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SOCIOCULTURAL LEARNING: A PERSPECTIVE ON GSS-ENABLED GLOBAL EDUCATION

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RESEARCH;
TEACHING

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ABSTRACT

Virtual teams are developing rapidly in organisations of the new economy. As educators, we have a responsibility to ensure that our students are appropriately prepared for work in the virtual workspace, where teams may cross time, geographical, and cultural boundaries. In this article, the culturally sensitive theory of sociocultural learning is combined with GSS (Group Support Systems) to illustrate how cross-cultural, globally distributed virtual teams of students located in The Netherlands, Greece, and Hong Kong work on vested interest projects. Finally, a set of critical success factors that inform virtual learning contexts is derived from our findings and recommendations are made for operational practice in the virtual work space.

Keywords: sociocultural learning; virtual teams; virtual workspaces; culture; group support systems.

I. INTRODUCTION

A prime function of the educational process is to prepare students for work. In the past, we tended to assume that working environments involve primarily face-to-

face based communication in teams, but increasingly this assumption is becoming unsatisfactory. A new, but expanding phenomenon in the working environment is the creation of GSS-enabled virtual teams. These teams of distributed individuals share a workspace, but may not share the same geographical location, time zone or culture. To ensure that our students develop the right cognitive strategies that will enable them to think critically, make decisions and solve problems in the virtual workspace, we need to examine the way in which we encourage them to learn.

In this paper, we first discuss the rise of virtual teams (Section II). We then examine how and why culture is an important modifier of virtual interactions (Section III). In Section IV we describe the pedagogical theory of sociocultural learning (which is sensitive to culture), and the synergy that can be realized when sociocultural learning is combined with group support systems (Section V). Next, in Section VI, we present an analysis of a number of virtual team contexts with which we have been involved, focusing on the key findings and lessons that emerged from this work. Finally, in Section VII, these findings are discussed in the context of identifying a new paradigm in education that will address the needs of virtual teams.

II. VIRTUAL TEAMS

The existence of virtual teams is a relatively recent phenomenon, emerging only as the Internet developed sufficient capacity to support the communication needs of co-workers who are distributed around the world. The use of virtual teams in the educational environment is even more recent. Few academics have yet been willing to invest the considerable time and resources necessary to facilitate extended virtual team work. Early studies in this domain examined virtual teams within a single cultural environment, but more recent work extended to consider globally distributed teams located as far apart as Hong Kong, Finland, Greece, the Netherlands and the USA. In a virtual team context, the virtual workspace

provides a shared environment where all the necessary communicational transactions can take place.

Virtual communities and community informatics parallel, yet should not be confused with virtual team work. Virtual communities are social aggregations that emerge when a community of people engage in discussions and interactions for so long that they develop webs of personal relationships in cyberspace [Rheingold, 1993]. Communities cover a multitude of subjects, some in the consumer domain, others involving business issues. However, virtual communities are assumed to have achieved some degree of permanence, which is often not a characteristic of virtual teams. Virtual teams are often ad hoc, being formed for a specific purpose (whether educational or work-related) and are disbanded when that purpose no longer exists.

As we engage in increasing levels of e-business, we expect to see virtual teams become more commonplace, with resultant increased levels of demand for supporting extended virtual teams. Consequently, it is important that we prepare our students for work in this context. Germane to this preparation is an understanding of precisely which skills and work practices we expect to be valuable in the virtual workspace - skills and practices that we need to develop in our students.

III. CULTURE

Culture is simultaneously an elusive and pervasive phenomenon. It persists everywhere, yet it is notoriously hard to pin down to precise concepts that are widely held to be true. Culture is often described as involving patterned ways of thinking, feeling, and reacting in different situations [cf. Hofstede, 1980]. Culture can also be described as a lens through which we view and experience the world - and each of us may employ several of these cultural lenses, depending on the circumstances. Circumstances necessarily include the various environments where we interact with other people, and few of us would claim to be so isolated

from these environments that they exert no influence over our behaviour. Culture here can be considered in terms of national, professional, and corporate values, each of which contributes a unique and valuable perspective on the solving of problems in our daily lives. All of these forms of culture can appear in distributed virtual team contexts. Therefore, understanding the impact that culture may exert is of increasing importance in the development and management of virtual teams.

- 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 and scientists may develop different ways of thinking and problem solving than those educated in liberal arts with professional experience in sales, marketing, or accounting.
- Furthermore, organizational culture is widely acknowledged (and observed) as affecting team member actions [e.g., Schon, 1983]. Multi-national organizations face special considerations as components of local national culture interact with cultural aspects of the corporate headquarters organization.

A popular way to look at culture involves examining personality traits. From this perspective, culture is seen as a relatively stable and long lasting attribute of behaviour. Numerous cross-cultural researchers [Gudykunst et al., 1988] used *cultural dimension models* developed by Hofstede [1991] and Hall and Hall [1990] to distinguish members of one cultural group from another. While Hofstede's cultural model is often criticized because of sampling flaws (all 116,000 respondents across 53 countries were employees of a single large corporation, IBM), the general cultural constructs or dimensions appeared to be particularly

useful in helping explain potential differences in culture with regard to the use of IT. These dimensions are:

Power-Distance (PDI) - the extent to which less powerful members of society accept the unequal distribution of power. High PDI cultures possess established authority structures and emphasize autocratic behavior; low PDI cultures favor participative management, equal rights and the use of legitimate rather than coercive power.

Uncertainty-Avoidance (UAV) - the extent to which uncertainties are accepted by a particular culture. High UAV cultures (e.g., Mexico) have low tolerances for uncertainty, possess a need for formal rules, and are likely to resist innovative ideas. Low UAV cultures (e.g., the USA) are inclined to take risks, and be more receptive to innovative ideas.

Individualism-Collectivism (IND) **-** the relative importance assigned to individual goals versus group goals. Individualistic cultures are more self-reliant and value the rights of the individual. Collectivistic cultures value group rights above individual rights, prefer cohesive social frameworks, and are more concerned with group harmony and avoiding confrontation.

Masculinity-Femininity (MAS) - the relative trade-off between assertive (masculine) environments and nurturing (feminine) or supportive environments. High MAS scores emphasize power, assertiveness, and individual achievement. Low MAS scores emphasize nurturing and cooperation.

Long Term-Short Term Thinking (LTO) **-** this dimension is closely associated with the teachings of Confucius. Although harmony at the inner, social, and structural level is central to Confucianism, this dimension can lead to different types of behaviour. In essence, high LTO scores reflect a

focus towards the future, stressing perseverance, thrift and a long-term perspective. In contrast, low LTO scores reflect a greater respect for tradition, greater concern for preserving the image presented in social interactions, and perhaps most importantly, greater respect for *personal* steadiness.

Another perspective of culture involves dynamic and process-based components, being affected by the infinite variety of circumstances. Bond's [1986] summary of the characteristics of Chinese social psychology is instructive here, because it reflects the importance of relationships in the evolution of culture, namely:

1. man exists through and is defined by his relationships with others;
2. relationships are structured hierarchically;
3. social order is enshrined through each party honoring the requirements in the social relationship;
4. ties between individuals may be seen as expressive (reserved to close family), instrumental, or a mixture of both.

In a similar vein, but here in a practical context, Vogel et al. [2001] found that culturally diverse and geographically non-proximate student teams that never met face-to-face were not only able to identify each other's cultural characteristics but, in addition, were able to develop ways of working together that reflected a form of cultural melding. Along the same lines, Hong et al. [2000] note that under conditions of heavy time pressure, experimental subjects tend to behave in a manner consistent with trait-based cultural norms [cf. Hofstede, 1991]. However, if time pressure is absent, experimental subjects exhibit greater cultural variance and willingness to change normalized behaviors. Similar effects exist when cognitive load is heavy or light [cf. Briley et al., 2000].

These two perspectives of culture (trait-based and dynamic) need not be adversarial or incompatible; indeed, they can be mutually supportive. Rather than being set in stone, culture can be malleable as it can start with a shape or identity based on trait-based characteristics but evolve as it encounters any of the

various circumstances present in the working environment. Furthermore, culture, as it exists in the minds of people, need not develop solely in a linear fashion. If modifying conditions or circumstances are no longer present, culture may revert back to its original trait-based identity.

What we do not yet know, and this is an area for systematic examination, is whether a learning effect takes place to the extent that individuals can quickly recognize and switch between cultures as circumstances dictate. It is interesting to reflect on how cultural learning occurs i.e., how we "read" culture.

The importance of culture, and the need for cultural sensitivity, cannot be underestimated, yet at the same time we do not understand it well enough to be able to make strong pronouncements on how it functions and evolves. In this context, it is appropriate to question whether societal values are as stable now as they were a generation or two (or more) ago. Considering the populations sampled in these studies, learners (students) represent a broad cross-section of the population as a whole, and hence their values may reflect the nature of culture more accurately than a sample drawn, such as Hofstede's [1991] from a single organization.

IV. SOCIOCULTURAL LEARNING THEORY

As we examine the types of learning that take place and are supported in virtual communities and global working environments, it is useful to reflect back on learning theories. A number of researchers point out that an individual learner constructs his or her unique understanding of the world in a social context [Cunningham et al., 1993]. As individual learning extends towards team and organizational learning in multi-cultural contexts, we need to consider a broad range of issues and perspectives. The *sociocultural learning* model provides a backdrop against which we can create a virtual learning environment and examine the implications of virtual team interactions for team members, instructors, pedagogy and learning effectiveness.

The roots of the sociocultural model are centered around the writings of Vygotsky [1962]. Vygotsky's model of socially mediated instruction holds that all learning originates in social interactions. As Leidner and Jarvenpaa [1995] note, "the sociocultural model is both an extension of and a reaction against some assumptions of constructivism". As in constructivism [cf. Piaget, 1973], the sociocultural 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]. As such, it is important that students begin to construct meaning on their own terms and in their own interests within their own culture and its relevant dimensions [cf., Hofstede, 1991].

Sociocultural theory calls our attention to the social context of learning [Vygotsky, 1978]. From this viewpoint, learning is no longer a solitary activity, but is described as occurring through social interaction with peers, mentors and experts. Extensive interest in sociocultural learning resulted in a thorough articulation of its tenets. An examination of this literature has enabled us to derive a set of ten principles

- activity setting
- assisted learning
- cognitive apprenticeship
- distributed intelligence
- internalization
- intersubjectivity
- mediation
- scaffolded instruction
- teleapprenticeship
- zones of proximal development

These principles challenge us to create learning communities that use authentic problem-solving activities that are learner-centered with new forms of learning

assistance. We introduce these principles in the next ten subsections and identify their relevance in the context of virtual learning.

ACTIVITY SETTING AS UNIT OF ANALYSIS

The analysis of human activities in real settings, whether face to face or virtual, links individuals and social systems and provides insights into both cultural practices and individual higher order thinking [cf. Cole, 1985]. It is in activity settings that one can begin to position groups or individuals, products or processes, and cognitions or cultures. Similarly, Wertsch [1995] proposed using human action as the primary unit of analysis because it helps in understanding the sociocultural context as well as the mental functioning of individuals operating within it.

ASSISTED LEARNING

Not only is the environment transformed when sociocultural practices are adopted, but so too is the pedagogical role of the instructor. Clearly, the focus here is on assisting learning, not directing it [Tharp and Gallimore, 1988]. Teachers can employ a range of techniques in the virtual learning process, e.g., modeling, coaching, scaffolding and fading, questioning, directly instructing, task structuring, management and feedback, and pushing students to explore, articulate, and reflect on ideas. When these means of assistance are woven together, the teaching-learning situation evolves into a rich "instructional conversation" [Gallimore and Tharp, 1990, p.196; Tharp and Gallimore, 1988, p.111].

COGNITIVE APPRENTICESHIP

In asserting that learning is most effective when it approximates real-world situations or problem scenarios, sociocultural research on collaborative technology also draws on insights from cognitive apprenticeship theory [Collins et al., 1989; Collins, 1990; Pea, 1993]. As mentors negotiate and support novice learners through experiences suitable to their zones of proximal development, they, in turn, gradually cede control of the task to the learners [Brown et al.,

1989]. When the learning participants gradually assume greater task responsibility, they begin to internalize standard cultural practices [Rogoff, 1995]. Such apprenticing situations readily emerge in computer-mediated, virtual communication environments.

DISTRIBUTED INTELLIGENCE IN A LEARNING COMMUNITY

The current generation of collaborative educational learning tools presents unique opportunities for supporting and organizing human conversations and creating new learning communities [Blumenfeld et al., 1996]. Because human mental functioning is rooted in social relations and because intellectual performance is distributed among members of a virtual learning community, it is critical to begin to understand how electronic tools may enhance the collective intelligence of such a community.

INTERNALIZATION

Another important concept is the notion that intellectual development takes place between people before internalization. From this perspective, instruction is most effective when it is in a form of discussions or dialogues wherein learners can interact with peers or mentors who can challenge and scaffold their learning. As sociological researchers point out, instruction should take place in an environment in which learners use socially mediated and intellectual tools to achieve cognitive development [Rogoff, 1990; Salomon, 1993]. Virtual communities offer many opportunities for the employment of these tools, and hence for critical dialogue between community members.

INTERSUBJECTIVITY

Intersubjectivity refers to a shared, collective understanding based on a common framework among virtual community learners. As common ground [Rogoff, 1990] and shared thoughts [Levine and Moreland, 1991] are realized, so members of a virtual community can more easily exchange ideas, build new knowledge and negotiate meanings. The appropriate application of group support technologies

may stimulate learners to consider a variety of alternative perspectives and viewpoints by providing a range of tools such as electronic whiteboards, conferencing tools, and opinion polls. These tools should help culturally myopic students escape from their own narrow perspectives and subsequently engage in more extensive dialogue with their peers. Such tools not only bring unique opportunities for enhancing intersubjectivity, but open up a window into the broader aspects of electronic collaboration.

MEDIATION

The learning and development of individuals depends on the institutions, settings, and cultural artifacts in their social milieu. The tools and signs one is exposed to, therefore, influence or mediate new patterns of thought and mental functioning [Wertsch, 1991a]. Software visualizations, electronic messages, web pages and electronically displayed information are mediational tools used in determining the impact of cognitive functioning. In a virtual community, the selection of mediational tools is critical as they must enhance the communicative process in a non-threatening fashion.

SCAFFOLDED INSTRUCTION

Scaffolded instruction refers to a mentor or guide providing the learner with the support or assistance necessary to complete a task that would not have been completed without the help. Examples of scaffolding can include prompts, hints, comments, explanations, questions, counter-examples and suggestions. Given their likely unfamiliarity for learners, virtual learning contexts are likely to present a number of task contexts where scaffolded instruction is valuable. A learning scaffold may be embedded in an explicit request to include additional information or a more general question or comment intended to spur new idea linkages. In terms of scaffolded activities, collaborative and group support technologies can offer opportunities for both peer and mentor electronic guidance and feedback that stimulate learner discussion and internal reflection.

TELEAPPRENTICESHIP

Many universities are exploring computer supported collaborative learning (CSCL) tool features that provide unprecedented student-to-student social interaction opportunities and cross-cultural activities and events [Harasim, 1990; Levin et al., 1990; Riel, 1993]. Virtual apprenticeships can involve experts and peers demonstrating ideas, posing questions, offering insights and providing relevant information when needed. A series of CSCL breakthroughs resulted in electronic file exchange, digital libraries, electronic whiteboards and distributed opinion polls. Such tools and strategies function collectively to enable teleapprenticeship and thus assist in student learning.

ZONES OF PROXIMAL DEVELOPMENT (ZPD)

According to sociocultural theorists, an individual acquires new mental functions and patterns of thought from the mediational assistance of tools, signs, and human scaffolding when it is offered within his or her zone of proximal development (ZPD) [Salomon, 1988; Wertsch, 1991a; 1991b]. The ZPD can be defined as the distance between a learner's independent problem-solving level and that obtained under instructor guidance or in collaboration with more capable peers [Wertsch, 1985]. A ZPD might be evident in virtual communities when students teach their peers about their particular area or locale [Harasim, 1993; Riel, 1990; 1993] as well as when the teaching comes directly from a computer tool in the form of thinking-related prompts and feedback mechanisms [Daiute and Dalton, 1988; Zellermayer et al., 1991].

V. GSS AND SOCIOCULTURAL LEARNING

We believe that GSS has great potential for facilitating sociocultural learning in virtual learning communities because it can ameliorate the virtual interactions that must take place between learners and instructors. In merging socioculturally based learning ideas with the unique capabilities of this technology, we have an ideal opportunity to transcend our current educational paradigm and create a virtual learner-centered environment. The strength of sociocultural theory in this

context is its potential to unify methodological orientations aimed at understanding the learning and development of individuals who may be separated in time, space and culture.

Many educators and administrators consider state-of-the-art technology to be a means of automatic enhancement for learning and teaching processes. However, beyond the hype and irrational enthusiasm of these pundits, a major gap exists in the understanding of the role and impact of the technology used in today's classrooms. Salomon et al. [1991] echo this concern as they write "…the real issue here is to determine whether applications of technology will yield the promised improvement of learning or not". In virtual learning community contexts, the knowledge gap yawns wider still, few of those who expound on the topic having a clear idea about the technological and pedagogical requirements.

These virtual communities were identified as "educational networlds" in which educators and learners "…can access virtual classrooms, on-line work groups, learning circles, peer networks, electronic campuses, and on-line libraries in a shared space … that connects people from all over the globe" [Harasim, 1993, p.21]. Such educational networlds promote the creation of lifelong learners who collaborate with peers and experts within the classroom, the virtual community and across the globe to build and share knowledge [Harasim, 1993]. Thus, we have the opportunity to create virtual subcultures where students and instructors can assemble electronically, across time and space, to engage in and extend the dialogue of learning.

GSS has much to offer in the context of virtual community communications. In general, GSS seek to minimize potential process losses and maximize process gains. Sample process losses include: language difficulties, apprehension, fear of evaluation, failure to remember, implicit or explicit pressure to conform, domination and information overload. Process gains, on the other hand, include: 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, though cultural differences may still cause interactional difficulties. Nevertheless, when appropriately configured in support of appropriate processes with minimal critical structure, collaborative technology can enable multi-cultural virtual teams to achieve synergy. GSS are recognized as positively affecting knowledge acquisition [Kwok and Khalifa, 1998] and may help combat 'groupthink' [cf. Janis, 1972].

VI. STUDIES OF MULTI-CULTURAL DISTRIBUTED TEAMS

Technology is widely used to support a constructivist perspective of education [Jonassen et al., 1999. The use of collaborative technology to assist learning in classroom contexts [e.g. Alavi, 1994] and to link classes together, whether within a country [e.g., Alavi et al., 1997] or between countries [e.g. Jarvenpaa and Leidner, 1998] is increasingly common. Over the past three years, we facilitated and analyzed a number of "between country" virtual team studies using two separate types of groupware:

- Ventana's GroupSystems and
- Instinctive's eRoom.

In this section, we present key lessons learned from the studies in which we were involved. Table 1 summarizes the particulars of the virtual teams. In the studies reported here, it is important to note that the vast majority of the students used English as a second or third language. The sections that follow are organized along the lines of the key findings that emerged from this stream of research into virtual team interactions. While many of the findings were gleaned from more than one team or project, we refer to illustrations of the lessons using the codes in Table 1. Data was collected throughout the studies including content, exchanges, and observations. Pre- and post surveys were conducted to develop insights into aspects of educational value, team dynamics, and cultural learning.

Table 1 Seven Virtual Team Projects

Code	Universities Involved	Students Involved (number)	Duration	Tech. Used
HK-NET1	City U. of Hong Kong Eindhoven U. of Tech.	Accountancy MBA (33) Business Engineering (39)	Oct.-Nov. '98	GroupSystems
HK-NET2	City U.of Hong Kong Eindhoven U. of Tech.	Management MBA (32) Business Engineering (25)	Nov.-Dec. '99	GroupSystems
HK-NET3	City U. of Hong Kong Eindhoven U. of Tech.	MSc Electronic Commerce (31) MSc in Tech. Management (30)	Oct.-Nov. '00	GroupSystems
HKNL1	City U. of Hong Kong Erasmus U., Rotterdam	MA Int'l Accounting (21) BA Information Management (104)	Apr. '00	eRoom
HKNL2	City U. of Hong Kong Erasmus U., Rotterdam,	MA Int'l Business Management (28) MBA (20)	Oct. '00	eRoom
HKNL3	City U. of Hong Kong Erasmus U., Rotterdam	MBA (28) Executive MBA (21)	Mar.-Apr. '01	eRoom
HKGR1	City U. of Hong Kong Athens U. of Econ. and Business	MA Professional Acct. and Info. Systems (44) MSc Decision Sciences (18)	Feb-Mar '01	eRoom

Acct. = Accounting, Econ.=Economics, Info.=Information, Int'l = International, Tech.=Technology, U. = University

TASK AND TECHNOLOGY

The seven projects in Table 1 used a number of realistic tasks for team members to consider. These included: comparing the status and actions taken in Hong Kong versus those in the Netherlands with respect to year 2000 problems (e.g., economic impact, contingency plans and legal issues); identifying the impact of software defects; managing large software projects; identifying the critical success factors inherent in virtual team communication; and recommending an e-business strategy for a dot.com business.

The three HK-NET projects used Ventana's GroupSystems software. GroupSystems, which is a client-server based software, enables team members to engage in structured activities such as electronic brainstorming, categorizing of ideas, voting, and shared report writing. In GroupSystems supported projects, team members interacted within the structure established by the instructors,

sometimes in a same-time/different-place mode and other times in a different-time/different-place mode. They were also able to use private email accounts to communicate with one another. Each GroupSystems project used a high-bandwidth video-conferencing session to help introduce all the participants. Another high quality videoconference at the end of the project presented the results and implications of the project and gave awards given to high-performing teams. [Sidebar 1 provides additional details about GroupSystems.]

SIDEBAR 1

GroupSystems is a software package currently developed and marketed by GroupSystems.com. It contains a number of software tools that can be used to support electronic brainstorming, idea categorization, group (shared) authoring, consensus building, matrix analysis and survey taking. Group members may participate at the same time and in the same physical space, or they may be distributed - in both time and space. Each software tool comes with a number of group-setting options that permit the meeting owner or facilitator to structure the way GroupSystems is operationalised in practice. For example,

- group members may participate anonymously or they may be identified;
- ideas that are contributed may have date and time stamps appended for easy reference and improved sequence management;
- ideas may also be given unique reference numbers;
- the meeting owner may permit group members to add comments and ideas, but not to edit and/or delete ideas of other members - or, on the contrary, group members may have a full set of editorial privileges.

For further details about GroupSystems, see the GroupSystems web page at: http://www.groupsystems.com.

Figure S-1 shows typical GroupSystems screens.

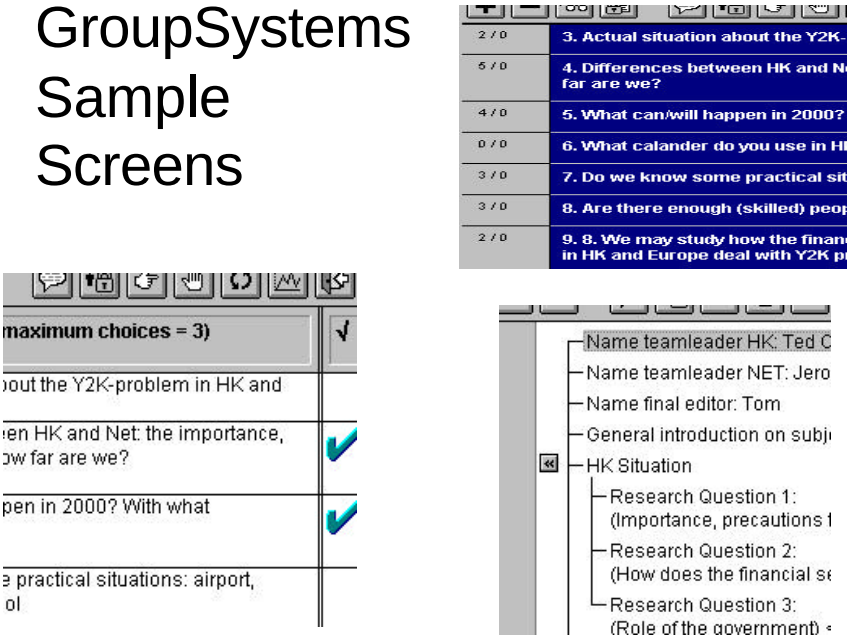

Figure S-1. Group Systems Sample Screens

The HKNL and HKGR projects used Instinctive's eRoom software. In the eRoom projects, videoconference support was not available at any time, and there was minimal facilitator intervention. The teams were required to work independently within the virtual environment and to create structures according to their own conceptualization of the problem they were addressing. They were permitted to use private email to support their interactions, but were encouraged to report back on their private email exchanges to the eRoom to ensure that the material would also be shared by the group. [Sidebar 2 shows additional details about eRoom]

EDUCATIONAL VALUE REALIZED THROUGH THE VIRTUAL INTERACTIONS

The main objective of all seven projects was to enhance the knowledge of the participating students through experiential learning. The vast majority (85-95%) of students agreed that the projects contributed to their knowledge of virtual teamwork and knowledge of the specific topics being investigated. The majority of the Dutch students in the HK-NET and HKNL projects agreed that learning

SIDEBAR 2

eRoom is a web-based virtual workspace with the appearance of a desktop that team members can use as a virtual environment for their interactions. Each team typically is given access to a number of public workspaces, as well as to one or more private workspaces, where they also have the authority to manage passwords. Each space can be structured with an unlimited number of folders and sub-folders to enable a variety of interaction mechanisms such as: brainstorming, document routing, uploading and downloading of files, voting, and engaging in live 'IRC'-type chatting. Team members can create hyperlinks to external resources, and can post to the unique email address for each space. However, the facilitator or instructor can access all workspaces, and so is able to observe what individual teams are doing and how they use the workspaces. For greater detail about eRoom's functionality, see the eRoom web site at: http://www.eroom.com.

A sample view of an eRoom screen is shown in Figure S-2 on the next page.

was more effective when they discovered it for themselves, rather than being shown what to do, thereby supporting theories of constructivism. However, Hong Kong students tended to disagree with this view, reflecting the rote learning style of education traditionally prevalent in Hong Kong.

Many students observed that their technical skills were tested and improved through the project. A general measure of student satisfaction with the work space environment can be seen through the extent to which they would recommend others to engage in virtual team interactions. Of the HK-NET participants, ninety six percent recommended such engagement, while the Hong Kong members of HKNL1 rated this activity the highest out of nine class activities undertaken. The teams that performed better (in terms of the grades they received for the project work) were more positive about the virtual work environment.

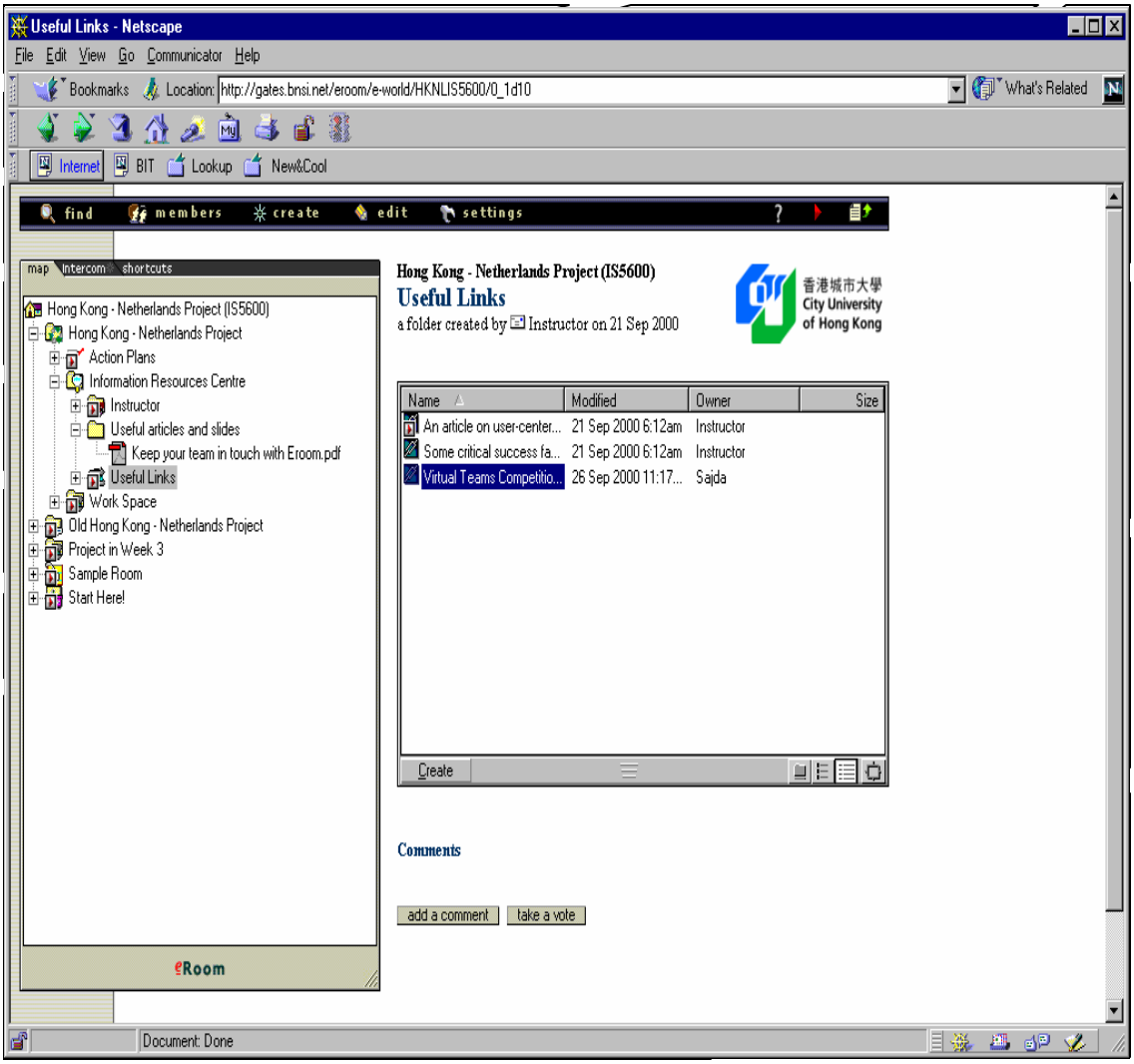

Figure S-2 e-Room Screen

Finally, many students took the trouble to indicate not only how much they learned, but also how much they enjoyed the entire process. "It was really FUN to work on" and "the eRoom assignment was very interesting and challenging" are typical of these views.

TEAM DYNAMICS

In general, most teams were able to undertake the required task successfully and within the available time. However, communication problems did arise. In HKNL2, the two male Hong Kong students in one team reported that their Dutch teammates never participated in the eRoom discussions, never commented on

their suggestions, and were generally invisible. They decided to create a virtual persona - a pretty girl - as a means of enticing their Dutch team members to become more involved. They manipulated eRoom to make it appear that the girl introduced herself, uploaded pictures of herself, etc. Unfortunately, the Dutch team members ignored these overtures as well, never participating in the project. A similar problem was experienced by the Hong Kong members in a HKGR1 team. Neither of the two Greek team members ever showed up for discussions as requested. This initial failure to connect and communicate seriously undermined the progress of the project for individual teams.

When we consider differences between high performing teams (those that received better grades for their team projects) and low performing teams, we observe that richer levels of interaction generally characterized high-performing teams. They were able to use the available technology to understand what their team members wanted to communicate. This observation does not mean that the team members necessarily agreed with one another. In HKNL2, several teams reported radical differences of opinion with their team members; in some cases they could not agree on a common final report. In another HKNL2 team, the gender of one of the team members was only positively identified after the end of the project - when the person said "Excuse me, but actually I am a lady"! This confusion can perhaps be explained by all students' lack of familiarity with 'foreign' names, but also suggests that students did not introduce themselves thoroughly.

Team dynamics similar to those encountered in the HKNL and HKGR projects occurred in the HK-NET projects. In HK-NET1, two out of the ten teams failed to come to a sufficient level of mutual understanding and cooperation in creating a final report worthy of a passing grade. This occurred in spite of a six week project timeline during which the teams had ample time and resources with which to communicate. They simply chose not to and vented their frustrations about “uncooperative foreign team members” on instructors in both the Netherlands

and Hong Kong. In HK-NET2, the teams had the opportunity to introduce themselves at the start of the project during a kick-off session using a high bandwidth videoconference link between the two universities. Immediately after the introduction, all participants accessed GroupSystems via the Internet to interact in a more structured fashion.

This video and data combination in HK-NET2 tended to initiate higher levels of sustained communication throughout the project. All teams successfully completed the project and, at the end of the project, had a modicum of consensus on cultural attributes. Prior to project initiation, students were asked to identify their own cultural characteristics from a list of 39 attributes drawn from the literature (Appendix). 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 counterparts. The results of these surveys are presented in the Appendix.

In HK-NET3, additional attention was given to cultural orientation for the students. A session conducted by a cross-cultural facilitator (Gert-Jan Hofstede) [Dustdar and Hofstede, 1999; Hofstede, 1996; Hofstede et al., 1997] via videoconference exposed the students to issues in cross-cultural collaboration. The teams continued to learn about their own culture as well as that of their counterparts over the course of the project. For example, the HK students concluded they were much less tolerant after the project than their initial self-perception. Similarly, the HK students had initially expected the Dutch not to be especially conventional and changed their opinion considerably. Some self ratings stayed consistent (e.g., HK friendliness and industriousness) as did HK perceptions of NL (e.g., friendliness, honesty and ambitiousness) Some ratings stayed consistent across time for both cultures. For example, arrogance was consistently rated low. In general, the HK-NET3 participants re-organized their pro-typical set of stereotypes for both cultures. The ethnic cognitive beliefs of the participants

changed after they interacted as a group. All teams successfully completed the project.

We note, however, that attraction to work with different cultures varies considerably among students. We operationalised attraction for different cultures in a questionnaire to see whether participants who volunteered to engage in the project would be more attracted to different cultures than a cohort of students who did not engage in the project (the control group). As an illustration, the item "How much do you feel attracted to working with foreign people?" showed that the HK-NET3 students appeared more attracted to work with foreigners than the control group. Responses to the item "How much would you like to be involved in a long-term relationship with a foreign person?" allowed us to conclude that the HK-NET3 participants were significantly more sensitive to cultural homophily than the students in the control group.

Jarvenpaa and Leidner [1998] noted two aspects of team dynamics that exert significant impacts *on the quality and progress of global teamwork, namely team feeling* and *trust* within a team. The next two subsections describe our results on these aspects.

TEAM FEELING

To examine whether the team members experienced a mutual team feeling with their counterparts, the students were asked if they felt part of a global team during the project. Not surprisingly, high performing teams reported significantly ($p=.024$) higher levels of team feeling than poor performing teams. However, cultural differences emerged between Hong Kong and the Netherlands, with only about a quarter of the Dutch students, but more than three quarters of the Hong Kong students, agreeing or strongly agreeing that they experienced this sense of belonging to a global team. The existence of significant time differences between project sites, typically 6 to 7 hours, certainly created some logistical difficulties for the students and may have contributed negatively to the development of team

feeling. Another factor that contributed negatively to team feeling was the lack of interaction evident in some teams, as described above. In some HKGR1 and HKNL2 teams, virtually no team feeling developed at all, the relations being more antagonistic than cooperative, and one HKGR1 team was dissolved when team members of both sides backed away from participating with one another.

TRUST

The difference between the development of trust perceived by the Hong Kong and Dutch students during the projects described here was remarkable. While 63% of the Hong Kong students in the HK-NET projects experienced an increasing confidence in their Dutch teammates over the course of the project, 69% of the Dutch students in the same projects felt the opposite, indicating a decrease in confidence. Those Hong Kong students who generally considered the interaction between the individual teams as adequate, also experienced a global team feeling. This dynamic is consistent with Jarvenpaa and Leidner [1998] who found frequent interaction to be a key determinant of trust. In HKNL2, the students distinguished trust from "swift trust" [Jarvenpaa et al., 1998] - the trust that a group can attempt to develop quickly without the longer-term relationships between people being present. Some of the HKNL2 groups reported that they could develop swift trust quite easily. This characteristic was also associated with those teams that performed better.

CULTURAL LEARNING

Issues of culture, cultural adaptation, and observations about the cultural practices of other team members arose in a number of ways. For example, some Dutch students claimed that their Hong Kong colleagues did everything strictly by the rules, which could result in both negative and positive consequences:

> *"They don't show much initiative. Tell them what to do and they will. They won't do <u>anything</u> if they were not told what to do"*

"..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 reflects 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 for their individualistic behavior:

"..they stick to their own interest, do not try to reach consensus with their counterparts"

"they did not follow the rules of the game".

One student described the difference between cultures as

"Netherlands: more creative and innovative, Hong Kong: prudent but effective".

In HKGR2, a Greek participant described her HK teammates as behaving like "wild animals" whom she found impossible to control. The HK members were upset by this description, not realizing that in Greek this is not at all derogatory but simply a mild form of comment about colleagues who act in an unpredictable or slightly bizarre fashion. In HKNL1, meanwhile, one HK participant noted:

"I found that my team members were rather rude and impolite and hoped that they were not typical"

and another noted

> *"people speak English but not necessarily know what the others mean".*

These concerns over use of language are entirely legitimate as language is an essential component in the cultural learning process.

All students were also asked to indicate what they 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 that they were more passive than their Dutch counterparts. They realized that they were more inclined to work collectively and to avoid issues of conflict. These findings are illustrated by the following quotes:

> "*We are relatively less active and would tend to compromise when a 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".*

SUMMARY

Generally speaking, the students reacted positively to the opportunity to interact with counterparts internationally, mediated by technology. The tasks were designed to be both relevant and realistic, while the technology permitted the establishment of a meeting space with cognitive diversity, where differing opinions could come together from a socio-cognitive conflict perspective [Doise and Mugny, 1984]. In course feedback, students observed that "activities which allow discussion at any time and place with members with different cultures and thinking" were particularly effective.

VII. DISCUSSION AND CONCLUSIONS

The sociocultural framework and a GSS such as GroupSystems and eRoom are powerful tools that can enable us to reshape the traditional model of education. These tools challenge us to create innovative learning communities that promote active learning, collaboration, problem solving, and the use of real-world contexts [Bonk et al., 1996]. Learners should be able to take full advantage of the new technological medium in which they will be living and working. From this viewpoint, learning should no longer be seen as a solitary activity, but as occurring through social interaction with peers, mentors, and experts.

CRITICAL SUCCESS FACTORS

The ten principles of sociocultural learning that we identified in Section IV can be transformed into critical success factors for the use of GSS across national boundaries that are bound more closely to the practice of virtual learning contexts. Through such a transformation, we can guide the application of sociocultural learning theory to virtual learning in a culturally sensitive manner. Certainly there is a need to move away from the opacity of the theory towards a transparent nomenclature readily acceptable to educational practitioners and the students themselves. Thus:

Activity Setting as Unit of Analysis relates to activity setting comfort. GSS enable creation of an activity setting (i.e., an environment) that is conducive to learning, e.g. richly supported and non-threatening.

Assisted Learning aligns with facilitation as an aspect of changing instructor roles. GSS help by communicating messages and feedback efficiently to help people learn. The focus of instructors shifts from teaching to assisting in the learning process.

Cognitive Apprenticeship illustrates self-directed learning, with the focus on learners taking responsibility. GSS present information in a structured fashion but also allow browsing and encourage exploration. Learners are not forced into specific responses as might occur with a more structured tool. GSS support a flexible structure and varying privileges (e.g., editing) that can be engaged as appropriate to give learners more intellectual freedom.

Distributed Intelligence in a Learning Community gives a sense of knowledge management. Web-based GSS provide easy access to external resources, while in addition providing many ways to express individual feelings. GSS not only establish the learner network but further reduce barriers to participation through features such as anonymity, simultaneous interaction and the establishment of a collective learning community memory.

Internalization gives a sense of knowledge application. The key here is communication before internalization. GSS support this activity through making information available in an effective and comforting fashion to set the stage for individuals to build on their existing mental models so internalization can take place more easily.

Intersubjectivity gives an indication of synergy among team members. GSS support development of shared understanding. The tools promote consensus formulation but enable a broad range of views to emerge.

Mediation brings to the fore issues associated with learning transformation. GSS provide a range of technical and structural support (e.g., voting, convergence, messaging, and routing) that can assist in enhancing the communication process and sociocultural learning in a supportive and non-threatening fashion.

Scaffolded Learning relates to the impact of external structuring. GSS provide varying degrees of structure to match needs of the learning environment. It is important to create an appropriate structure and be able to modify the structure dynamically so as to meet evolving learning needs. Having the minimal critical structure is of paramount importance.

Teleapprenticeship indicates technology supported learning environment effectiveness. Here the focus is more on the technology and tools. GSS are a prime example of technology and tools to link remote communities with varying characteristics and degrees of impact.

Zones of Proximal Development provide indicators of communication effectiveness over distance. Distance in this sense includes learning from more experienced people, not just those at the same level. GSS provide the means to link up with multiple cultures and facilitate cultural learning with strong support for topic focus. GSS also enable bringing together a broad range of participants from multiple levels and perspectives.

EMPOWERMENT

Beyond these critical success factors, we also need to evaluate the extent to which learners are comfortable working in GSS environments and along the lines indicated by our analysis. It is not only that they are empowered to take greater

charge of their own learning experience, setting out on the long haul through life-long learning, but also that they are willing to be empowered.

We noted that Dutch students tended to be more appreciative of self-directed learning, Hong Kong students having been acculturated in a rote-education system that neither provides extensive self-directed learning, nor encourages much individual reflection. In this sense, we need to ensure that the critical success factors of sociocultural learning are interpreted in a culturally sensitive fashion, since there is an evident danger that the pedagogy will become as sclerotic, culture-bound, and entrenched as the pedagogies that preceded it. The corollary to this argument is that the pedagogical theory itself must adapt to the infinite variety of circumstances in a dynamic fashion, just as culture does. Sociocultural learning theory cannot escape the cultural bounds that encompass the students, and virtual workers, with whom we work. Indeed, it should not try to. The richness evident in cultural diversity and the endless possibilities available through cultural learning, which we have only hinted at in this article, offer opportunity for a culturally sensitive educational practitioner. All you have to do is try!

RISKS

Despite this latent optimism, we are bound to consider the logistic and operational hazards present in these virtual learning contexts. Certainly they cannot be considered painless - either for students or instructors. Students experienced the whole gamut of technical and interactional ups and downs, with system failures, human failures, and all the messiness present when the social, cultural, and technical environment is evolving as you proceed, rather than being prespecified and set in stone at the outset. Not all students appreciated this lack of predictability. Furthermore, it is eminently possible to give students more than a taste of real-world working practices without linking half way around the world. These globally distributed team projects are difficult to sustain and require significant infrastructure support to leverage instructor input. Ma et al. [2000]

point out a number of the organizational issues that need to be addressed, such as IS staff development in addition to technology and software provision, integration, and maintenance. On the whole, however, we think that global team projects do present sufficient added value to students and instructors to warrant expansion and operationalization in educational programs. We also believe that the sociocultural learning model is a useful starting point both for guiding operational possibilities and for comparison of results across cultures.

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APPENDIX

THIRTY NINE CULTURE ATTRIBUTES

Table A-1 lists the 39 attributes of culture which the student subjects were asked to evaluate in terms of both their own culture and the culture of the counterparts with whom they worked. The attributes are drawn from Grant and Holmes (1981), Katz and Braly (1933) and Kirby and Gardner (1972) .

Table A-1. Attributes of Culture

Friendly	Warm	Industrious	Cold	Extravagant
Sincere	Tolerant	Sophisticated	Argumentative	Hypocrite
Practical	Quiet	Conventional	Stubborn	Musical
Straightforward	Neat	Progressive	Collectivist	Irresponsible
Efficient	Honest	Responsible	Irritable	Strong
Reliable	Happy	Meditative	Lazy	Romantic
Courteous	Cheerful	Unreliable	Sportsmanlike	Arrogant
Individualistic	Modest	Ambitious	Materialist	

Table A-2 presents the common cultural characteristics of Hong Kong and Dutch students in HK-Net2. Pre and Post refer to when the survey was conducted. Thus, for example, Pre HK on HK refers to the attributes that the Hong Kong students ascribed to themselves in the pre-survey. Post Hong Kong on NL refers to the attributes that HK students believed characterized Dutch

students in the post-survey. Common refers to the attributes believed by all students to be common to all students.

Table 2: Cultural Attributes of Hong Kong and Dutch Students in HK-NET2

Pre HK on HK	Post NL on HK	Pre NL on NL	Post HK on NL	Common
Collectivist	Collectivist	Straightforward	Straightforward	
Friendly	Friendly	Friendly	Friendly	
Sincere	Sincere	Sincere	Sincere	Sincere
Reliable	Reliable	Reliable	Reliable	Reliable
Tolerant	Tolerant	Tolerant	Tolerant	Tolerant
Honest	Honest	Practical	Practical	Practical
Practical	Reserved	Efficient	Efficient	
Courteous	Quiet	Ambitious	Courteous	
Efficient	Modest	Honest	Individualistic	
Warm	Conventional	Progressive	Warm	

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LETTER TO THE EDITOR

December 2001

CULTURE AND FINDINGS IN "SOCIOCULTURAL LEARNING: A PERSPECTIVE ON GSS-ENABLED GLOBAL EDUCATION"

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The authors of this paper have made a valuable contribution to the practice of cross-cultural distributed learning. Joint learning through GSS by students from different countries is an issue of growing importance in our globalized world, and the article describes some memorable experiences with it. But it seems to me that they forgot to insert one section, and that is why I venture to contribute it. This section "VI bis" could go between the current section VI and VII and links Culture theory (Section III) to field experiences (Section VI).

SECTION VI BIS: FINDINGS AND CULTURE

In this section we shall try to interpret the results presented above in the light of culture theory. The students in our study have for the most part no professional or organizational culture yet due to their early career stage; and anyhow we do not have employment data about those who held jobs. Our data comes from a very narrow sample; Hofstede (1980) had data from 50 different occupations ranging from production workers to top managers and we have only business students. Yet, because the sample is pretty well stratified, we feel confident to

draw a comparison along national boundaries. The subjects certainly do have a national culture and have had so for many years and that shall be the concept of culture we work with, using Hofstede's conceptualization (Hofstede 2001). We shall limit the discussion to Hong Kong and the Netherlands, being the two countries mentioned most in section VI. In terms of Hofstede's dimensions of culture the two countries are wide apart on Individualism (HK low, Nl high). They are also rather wide apart on the other dimensions: Power distance (HK large, Nl small); Masculinity (HK masculine, Nl feminine); Uncertainty avoidance (HK low, Nl moderate): and Long-term orientation (HK long, Nl moderate). So we expected to find clear perceptions with both groups of country differences, particularly along the Individualism dimension. The Dutch, high on individualism and low on power distance, are likely to perceive the Hong Kong students as restrained and lacking in initiative. The Hong Kong students are conversely likely to perceive the Dutch as blunt, individualistic, and direct. The longer-term orientation of the Hong Kong students would likely cause them to be perceived by the Dutch as reliable where it comes to meeting deadlines.

Indeed the results, as shown by many quotes in section VI, confirm this hypothesis in the direction suggested by the differences mentioned above. We can conclude that, at least in this study, national culture differences are a very good predictor of perceived differences across groups working on assignments through GSS.

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