Building successful on-line learning communities across international boundaries: a Case Study

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ABSTRACT

The development of on-line learning communities across international boundaries is now a viable proposition using available asynchronous technologies. As has been reported in previous papers (Grodzinsky, Griffin & Jefferies, 2002; Griffin, Grodzinsky & Jefferies, 2002) such use has proved to be extremely valuable for supporting the teaching of computing and ethics. For example, not only does asynchronous computer conferencing offer new opportunities for students to gain valuable first-hand experience in using such technology to communicate with peers in other countries but it also facilitates them gaining a more direct appreciation of the cultural, legal and ethical differences that abound. However, the setting up of successful 'virtual' communities with campus-based final year undergraduates based in three different countries posed a number of issues that had to be addressed prior to implementation. Prime amongst these were concerns as to how to overcome some of the perceived barriers to establishing effective groups within a text-based virtual environment across international boundaries and how to integrate use of the technology within the traditional face-to-face context of learning.

This paper will, therefore, report on how this blended approach to learning and teaching was developed and implemented using the Belbin Self-Perception Inventory (1981). It will then report on research undertaken into the impact that this strategy had on how individuals actually operated within their teams in the virtual environment. It will also detail some of the findings from this case study when these perceived Belbin types were matched with transaction analysis (Wortham, 1999) and types of messages posted (Garrison, Anderson & Archer, 2001). Finally it will draw conclusions from the case study in order to make recommendations for future implementation of asynchronous computer conferencing within a campus-based Higher Education (HE) context.

INTRODUCTION

This fieldwork study again involved computing undergraduate students in three universities: University of Limerick in Ireland, De Montfort University in England and Sacred Heart University in the USA. As had been done in the previous fieldwork study, students from each of the three universities worked together in virtual groups to solve moral dilemmas. Student feedback and data from our previous study (Griffin, Grodzinsky & Jefferies, 2002) indicated that a more formal establishment of roles within virtual groups was instrumental in contributing to the success of the group. Therefore, in this study, tutors established groups comprised of two members from each site. These members were selected on the basis of the Belbin (1981) Self-Perception Inventory that requires individuals to determine their perception of his/her own behaviour within a group.

ESTABLISHING THE GROUPS

Students were, at the outset, asked to complete the Self-Perception Inventory and were then classified according to one of 8 roles identified by Belbin (1981) – Chairperson, Shaper, Monitor/Evaluator, Team Worker/Builder, Company Worker/Implementer, Resource Investigator, Completer/Finisher or Plant. See Table 1:

Type	Symbol	Typical Features	Positive Qualities	Allowable Weakness
Company Worker	CW	Conservative, dutiful, predictable.	Organising ability, practical common sense, hard-working, self-discipline.	Lack of flexibility, unresponsiveness to unproven ideas.
Chairman	CH	Calm, self-confident, controlled	A capacity for treating and welcoming all potential contributors on their merits and without prejudice. A strong sense of objectives.	No more than ordinary in terms of intellect or creative ability.
Shaper	SH	Highly strung, outgoing, dynamic	Drive and a readiness to challenge inertia, ineffectiveness, complacency or self-deception.	Proneness to provocation, irritation and impatience.
Plant	PL	Individual, serious-minded, unorthodox	Genius, imagination, intellect, knowledge	Up in the clouds, inclined to disregard practical details or protocol.
Resource Investigator	RI	Extroverted, enthusiastic, curious, communicative.	A capacity for contacting people and exploring anything new. An ability to respond to challenge.	Liable to lose interest once the initial fascination has passed.
Monitor-Evaluator	ME	Sober, unemotional, prudent.	Judgement, discretion, hard-headedness.	Lacks inspiration or ability to motivate others.
Team Worker	TW	Socially oriented, rather mild, sensitive	An ability to respond to people and situations, and to promote team spirit.	Indecisiveness at moments of crisis.
Completer (Finisher)	C	Painstaking, orderly, conscientious, anxious	A capacity for follow-through. Perfectionism	A tendency to worry about small things. A reluctance to "let go".

Table 1: Belbin (1981) classifications of group roles

These classifications were then used to group the students together for the purposes of the assignment. The underpinning rationale for using this particular instrument was to try to establish balanced teams by bringing together people with perceived individual strengths who had the variety of requisite skills needed for group working to see if this improved the overall performance of the group as well as the group dynamic. However, it was difficult to ensure that all 8 group roles were covered in all groups because the groups were limited to 6 students and on some sites, students were permitted to choose a partner to work with on the same team. To an extent this was overcome by looking at both 1st and 2nd preferences, but even then only 3 out of the 8 groups had all of the 8 roles represented. However, 5 out of the 8 groups had a Chairman type and 7 of them a Completer. The roles designated by Belbin as being "inward" and "outward" looking roles were also fairly evenly distributed.

SCAFFOLDING THE PROCESS

Once the eight groups were established encouragement was given, via the Blackboard system, for members to begin by socializing with each other.   Such initial socialization was encouraged because research (e.g. Jarvenpaa and Leidner, 1998) has identified that the building of trust is important to the development of virtual teams and that this can be achieved through social communication such as exchanging names, interests and other personal information.

However, scaffolding of the learning experience was further achieved through initially requiring the students to focus on group work activity and to collaborate in production of a strategy for approaching the assignment itself as an interim deliverable. All of the groups, therefore, started socializing by posting messages about themselves. Once such initial introductions had taken place, groups debated their strategy until agreement was reached. Having posted their strategy by the deadline imposed, the groups then, as they had in the previous fieldwork study, chose a scenario from the selection supplied by the course tutors. The groups then worked over the ensuing period of time using text-based asynchronous computer conferencing (ACC) tools provided within the learning management system, Blackboard, to produce a report.

GROUP ACTIVITY

As regards group activity within this fieldwork study, it was evident that all of the groups progressed through the 'forming', 'storming', 'norming', 'performing' and 'adjourning' phases of group development modeled by Tuckman (1965) although there were some slight modifications. Such modifications to behaviour are likely to have been caused by the strategy adopted for implementation as well as by the virtual nature of the conferencing environment. For example, in the 'forming' stage (Tuckman, 1965) all of the groups began by having a high dependency on tutors in the face-to-face (F2F) context for giving them guidance and direction as to how they were going to use the conferencing environment. Students were also dependent at this stage upon the tutors for setting them up into their groups within the virtual environment and had to have the various tasks outlined to them. This was achieved both verbally in the F2F contact sessions as well as through provision of both "hard" and "soft" copy written text.

During this stage tutors found that some of the students exhibited concern over using virtual conferencing as this was a new experience for them whilst others were

extremely enthusiastic about having the opportunity to communicate with students in other universities. For example there were some concerns expressed by a few students regarding undertaking what they perceived to be "an experiment" and group work that would count towards their final classification. In order to overcome such concerns, the tutors had to be extremely supportive and encouraging to those students who were worried about the ensuing experience. Tutors thus had to make it very clear to students what their expectations of them were. For example, how such usage of the conferencing environment related to the learning outcomes for the module, how the students would be expected to use the discussion board, together with the safeguards that were in place to minimize any potential problems.

Discussion of these and any other concerns raised were undertaken with each class in the F2F contact sessions. This could, of course, be aligned with one of the defining aspects of this phase identified by Tuckman (1965) - where students will test the tolerance of the leader/tutor. During the next stage (storming) the necessity for vying for position was largely eliminated by virtue of the fact that the students had undertaken the Belbin (1981) Self-Perception Inventory. Students used the results of these to assign themselves roles and generally found this to be useful. For example, it made them much more aware of group dynamics in development of their strategy:

> *"I think the group allocation of roles worked well"*
> *"I thought this strategy was grand. The delegation of work in the group worked well".*

However, there were, as Tuckman (1965) predicted, barriers to communication at this stage. For example one student commented:

> *"It was hard to get my ideas across through text instead of verbally and this is something I must work on. This project made me think a lot and it was difficult to come up with a final conclusion.Is it fair? Isn't it fair? There were so many advantages and disadvantages to such a system."*

Nevertheless, requiring students to provide short biographies of themselves helped most of them overcome any initial reticence in making their first posting and one student commented:

> *"The threaded discussions proved an easy and valuable resource to utilise in combining everyone's ideas, arguments and suggestions".*

The next stage (norming) evidenced that, in the main, individuals had accepted the various roles:

> *"As Company worker, I felt the role suited my practical, common sense and less creative aptitude towards solving problems."*

Apart from one or two students, general commitment to the group was strong although some of this commitment was impacted by the workload with which students were variously burdened. As a consequence some students withdrew from making any contributions to the discussion board during this phase. Some of the students who felt the need to explain their reasons for such reduced contribution later posted apologies for their lack of activity.

At the 'performing' stage the groups did evidence a clear focus in knowing why they were doing the exercise and what was expected of them. They also exhibited a high degree of autonomy and made, as expected, more rapid progress towards completion of the tasks as the deadline approached. Once again some groups exercised their own discretion in determining how late submissions should be dealt with. For example, when mitigating circumstances were offered, the group determined that the individual concerned should not be prevented from participating in the rest of the work. At the end of this phase, all of the groups were successful in producing their report to deadline and the grades achieved were high. Finally the majority of the groups (7 out of 8) engaged in the 'adjourning' phase by posting messages indicating their pleasure at having worked with each other, wishing team members luck with their future and their exams, and generally thanking others for their efforts. Overall perception of the whole experience was positive with one student commenting:

> *"Being part of a group in a project of this kind opened my eyes in a way to the importance of communication among members in order for further development of the work".*

Thus, despite the fact that the groups never met F2F there was clear evidence that group identity and cohesiveness had been developed.

ROLES MAPPED TO BELBIN TYPES

When the actual postings were analysed it was also interesting to note that, in each of the groups, students were clearly adopting different roles as evidenced by the quantity and types of messages they were posting. See Figure 1:
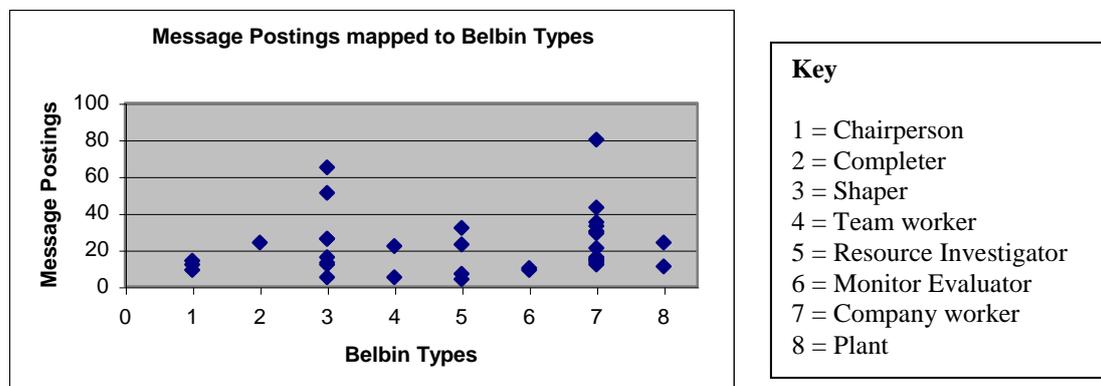

Figure 1: Total number of Message Postings mapped to Belbin Types

Such messages were then further categorized according to the Garrison, et al, (2001) Cognitive Presence model – 'Triggering', 'Exploration', 'Integration' or 'Resolution' in order to determine whether or not any correlation could be found between the identified Belbin (1981) types and the categories of postings made.

ANALYSIS OF COGNITIVE PRESENCE

There are four categories in the cognitive presence element within the model proposed for the analysis of critical thinking and practical enquiry (Garrison, 2001). These are:

triggering events, exploration, integration and resolution. (There is a fifth category to represent non-cognitive interactions such as arranging meeting times etc. This was not used in this study.)

Each category is then defined using a set of descriptors. The following table shows the categories, their descriptors and indicators.

Category	Descriptor	Indicator
Triggering events	Evocative	Recognizing the problem
		Sense of puzzlement
Exploration	Tentative	Divergence within community
		Divergence within single message
		Information exchange
		Suggestion for consideration
		Brainstorming
		Leaps to conclusions
Integration	Provisional	Convergence among group members
		Convergence within single message
		Connecting ideas – synthesis
		Creating solutions
Resolution	Committed	Vicarious application to real world solutions
		Defending solutions

Table 2: Categories for analysis of cognitive presence in the community of inquiry model (Garrison, 2001)

For the purpose of this study, the most appropriate unit of analysis was the message as this combined "the flexibility of the thematic unit, which allows coders to capture a unit in its natural form, with the reliable identification attributes of a syntactical unit" (Garrison, 2001).

Types and the evidence gained from this indicated that, whilst all of the students contributed messages that could be categorized as "Exploration", some students identified by their Belbin (1981) type were evidencing different patterns of message posting. For example, those students who perceived themselves as being "Resource Investigators" posted most of the "Triggering" and "Resolution" types of messages, whereas the "Company Workers" and "Completers" seemed to contribute more in the way of "Integration" and "Resolution" type messages. See Figures 2-5:
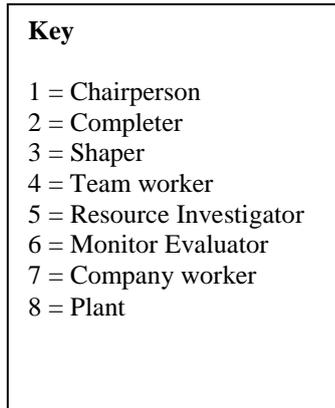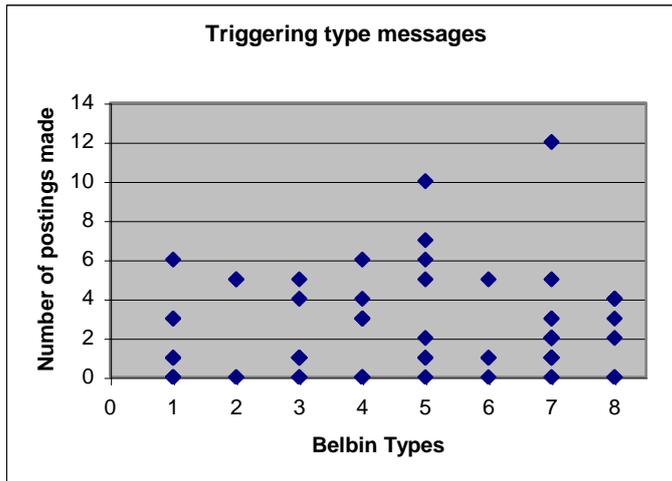
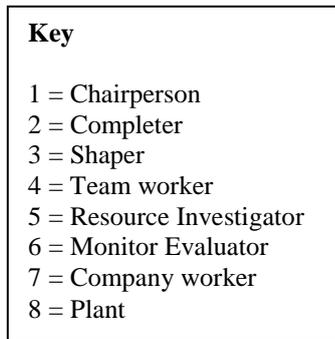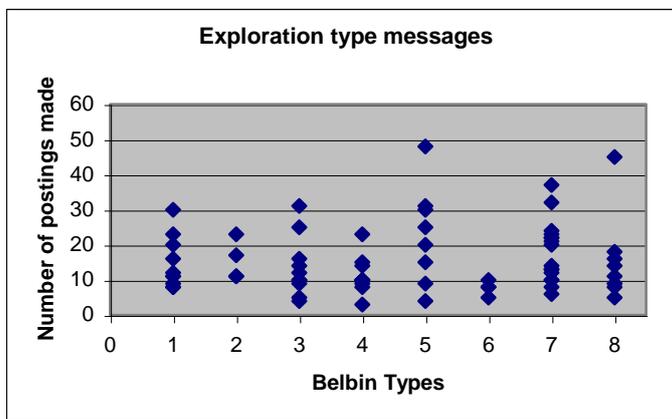**Figure 2: Triggering type messages mapped to Belbin Types**

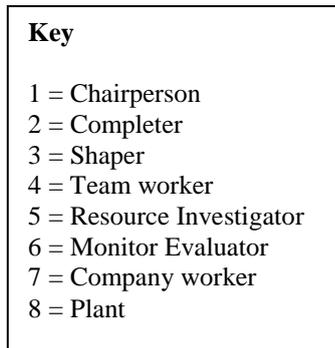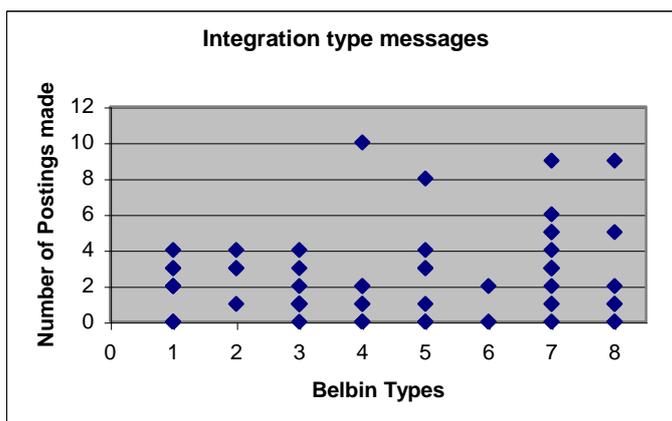**Figure 3: Exploration type messages mapped to Belbin Types**

Figure 4: Integration type messages mapped to Belbin Types

Resolution types messages

Number of postings made (y-axis: 0, 2, 4, 6, 8, 10)	Belbin Types (x-axis: 0–8)

Key

1 = Chairperson
2 = Completer
3 = Shaper
4 = Team worker
5 = Resource Investigator
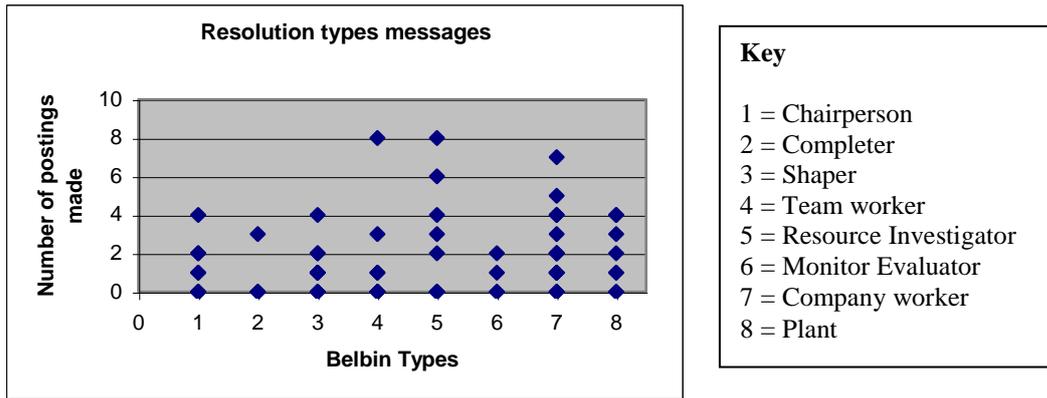6 = Monitor Evaluator
7 = Company worker
8 = Plant

Figure 5: Resolution type messages mapped to Belbin Types

TRANSACTION ANALYSIS

Other findings using transaction analysis (Wortham, 1999) indicated a propensity towards a "star" network pattern of communication when tutor intervention was undertaken in order to prompt and guide student discussion on a particular topic. See Figure 6:
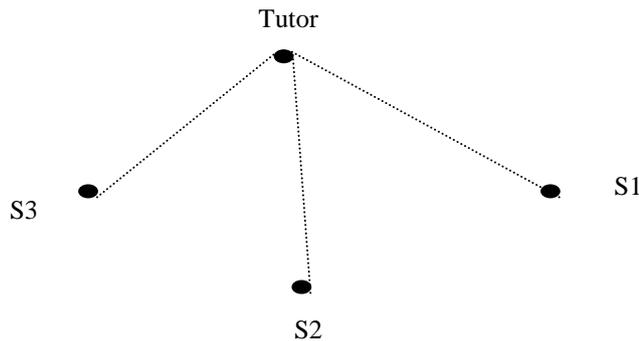
Tutor

S3

S1

S2

Figure 6: Transaction analysis on a thread where tutor intervention has been undertaken

When tutor intervention was for the purpose of giving administrative/procedural guidance transaction threads usually terminated. (Nurmela, Lehtinen and Palonen in a similar but more restricted study --18 students, 1 tutor and 2 supervisors found a similar pattern of communication).

Without tutor intervention the patterns of contribution evidenced longer threads and greater participation by group members. See Figure 7:
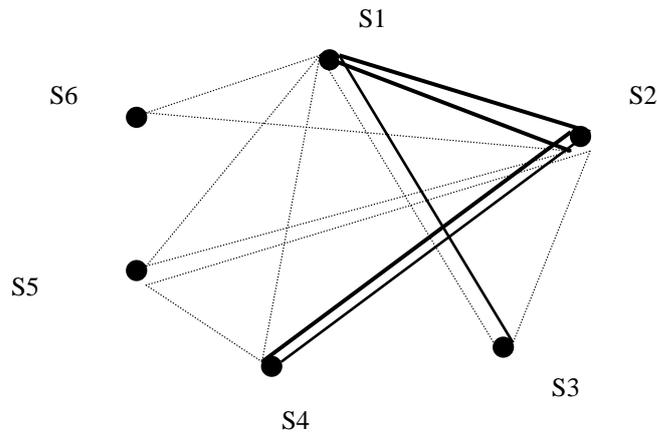

Figure 7: Transaction analysis of one discussion thread *without* tutor intervention

This diagram illustrates that within this particular thread that all of the group members were posting messages to each other. However, the thicker lines indicate more message posting by some individuals.

Nevertheless, engagement with the module outside of the F2F contact times was clearly evidenced by the number of student contributions made and the messages themselves indicated development of analysis and reflection. Tracking of student contribution also helped the tutors to know which of the students was not engaging with the discussion and to then follow this up in the F2F sessions.

CONCLUSIONS

Overall, use of the Belbin Self-Perception Inventory was found to have been of help to both tutors and students in a number of different ways. For example, tutors found it to be useful in assigning individuals to groups. However, by allowing students to choose their own partner on some sites inevitably constrained the ability to set up "balanced" groups, because it was found that some of the students who chose to work together as a pair were designated as being of the same Belbin type. Whilst this inevitably meant that some groups did not have all of the requisite roles represented, this did not, in fact, appear to impact the overall assessment performance as the majority of the highest grades were achieved by groups who were not, in Belbin's terms, completely "balanced".

Nevertheless, students found use of the Inventory useful as it both raised awareness and focussed their attention on different group roles. Some of these perceived roles were then used in developing group strategy and in task assignment although preliminary findings were that conferencing activity actually undertaken did not always reflect the Belbin types identified. This may, of course, point to the fact that some of the students took a less than serious or honest approach towards self-assessment which meant that the roles identified did not then reflect their group role

propensities. For example one group, in particular, was let down by the fact that two members designated as Chairman and Resource Investigator failed to fulfil their roles. There was, however, a clear indication in most groups, especially as the deadline approached, that Completers and Finishers took their roles seriously and integrated and polished the final submission.

RECOMMENDATIONS

Based on a literature review and fieldwork studies undertaken the following incremental set of guidelines are now recommended to support successful integration of ACC within a campus-based HE context:

- Choose an appropriate, focussed module that has a discursive nature requiring development of critical analysis.

- Determine strategies for integrating use of the ACC environment into the F2F sessions as well as defining how such use is going to be assessed.

- Brief students as to the monitoring that will be undertaken and how they are expected to use the environment.

- Propose introductory exercises for students to undertake using the technology.

- Encourage students within the F2F contact sessions to organise themselves and use the conferencing environment effectively.

- Facilitate consideration of group roles in strategy development and implementation.
- Encourage development of critical evaluation and responsibility for learning through adopting a non-moderating role within the conferencing environment.

- Monitor the environment on a regular basis to pick up any issues that can then be addressed in the F2F contact sessions.

- Facilitate both intrinsic and extrinsic reward for using the conferencing environment.

Finally, placing each of these guidelines within an activity framework, a generalised learning model for implementation of asynchronous computer conferencing within a predominantly campus based context of learning has been developed. Such framework can then be used to construct either campus based or collaborative off site groups. See Table 3:

CONFERENCING ACTIVITY	TUTOR ACTIVITY *(Individual or in collaboration with other tutors involved in the project)*	STUDENT ACTIVITY
Preparation for conferencing	Choose an appropriate (discursive) module Design delivery Set up exercises: • Introductory exercises • To provide extrinsic reward Brief students	Develop skills: • Critical evaluation • Groupwork • IT
During conferencing	Encourage Monitor Integrate with F2F Assessment	Socialise Form group strategy On task Task completion Adjourning

Table 3: A generalised learning model for implementation of ACC within a predominantly campus based context of learning

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