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**INTERNATIONAL MANAGEMENT VIRTUAL TEAMWORK: A
SIMULATION**

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ABSTRACT

As the international environment increasingly turns to electronic communication technologies, experience in manipulating such technologies is in itself a critical learning objective for the 21st century. Especially in the international environment, firm 'best practice' increasingly turns to information and communication technology (ICT) as a means of improving efficiency in using internal firm resources, including management time and experience. As a means of preparing students to participate in this increasingly electronic international management environment, this paper reports on the development of a multi-phase, term length "virtual team" active learning simulation in the undergraduate academic environment.

INTRODUCTION

Proliferation of cross border communication nodes and advances in the speed and convenience of international transportation has coincided with the rapid growth of international trade in the past several decades. For firms pursuing international markets, the level of international travel to meet market satisfaction demands has increased commensurately (Hill, 2000). At the same time, the environment of management has also changed. "Downsizing" and "rightsizing" have resulted in flatter organizations with fewer levels of information flow and decision-making, requiring more interpersonal skills and an increasing emphasis on teamwork in organizations (Donnellon, 1996). The widespread deployment of information management and computer technology and the development of computer skills has generated an alternate means of achieving much of a firm's market presence and coordination ability through the application of information and communications technology (ICT) to the team effort (Mankin, 1996), substituting for an increasing portion of the cost of transnational employee movement. As a result, international "best practice" increasingly demands the ability of executives/employees to work cooperatively over communication media and computer networks.

As the international environment increasingly turns to electronic communication technologies (Hill, 2000), experience in manipulating such technologies is in itself a critical experiential learning objective for the 21st century. Some of these changes are reflected in the curriculum, with increasing group work and team building exercises as

integral components of course requirements (Jacobs, 2000). Matching international "best practice" increasingly demands the ability of faculty and students to work cooperatively over communication media and computer networks. To that end, this paper reports on the development of one such exercise to develop international "best practice" student performance capabilities.

CONCEPT OF SIMULATION

Simulations are defined as "1. imitation or enactment, as of conditions anticipated; ...4. the representation of the behavior or characteristics of one system through the use of another, esp. using a computer." (Random, 1997, 1205) or alternatively as "3a. imitate the conditions of (a situation, etc) e.g. for training; b. produce a computer model of (a process)." (Thompson, 1995, 1294). These can run the gamut from world encompassing, programmable computer models (Hughes, 1999) to total enterprise simulations (Anderson & Lawton, 1992) to single event role playing situations (Malik, Howard & Morse, 1997). The commonality among them all is the intended reduction of extraneous environmental influences which have little relevance to the issue at hand (whatever that may be). In a similar vein, experiential learning is "... the process whereby knowledge is created through the transformation of experience" (Morse & Malik, 1998). Simulations provide a very real supplement to experiential learning exercises (and vice versa) in preparing students for the anomalies of the post-collegiate environment (Malik, Howard & Morse, 1997).

To adequately prepare for these environmental changes, students must be shown the full range of information and communications technology (ICT) capabilities, to include the ability to create, coordinate, and cooperate in a virtual environment. Already conversant with the technologies associated with email and "surfing the net", students must be shown some of the other, e-business related capabilities and limitations of this exploding technology. Coupled with this demonstration is the need for sensitization of the difficulties of communication without the physical presence of other participants, and the difficulties of transmitting/receiving associated communication cues (Page & Platt, 2000). In the international arena these difficulties are exacerbated by the difficulties of cross-cultural communication in such a non-contact environment. Finally, it is useful, although of lesser importance, to demonstrate

the sometime unreliability of technology as a panacea for interoperability.

THE VIRTUAL TEAM

A virtual team is a group of discrete individuals assigned to achieve a common goal or purpose, identical to other teams. However, a virtual team employs ICT (wholly or in part) to enhance mobility and speed of information by operating both asynchronously and synchronously, generally without collocation (Lipnack & Stamps, 1997). A key to effective virtual teams is alignment of three separate, but overlapping characteristics. The goal must be well defined, and clearly specified. The team must be functional and interactive. And, complementing the above, the technology must be facilitative, and reliable. If these three characteristics coincide, the potential exists to develop the “virtual space” in which the virtual team functions as indicated in Figure 1 (Hornett, 2000).

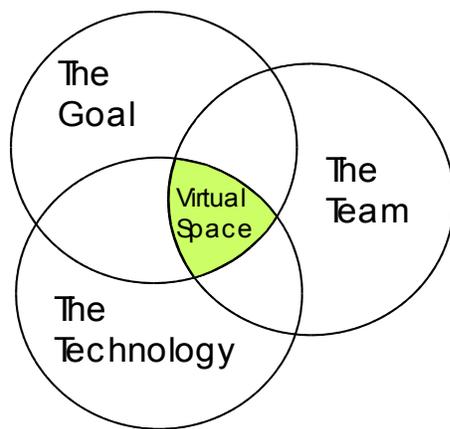


Figure 1. Virtual Team Space

Although a relatively new management tool, there already exists a rich literature identifying both development of virtual teamwork capabilities (Benson-Armer, 1977; Shapiro, 1999, Townsend 1998) and the accompanying difficulties (Heywood, 1998; Duarte, 1999) in imposing this additional skill requirement on participants. To demonstrate these abilities and develop familiarity with the underlying ICT systems, it has become necessary to design an exercise which would simulate the current technological environment, while at the same time highlighting the difficulties inherent with this new form of international management. Such an exercise must incorporate, to the greatest extent practicable, the virtual environment which would be expected to exist for the foreseeable future (Editors, 1999), and increasingly represents the capabilities today's students would be expected to offer in the employment market. To facilitate these design concerns, a term-length exercise in international virtual team management was created, tested and implemented at the

undergraduate level, as described below.

DESIGN

In considering the design of such an exercise, the following initial objectives were used:

- Show that teamwork can be accomplished electronically, while demonstrating the technical difficulty of electronic communication, including the:
 - ease of communication using electronic resources;
 - added complexity of coordinating activities “on-line”;
 - relaxation of time constraints associated with “in-person” international management;
 - difficulties associated with non-verbal communication cues in a non-contact environment.
- Develop a sense of skills acquisition through completion of a virtual exercise, to include:
 - exposure to ICT capabilities not previously used in student exercises (i.e., video conferencing, synchronous editing, etc.);
 - positive reinforcement of existing “on-line” skills;
 - reinforcement/expansion of existing teamwork/cooperation skills.

In addition, these objectives must be incorporated as a transparent addition to the academic material of a subject or discipline, thus enhancing the reality as well as the applicability of such an exercise to the requirements of the curriculum.

Development was constrained by a number of limitations. While all participants were fourth year (senior) undergraduate business majors, the exercise had to be completed within the framework of a single semester, and the administrative confines of a single course. Given the necessity of a first week of enrollment turbulence, and a final week of course wrap-up, the exercise was limited to a maximum of twelve (12) weeks duration. Given these inherent limitations, some artificialities are incorporated in the design, as with any simulation. The following elaborates the construction and implementation of the developed simulation.

A phased approach was used to compliment course content by requiring virtual team development of a term length offshore investment feasibility study in parallel with traditional lectures and technology support. The feasibility study required detailed investigation to determine the potentially most profitable offshore (Asian) location for a new production (manufacturing) facility. This allowed discussion of course concepts while research was being completed. For assessment purposes, two deliverables were required: a virtual team presentation and a supplemental written feasibility study with relevant supporting data.

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To facilitate achievement of these objectives, a number of complimentary technologies were combined to provide the underlying transparent delivery platform. In keeping with the cumulative nature of the exercise, the phased approach was developed as indicated in Table 1. Each

phase, built on cumulative learning and the prior phases, accentuates the complementarity of ICT and corporate research/problem solving. Each phase is described in more detail below.

Virtual Team Project	
Phase of simulation	Operating constraints
Phase 1 – Orientation (1 week) key technology: demonstration laboratory	New Assignment – explain deliverables New technology – explain asynchronous communication
Phase 2 – Research (6 weeks) key technology: asynchronous communication	Prohibit “face to face” communication New technology learning curve
Phase 3 – Integration (3 weeks) key technology: synchronous communication simultaneous editing	New technology – explain synchronous communication, demonstrate software New skills – simultaneous document manipulation & control
Phase 4 – Presentation (1 week) key technology: video conferencing	New technology – explain/demonstrate video conferencing New skills – video/televised broadcasting
Phase 5 – Revision (1 week) key technology: synchronous communication simultaneous editing	None (continue phase 3)
Phase 6 – Delivery (single date/time) key technology: email attachment	None (email attachment/uploading?)
Phase 7 – Feedback (1 week)	None

Table 1. Simulation Phases

Phase 1: Orientation (1 week)

A period of group project orientation was used during this phase to outline the simulation construct, present the learning objectives, identify the two required deliverables and specify the minimum expected behavior. Based on responses to a participant questionnaire, teams were constructed whose members were assigned by the lecturer in order to nearly equally match a series of demographic

characteristics, (i.e., foreign student vs domestic, work experience (yes vs no), teamwork skills/experience (much/some/none) and gender) such that each team would encompass roughly similar levels of this broad range of demographic characteristics.

The resulting virtual teams were composed of four to five members who were only allowed to communicate via electronic means, as illustrated in Figure 2. Initially, asynchronous technology (bulletin board) was used to

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separately provide secure communication between members of each team. The final act in this orientation phase was thus a computer laboratory demonstration of the underlying asynchronous communication software dedicated to each team's internal communications. Once this communication orientation was completed, all teams were transferred into phase two.

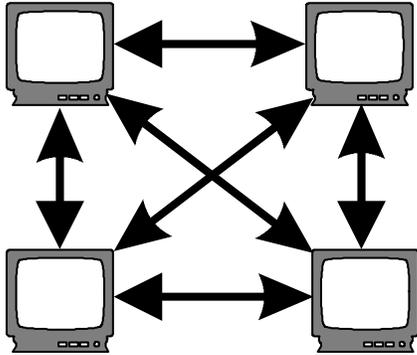


Figure 2. The Virtual Team

Phase 2: Research (6 weeks)

As with any other academic research project, teams were required to assess the assigned problem, divide the workload, brainstorm the issues, and search for relevant information, with the added difficulty of the virtual team environment. Standard research tools were available, to include both Internet and paper resources, analytical software, and access to "expert advice". But, as each team member was linked with the other participants only through ICT, it became necessary for the team members to address team building and information manipulation issues through their single common link – ICT.

In this phase, asynchronous ICT was deemed the minimum necessary, given the restriction of no face-to-face communication, for research and information/work sharing purposes. An asynchronous communication protocol capability was demonstrated in a computer laboratory environment as the transition to this phase. Once the relevant ICT had been demonstrated in the computer laboratory, the remainder of the first week of this phase was used as an introduction and familiarization period, followed by a five week period of information accumulation and sharing. While email dissemination was tried in an early experiment, a secure, dedicated "bulletin board" facility for each different team proved most useful in this phase.

A number of issues arose during this phase. Participant typing and written communication skills were an early concern, which declined with practice (evidence of a learning curve effect). Participants discovered a need to use a wide range of ICT skills including scanning, web browsing, and document sharing to supplement their varied backgrounds in management. Although the level differed by team, all teams shared accumulated skills and knowledge to

raise the ICT manipulation capability of the team as a whole, such that by the end of the sixth week, each team was much more ICT-literate than when they had begun, as attachments from scanned documents, web page addresses, and created text pages were being routinely shared between virtual team members. This development was most noticeable among foreign participants who initially had a lower level of ICT skills than their domestic counterparts.

Phase 3: Integration (3 weeks)

After six weeks of research, most teams had outgrown the capabilities provided by asynchronous communications, and thus were introduced to a new technology – synchronous communications. This technology allowed chat-type coordination (interactive communication), but also the simultaneous remote manipulation of documents for the deliverable creation process (a synchronous editing capability which facilitated multiple simultaneous access to an open document). To facilitate this capability, a laboratory learning exercise was presented as a technology familiarization tool, followed by a short in lab period of guided group interaction. Teams were then returned to the ICT environment to complete their research and required deliverables.

Although evidence of a rapid learning curve effect was again noticeable, a number of new issues arose during this phase, the most significant being the difficulty of switching from asynchronous to synchronous communication modes. Participants who had become accustomed to deposit and depart contributions to the teams growing research journal (bulletin board) found scheduling a simultaneous (synchronous) session for file development and/or document editing difficult. In most cases, teams suggested they reverted to previously learned behaviour, and developed deliverables in subgroups, rather than in full team communications.

Phase 4: Presentation (1 week)

Teams were required to prepare two deliverables: an oral presentation and a substantiating written feasibility report. The oral presentation was to be delivered approximately one week before the written report, to allow teams to revise any written materials on the basis of interaction during the oral presentation. The first deliverable, the oral presentation, was due during the eleventh week, and the final written report was due for delivery at the close of the exercise in the twelfth week.

The oral presentation, deliverable during the eleventh week of the term, required familiarity with yet another ICT platform, as it was to be delivered through video conferencing. The presenting team reported live at one location while the simulated board of directors received the presentation at a second, remote location. Teams were allowed to meet in the video conference facility during periods up to two days before their presentations were due.

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This was thought to replicate firm practice of bringing the team together prior to formal presentation. These meetings were designed primarily to allow participant familiarization with video conference broadcast and receive technology, and as a means to allow some pre-presentation coordination and practice.

The presentation was to consist of an oral delivery by the team, supplemented by MS Powerpoint graphics, followed by a short question period. While the presentation could be delivered using one-way video conferencing, the question session required simultaneous transmit/receive capability between two locations. During the presentation, teams delivered their prepared presentation materials, then responded to questions from the remotely located audience. A technician was provided at each end of the video conference to minimize the impact of technology on team performance. The resulting presentations reflected not only an adjustment to a technology based environment, but the development of participant communications skills.

Phase 5: Revision (1 week)

One of the purposes for the question period during the oral presentation was highlight both strengths and weaknesses within the presentation, and to suggest potential areas for improvement. The following week was then set aside to allow for team revision and finalization of the second deliverable – the written feasibility report. At this point, teams returned to the virtual team environment to finalize the written recommendation using any combination of remote ICT (other than video conferencing) that they deemed appropriate, while revisiting their previously developed virtual teamwork skills with some additional participant familiarity.

Phase 6: Delivery

The final written feasibility report was delivered as an attachment to one of the underlying ICT programs on which the whole exercise is built. No new technology or skills are required here, and the exercise is ended.

Phase 7: Feedback (1 week)

Once the exercise had been completed, several feedback instruments were used to gauge both effectiveness of the simulation (technology) and completion of the learning objectives (Heywood, 1998). These instruments included debriefing and peer evaluation as well as an individual written feedback questionnaire. First, each team was debriefed as a group, from a set of prepared interview questions. These questions mainly addressed two issues – technology/technology skills and team development. This served as a verbal forum for discussion of the entire project as well as the structure and operation of the simulation. Once the presentations were completed, the participants engaged in an open discussion of the exercise to that point,

and nearly unanimously suggested they had unexpectedly broadened their ICT skills immensely.

Second, each team member completed a peer evaluation, through which they provided their individual impressions of the performance of each team member, the team as a whole, and the simulation. This served not only the motivational function of generating participation (thus reducing potential free-riding) but also reported on the positive and negative issues of virtual team performance, as suggested by Heywood (1998).

Finally, each participant was given an open ended questionnaire through which they could identify both positive and negative impressions of the technology, the learning, and the virtual team environment. The resultant data was then available to be used to evaluate the overall effectiveness of the exercise relative to objective achievement and reliability. This feedback could also be used to refine the objectives, content and technology for a future iteration of the exercise.

ISSUES

The exercise above raises a series of issues, some related to the exercise itself, and others of a more general educational pedagogy nature. Among these issues are the following.

Technology: A key assumption in developing this exercise was the desire to use existing, off-the-shelf technology, to replicate that which might exist in the present international management environment. To that end, most of the cobbled-together ICT worked reliably. However, indicative of the existing ICT environment, participants were presented with their share of frustrations through compatibility or availability disruptions. Many of the day to day operational capabilities of the multinational office were built into the exercise design. For example, handling of physical document transfer was made through an intermediary as a substitute for either facsimile or postal/courier movement. This was done to simulate the time lag associated with the physical movement of “paper” resources, and was thought to encourage greater use of electronic means of information flow (i.e., use of scanners for graphics, etc.).

Technology skills: In conjunction with the addition of new technology is the need to develop technology related skills. This became a key issue when the range of participant skills was discovered to be very large. At the upper end were those participants who were thoroughly familiar with the operation of email, bulletin boards, chat rooms and web-surfing, while at the lower end were those participants who had a basic familiarity with email, but little else. The disparity of skills led to a level of frustration among those on the upper end with those on the lower end of the skills range. At the same time, it was the participants on the lower end of the skills range that suggested they learned the most from participation in this exercise.

Non-contact communication: A key objective of the

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simulation was introduction to and development of virtual team skills. Thus, participants were prohibited from using direct, face to face communication, or scheduling physical team meetings, even in the collective laboratory environment. This was successful in achieving the initial objective to the extent that the incentive system allowed enforcement, given that a majority of students would be collocated in the same business school computer laboratory environment. This was immeasurably aided by the existence of a number of off-site computers, inhibiting physical meeting. However, much of the success was dependant on voluntary compliance of the participants with the face-to-face communication prohibition.

Trust: From the previous, heavy reliance is placed on student "honesty" in limiting communication activity to electronic means, given that some participants may be collocated on a single university campus. This is an ongoing problem in virtual teaching/learning (Page & Platt, 2000) and a potential subject for further research.

Cross-cultural issues: The participants in the course in which this simulation has been used are widely multicultural. The two most recent iterations consisted of 50% domestic/50% foreign participants and 35% domestic/65% foreign participants respectively. Non-domestic nationalities represented included Chinese (Mainland, Taiwan and other overseas Chinese) Thai, Sri Lankan, Indian, Malaysian, Chilean, English, German, Swiss, Canadian, and American. Further, the domestic component included a significant (20% and 30% respectively) component of Maori participants in addition to the European majority. This cultural diversity raises a number of issues which can only be briefly mentioned here but are further described in Morse (2001). Incoming levels of ICT skills are an obvious difference, and a problem. Language differences are another problem, as illustrated by the Chinese students who were required to type in English. Further, a wide range of cultural differences leading to differing group behavior significantly affects the development of a virtual team. Surprisingly, many of the participants see the virtual environment as a culturally neutral arena, and do not readily perceive cultural differences except through written language usage.

Free riders: As in any group exercise, the potential to let someone else do the work is increased when assessment is based on a group outcome. To this extent, peer evaluation is a helpful tool. For example, an early peer evaluation instrument in about the third or fourth week serves notice on all participants that they are accountable to their team members as part of the assessment process, thus providing incentive for increased participation. Likewise, the ability of the lecturer to monitor each teams ICT platform implicitly suggests the need for each participant to be observed as making contributions, whether those contributions were assessed or not. However, these control devices themselves contribute to the difficulty associated with the issue of trust as identified above, as they imply that an individual team member is perhaps not trusted as a full team participant.

These and a number of other issues provide the foundation for the next step in multicultural virtual team simulation research. Yet, it is the need to provide such skills and capabilities to a wide range of culturally different participants which renders these issues secondary to that of exercise development.

SUMMARY

This paper has discussed the creation of an experiential learning exercise to attempt to replicate international 'best practice' as a means of preparing final year undergraduate students for the technologically sophisticated ICT environment they can expect to face after graduation. While the context of this exercise has been taken from the field of international management, it could just as easily apply to any management subject/study which is composed of numerous remote locations. This exercise simply combines the capabilities of a number of existing ICT platforms which provide the communication mechanism for a virtual team assignment. While it has been successful in raising participant ICT skills, it has raised new issues of trust, multicultural impacts and technology for further examination; issues which are relevant to not only management education, but the wider area of virtual team management.

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