outside of class.

3.6: Information technology

Information Technology factors include software, hardware and telecommunication technology characteristics such as software functionality and usability of the interface, hardware access and reliability [19, p. 80], response time and the communication media utilized.

In this project, the set of common Internet tools available included: E-mail, Telnet, Ftp, Gopher, Archie, Veronica, WAIS, WWW. Both the American and the Polish students were provided with appropriate freeware communication products to connect to the Internet from home, if they desired. The groups were not encouraged to use other forms of communication media other than Internet; however, if they requested fax numbers of their virtual teammates, they were not prohibited from using them.

Polish MBAs had access to the Internet through a small lab equipped with one 80486 and nine 80386 computers running Pine Mail under UNIX and Mosaic under Windows. Access to the lab was limited to 9 a.m. - 5 p.m. Monday through Friday when classes were not in session.

The American MBAs accessed the Internet either in class or in a lab equipped with 25 80286 and 80386 networked computers connected to an IBM mainframe running MUSIC mail. The lab was open Monday through Saturday 8:30 a.m. to 8:30 p.m. and on Sundays 1 p.m. to 5 p.m.

The local technology proved to be fairly inaccessible for the Poles and rather unreliable at both universities. The following problems occurred during the project:

- hardware problems at the American university which caused the initial messages sent from Poland to be lost. Later in the project, a virus brought the system in the US to a halt.
- E-mail address problems at the American university which led to new addresses being issued.
- three bomb scare problems at the Polish university, which led to facility shutdowns and delays in communications.
- system problems in Poland which led to return of messages sent by the Americans and delays in communication.

3.7: Collaborative process

Initially, five weeks were allowed to complete the project; however, the project deadline was extended a month due to a variety of difficulties outlined above. Initially, the collaboration proceeded as intended. A majority of the groups reported project procedures similar to the following:

We first got to know one another through some friendly correspondence. Later, after carefully reviewing the case study, we exchanged views on how to proceed. We decided that it might be easier for the students in Poland to concentrate on the then part of the project, as it was thought it would be easier for the American students to collect current information for the now part of the Project.

As reported by another group of students, from Poland, the medium of communication and the international aspect of communication may have even overshadowed the actual purpose of exchanging messages. Once the responsibilities for the project were divided, students gathered the necessary information. Then, they wrote up their part of the case and, in some cases, sent the information to their virtual teammates for inclusion in the common document.

3.8: Outcome assessment

In order to assess the collaborative process, the collaboration effectiveness and the learning that occurred during the project, a variety of quantitative and qualitative data were collected.

Each student was given a series of group effectiveness measures [16] and open-ended questions designed to elicit impressions of the Internet as a project tool, the group experience, and the value of the project. Specifically, the Work Group Assessment tool developed by Friedlander [11] was administered to the students.
This instrument is designed to assess the following factors: Group Effectiveness, Mutual Influence, Personal Involvement, Intragroup Trust versus Integroup Competition, Role and Idea Conformity, and a general Evaluation of Group Meetings.

Also, the students' projects included printouts of all of their communication and a one page report on the group process, the division of work, their perceptions of the project, etc.

The faculty scored the projects using a ten-point scale (with 10 being a high score) using the following criteria:

- the degree to which the project followed guidelines
- the completeness and depth of the analysis
- the originality of the recommendation
- the conciseness of the analysis
- the form and style of the presented document
- the quantity and effectiveness of the virtual team communication

Each researcher rated the projects individually, and generated a total score for each project. The total scores from each researcher were averaged and rank ordered with the highest score project receiving a ranking of one. The researchers then discussed the project rankings and came to a consensus regarding the final rank ordering of the projects.

4: Results

The data analysis completed to date addresses in a cursory fashion the technical and the behavioral research questions. To answer the technical research question of how well the Internet performs as a tool for communication, information acquisition, and decision-support, an initial assessment of the collaborative process was performed.

We found that while the Internet was able to assist the students in the initial communication and the decision-making process quite well, they almost totally failed to use the Internet tools during the information acquisition stage. Only 18% of the students used Gopher, WWW, Ftp sites or E-mail to locate information for the case. Others relied on more traditional sources of information - the Library.

Table 4 presents characteristics of the virtual teams and their collaborative process, in rank order of project quality. In general, the teams that exchanged more messages and were successful in generating a common document have performed better case analysis. There is evidence that the teams that started and completed the project promptly were able to exchange all the necessary information and to submit a common document.

The project scores ranged from a low of 31 points to a high of 50, with an average score of 38 out of 60 points.
Table 5. Means and standard deviations of each group's perception of the project

<table>
<thead>
<tr>
<th>Factor/Group</th>
<th>Group Effectiveness</th>
<th>Mutual Influence</th>
<th>Personal Involvement</th>
<th>Trust vs. Competition</th>
<th>Role &amp; Idea Conformity</th>
<th>Meeting Evaluation</th>
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<td>(1.02)</td>
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<td>(1.47)</td>
<td>(1.76)</td>
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</table>

Note. Standard deviations are shown in parentheses. A high value for Group Effectiveness is positive, low values for Mutual Influence, Personal Involvement, and Meeting Evaluation are positive, and a high value for Trust vs. Competition represents trust while a high value for Role & Idea Conformity represents Conformity.
Table 6. Means and standard deviations of each country's perceived collaboration effectiveness

<table>
<thead>
<tr>
<th>Country/Characteristic</th>
<th>Poland</th>
<th>America</th>
</tr>
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<tr>
<td>Group Effectiveness</td>
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<td>Meeting Evaluation</td>
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</table>

Notes. Standard deviations are in parentheses. A high value for Group Effectiveness is positive, low values for Mutual Influence, Personal Involvement, and Meeting Evaluation are positive, and a high value for Trust vs. Competition represents trust while a high value for Role & Idea Conformity represents conformity.

* Significant at p < .10  ** Significant at p < .05

Table 6. Means and standard deviations of each country’s perceived collaboration effectiveness

.09), and Meeting Evaluation (F, = 4.37, p = .05) were all significant. The other variables examined, Group Effectiveness, Personal Involvement, and Idea & Role Conformity, did not significantly differ at the .01 probability level. Consequently, it appears that Polish participants felt they had less influence in their groups, tended to want to compete more than their US counterparts, and evaluated group meetings more positively than did the Americans.

5: Discussion

While the results to date suggest that forming groups from two geographically separate, distinct cultures with the Internet as the main means of communication for group-task accomplishment is not an effective way to enhance performance, positive cognitive and technical knowledge effects may have occurred behaviorally. However, because a number of unforeseen, potentially solvable, problems arose during the course of the project, it may be that the group-effort by Internet communication can be made educationally effective.

First, it became apparent that technical support from the university Information Systems (IS) staff is crucial. Unfortunately for this study, the IS staff at the American university began restricting Internet use in an attempt to manage its phenomenal popularity, and the IS staff at the Polish university frequently had their system off-line as they upgraded its performance capability. Not only did these events frequently prevent or delay communications between group members, but they also limited participants' ability to "surf the Net" for useful case-analysis information. In addition, the American system caught a series of viruses during the course of the project which further prevented effective group interaction and actually destroyed messages on more than one occasion.

Second, group efforts did not appear to be well synchronized and cohesiveness did not appear to be present in all of the groups. The researchers assumed the necessary steps to develop a sense of connectedness would naturally develop within all the groups as the members communicated over time. But, the "us vs. them" attitude-frames expressed by both Polish and American participants, indicate that the researchers either underestimated the time needed for cohesiveness to develop or neglected to take the necessary steps to ensure that cohesiveness did occur.

Third, while participants received a sense of closure from providing formal and informal feedback concerning their experiences with the project, a more lasting impact for cultural awareness would have been to provide the students with the actual analysis of their feedback. Were it possible to show the students the statistical compilations and comparisons of their various opinions and reacitons, a more meaningful perception of cultural differences and similarities might have emerged.

Despite all the difficulties encountered during the project, majority of the students felt that they benefited from it. Table 7 presents some of their comments regarding learning that took place.

6: Summary

In general, this attempt to use the Internet to enhance the technical, behavioral and cognitive development of students from different cultures has provided some useful insights concerning the challenges and opportunities possible with the technology.

We have found that projects of this nature are more time consuming than traditional case analyses and they tend to be more frustrating for the students. At the same time, students find it interesting and motivating to learn the technology while communicating with another culture.

To avoid our mistakes, future virtual team project administrators may want to consider the following:
• reliability of the hardware at all locations
• accessibility of the network, including providing communication software for offsite E-mail access
• WWW and IRC access with user friendly interface
• virtual team decision support tools
• availability of technical support in labs
• requiring mandatory conferencing every class period
• teaching web searching strategies and electronic socialization skills

Despite all frequently arising technical difficulties, we appreciated the possibility of working in an unusual, potentially unlimited way. Having an immediate contact with overseas partners was quite an experience making us aware of the great opportunities of closing a gap between people, getting them in closer touch. We will definitely benefit from the lessons we learned sooner than we may imagine. Group E -PL

We did get a taste of the potential of using the Internet and we are eager to continue once the systems improve and become more flexible. These types of innovative projects must definitely continue in order for education to thrive!!! Thank you for the opportunity! Group I -US

We believe that the project was a valuable tool in getting students to use and understand Internet. It also was an interesting premise to work with people currently living in another country and attending an academic course similar to ours. Attempting to assimilate our cultural and academic differences and similarities were challenging and we never would have had this opportunity to be exposed to this forum without such a project. Group A -US

Table 7. Students' comments on learning during the project

7: Bibliography

[1] Ackerman, D. and Zmud, R. "Bringing the 'Net' into the OC/IS Classroom". Workshop at the Academy of Management National Meeting, Dallas, TX, August, 1994.


