Crossing the International Teaching Divide - the Evaluation of an Internet Based Teaching Project

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Executive Summary

This paper details the results of an investigation into the use of the Internet as a means of communication for teams of students from different universities who were many thousands of miles distant from one another. The aim of the investigation was to identify whether virtual team interactions could produce similar results as face to face team interactions.

Teams of students made up from two to three pairs of students from different universities were set a business project as an assignment. The students interacted by means of the Internet and their project output was evaluated. In addition, the students were surveyed in order to identify their opinions as to the success of the exercise and what modifications could be recommended for the future. Responses were collected in the form of rated responses to closed questions as well as open statements in regard to the students' likes and dislikes in relation to the project and their recommendations for future modifications. The open responses were categorised and the implications of these responses are discussed. The closed questions were used to examine two regression models and to investigate the overall consensus views of the respondents, by examining the mean values of the responses.

The result of the investigation has been to show that virtual teams can produce good output and that in the eyes of many of the respondent students, virtual teams can operate as successfully as face to face teams. The implication of this finding is very important for international business studies in that it provides a new and very economical way for effective student teams to be created from members with different national and cultural backgrounds. The use of such mixes of people in team interactions can provide essential experience of foreign cultures and thought processes, which is a key component of international business studies.

<u>Keywords</u>

Internet communication, distance teaching, collaborative learning, virtual teams, distance team interaction

<u>Abstract</u>

This paper reports the results of a study which examined the use of the Internet as the means by which international business students who were engaged in a collaborative learning project could conduct their interactions at distances of many thousands of miles.

The students were surveyed after completion of the project. The difficulties, which they experienced when using this medium of communication, are reported, as are the positive aspects, which were identified. The survey also identified key areas of suggested improvement for future Internet based collaborative projects.

The paper discusses the results of the study and suggests methods by which Internet based teaching projects can be improved, as well as areas for further research.

Introduction

Distance communication methods such as video and telephone conferencing have been used

for distance education purposes for a number of years and even today are being proposed for more

extended use (Feller, 1995; Lucas 1996: Winner, 1994). However experience at some universities

have shown them to have had limited success[1].

The advent of the Internet and the World Wide Web (WWW) has introduced new distance

communication possibilities to the educational community. (Duguet, 1995) However, much of the

value of this medium has arisen from the potential for greater levels of communication between

academics and post-graduate students particularly in terms of their ongoing research. This has taken

place either via direct communication or by being members of listserv based discussion groups (for

example those for marketing eg ELMAR, services marketing eg SERVNET, and statistical

methodologies eg SEMNET). Many listserv groups exist for discussions in a multitude of fields such

as human behaviour, psychology, statistics, computer usages etc.

Some existing educational organisations with on-campus students and distance programs

have already begun to take advantage of the existence of the Internet by providing on-line lecture

notes and course materials for their on-campus and distance education students (Vasarhelji and

Graham, 1997). Bjorner (1993) has provided details of on line course offerings available through

computers and modems. Moskowitz (1995) has been able to detail more than 70 colleges and

universities who are trying to make their regular course offerings available on line, and Velsmid

(1997) has supplied recent details of such college and university courses. Businesses such as the

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[1]Discussions with teachers who have used this medium for a number of years at Southern Cross
University, Australia and with teachers who have tried the method at other universities have indicated
that even with detailed preparation and careful procedural controls to remove the "talking head"
syndrome, this method does not cause students to feel that they have had a satisfactory educational
experience and that telephonic communications without the video component achieve the same ends.
Siedel as quoted in Lucas (1996) also mentions that the normal professor and student interaction is

Royal Bank in Canada are also beginning to use the internet for their training programs (Grantham, 1997). However, such training largely relates to the provision of on line materials and multimedia resources (Horowitz, 1997).

Web pages detailing university facilities course details and methods of application for course entry is widespread and virtually universally used by most tertiary academic institutions around the world.

The advantage of Internet communication is its ability to span vast distances almost instantaneously and to bring together people from distant areas that may never come face to face with one another. In so doing, it is able to provide access to skills that might otherwise have been removed from some of the communicants and to bring into close verbal contact people from different language and cultural backgrounds. One such use is detailed by Chadwick (1995). It provides examples of students from distant educational institutions being able to access data, pictures and web pages in respect of particular educational projects.

Computer based linkages such as those that are achievable through direct interaction whether by keyboard entry or voice communication, have offered the potential to develop virtual universities. Here, students can meet in virtual surroundings, scan bulletin boards and discuss topics with one another. Virtual universities and on-line campuses offering fully on line courses have thus begun to make offers to students and details of some of the first of these have been given by Di Lorenzo (1994), Moskowitz (1995) and Velsmid (1997). Internet based technology with virtual interactions therefore also offers opportunities for universities to harness new levels of interaction for their students particularly in the field of cross-cultural interactions.

Business and the Internet

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found to be missing when video conferencing is used.

The world is moving inexorably towards a single global market, and those companies that will survive and prosper particularly in the manufacturing areas in the future, will be those that can adopt a global approach. They will need to set up their businesses in order to harness the benefits of operations or sections of operations in different parts of the world. The ability to do this requires business people to have a good understanding of different cultures. They should be able to interact through the medium of the English language. This is rapidly assuming the role as the major language medium for interchange between countries and according to Cornish (1996) "... may become the native language of most people around the world".

Cornish (1996) has also identified a number of ways in which technology will change our lives in the future. In these scenarios he sketches out the situation where telecommunications reduce distances so that "People thousands of miles apart are now finding ways to work together, buy things from each other, and form groups for common purpose." He therefore suggests that, "We are moving towards an era when individuals and organisations will operate almost as if national boundaries and natural boundaries did not separate them". In addition, in the educational field he suggests that "Global universities will emerge, connecting students, lecturers and researchers in many nations via computer networks, satellite television, and other advances."

The New World, which is envisaged by Cornish, may or may not develop to the extent that he has predicted. However, there is no doubt that current levels of information technology already offer the potential for university lecturers to provide greater value for their students. This is particularly in respect of providing them with a better understanding of the capacity of the technology and of people in distant lands and different cultures, aspects of particular importance when teaching international business. An understanding of the potential of the medium will also be essential for future business people if as is suggested by Rogers (1996) there is a "...shift towards virtual networked organisations that transcend conventional boundaries".

The use of the Internet for teaching

However, use of the Internet and WWW in teaching is yet in its infancy. Very few studies have been conducted to examine the difficulties that are likely to be encountered when using this medium for student group instructional interactions. There has also bee little research to identify the type or nature of difficulties that will need to be addressed when using the medium.

Vasarhelyi and Graham (1997) have outlined the potential ways in which electronic linkages can be used in teaching. Ives (1996) presented a scenario of the effect of the Internet on business education. He postulated a requirement for radical changes in business structure to combat the rise of other suppliers of education while assuming that personalised instruction from educators will remain a major role although as facilitator or coach rather than as expert. This however need not be the case and the level of involvement and type of involvement of instructors is yet to be decided. It will only become apparent as more experience and knowledge is gained about the operation of Internet based teaching and the student's reaction to the system.

Halal and Layabouts (1994) examined the future impact of electronic communications and multi-media on education and suggested a number of ways in which these systems would impact on education in the future. They also identified a number of universities that were already experimenting with the different media.

From this, It would seem that the use of electronic communications will become more frequent in the future. Hence, investigations of the difficulties to be overcome when using these media and of areas of focus for delivery of optimum results for students are urgently required.

A few studies have also been carried out to examine the possibilities inherent in using the Internet as a teaching medium (Atwong, Lange, Doak and Aijo, 1996; O'Brien, 1996). These studies

have reported on some of the effects/difficulties encountered by the instructors such as the need to train students in the technology, differences in approach between students from different cultural backgrounds and matching of times. However there have not been detailed student evaluations of the process and its difficulties. If educational organisations are to be able to constructively improve their utilisation of the new technologies of distance communication it is essential that the problems and barriers encountered by students in utilising the new technology be carefully researched. This paper has conducted and reports on an evaluation by international students after they had been involved in an Internet based collaborative distance learning exercise.

The nature of the study

Collaborative learning is that which involves interpersonal processes whereby a small group of students works together on a specific project. In this form of interaction, learning takes place through discussion and the sharing of information (Leidner and Jarvenpaa, 1995). It has been identified as developing problem solving skills and critical thinking as well as enhancing student satisfaction (Alavi, 1994) and as being superior to individualistic instruction in many areas (Leidner and Jarvenpaa, 1995). It is a common method of instruction in many university courses and it was used as the basis for this study.

The study addressed several of the research issues highlighted by Leidner and Jarvenpaa (1995). These were the exploration of teamwork interactions across global student bodies and the requirements of students and teachers who might interact through the medium of the new communication technologies, when using collaborative learning.

 Groups of between 4 and six English speaking MBA or equivalent students from three continents were set a task of developing a business plan for an Internet based product or service offering. While all the students were able to interact in English, not all of them used English as their

home language.

A similar project would commonly be carried out in an MBA program with teams operating in an on-campus face to face mode. However, the students in this project were placed into their teams with at least two students from the same university teaming up with other pairs of students from other universities. The students were directed to use the Internet in order to interact with their distance team members and were encouraged to engage in direct contact and discussion through the medium of chat-lines as well as through the medium of e-mail.

The students were informed of the educational goals of the project which were to:

*   promote active learning in diverse virtual teams and to develop an appreciation of
         electronic media, team interaction and learning-to-learn issues

*   foster critical/integrative knowledge building in the areas of electronic commerce,
         electronic communities and virtual organisations (including the enabling role of IT)

*   further students' learning about the Internet's capabilities for retrieving and
         communicating information as well as providing resources to support creative
         decisionmaking processes

The study had some similarities to the study by Atwong, Lange, Doak and Aijo, (1996) where teams of students from California State University - Fullerton and Lappeenranta University of Technology, Finland carried out a collaborative marketing exercise. However, the report on this study provides only limited information. There is no evidence of an in depth survey of the students having been carried out in order to gain an overview of the problems and practices that need to be addressed

when using the Internet for teaching.

Project details

Nine universities participated in the project. These universities were: Central Missouri State University, East Carolina University, George Mason University, Seattle Pacific University and Texas Christian University in the USA. The Memorial University of Newfoundland and Université Laval in Canada. Universidade do Minho in Portugal and Southern Cross University in Australia. The number of participants from each university, the courses that were being studied and the numbers of participating students are shown in Table 1.

Insert Table 1 about here

The teams were made up to include at least one pair of students from one of the US universities with a pair of students from a university located in another country. Non-US partners were located in Australia, Canada and Portugal. There were 45 teams in all. The students ranged in age from 23 to 48 and all were graduate students taking business or management information systems courses. Because some of the students were studying in a different country to their home country, the countries of origin of the students included Canada, Colombia, Germany, Hong Kong, India, Indonesia, Portugal, Thailand, Ukraine and the USA. The study therefore examined the interactions between students from a wide range of different cultures. All of the students who were based in Australia, were Asian students who were studying there on a one year postgraduate study program.

The project was set out on the WWW at a VLE (virtual learning environment) project site at http://zeta.is.tcu.edu/~blobert/vle/project.html. The Information, which was provided, on these web

pages introduced the students to the project. It gave them a background and informed them of the requirements for the project as perceived by the various staff members who were supervising the different classes at the different universities. The pages also identified the different members of each team who had been chosen to work together so that participants could look up their own name and find their fellow team members.

A suggested method of proceeding with the project was also set out. Members were encouraged to engage in early Internet based familiarisation sessions with their team members, and could also use a web site to determine their personality type using a Jungian based system of classification.

The task, which was set, was that the students should produce an international business plan for an Internet based business. This business would offer a product or service world wide, via the WWW. It would present the plan via the Internet to a theoretical Web Venture Capital Group that might be interested in funding the venture. The students were provided with an outline format for the international business plan and with the assessment criteria. The experiment operated successfully in that all the student groups did return at least reasonable projects. However, in a few instances team disagreements resulted in some team members independently returning their own different projects since they were not in full agreement with the group project outcome.

Examination of transcripts of discussions in the case of one of the teams which encountered major disagreements, revealed a situation where initial disharmony was fostered as a result of tardy early link-ups by overseas team members with their USA team members. This resulted in comments being made by the USA team members to the effect that the project would be easier if the distant partners never came on board. Further difficulties then appeared to have developed because of cultural differences, where lack of disagreement by the overseas team members led to the USA students assuming that agreement had been reached. In fact this was not the situation since the

cultural background of the overseas students meant that they perceived outright disagreement to unacceptable behaviour. They therefore continued to proffer alternate suggestions which caused extreme irritation amongst the USA team members, who felt that these were irrelevant suggestions. Eventual final communication breakdown occurred further down the track when the overseas students seemed to have overcome some of their cultural inhibitions and burst out with messages stating that they had never agreed to the project in the first place.

On completion of the project, the students were surveyed via an Internet survey form to evaluate the team interaction processes and their learning experience. Seventy-three responses were received. Table 1 also details the number of responses by university.

Nature of communication methods used

The participants in the experiment had a number of possible methods of communicating with one another and Table 2 details the nature and frequency of communication that was reported. It is apparent that the greatest amount of contact was occasioned by face to face meetings with local team members. In relation to the distance communication component, e-mail was the most used communication method followed by the chat lines.

Insert Table 2 about here

Some students such as those in Australia experienced great difficulty in using the chat lines. This was both as a result of a lack of local expertise and the fact that the lines from Australia were insufficient to handle the amount of traffic required and hence tended to break down reasonably frequently. These students therefore tended to use e-mail to a major extent. However, this did not

explain the frequency of e-mail communication that was evidenced by most of the respondent students. It would seem that e-mail was found a very useful means of distance communication in a team situation. This was the case for those students who were interacting with fellow team members within the same country as well as for those in other countries.

Evaluation of project aspects

The students were asked to state whether they agreed or disagreed with a number of statements relating to the project overall as a learning exercise and the process which they had employed in working as virtual teams. The responses to these questions are listed in Table 3. in terms of the respondents' agreement or disagreement with the statements.

Insert Table 3 about here

The percentages listed add to less than 100 in each case because of the non-reflection of the responses by those students who neither agreed nor disagreed with the statements. In order to identify those issues where there was a clear majority either in agreement or disagreement with a statement, z values were calculated.The difference between the different proportions of agreement and disagreement and were then corrected to allow for the increased chance of the occurrence of a Type I error. This might have arisen because of the repeated nature of assessment of the answers to the questions.

Examination of those questions where a significant orientation towards either agreement or disagreement existed yielded a number of interesting observations.

Overall, the responding students were positively oriented towards their teams. There was a

majority view that the teams had worked well, that choosing member roles was easy, that all members did their best and that they were proud of their plan. This would indicate that virtual teams can produce beneficial team results. Hence, the use of virtual teams in international business teaching situations can enhance the learning experience even though some of the members do not come into face to face contact with one another. This view is further supported by the fact that a predominance of respondents also felt that they would prefer to work in virtual teams rather than alone.

However, there is a possibility that the responses were biased towards those team members who felt positively about the virtual team exercise. The non-respondents could have constituted students who did not feel that the experience had been beneficial and hence that the positive aspects of the virtual team experience was not experienced by the majority of the students. Even if this were to be the case, it would not detract from the fact that some students can produce a positive team feeling when working in virtual teams. It would highlight the need to identify the possible problem areas that can arise with virtual teams. In this regard the areas of difficulty identified by the largely positive body of respondents would be even more important as they would identify very key areas of required concentration when conducting teaching exercises using virtual teams.

Inspection of the other areas of majority opinion showed that the respondent students felt that knowledge of Internet technology was of importance as was the participant's personality. Although the responses did not show a significant consensus for either agreement or disagreement, there was a suggestion that a majority of the respondent students might have felt that cultural similarity was not important. However, in the light of the recorded interactions described earlier, cultural differences may have played a major role in some instances and may be particular to certain types of cultural differences.There was also a suggestion that the virtual aspect of the team exercise detracted from the experience they might have had in a face to face situation.

The conclusion to be drawn from these results would be that any students who are to engage

in an Internet based virtual learning exercise should firstly be well trained in regards to the use of the technology. The training of the people in the teams is also an important issue to overcome both virtual interaction and cultural differences. It would seem possible that distance based team interactions will require that more attention is paid to team building than in the case of face to face teams. This could be because of the lack of direct contact and the absence of body language in the interactions. However, this was not able to be assessed in this study and represents an area for future research. The nature of and effect of different cultural aspects on virtual interactions is also an area requiring further research.

A distance based method of interaction does evidence a potential for enhanced problems with team disagreements and there is a need for careful team training and the provision of tools to help manage team dynamics. It is also evident that more training about the challenges of dispersed teamwork is needed, when using distance based teams for instructional purposes.

Significant features of the virtual team experience

Using interval scaled responses from the respondent students, the data was examined for significant associations using multiple regression to examine two models.
The first model depicted the association between the scoring of the statement "It went generally better than anticipated" and a number of features of the team interaction experience. The overall model was found to be supported by the data ($p = 0.0001$). A subsequent stepwise regression with entry and exit levels set at $p = 0.05$ was then used to identify the significant variables. The results of this regression analysis are shown in Table 4.

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Insert Table 4 about here

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The significant variables mainly related to team interactions and it would seem that the respondents' perception of better than expected performance was linked to the level of positive team interaction. It should be noted that the coefficient for "local team did more work than our virtual partners", was negative. Hence, the level of positive appreciation was in part linked to team members finding that the contribution of the distant team members was equal to that of the local team members. Other interesting aspects were that there was a positive association with the concept that virtual teams were more efficient than face to face teams and that pressure was seen to increase the likelihood of success in a virtual environment. It would seem possible that this latter association was because pressure increased the rate of response by virtual team members and that communication was an important ingredient in team success.

The second model depicted the relationship between "our team worked as a real team" and the team interaction features. The overall model was again supported by the data (p = 0.0001). A subsequent stepwise regression with entry and exit levels set at p = 0.05 was used to identify the significant variables. The results of this regression analysis are shown in Table 5.

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Insert Table 5 about here

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The positive assessment of team performance was seen to be mainly associated with a perception that all team members had done their best and with a better than expected level of virtual team efficiency. It would appear that the fact that the respondents were "really proud of our plan" might have influenced their perception of the performance of the team. However, this association could also be because when teams felt that they had worked well they were also more proud of their final output.

It was noted that in the case of both models "defining roles went relatively easily" was

positively associated with the project going better than anticipated and the respondents' teams working as a "real team". It would seem likely that, where teams interacted well from the start, or where the team members brought different required skills to the team, and hence contributed perceivable value to the team effort, there would have been little conflict over the roles of the different team members. However, this possibility was not assessed in this study and therefore represents an area for further research.

Project members' likes and dislikes

The information and analysis conducted above provided some information in respect of areas of evaluation that could be easily identified. Because of the very new nature of the method of instruction, however, it was very likely that this information could have overlooked particular issues of importance. It might also not have identified the real reasons lying behind responses to the closed questions. For this reason, the respondents were also asked to list the three features of the project that they liked most and the three features that they liked least. These open responses were then inspected and grouped into categories, which appeared to best represent the key aspects relating to the different responses. Table 6 lists the categories identified and the frequency of response in respect of the most liked project features.

Insert table 6 about here

The most liked features of the project related to those areas of learning which were intended to be developed, namely knowledge about the Internet and the technology that is used to access the features of the Internet and team relationships. The Internet knowledge comments were expressed in statements such as: "A better knowledge of Internet technology", "connecting members of different

countries", "creating a web page" and "experience of working on Internet". Another major area was the knowledge of other peoples and cultures. These were expressed in terms of statements such as "interacting with people from a different environment"; "got a taste of different cultures"; "getting to know people with diverse backgrounds"; "country interaction"; "cultural difference"; "interacting with students from outside of (sic) my school". Another main area of liking was related to experiences with individual and team relationships. These were expressed in terms of comments such as the following. "Access to teams from other schools"; "Enteracting (sic) with my Virtual Team Members"; "It forced me to work with people I wouldn't have"; "Having the challenge of motivating those you are not in face-to-face contact with"; "New Experience in working together".

In addition students also enjoyed the novelty of the experience ("excitement of a new experience"; "New learning experience"; "Sounds like a cutting edge project"). They felt that they had acquired business skills from the nature and content of the projects ("real project"; "creating a business plan for an exciting product"; "It was a great experience and the business plan was a good idea for that"). They also felt that they had acquired skills in regard to the application of the Internet to business practice ("Application of a 'real' business via the Internet" and "I learned a lot about businesses on the Internet, it would not be that hard to start up something on the Internet").

The most disliked features of the project are listed in Table 7.

Insert table 7 about here

A wider range of disliked features was apparent with the most frequently mentioned dislikes relating to problems that were experienced with using the technology to communicate. These were grouped into a number of different categories. By far the most disliked features of the projects were those that could be categorised as team interaction problems. These were expressed in terms of

phrases such as: "Conflicts amongst members", "distribution of work (Very Hard)" and "difficult to solve problems if one has differences with one's virtual team members".

This result, while obviously a source of real concern to the team members, did however identify the fact that the distance-separated teams had experienced team interactions. The primary difficulty that they had experienced meant that although the team members were separated by distance their learning experience did encompass the problems of dealing in-group interactive situations with other team members. This was an intended aspect of the project experience.

The second most disliked category of project features was related to communications difficulties, for example "Communication limitations" and "Communication difficulties resulting from no face-to-face meetings". Next were technology faults and technological inadequacies such as "Dependence on technology - if something went wrong it set us back", "Difficult to get through on chat lines - was unsuccessful" and "freezing of computers while working". These difficulties related in part to the as yet quite early stage of development of internet communications, in particular the chat lines and to the overloading of lines between some countries such as Australia and the USA.

Project co-ordination problems and different university requirements were other identified problems. These could be ascribed to the fact that the project universities operated on different times and were involved in teaching different subjects. This highlighted a need for future projects to be conducted by teams from classes which were studying the same subject material and to a need to set up a project timetable which is compatible with all the participating universities' courses. This problem was also highlighted by another disliked feature namely time pressures. It would appear that the project was too substantial for completion within the time allowed, while at the same time allowing for the need to acquire the Internet communication skills required and to develop the team understanding needed. It would appear that a necessary activity prior to future projects of this nature would be the use of preparatory exercises. These would enable the teams to get to know one another

and to gain facility with using the Internet and the communications media.

Additional suggestions for improvement when using Internet based projects

Students were also asked to make suggestions as to the ways in which similar projects could best be improved in the future. These comments essentially addressed the elements of the project, which had already been identified in terms of the most disliked aspects. Their categorised responses are shown in Table 8.

Insert table 8 about here

In this table the major suggestions related to project aspects that students obviously perceived as being directly under control of the project organiser(s). Thus, two of the primary suggestions related to better co-ordination of the project across participant universities, particularly in terms of assessment standards and project requirements and clearer guidelines for project participants. Typical comments in this regard were "all locations have identical requirements", "all students should have the same deliverables", "develop consistency between professors' criteria and deadlines". More time for the project was also seen to be an important requirement, a typical comment being "A longer time frame to complete the project". A requirement for prior training in the technology as typified by the comment, "The students must already be familiar with e-mail and web browsers" was also identified as an area for potential improvement. A pleasing aspect of the comments was the suggestion for a requirement for more team building exercises prior to the project, (for example "Create exercises up front to build team cohesion"). This reflected the fact that, as intended, the project had proved in many instances to identify the types of problems that are often encountered in team situations. However, it is also an area of focus that should be taken into account when conducting similar

exercises.

A requirement for better communications links, improved technology and technical support reflected the fact that the Internet is not yet an ideal communications medium and that its use can cause communications problems. It is expected that this situation will change over the next five years as the linkages and technology improves.

Conclusions

The major conclusions that can be drawn from this study can be summarised as follows:

Teams comprised of distance separated members can operate reasonably as teams by using the Internet as a communications medium even when separated by major distances and incorporating people from different countries and cultures. Some teams returned very good joint efforts. There were a few instances of major team disagreements resulting in individual team members separately handing in different project returns. However, these were few in numbers and possibly did not exceed the normal level of team disagreements that are commonly encountered with face-to-face teams. Although there is a suggestion from the qualitative information that some cultural differences may cause difficulties, there is no evidence that this would be any different than in face to face team interactions.

The Internet is not yet fully suitable for distance based team members to be able to achieve optimum levels of possible benefit from their collaboration. This is because of the problems that can currently be encountered with the bandwidth of distance communications and in particular with the chat lines (Horowitz, 1997). It is to be expected that Internet advances around the world will lead to better and better communications possibilities as time progresses. However, the rapid rate of increase in Internet traffic expected in the immediate future may cause a short-term deterioration in communications capabilities.

Because of the current attenuation of communications as a result of Internet usage, teams comprised of distance separated members should allow longer times for team members to become acquainted with one another than would be anticipated with face-to-face teams. This additional time should be arranged prior to the commencement of the project work. Prior training of team members and experience of such members with the use of communications software is required. The concurrent elimination of any technological teething problems is also an essential requirement when using teams comprised of distance separated team members linked by Internet based communication.

The project exercise used in this trial, incorporated students who were studying a number of different courses. It is evident that it would be more satisfactory if future exercises were to link students with similar academic or experiential backgrounds who were studying the same subject material in similar courses with common evaluation criteria.

When teaching internationally, some allowance will also be necessary in order to overcome the problems that are occasioned by universities in different parts of the world operating on different term dates. Universities in different countries are unlikely to change to operate on the same term dates in the near future. It may therefore be necessary for projects, which link teams across different countries to arrange at particular universities for the project to operate outside normal term dates so that all team members can have the same deadlines.

In the business area, some businesses are already using intranets to communicate across the world and these are likely to be more and more used for international business team interactions. It is anticipated that such interactions will probably experience similar effects to those identified through this project. These are likely to be very evident if they link people who have not previously met and who come from dissimilar backgrounds and cultures, into team activities. As identified, in this research there will need to be sufficient time allowed for electronically linked team members to firstly become acquainted with each other before commencing any team activities. The use of team

building exercises would be recommended during this phase. Even in those instances where team members have already met in face-to-face situations and/or already know the other team members it will be necessary to make allowances for the communications difficulties. These can arise from interacting through a medium which removes much of the normal social interaction aspects of teamwork and interactive communication elements such as body language, facial expressions etc. However, this research indicates that internet linked teams can be efficient and can provide an enjoyable experience for the members. This suggests that there is a potential for considerable future savings in the area of team interactions for international businesses.

Table 1. Student participant and respondent numbers by country, university and study subject

University	Country	Subject being studied	Number of students participating	Number of students responding to the questionnaire
Central Missouri State University	USA	Management Information Systems	15	1
East Carolina University	USA	Core Management Information Systems	6	4
George Mason University	USA	Leveraging Information Technology	26	12
Seattle Pacific University	USA	Introduction to Information Systems	8	6
Texas Christian University	USA	Core Information Systems	93	7
The Memorial University of Newfoundland	Canada	Core Information Systems	24	8
Université Laval	Canada	Marketing and Management of Technology	19	19
Universidade do Minho	Portugal	Information Systems	10	4
Southern Cross University	Australia	Strategic Management	12	12

Table 2. Nature and frequency of respondents' contacts during the project

Contact type	None	1-5	6-20	21+	Don't know
Face to face meetings with local partners	8	18	33	13	1
phone calls to local partner	8	22	35	8	0
phone calls to virtual partner	48	21	3	1	0
faxes sent	50	22	1	0	0
faxes received	62	11	0	0	0
e-mail items sent	0	3	28	42	0
e-mail items received	0	2	27	42	2
hours on chat lines	14	29	27	1	2
minutes on video link	72	0	0	0	1

Table 3. Respondents' views on project aspects

Project aspect	Percentage Disagree	Percentage Agree	z-value
Teamwork			
All team members did their best	27.4	67.1	4.8**
Our team worked well	28.8	63.0	4.1**
Local partners more helpful than virtual ones	28.8	43.8	1.9
Local team members did more work than virtual partners	38.4	26.0	1.6
Defining member roles was easy	27.4	63.0	4.3**
Business plan style			
Really proud of our plan	15.1	65.8	6.2**
Could not have done this plan on my own	35.6	45.2	1.1
Comparison of Real and Virtual Teams			
Virtual teams more efficient than face to face teams	71.2	8.2	7.8**
Virtual teams more efficient than anticipated	38.4	42.5	0.5
Virtual teams more fun than face to face teams	45.2	24.7	2.6
Virtual teams more fun than anticipated	34.2	47.9	1.7
Success/Failure Factors			
Time pressure increases the likelihood of success in a virtual environment	41.1	37.0	0.5
Familiarity with Internet technologies a key success factor	8.2	83.6	9.1**
Cultural similarity a key ingredient for success in virtual environments	45.2	27.4	2.2
Participant's personality a key factor for success in virtual environments	12.3	79.5	8.1**
Overall project evaluation			
Went better than expected	24.7	52.1	3.4*
Would do it again	8.2	83.6	9.1**
Would prefer local teams to virtual teams for the same or similar task	35.6	34.2	0.2
Would prefer to work alone rather than in virtual teams	65.7	13.7	6.4**

* Significant at the 95% level after Bonferroni correction
**Significant at the 99% level after Bonferroni correction

Table 4. Model 1 stepwise regression results

Dependent variable: "It went generally better than anticipated"

Variable	Coefficient	p > F
worked as a real team	0.28	0.0003
virtual teams more efficient than anticipated	0.26	0.0023
local team did more work than our virtual partners	-0.22	0.0016
virtual teams more efficient than face to face teams	0.21	0.0367
more time pressure increases the likelihood of success in a virtual environment	0.18	0.0046

$R^2 = 0.70$

Table 5. Model 2 stepwise regression results

Dependent variable: "Our team worked as a real team"

Variable	Coefficient	$p > F$
everyone did his/her best	0.50	0.0001
virtual teams more efficient than anticipated	0.30	0.0001
really proud of our plan	0.19	0.0072
defining roles went relatively easily	0.14	0.0001

$R^2 = 0.77$

Table 6. Most liked aspects of the project

Project aspect	Number of mentions
Internet knowledge and skills	66
Interactions with other cultures and people	47
Individual and team relationships	30
Developing business skills	17
New and novel experiences	14
Enhancement of efficiency	10
Interesting and challenging experience	7
Freedom of project format	2

TABLE 7. Most disliked aspects of the project

Project aspect	Number of Mentions
Team interaction difficulties	41
Technological inadequacies	27
Communication difficulties	25
Time pressures	22
Different university requirements	17
Project organisation/co-ordination	16
Inadequate prior knowledge	8
Technological faults	6
Time zone problems	8
Technical support	5
Slowness of interaction via the internet	4
Poor project outcomes	3
Lack of privacy	2
Cultural/language problems	2

Table 8. Suggested project improvements

Project aspect	Number of mentions
Better co-ordination across universities	36
More training on the technology prior to the project	30
More emphasis on team building and teamwork facilitation	27
More time for the project	23
Clearer guidelines and direction	23
Better communications links	20
Task tailored to suit all team members	5
Better technical support	3
Improved equipment	2

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