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Sociocultural Learning with Groupware

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Abstract

The impact of national and professional cultures is a salient issue that interacts with technological support of distributed teams. As we prepare for the world of the future, it becomes imperative that we give students the experience of working in multi-cultural distributed teams. In order to gain experience in this area, a two-year project between teams of students from the City University of Hong Kong and the Eindhoven University of Technology was initiated. Various web-based technologies were used to provide support for the teams as they learned to work together. Aspects of sociocultural learning were applied to create an environment conducive to cross-cultural collaboration. This paper describes two years of experience with the Hong Kong – Netherlands project. Data collected on the project are reported and discussed.

Keywords: culture, education, learning, groupware

1. Introduction

In classroom contexts, we seek to prepare students for present and future organizational demands. As such, it becomes imperative that we give students the experience of working in multi-cultural distributed teams, especially when they cross disciplinary and national boundaries. In this learning environment, we are particularly interested in how students from different cultures can work together effectively, not by establishing a common ground or adopting a particular culture, but by accommodating each other's culture in a synergistic fashion.

The sociocultural learning model is an especially good fit with attributes of this learning environment. In association with the tenets of the sociocultural model of learning, knowledge cannot be dissociated from the historical and cultural background of the learner (O'Loughlin, 1992). As such, it is important that students begin to construct meaning on their own terms and in their own interests within their own culture. Socioculturalists are especially concerned that majority cultures not force minority cultures into a common understanding. Rather, they feel that cultures should be respected and allowed to co-exist in the context of shared activities.

Technology in general and groupware in particular provide a way to bridge cultures without physically disrupting people and potentially enable synergism to emerge. In order to gain experience in this area, a collaborative program between faculty and students from the City University of Hong Kong and the Eindhoven University of Technology was initiated in 1998. Teams used e-mail, videoconferencing and a group support system (GroupSystems) for both synchronous and asynchronous interaction over the course of their projects.

The purpose of this paper is to describe how sociocultural learning has been achieved in a structured project environment linking students in Hong Kong and the Netherlands. This paper documents experiences from the Hong Kong – Netherlands (HK-NET) project. Data collected on the process are reported and discussed. In the final section, conclusions are drawn.

2. Background

Virtual teams are increasingly important elements of the world in which we live. Such teams are often complex in terms of membership culture as well as processes, technological support and organizational dynamics.

2.1 Culture

If we view culture in a broad sense as patterned ways of thinking, feeling and reacting, it suggests that distributed teams can be influenced by a number of perspectives. We may see aspects of national, professional, and corporate culture emerge as teams interact to solve problems. All of these forms of culture can occur when linking teams over distance with technology.

- From a national culture, perspective dimensions such as power distance, collectivity, masculinity, uncertainty avoidance, and long term orientation may become apparent (Hofstede, 1991).
- Aspects of professional culture may emerge as team members from different disciplinary backgrounds interact. For example, engineers may develop different ways of thinking and problem solving than do those educated in liberal arts with professional experience in sales and marketing or accounting.
- Further, organizational culture has been widely acknowledged (and observed) to impact team member actions (e.g, Schon, 1983). Multi-national organizations have special considerations as components of local national culture interact with cultural aspects of the foreign corporate organization.

It can easily be argued that religion as well as demographics could induce additional patterned ways of thinking, feeling and reacting. In short, culture has the ability to affect the way teams and their members work, an increasingly important issue as multi-cultural teams become more commonplace.

2.2 The Sociocultural Model

The sociocultural learning model provides a backdrop against which to create an environment and examine the implications of team interactions.

In association with the tenets of the sociocultural model of learning, knowledge cannot be dissociated from the historical and cultural background of the learner (O'Loughlin, 1992). As such, it is important that students begin to construct meaning on their own terms and in their own interests within their own culture. Socioculturalists are especially concerned that majority cultures not force minority cultures into a common understanding. Rather, they feel that cultures should be respected and allowed to co-exist in the context of shared activities. This presents the opportunity for synergy that can be lost through the dominance of any particular culture.

As Leidner and Jarvenpaa (1995) note, “the sociocultural model is both an extension of and a reaction against some assumptions of constructivism.” Like constructivism (e.g., Piaget, 1973), the social cultural model recognizes knowledge as created (constructed) by each learner. However, rather than assuming, as does Piaget (1973) that the goal of learning is the formation of abstract concepts to represent reality, socioculturalists feel that knowledge cannot be dissociated from the historical and cultural background of the learner (O’Loughlin, 1992). Wertsch (1991) argues that the means that we bring to bear in communicating and interpreting our experiences are necessarily culturally constituted. Reasoning is conceived to be an inherently social and cultural process of meaning making. Meaning making is not viewed as an isolated mental activity but as a joint product of the person and the mediating means, operating in a particular setting (O’Loughlin, 1992).

2.3 Technological Support

Supporting virtual teams with technology is a goal of groupware in general and Group Support Systems (GSS) in particular, yet little exists in the academic literature with respect to systematic investigation. The vast majority of historical GSS research has been oriented around same-time/same-place groups, primarily in laboratory settings. Studies of educational GSS use and evaluation in field contexts are few and far between (e.g., Vogel, et al., 1989; Brandt and Briggs, 1995). Even rarer is systematic evaluation of groupware in distributed educational contexts. An exception is Alavi, Yoo, and Vogel (1997) where groupware as well as videoconferencing was used to link classes in both synchronous and asynchronous settings. Vogel, Wagner, and Ma (1999) also report on use of a variety of synchronous and asynchronous technologies in supporting classes and teams.

GSS have much to offer in the context of distributed team support. In general, GSS seek to minimize potential process losses and maximize process gains. For example, process losses can include travel time, language difficulties, apprehension, air time fragmentation, attention blocking, failure to remember, conformance pressure, free riding, domination, information overload, co-ordination problems, incomplete use of information and incomplete task analysis. Process gains, on the other hand, can include more complete information, synergy, more robust evaluation, stimulation, buy-in and cultural learning (Nunamaker, et al., 1991). When teams are distributed, it becomes easier for individual cultures to remain intact and let technological support enable sharing and communicating. Technology, when properly configured in support of appropriate processes with minimal critical structure, can provide a degree of freedom in helping multi-culture teams achieve synergism in being both effective and efficient.

3. The Hong Kong – Netherlands Program

The Hong Kong – Netherlands (HKNET) program has extended over a two year period. The program was initiated in July 1998. The aim of the program is to make a valuable contribution to the knowledge of its participants by letting cross cultural teams do a joint project on a specific IT-related subject resulting in a joint report. Examples of the subjects were: a comparison of the status and actions taken in Hong Kong versus the Netherlands with respect to year 2000 problems (e.g., economic impact, contingency plans and legal issues), trends in embedded software, the impact of software defects, managing large software projects, extreme consequences of software defects and labor shortages in software. Technology, processes and materials were prepared for team access from a common server.

A commercially available groupware product (GroupSystems) served as a shared group memory and a common environment for both synchronous and asynchronous brainstorming, discussion, voting and report writing. Thin client technology was used to supply all participants with Internet connectivity to enable GroupSystems access from their homes and businesses as well as from the universities. All participants additionally had an e-mail account at their disposal. Microsoft NetMeeting was also used for synchronous face-to-face contact. The NetMeeting sessions could be booked in the agenda in the main project folder of GroupSystems.

The first trial commenced in October 1998 linking teams consisting of part time accountancy students from the City University of Hong Kong and full time business engineering students from Eindhoven University of Technology in the Netherlands in a structured seven-week project. In total, 72 students participated divided into 10 teams. Feedback from that trial was used to further modify technology, processes and materials. In particular, the need to better orient the students and familiarize them more with the material and each other had become especially apparent in the first trial. A second trial between the same institutions was launched in November 1999 that build on knowledge gained from the first year. The second trial consisted of 57 students divided into 9 teams with balanced Hong Kong – Netherlands membership. In the second trial, part time management students from Hong Kong and full time business engineering students from Eindhoven engaged in a structured six-week project.

3.1 Background of the Participants

In the first trial, the Hong Kong participants were part time students at the City University of Hong Kong who combined their courses for a Masters degree in international accounting with a full time job as middle level managers. In the second trial the Hong Kong students were similar except that they were in an international management program. Most of the Hong Kong students worked for large multi-national companies with varying corporate cultures as well as local business and government organizations. The Dutch participants, on the other hand, in both trials were all full time graduate students of the Master's program of Business Engineering and Management Science at Eindhoven University of Technology in the Netherlands. As such, elements of professional as well as national culture prevailed.

A survey conducted at the beginning of both project trials indicated that the majority of the participants had never been involved in remote virtual collaboration. Experience in multicultural teamwork varied widely over the trials. For example, in the first trial, the Dutch appeared to be more experienced in this area than the Hong Kong students (respectively 40% and 22%). Dutch experiences ranged from international trainee-ships and exchange programs to having a foreign friend (“my girlfriend is from Bulgaria, does this count too?”). The Hong Kong experiences included working in multi-national companies. In the second trial, the Hong Kong students reported considerable more multi-cultural team experience (remember, these were management rather than accounting students). Fully 70% had professional experience in working on a multi-cultural team (48% for more than a year) and 56% had collaborated remotely (excluding phone and FAX). The Dutch students were essentially the same in the second trial as the first (i.e., 38% had multi-cultural teamwork experience).

A comparison of the usage of IT tools between the different locations (illustrated in tables 1 and 2) shows that the Dutch respondents were considerably more experienced in the use of Internet and e-mail in trial 1. However, the Hong Kong students in trial 2 had closed the gap

and were frequent users of e-mail as were the Dutch.

Table 1. Usage of Internet by HK and Dutch respondents

Internet Usage	Trial 1		Trial 2	
	HK	Dutch	HK	Dutch
Frequent user	15%	47%	37%	58%
Regular user	48%	40%	59%	42%
Novice user	37%	13%	4%	0%

Table 2. Usage of E-mail by HK and Dutch respondents

E-mail Usage	Trial 1		Trial 2	
	HK	Dutch	HK	Dutch
Frequent user	33%	53%	70%	73%
Regular user	37%	43%	26%	24%
Novice user	30%	3%	4%	0%

Virtually none of the participants had any experience with tools other than e-mail for remote collaboration across both trials. Fewer than 20% of the respondents mentioned having used other remote IT tools such as Lotus Notes, GroupSystems and videoconferencing.

3.2 Project Implementation

Preceding the start of the project, the students attended lectures covering several subjects related to the team assignments. Because of the different background of the students, the lectures on both locations were not identical. While the Dutch lectures were given from a software-engineering point of view, the Hong Kong lectures focused on aspects of the impact and implications of information systems from a management perspective. Efforts were extended in the second trial to make the material more common immediately preceding project kick-off; e.g. a Hong Kong session focused specifically on software engineering. Class web sites gave students at both sites access to common materials.

All the students received the same handout that served as a guideline during the project. It provided the following information:

- General information in terms of objectives, planning, deliverables and support
- Background on the participating students and their universities
- Explanation of the different projects stages and the supporting IT tools in each stage
- Rules of play regarding the use of the IT Tools and some general “netiquette”
- User instructions for GroupSystems, NetMeeting and special feature of MS-Word

In addition to the hard copy version, the students could also consult the handout in a section of GroupSystems as well as on the class web-site.

These cross-cultural teams had the opportunity to introduce themselves at the start of the project during a kick-off session, for which a high bandwidth videoconference link between the two universities was established. After the introduction, all participants gained access to GroupSystems via the Internet, the main collaborative tool for students to work on their project in a structured way. They could also use e-mail and desktop videoconferencing via NetMeeting to communicate with their teammates.

Each activity functioned as a milestone and was restricted by a deadline. This was supposed to keep all team members working at the same pace and to make the progression more

tangible. Since the first stages of the teamwork process were all items on the GroupSystems agenda, the teams could see the progression of new items on the agenda as time passed. However, if a team preferred to use other tools than those suggested, they were free to do so. The sequence of activities is illustrated in Table 3. The HK-NET projects concluded with a final high quality videoconference in which the results and implications of the project were presented and awards presented to high-performing teams.

Table 3. Sequence of activities

<i>Gathering and sharing of information:</i> An activity was created to encourage the participants to share the information they found with their team members. This activity was available during the entire project.
<i>Brainstorm on research questions:</i> The team members were asked to name possible research questions for their project. All ideas were transferred to the voting activity after a check for duplicates. The activity started at the same time as the gathering of information activity and was available for seven days.
<i>Vote on research questions:</i> The voting activity was used to establish consensus on the report framework. After the vote, the top three research questions were to form the reports' framework. The results from the vote were transferred to the division of work activity. The activity started right after the brainstorm and took three days.
<i>Division of responsibilities:</i> After the framework was established, each team member selected a part of the report to write. The names of the people responsible for each part were entered in the outline. This activity was started right after the vote and remained open for discussion for the rest of the project.
<i>Plain text and comment on contributions:</i> This activity enabled the team to simultaneously write different paragraphs for the report. Students could immediately see the contributions of the other team members on their part. This activity started after the deadline for the division of work and remained open for fourteen days.
<i>Editor prepares concept report:</i> The results from the work in GroupSystems were exported into a text-file and sent to the team-editor selected by teammates. The editor had to transform the text-file into a draft version of the report by removing date and time stamps, applying some layout, etc. The editor had four days to finish the draft and to send it to all team members for evaluation.
<i>Evaluation of the concept report:</i> The team had seven more days to suggest changes to the report to the team editor.
<i>Final editing by editor:</i> The editor had one week to process all the remarks from the other team members and to finalize the report.

4. Results

A survey was conducted at the conclusion of the project to develop insight into aspects of educational value, team dynamics and cultural learning.

4.1 Educational Value

The main objective of the HK-NET project was to enhance the knowledge of the participating students through experiential learning. On average, 65% of the students indicated that the project has enhanced their IT skills. The vast majority of students (84%) believed that the project significantly enlarged their subject knowledge. Almost all students (94%) agreed that the project has contributed to their knowledge of virtual teamwork.

The students were highly enthusiastic about their participation in the HK-NET project. The final survey indicated that 96% of the respondents would recommend participation in the HK-NET project to other people. The respondents assigned an overall average grade of 7.4 (on a 10-point scale) to the project. There was no significant difference in the overall grading of the project between the Dutch and the Hong Kong students. Last but not least, many students indicated that they not only learned a lot, but also enjoyed working on the project. As one student remarked: *“It was really FUN to work on, Thanx!”*

4.2 Team Dynamics

In the first trial, eight of the ten teams managed to produce a satisfactory joint report, while the remaining two teams needed an additional assignment to receive their credits. In the second trial, all nine teams managed to produce a satisfactory joint report, although some quality differences were apparent. Data collected during the project was used to shed light on differences between successful and less successful teams.

There was a significant difference ($p=0.001$) in the perceived interaction between subgroups for high and low performing teams and between HK and NL participants. As to be expected, the high performing teams considered the interaction as being adequate, while the low performing teams reported a poor level of interaction between the subteams. The majority of the students indicated that they could understand most or all of the comments that were made by their global teammates. In case they didn't understand the comments, the students tried to resolve this by sending an e-mail or to clarify it directly in a NetMeeting or a synchronous GroupSystems discussion. The Hong Kong students had a greater tendency to resolve the issue by discussing it with their local teammates, while the Dutch were more inclined to address teammates from either cultural background.

As Jarvenpaa and Leidner (1998) have noted, two aspects that greatly impact the quality and progress of teamwork are: **teamfeeling** and **trust** within a team.

- **Teamfeeling.** To examine whether the team members experienced a joint teamfeeling with their counterparts, the students were asked if they felt a part of a global team during the project. Only 27% of the Dutch students agreed or strongly agreed, while the majority (85%) of the Hong Kong students indicated to have experienced a global teamfeeling. Not surprisingly, high performing teams reported significantly ($p=.024$) higher levels of teamfeeling than poor performing teams.
- **Trust.** There was a remarkable difference between the development of trust perceived by the Hong Kong and Dutch students during the course of the project. While 63% of the Hong Kong students experienced an increasing confidence in their Dutch teammates throughout the project, 69% of the Dutch students felt the opposite, indicating a decrease in confidence. Those Hong Kong students who generally considered the interaction between the subteams as adequate, experienced a global team-feeling. This dynamic is consistent with the conclusions of Jarvenpaa and Leidner (1998) who found frequent interaction to be a key determinant of trust.

4.3 Cultural Learning

Issues of cultural arose in the first trial in a number of fashions.

- For example, some Dutch students claimed that their Hong Kong colleagues were doing everything strictly by the rules. This could work out both negative (*“They don't show*

much initiative. Tell them what to do and they will. They won't do "anything" if they were not told what to do") and positive ("...they feel very responsible about their tasks. You can really count on them that they will do their job").

- The following quote of a Hong Kong student reflected the general opinion of the Hong Kong students about their Dutch teammates: *"They are open-minded, outspoken and really concerned about their individual performance"*. Some Hong Kong students were annoyed with the Dutch individualistic behavior: *"...they stick to their own interest, do not try to reach consensus with their counterparts"*. And others noticed that *"they did not follow the rules of the game"*. One student described the difference between both cultures as *"Netherlands: more creative and innovative, Hong Kong: prudent but effective"*.

All students were also asked to indicate what they have learned about their own culture during the project. Many of the Dutch students felt that they didn't learn much new about themselves. Some observed a direct and open minded approach to communication which seemed to be typically Dutch (*"Dutch people have an attitude characterized by "well, let me tell you how to do it" and are pretty persistent and active."*) On the Hong Kong side, several students observed themselves to be more passive than their Dutch counterparts. They found themselves more inclined to work collectively and to avoid issues of conflict. These findings were illustrated by the following quotes:

"We are relatively less active and would tend to compromise when dispute arises".

"More group sense, not to stand out too much from the team. Help other members who are considered less capable. Able to fulfill the deadlines".

"The Hong Kong team members are relatively passive, but they are also very cooperative and easy going".

In trial 2, additional attention was placed on the question of cultural difference within team dynamics. In particular, the researchers were interested in seeing the degree of consensus among students with respect to attributes of their own culture. On the questionnaire answered by the students prior to project initiation, they were asked to identify their own culture characteristics from a list of 39 attributes. At the conclusion of the project, the same list of 39 attributes were presented to the students, but this time they were asked to identify the cultural attributes of their counterpart.

- In the pre-test, Hong Kong students felt that they were culturally **collectivist, friendly, practical, sincere, reliable, honest**, courteous, **tolerant**, efficient and warm. At the conclusion of the project, Netherlands students felt the Hong Kong students were **friendly, sincere, tolerant**, reserved, **reliable, honest**, quiet, modest, **collectivist** and conventional. Overall there was agreement among the Hong Kong and Netherlands students on **six** of the ten attributes.
- In the pre-test, Netherlands students felt that they were **tolerant, straightforward**, ambitious, **practical, reliable, friendly, efficient, sincere**, honest and progressive. At the conclusion of the project, Hong Kong students felt the Netherlands students were **friendly, sincere, practical, straightforward, efficient, reliable**, courteous, individualistic, warm and **tolerant**. Overall there was agreement among the Hong Kong and Netherlands students on **seven** of the ten attributes.

In summary, common to both Dutch and Hong Kong students were attributes of **friendly, tolerant, sincere** and **reliable**. There was additional consensus that Hong Kong was **collectivist** and **honest** and that the Dutch were **practical, straightforward**, and **efficient**.

5. Discussion

A number of issues arise from the two trials of this program that warrant discussion including differences across trials and support of the sociocultural learning model.

5.1 Differences Across Trials

The most striking difference between the two trials of this program were those associated with the Hong Kong students. The Hong Kong students in trial 2 were much more technologically astute in terms of use of the Internet and e-mail as illustrated in Tables 1 and 2 as well as more experienced in working in multi-cultural teams. Recall that in trial 2, fully 70% of the Hong Kong students had multi-cultural team experience compared to only 22% in trial 1. It could be suggested that this is a function of time, i.e., that Hong Kong students have become heavier users of technology and more involved in multi-cultural teams over the period. But, consider also that the trial 2 Hong Kong students were management students while those in trial 1 were accounting students. Both groups of students were of similar age, employed in comparable organizations and going to school on a part time basis in graduate programs with considerable overlap in content. The major differentiator was their profession. Those in the management profession appear to have job responsibilities and a professional culture that encouraged more outreach while those in accounting exhibited more inwardly focused behavior. Data gathered from a similar group of accounting students 15 months later suggests that both explanations have some plausibility. Accounting students in the more recent group have multi-cultural team experience on a par with the management students but fall somewhat below the management students in technological experience albeit much higher than the original group of accounting students.

This difference between trial 1 and trial 2 Hong Kong students had a major impact on a number of the project's outcomes. As instructors, we noted early on that the trial 2 Hong Kong students were much more pro-active (independent of gender or other characteristics) than were the Hong Kong students in trial 1. Their experience with technology and multi-cultural teams working over distance became quickly apparent at project initiation. They exhibited emergent and shared leadership and recognized team roles (e.g., shepherding of team members) in a way not seen in trial 1. This led to a much smoother team dynamic based on perceptions of Hong Kong and Netherlands instructors and support personnel with experience in both trials. Fewer student complaints on both sides occurred in trial 2 and there was considerably less need for synchronous conferences to work out difficulties. In fact, even though a cyber-cafe had been specially setup for student video interaction, it was never used in trial 2. As one might expect, the content of the trial 2 project reports also had a stronger focus on management issues.

5.2 Sociocultural Learning

As mentioned earlier, a tenet of the sociocultural learning model is that knowledge cannot be dissociated from the historical and cultural background of the learner and that students begin to construct meaning on their own terms and in their own interests within their own culture (O'Loughlin, 1992). The researchers were pleased to see that students could indeed recognize cultural attributes of their team without ever having met them face-to-face. Recall that only 40% of the Dutch students had multi-cultural team experience. Even though the Hong Kong students (in trial 2) had more such experience, it was dominantly Asian-based (59%) although

some had multi-cultural team experience with European (26%) and American (22%) counterparts.

Further, both groups were able to stay within their own culture while appreciating characteristics of their teammates without creating an alien culture to complete the project. The influence of national and professional culture was apparent in both the project process and its final outcome. The end result was that students were able to work effectively together and emerge satisfied without sacrificing their own cultural inclinations. It is interesting that Hong Kong students initially expected problems of time pressure and technology, while Netherlands students expected problems to be mainly cultural. In the final analysis both Hong Kong and Netherlands students agreed that problems were caused by time pressure and lack of interaction. Most importantly, students enjoyed the project (7.5 average on a scale of 10) and felt that the “foreign” team members performed well (8 average on a scale of 10).

It was also interesting to see accommodation and appreciation of alternative ways of working take place over the course of the project as team members were exposed to a different culture. For example, when asked to rate how much the presence of a group leader is required on a scale of one to ten: Hong Kong students went on average from an “8” (pre) to “7” (post). On the other hand Netherlands students, on average, went from a “6” (pre) to “7” (post). Asked whether any kind of social relationship has to be structured hierarchically to be harmonious, Hong Kong students agreed both pre and post while Netherlands students went from ‘disagree’ to ‘neutral’.

On the whole, the ability to recognize and agree on cultural characteristics without meeting face to face is noteworthy and supportive of the viability and longevity of virtual teams. Virtual teams have burst on the scene and bring with them a variety of technological and organizational issues. This is an area of special concern to multi-national organizations increasingly launching distributed multi-culture team projects. The researchers are currently engaged in a project to study virtual teams currently in place in a large Hong Kong based organization with global operations.

6. Conclusion

The HK-NET project was a rewarding learning experience, both for the researchers and students. Our teams were a “worst case” test in many ways. There was an initial lack of experience in working in globally distributed contexts and widely differentiated backgrounds, both personally and disciplinary. However, we were able to demonstrate that information technology can make global teams more effective and also that teams can help fulfill the promise of new information technology. We suggest that, together, teams and new information technology can catalyze dramatic improvements in organizations. Many students indicated that experiencing this innovative way of working made them appreciate the project despite difficulties related to its trial status. As one of the students remarked: *“As a whole, I am still happy to do this project. This doesn’t only provide me with knowledge of new information system technologies but also gave me the chance to have an experience I have never gained before”*. The HK-NET program has created a win-win situation as both universities (and their students) were able to test educational technologies, observe user behavior and gain experience in multi-cultural virtual teamwork in education.

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