

P R O C E E D I N G S



The 2nd Conference on Information Technology



Asia

***Advanced ICT for
The New Millennium***

17-19th October 2001
Kuching, Sarawak, Malaysia

Organised by :



In Collaboration with



G I T I

Edited by

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The 2nd Conference on Information Technology in Asia

Proceedings of CITA'01

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EDITORIAL PREFACE

These are the proceedings of the 2nd International Conference on Information Technology in Asia (CITA'01) held on the 17th, 18th and 19th October 2001 in Kuching, Malaysia. The conference was organized by Universiti Malaysia Sarawak in collaboration with Global Information & Telecommunication Institute.

The last millennium has witnessed myriad technological advancements in the many areas of Information and Communications Technology (ICT). However, problems and issues endemic to Asia (such as the widening digital divide) still remain today. As such, the new millennium provides us an opportunity to tackle and address the ICT issues confronting people in Asia. CITA'01 aims to bring together experts from academia and industry to exchange ideas and experiences, as well as to tackle real-world problems. The conference also presents an excellent opportunity for people to develop and strengthen professional relationships and friendships. Despite the Asian-focus of CITA'01, the conference is also open to all our researchers and practitioners from all corners of the world.

About 100 papers were submitted to the conference from 12 countries. We have selected the best 43 papers, which have been organized under 5 major tracks. The five tracks are: Information Technology in Education; Application of Information Technology; Adoption of Information Technology; Communication Systems and Networks; and Image, Speech and Signal Processing.

The range of topics covered by the conference papers reflects the pervasive nature of ICTs in the new millennium. It is our hope that you will find the range of topics covered interesting and enlightening.

The editors extend their gratitude to the programme committee:

Dr. Rosziati Ibrahim, *Universiti Malaysia Sarawak (Chair)*

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The editors also extend their gratitude to the hard work put in by the organizing committee:

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The conference organizers also wish to extend their heartfelt gratitude to the many people who have contributed significantly to the conference programme. We wish to thank the members of the programme committee for reviewing the papers against a tight schedule, and we wish to express our gratitude to all the authors without whom the conference would not have been possible. We extend our gratitude to all our sponsors, and we welcome the exhibitors at the exhibition.

Finally, we thank the authors for their efforts in preparing their contributions and keeping to the tight deadlines. We commend their work to you and wish you an enjoyable and informative conference.

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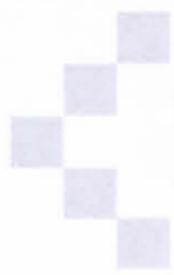


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ICT AND DISTANCE LEARNING

Volume 1, Issue 1

ABSTRACT

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ICT AND DISTANCE LEARNING

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ABSTRACT

With a rapid development of Information and Communication Technologies (ICTs), undergraduate and postgraduate education and ongoing professional trainings are evolutionally changing.

This paper first explores the current status of Distance Learning in higher education, including the case study of challenges at Waseda University. Secondly, new educational paradigms for the 21st century will be investigated, with focuses on the followings:

- e/mLearning, an E-learning with mobile communication environments
- Joint development of learning contents
- Distributed Collaborative Learning based on ICTs

Lastly, establishing the scheme/forum is proposed for sharing of knowledge and wisdom in educational activities for the 21st century.

Keywords:

ICT, Distance Learning, E-Learning, Computer-supported Collaborative Learning, Web-based Training, Distributed Collaborative Learning

1. INTRODUCTION

In order to realize the Advanced Information Society for the 21st Century, we are now tackling with tasks for constructing Information Infrastructure and developing lots of socio-economic systems including Electronic Commerce, for example. Above all, Human Resource Development is one of the most important factors in these challenges.

With a rapid development of ICTs, our daily lives have greatly changed in the fields of politics, economics and social activities, and so on. These ICTs are the driven forces for evolutionary changes of undergraduate & postgraduate education and ongoing professional trainings. Lately, educational environment has been greatly changed with the introduction of the Internet, and many of Distance Learning or E-learning systems have become increasingly popular.

Distance Learning (E-learning) is here defined as an education where instructors (facilitators) and students are (at least partially) geographically dispersed and ICTs are effectively used to facilitate the education.

In other words, Distance Learning (E-learning) is provided over the Internet and learners could access to and use courseware with Web Browsers and is expected to be a supplement or partial replacement of ordinary classroom or face-to-face education. Of course, traditional face-to-face education still plays an important role in many cases.

In this paper, we explore the current status of Distance Learning (E-learning) in higher education, including the case study of challenges at Waseda University. Secondly we investigate new trends, focusing on the information infrastructure, learning contents and new educational paradigms for the 21st century. Lastly, we propose the setting up of a forum for sharing of knowledge and wisdom in educational activities.

2. CURRENT STATUS OF DISTANCE LEARNING (E-LEARNING)

2.1 Development of ICTs and Changes in Educational Environments

The recent development of ICTs greatly contributes to the change of educational environment, in term of learning tools, learning contents, and faculties.

In the 1960s, text-based CAI systems were developed, followed by Computer-based Training (CBT) systems are distributed on CD-ROMs in the 1980s. In the 1990s, with rapid development of the Internet, Web-based classes were developed, and are now getting popular.

Due to the acceleration of transmission speed and capacity of the Internet, new educational paradigms, such as distributed collaborative learning and Computer-Supported Collaborative Learning (CSCL) have emerged.

These Distance Learning (E-learning) paradigms are becoming increasingly popular due to their potentials:[1]

- Cost saving
- Time saving
- Accessibility to experts
- Accessibility for students

2.2 Types of Distance Learning (E-learning) Systems

1) Asynchronous Learning systems

Asynchronous Learning systems are sometimes called as WBT (Web-based Training) and VoD (Video on Demand) Learning systems, and learners can learn without any restriction on time and location, namely anytime and anywhere.

2) Synchronous Learning Systems

Via networks and through the creating of a virtual class, on-line and real-time (live) classes are provided to learners without location restriction, but with restriction on time.

3) Hybrid/Blended Learning Systems

Combination of two types: type 1 and type 2.

2.3 Types of Learning Styles

1) Self-managed Learning or Self-centered Learning

In rather traditional learning environment, learners learn by themselves under their own management, according to their learning speed.

2) Collaborative Learning

In the last decade, a keen attention have been paid to a new educational paradigm, collaborative learning where groups work together effectively for common purpose in educational environment.(See section 4.4)[2]

3. CASE-STUDY: CHALLENGES AT WASEDA UNIVERSITY [3]

The history of ICT-based challenges at Waseda University dates back to the beginning of 1980s, when we began to build network systems in the areas of education and research, academics and information, and administration. The Media Network Center was founded in September of 1996 and its ultimate goal is to integrate these three network systems through an all-campus program for the promotion of ICTs. The pace of progress has increased, and a variety of cutting-edge projects have gotten under way.

1) Classes over the Networks

In September 1999, Waseda University started the project on experimental “network classes” where digitalized lecture contents are transmitted over networks such as the Internet to participating universities in various locations.

When the lecture is replayed over the monitor, the faculties at Wasda Univetsity, in charge of the class, give instructions. Question-and Answer and discussion are carried on through e-mail, bulletin board and teleconferencing system.

2) Joint Seminars over the Networks

Joint seminars between Waseda University and other member universities were begun in 1999. In these seminars, two classrooms or seminar rooms are connected through the networks. Sharing the same “space” enables these two seminar groups to proceed their research as equal partners, rather than as one leads another..

3) Foreign Language Education over the Network

Network-transmitted language classes make use of teleconferencing system to help students improve their English communication skills. Students can work in pairs, or a group of students can works with a tutor. The experimental stage, which begun in 1997, has been completed, and some classes are currently being conducted in this way.

4) On-line, Real-time (live) Distance-Learning between Vietnam and Japan[4]

With the support of three Japan's funds, TAF, ICF and HBK, GITI (Global Information and Telecommunication Institute) at Waseda University and PTIT (Post and Telecommunications Institute of Technologies in Vietnam) have jointly carried out a project on Distance Learning over the international ISDN, with PC-based AV teleconference systems.

The contents of participated courses are:

- Telecommunication Technology (General)
- Broadband ISDN, Mobile communications and Network management
- Policy, Regulation and Business in Telecommunications

5) Digital Campus Consortium

The Digital Campus Consortium was founded in April of 1999 in response to the increasing demand for more accessible higher education, which promises to be popular in the coming age of continuing education. The Consortium plans to participate in and develop various educational and business projects by the year 2002, including online lectures, by integrating the knowledge and experience of Waseda University and its Partners.

6) Changes in educational environment at Waseda University

Changes due to introduction of ICTs at Waseda University includes the followings.

- Efficient and Effective sharing of educational resources, information and knowledge
- Improvement of teaching/learning in classes
- Acceleration of implementing collaborative educations
- Promotion of collaboration among industries and universities
- Expanding opportunity in life-long education to meet social demands

We may conclude ICTs drastically contribute to making Waseda University "open" to the public.

4. NEW TRENDS IN EDUCATIONAL ENVIRONMENT FOR 21ST CENTURY

Although it is very difficult for us to predict what changes we may have in the coming decades, the following trends should be noted in infrastructure, learning contents and learning styles.

4.1 e/mLearning[5]

Future communication will mostly be mobile and wireless. Next-generation Mobile networks will be able to support voice, image and video in high quality, and a new educational paradigm, m-Learning where learners can learn in mobile communication environments, namely anytime and anywhere when they want to learn.

4.2 Joint Development of Learning Contents [6]

Recently, it is of great importance how to efficiently develop learning contents with high quality for Distance Learning (E-learning).

In traditional ways of learning, Intellectual Property Rights (IPRs) of learning contents are not critical, because the use of these contents is limited in a classroom. However, in the case of network-based learning, classes would be open to the public, which means that consideration of IPRs is essential.

Linux approach is attractive and promising for development of learning contents. Here, the Linux approach implies the ways that lots of volunteers would globally join the development and share these products as common wealth.

To make this approach more realistic, we have to provide a way that can identify original contents developers. We proposed a video editing detection system that is based on the concept of digital signature for the purpose of detecting illegally edited videos.[7] In our system, a message of digital signature mechanism corresponds to video contents, so does a digest to so-called VFI (Video Fingerprint Information), that describes characteristics of video content. VFI, consisting of average value of Y, Co and Cr per frame, is embedded over the content by digital watermark techniques with DCT coefficient manipulation. The editing detection, or content integrity, is confirmed by comparing embedded VFI with newly extracted VFI'.

4.3 Distributed Collaborative Learning and CSCL[2][8]

As a new paradigm of 21st century education, Computer-Supported Collaborative Learning (CSCL) is very attractive. CSCL is defined as groups working together effectively for a common purpose in educational environment and is based on the promise that computer-supported systems can support and facilitate group process and group dynamics in ways that are not achievable by face-to-face education. Its main purpose is to scaffold or support students in learning together effectively.

The CSCL paradigm is based on recent learning theories and concepts that include;

- Socio-cultural Theory of learning
- Constructivism Theory
- Distributed cognition
- Situating Cognition
- Problem-based Learning
- Distributed Cognition

5. CONCLUSION

In concluding, we would like to propose "collaboration" among the participants of this conference and people who have the same goal as ours, namely the sharing the knowledge and wisdom on distance learning based on ICTs to foster the leaders of the Advanced Information Society in the 21st Century.

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TECHNOLOGY SUPPORT FOR CROSS-CULTURAL COLLABORATION

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ABSTRACT

As the future unfolds and technology develops, distributed collaborative projects will likely become increasingly common. In this context, an understanding and appreciation of differing cultural backgrounds becomes essential to facilitating effective collaboration. As we prepare for such a future, it becomes imperative that we give people of all ages and backgrounds the experience of interacting in multi-cultural collaborative settings along with an associated set of skills to help them negotiate the complexities of such an environment. Cost-effective technology support is increasingly available to enable meaningful cross-cultural collaboration. In some settings this involves support for same-time collaboration, whether in the same place or different places. In other circumstances, technology support focuses on different-time and different-place collaboration. This paper highlights experiences in linking together cultures from around the world in a variety of collaborative projects. Special attention will be given to lessons learned and critical success factors.

1. INTRODUCTION

We live at a time of rapid change in a world of challenges and contrasts. Shifts in political, economic, and environmental conditions come faster than ever before. Within this context, problem complexity and interest in robust solutions requires representation from multiple stakeholders. It is increasingly important that we provide an environment in which people from around the world can work effectively together. By nature, this involves cultural sensitivity. National as well as professional and corporate cultures must be considered as we interact in business settings (Schon, 1983).

We rely on technology to bridge cultures without causing a physical disruption and potentially enabling synergic relations to emerge. Group Support Systems (GSS) are designed to accomplish this goal. Cost-effective technology support is increasingly available to enable meaningful cross-cultural collaboration. In some settings this

involves support for same-time collaboration, whether in the same place or different places. In other circumstances, technology support focuses on different-time and different-place collaboration.

This paper highlights experiences in linking together cultures from around the world in a variety of collaborative projects. Special attention will be given to critical success factors and lessons learned.

2. BACKGROUND

To provide a background, we begin by looking more closely at definitions and aspects of culture. Following that, we examine the tenets and attributes of sociocultural learning. We conclude this section with an examination of the use of GSS in cultural contexts.

2.1 Culture

As we prepare for the world of the future, it becomes imperative that we give people of all ages and backgrounds the experience of interacting in multi-cultural collaborative settings. We often view culture as being composed of somewhat fixed traits. For example, Hofstede (1991) defines culture as the collective “programming” of the mind which distinguishes one group of people from the other. He says that culture consists of a set of mental programs that control an individual's responses in a given context (1980). Others, such as Briley, Morris and Simonson (2000) and Hong et al. (2000) reflect a constructivist perspective and tend to view culture as dynamic and contextually bound. In line with this thinking, there are numerous definitions of culture that are, in part, dependent upon context.

One of the earliest views on culture was put forth by Kluckhohn (1954), who notes that culture consists in patterned ways of thinking, feeling, and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values. Triandis (1972), on the other hand, suggests that culture is a subjective perception of the human-made part of the environment and notes that the subject aspects of culture include the categories of social stimuli, associations, beliefs, attitudes, norms and values, and roles that individuals share. In 1980 Triandis goes further to describe culture as a set of characteristics common to a particular group of people -- a function of interrelated systems including the ecology, sociocultural, individual, and inter-individual systems.

In general, when discussing culture, two popular approaches tend to emerge; one that focuses on personality traits and another that emphasizes dynamic circumstances. From the trait-based perspective, culture is seen as a relatively stable and long lasting attribute of our behavior. Numerous cross-cultural researchers (Gudykunst et al., 1988) have used *cultural dimension models* developed by Hofstede (1991) and Hall & Hall

(1990) to distinguish members of one cultural group from another. While Hofstede's cultural model has often been criticized because of sampling flaws (all 116,000 across 53 countries were respondents of a single large corporation, IBM), the general cultural constructs or dimensions are particularly useful in helping explain potential differences in culture with regard to the use of IT. The five dimensions at the core of Hofstede's cultural model are:

Power-Distance Index (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 versus coercive power.

Uncertainty-Avoidance Index (UAI) – the extent to which uncertainties are accepted by a particular culture. High UAI cultures (e.g., Mexico) have low tolerances for uncertainty, possess a need for formal rules, and are likely to resist innovative ideas. Low UAI cultures (e.g., U.S.) are inclined to take risks, and are 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. Confucianism promotes harmony at the inner, social and structural level of a society that tends to result in an observable pattern of behavior. 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 emerging view of culture presents a more dynamic, process-based and constructivist approach. This view recognizes that cultural convergence is influenced by numerous factors and because of this culture can be easily affected by a variety of occurrences. For example, Vogel et al. (2001). They found that student teams with culturally diverse memberships located on different continents were able to identify each other's cultural characteristics and develop ways of working together that reflected a form of cultural melding. This occurred without the subjects ever meeting together face-to-face. This is congruent with Hong et al.'s (1998) observation 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. Hence, cultural identity is strengthened or weakened according to external conditions or occurrences. 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 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 remains to be determined 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” the multiple layers of culture.

2.2 Sociocultural Learning

The sociocultural learning model based on the writings of Vygotsky (1962) provides a backdrop against which to examine the implications of team interactions. Socioculturalists are especially concerned that majority cultures not force minority or sub-cultures into a common understanding. Rather, they feel that all 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.

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”. The sociocultural model recognizes that knowledge is created (constructed) by each learner, and in this sense parallels constructivism (cf. Piaget, 1973). However, rather than assuming that the goal of learning is the formation of abstract concepts to represent reality (Piaget, 1973), 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, 1980).

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. An examination of the sociocultural literature reveals the existence of a set of ten principles, viz.: (1) activity setting, (2) assisted learning, (3) cognitive apprenticeship, (4) distributed intelligence, (5) internalization, (6) intersubjectivity, (7) mediation, (8) scaffolded instruction, (9) teleapprenticeship and (10) zones of proximal development. These

principles challenge us to create new learning communities that utilize authentic problem-solving activities, which are learner-centered and provide new forms of learning assistance. We introduce these principles next, identifying their relevance in the context of virtual learning.

2.3 GSS and Culture

The support of virtual cross-cultural 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 this subject. The vast majority of historical GSS research has been oriented around same-time/same-place groups, primarily in laboratory settings. The study of the impact of GSS in predominantly face-to-face settings is well established in information systems research (e.g., Dennis et al., 1988). Seeking a maximization of process gains and/or minimization of process losses was the focus of much earlier research (e.g., Nunamaker, et al., 1991). A few studies focusing on GSS and cross-cultural relations in business have emerged. Mejias et al. (1997) examine consensus and perceived levels of satisfaction between US and Mexican groups using GSS. Watson, et al. (1994) consider the impact of GSS in an Asian culture and draw comparisons with Western use. Finally, Tan et al. (1998) conclude that GSS reduces high power distance in the Singaporean groups.

Studies of educational group support system use and evaluation in field contexts are few (e.g., Brandt and Briggs, 1995). Even rarer is systematic evaluation of GSS in distributed educational contexts. An exception is a study done by Alavi, Yoo, and Vogel (1997) where groupware as well as videoconferencing was used to link classes in both synchronous and asynchronous settings. Ma, Vogel and Wagner (2000) also report on the use of a variety of synchronous and asynchronous technologies in supporting classes and teams. More recently, Vogel, et al. (2001) report on the impact of linking a group of students in Hong Kong with a group of students in the Netherlands.

GSS have much to offer in the context of multi-cultural 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). 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 synergy. 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 interaction difficulties.

Group support technology has great potential for facilitating sociocultural learning in virtual communities as it can ameliorate the virtual interactions that 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. When configured in support of appropriate processes, collaborative technology can enable multi-cultural virtual teams to work more effectively and efficiently. GSS, for example, are recognized as positively affecting knowledge acquisition (Kwok and Khalifa, 1998) and have been recommended to help combat 'groupthink' (cf. Janis, 1972).

3. EXAMPLES OF CROSS-CULTURAL COLLABORATION

In this section, we use two selected examples of cross-cultural collaboration to illustrate relevant concepts. The first is a comparison of cultural differences between the US and Mexico. The second is an examination of cross-cultural collaboration within the context of teams composed of members from the Netherlands and Hong Kong. In total, we address cultural differences in the context of GSS on three continents.

3.1 Mexico

The United States and Mexico are both in North America; however numerous differences are known to exist between these two cultures. Kras (1989) for example notes substantial cultural differences in family, religion, pedagogical approach, nationalism, emotional sensitivity, etiquette, grooming, status, aesthetics, and ethics. She goes on to note managerial style differences in work/leisure, direction/delegation, theory versus practice, control, staffing, loyalty, competition, time, and planning as well as training and development. Hofstede (1991) suggests particularly that Mexican cultures have a higher sense of power distance than do US groups. From this perspective, GSS tends to level the playing field which should encourage Mexican participation without as much concern for what superiors are thinking.

GSS are finding extended use in a variety of applications in Mexico. For example, GroupSystems software developed at the University of Arizona has been used at the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) with business and government groups. In particular, the Center for Strategic Studies (CSS) uses GroupSystems to bring together experts and stakeholders to gather and validate data on a wide variety of topics of interest to Mexico. One GSS-enhanced study of particular interest took place on the subject of regional development. In total there were 293 participants who averaged 40.8 years in age and were predominantly board members (7%), chief executive officers (26%), high level executives (16%), senior managers (10%) and supervisors (16%) in a mix of large business and government organizations in seven of the 31 states in Mexico. The participants had been in their current position for an average of 6.9 years and spent an average of 9.3 years in their respective organizations. They were invited to join in the regional development studies based on their expertise in relevant areas. Fully 97% of the participants agreed that they knew

enough information about the subject worked on during the session to actively participate. In terms of latest academic degree obtained, 3.6% had a doctorate, 27% had a masters degree and 56% had a bachelors degree, with the remaining 13% having high school education or less.

According to the results of the study, the Mexican participants generally agreed that group participation is greater when using a GSS (through which contribution was anonymous) than when engaging in face-to-face interaction. This supports Hofstede's finding that Mexicans live in a high power distance culture and tend to feel more comfortable engaging in non-direct communication with superiors. Hofstede also notes that Mexicans rate higher in terms of collectivism, in comparison to US managers who are inclined to be more individualistic (1991). In general, GSS tends to promote collective behavior and should evoke a feeling of comfort among Mexican groups. The overall positive reaction of the participants in the regional development study may, in part, be attributed to this cultural dimension. Session facilitators noted that there was still a sense of collective good that prevailed and encouraged participant interaction and participation. This is particularly noteworthy given the relative unfamiliarity of the participants with the methodology, technology and each other. Facilitators did note that the participants tended to place less emphasis on use of the technology than would occur with US groups, which reflects the natural tendency for collective behavior of Mexican groups.

Based on his comparisons of IBM employees, Hofstede also suggests that Mexican and US participants differ in terms of uncertainty avoidance. He particularly notes that Mexican participants exhibit a stronger preference to be surrounded with relevant information and knowledge of how other stakeholders feel than do their US counterparts (1991). The results of this study would again support Hofstede's conclusions to the extent that participants willingly contributed and shared information and stayed strongly engaged in the sessions. It may also align with the general acceptance and recognition of the GSS-supported sessions in terms of collection and validation of reliable and accurate information relevant to regional development.

Overall, the results of this study suggest that Mexican participants can indeed benefit from and feel comfortable with GSS and the methodology employed. GroupSystems particularly assisted the participants to enhance inter-group communication and integrate information, especially in the presence of facilitation support. Participants were especially pleased with the quality of the process and results. In this sense, the use of GSS in Mexico is similar to its application within organizational contexts in the US and supports the collective nature of this technology (Vogel et al., 1990; Nunamaker et al., 1997).

Facilitators did note, however, differences between applications of GSS in Mexican and US contexts. GSS application in Mexican contexts is often more flexible than with US groups. In general, facilitators tend to apply a combination of approaches and methodologies with less emphasis on GSS technology when setting an agenda for Mexican groups. This tends to place more importance on the facilitation role and presence during Mexican sessions.

Some questions remain, especially with regards to participant reaction to GSS versus face-to-face interaction. While the vast majority of participants preferred GSS (or were neutral), there was a small but recognized minority preference for traditional face-to-face interaction for participation and communication effectiveness. The best we can suggest at this point is that some participants perceived themselves as “expert experts” who had somewhat higher academic degrees who did not see as much value in the use of computer support as did other participants. This situation would be somewhat consistent with differences in power distance effects noted in conjunction with comparison of GSS use among the Singapore and US groups (Tan, et al., 1993). From this perspective, Mexican cultures would be likely to feel less comfortable in anonymous GSS contribution if participants were more used to recognizing others and being recognized in meeting contexts. Recall again that the participants from these groups were predominantly senior executives with no history (or future) of working together and came from a broad range of organizations, backgrounds, and topic perspectives. Facilitation style was generally passive without content intervention. Overall, however, the participants generally recognized that the sessions were more effective with computer support.

3.2 Hong Kong – Netherlands Program

The Hong Kong – Netherlands (HKNET) program has extended over a three-year period, beginning in July 1998 and continuing into the present. 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. Over the years, topics have changed to reflect interests in e-business e.g., electronic markets, e-Commerce in supply chain management, mobile e-Commerce and software quality in e-applications. Technology processes and materials were prepared for team access from a common server. By communicating with their team members overseas through group support technologies, the students gain experience in using these technologies and the team dynamics within these distributed cross-cultural teams. The educational objectives for this experiential learning context were to:

- let the students gain insight into the current situation of IT-developments in Europe and Asia and increase the understanding of the global differences and similarities.
- let the students experience the pros and cons of cooperating in a distributed team, with members from different cultures and backgrounds.
- let the students experience the advantages and disadvantages of using a remote Group Support System.
- let the students become familiar with several applications of GroupWare, which can be valuable to their study and (future) work.

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 and 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. The project involved a variety of structured activities over a six week period leading towards the creation of the joint report. Each year of the HKNET program had a similar structure with differences from year to year reflecting the maturity of the project.

The first trial (HKNET1) commenced in October 1998 linking teams consisting of part time MBA 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 and were divided into ten teams with varying degrees of experience in working in distributed cross-cultural contexts. Dutch participation 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 typically included working as middle-level managers in multi-national companies. Although eight of the ten teams were especially successful in completing the project and benefited from the learning experience, two teams experienced difficulties and expressed their frustrations about “uncooperative foreign team members” to instructors in both the Netherlands and Hong Kong.

In HKNET2, 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 HKNET2 tended to initiate higher levels of sustained communication throughout the project. All teams successfully completed the project. In HKNET2, 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 cultural characteristics from a list of 39 attributes. At the conclusion of the project, the same list of 39 attributes was presented to the students, but this time they were asked to identify the cultural attributes of their counterparts.

- 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 the attributes of **friendly, tolerant, sincere and reliable**. There was additional consensus that Hong Kong participants were **collectivist and honest** and that the Dutch were **practical, straightforward, and efficient**.

In HKNET3, additional attention was given to cultural orientation for the students. A session conducted by Gert-Jan Hofstede 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. Furthermore, the HK students had initially expected the Dutch to be more progressive than conventional, but changed their opinion considerably by the end of the project. Some self ratings stayed consistent (e.g., HK friendliness and industriousness) as did HK perceptions of NET (e.g., friendliness, honesty and ambitiousness). Similarly, some ratings stayed consistent across time for both cultures. For example, arrogance was consistently rated low. In general, the HKNET3 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 observed that attraction to work with different cultures varies considerably among students. We determined attraction for different cultures by using a questionnaire to see whether participants who volunteered to engage in the project would be more attracted to different cultures than a cohort of 32 students who did not engage in the project. As an illustration, an ANOVA conducted on the item "How much do you feel attracted to working with foreign people?" showed that the HKNET3 students appeared more attracted ($m_{hknet}=7.2$) to work with foreigners than the control group ($m_{Control}=6.6$). The difference between the two groups indicated a tendency towards significance ($p=.069$). An ANOVA conducted on 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 HKNET3 participants ($m_{hknet}=7$) were significantly ($p=.007$) more sensitive to cultural homophily than the students in the control group ($m_{Control}=6.2$).

All of this is consistent with more recent views of cultural dynamics that are more process-based and constructivist by nature with numerous factors noted to influence cultural convergence. In this sense, culture can be easily affected by a variety of occurrences as we have seen in the HKNET project. For example, Hong et al. (1998) 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), as did our HKNET3 HK participants. As stated earlier, this tends to occur regardless of the cognitive load (cf. Briley et al., 2000). In our case, for example we suspect that the cognitive load of the HKNET3 HK participants was considerably lighter from a cultural learning perspective given their extensive experience. This resulted in their not being as affected by time pressures. Similarly, the Hong Kong participants of the HKNET1 project struggled more with technology than their NET counterparts. This aligns with the suggestion of others that as teams have more experience, they can better adjust, but this is dependent of course on the applicability of their experience.