A Longitudinal Analysis of GSS Use in the Case Method Classroom

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Abstract

This exploratory study reports on term-long use of a discussion-based GSS by 137 undergraduate business students in a case-based core MIS course. We develop a model of student participation in case-based learning environments and examine the role and impact of technology on participation. Overall, participation increased significantly as students became more comfortable and adept with the technology. The GSS appeared to provide marginalized students with a ‘voice’ in the classroom, and allowed prolific participators an additional outlet. However, there were some negative consequences, as some students had difficulty with multitasking – typing and listening. We also found that the novelty of ideas was consistently low once a strong idea had been submitted. As a result, we advocate adoption of this technology, but suggest that its use be more structured, dividing class time into “technology” (GSS only) and “human” moments (oral discussion).

1. Introduction

The use of information technology (IT) to support teaching and learning in formal education settings is increasing at a dramatic rate [15]. Yet studies to determine the effectiveness of the use of this technology continue to lag behind practice. This is particularly true in the use of IT for education in business schools. Relatively little research has been conducted to assess how IT may be effectively integrated in real-time with various teaching methods that are used in business schools today.

The purpose of this exploratory study is to consider the role and impact that one technology, group support systems (GSS), might have on student participation when a face-to-face case teaching method is used. Unlike traditional, lecture-based methods, the case method uses descriptions of specific business situations (“cases”) rather than textbooks. Instead of giving lectures, the case method instructor leads a discussion of these business situations [12]. Instructors and students participate equally in direct discussion of business cases or problems, with a view towards developing knowledge that can be used in similar situations. As such, it is the responsibility of the instructor to generate, sustain, and structure a discussion in which major points can emerge and be applied to different contexts. Students share responsibility by participating actively – not just listening.

This study grew out of the desire to improve on one major shortcoming of the case method – time. Given growing class sizes (50+), it is virtually impossible to achieve meaningful involvement from all students in a 90-minute class. Moreover, there is typically a small number of students who find it difficult to participate in the classroom. It was our desire to give these marginalized participators a ‘voice’ in the classroom that led us to adopt a level-1 GSS [6] in two core-MIS classes this past school year. This paper reports on the results of using this system, and its impact on student participation.

2. Literature review

The literature review for this study begins with an overview of the work that has been done on the use of IT for management education. This is followed by an examination of the case method of teaching and its strengths and weaknesses. This section concludes with an argument as to why GSS might be useful for face-to-face case method discussion in the classroom.

2.1 IT in management education

Leidner and Jarvenpaa [8] suggest five possible learning theories that impact the use of IT for business education. The objectivist model is based on stimulus-response theory which suggests that change (or learning) comes about as a result of reinforcement. Technologies that automate teaching processes (e.g., computer-assisted learning, distance learning) best fit this model of learning. The constructivist model holds that individuals build their own, idiosyncratic reality. Information technologies like learning networks and the Internet best embody this perspective. The cognitive and cooperative models extend the constructivist perspective to include in the former case the establishment of long-standing mental models that serve as the bases for heuristic problem-solving, and in the latter case interaction between individuals.
Technologies like synchronous and asynchronous groupware, in the classroom or across distances, support this theory. Finally, the sociocultural model acknowledges that learning is rooted in the cultural background of the student. In the last four cases (constructivist, cognitive, cooperative, sociocultural), groupware-supported learning is said to play a primary role in supporting learning. Alavi and her colleagues support this conclusion [1,3,4], asserting that three attributes define effective technology-supported learning environments: active learning and the social construction of knowledge, cooperation and teamwork in learning, and learning through problem solving.

It nevertheless remains that the integration of technology into the classroom is slow. Leidner and Jarvenpaa cite a somewhat dated (1988) U.S. Congress study supporting this conclusion [8]. More recently, a study of 34,000 American university faculty showed that while the majority (nearly 9 in 10) favored the use of computers and the Internet for instruction, only 38% use IT to create class presentations, and only 35% use the Internet [11]. Young concludes that using IT (in his case, the Internet) in the classroom is a twofold challenge [15]. For instructors, the challenge lies in designing curriculum that showcases the technology and provides demonstrable results. Moreover, they appear to have to do so using an active team approach, not the usual individualized approach they may be most familiar with [5]. For students, the challenge lies in mastering the use of this technology, and once empowered, using it constantly to learn and to reinforce learning.

In sum, it appears that IT can potentially enhance learning in management education by offering the possibility of enriching the learning experience, and by allowing individual learner’s needs to be met more readily. In the case of cooperative and constructivist learning, advanced IT (groupware and the Internet) may offer the means to deliver meaningful management education.

2.2 The case method

As one Dean of a leading North American Business School recently put it [13]: “Teaching using the case method requires outstanding faculty – persons who can interact dynamically with students, leading a discussion to a desired outcome.” There are three critical components to the case pedagogy: the case study itself, the instructor, and the students. Erskine, Leenders, and Mauffette-Leenders define a case as “…a description of an actual administrative situation, commonly involving a decision or problem.” [7:10]. Lawrence adds “A good case is the vehicle by which a chunk of reality is brought into the classroom to be worked over by the class and the instructor.” [7:11]. Thus, cases are distinguishable from other types of teaching materials along three dimensions: they are descriptions of real situations faced by real decision-makers in real companies (in other words, they are not ‘made-up’ by the instructor); they typically contain either too little or too much information, reflecting the imperfect world of managerial decision-making; and they are used as catalysts for discussion.

Cases may be classified along three dimensions [9]: conceptual, analytical, and presentation, representing the work that both students and instructors must put into preparing for a case discussion, and the learning that ensues. The conceptual dimension concerns itself with the theory or management principle that is at the center of the case. The analytical dimension deals with resolving the problem(s) presented in the case and arriving at a decision, and the presentation dimension addresses the challenge of communicating this decision in a terse, meaningful, and convincing manner. Learning occurs exponentially in three interrelated stages: individually, when students read the case and conduct their own preliminary analysis; in small teams, where groups of 4-6 students discuss the case, not with a view towards consensus, but to provide each of them with an opportunity to air and test their ideas; and finally in a large group discussion, typically the classroom, where an instructor-led discussion takes place. This study is concerned with the latter stages, particularly the third stage – the classroom.

In contrast to lecture-based instruction, students engaged in the case method are more actively involved in the learning process, and exercise different skills at different times during the three learning stages. Individually, they must read background articles, textbook chapters and other materials in order to understand the nature of the problem presented in the case. They must apply their knowledge, based in part on this reading as well as on their individual work experiences in order to develop a viable solution to the problem(s) in the case. Finally, they must be able to communicate effectively orally and in writing when meeting in small teams to discuss the case, and then in the classroom when challenged by their peers and the instructor. Figure 1, adapted from Mauffette-Leenders, Erskine and Leenders [9], is a conceptual model that illustrates this process, and suggests that a number of Individual, Group, Case, and Technology factors affect this process. Unlike lectures, case classes are not pre-programmed, or even scripted. While instructors may have a set of discussion questions in mind, and even some reference material, they cannot control what students say, how they say, and how often they participate.
FIGURE 1: Case method learning process

The model argues that the key to case learning is student participation, first in small teams, then in the classroom. However, our experience and that of others [7,9,10] suggests that equal participation in the classroom is difficult to attain, and the single largest shortcoming to this pedagogy. As Figure 1 illustrates, student participation is directly affected by the case analysis done by the student and by Individual, Group, Case and Technology factors mentioned previously. If the key to learning with the case method is active student participation, any intervention that encourages and supports that participation may be valuable. In this study, we focus on the Technology aspects of the model.

2.3 GSS and the case method

Leidner and Jarvenpaa [8] assert that in the case of constructive, cognitive, and cooperative learning, such as embodied by the case method, instruction is skewed toward the student, not the instructor. Its purpose is knowledge creation, not dissemination. Learning is more conceptual than procedural, thinking is of a higher order, and effects are long-lasting. The impact of technology on individual behavior like participation and attention is high.

There is a strong body of knowledge that suggests GSS have had a positive impact on group decisions, performance, and member satisfaction [cf. 5, 6, 10]. They appear to do so by providing the means for individuals in groups to interact, by providing a structure for their interaction, and by creating a permanent record of this interaction. Nonetheless, results from over a decade’s worth of research are mixed. It appears that GSS are a technology in search of appropriate applications [5].

One such application might be the face-to-face case classroom. As Figure 1 shows, technological factors affect potential participation. Asynchronously, these might include presentation software like PowerPoint, or analytical software like Excel (spreadsheets). Synchronously, these technologies might be used in the classroom to include more students (e.g., videoconferencing [4]) or to encourage more participation by the same number of students. In the latter case, GSS have been used to link students from different locations [4]. However, we could find no study that used a GSS for one group at one site as an adjunct to the classroom discussion, and as a means by which parallel discussions might be supported.

The foregoing review suggests that while the case method may be more suitable for managerial education, it is not without its shortcomings. Its major problem lies in ensuring equal and equitable participation by all students. GSS might provide one means by which this goal might be achieved. This leads to our research question:

Are GSS an effective means by which to increase student participation in a case method classroom?

3. Methodology

In order to assess the impact of IT on student participation in classroom case discussions, two methods were used; (1) a quantitative analysis of electronic comments made throughout the course, and (2) a qualitative analysis of post-course student interviews. Participants in this study included 137 undergraduate students enrolled in two sections of an introductory Information Systems course at a large Canadian business school. It is important to note that this course was 100% case-based. Each student had access to a personal notebook computer and a 2 Mbps wireless connection to the school’s local area network (LAN) during class. A simple Level 1 GSS / topic commentator (referred to as the “e-forum”) was developed, and students were given instruction on how to use the system at the beginning of the course. (See Figure 2 for a screen-shot of the e-forum). Prior to the start of the course, the e-forum was seeded by the instructors with 22 discussion categories – one for each class, represented by the title of the case to be discussed that day. Students were invited to post messages before, during and after class. This study focuses its analysis on messages posted during class, as determined by each message’s date and time stamp.

Students were provided unfettered and unmonitored access to the discussion thread during class sessions. That is, a student could decide to type a comment or respond to another’s comment even while another was talking. Thus, the class session became a mix of parallel conversations – oral ones with the instructor engaging individual students, and written ones, with students keyboarding messages to the e-forum and to one another. As one instructor put it: “It’s strange at first to hear keyboards clicking away while you’re trying to engage the class in discussion, but it works. It seems that the most provocative questions and
comments generate both a flurry of hands (raised to offer comments) and the clckety-click of keys.”

The teaching case culture of the school is such that in-class participation is strongly encouraged and heavily weighted in student evaluations. In the Information Systems course, the total participation weight was 25% - 15% for in-class participation, and 10% for e-forum participation. Students were told by the instructors that they would be responsible for their participation across both dimensions – orally and on the e-forum.

4. Results

4.1 Quantitative analysis of e-comments

A total of 3,873 unique comments were posted during the three-month course (January 15th through April 10th, 2001). For the purposes of this study, only synchronous comments were used (i.e., those that were posted during class time). After removing the asynchronous messages, the final valid sample contained a total of 2,113 participant messages.

Using a scheme adapted from Trauth and Jessup [14], quantitative analysis involved two phases: (1) a “snapshot” assessment of a random sub-sample of 500 messages, categorized according to an emergent coding scheme; and (2) a longitudinal assessment of changes over time, using the full dataset of 2,113 messages. A treatment-blind coder was used to code all the comments after the researchers had agreed to main categories for the comments.

The coding scheme, including key factors and sample quotes, is shown in Table 1. It was derived from the conceptual model presented in Figure 1 as well as the preliminary analysis of the data, and specifies the dimensions of participation. Summary results for the initial sample of 500 cases appear in Table 2.

### TABLE 1: Factors and sample quotes

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sample Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty – contains original ideas, insights or analyses (coded “None” – “Moderate” – “Substantial”)</td>
<td>Case: RCA Records – “Really, we know what to download because we hear it on the radio, brought to us by record labels. Without hearing it on the radio, we would not download it on Napster. Therefore, Napster could not operate (in the same fashion that they are currently operating) without record labels.”</td>
</tr>
<tr>
<td>Agreement – agrees or disagrees with a prior post (coded “None” – “Agree” – “Disagree”)</td>
<td>Case: Data Warehousing at Canadian Tire – “I saw it a little differently…”</td>
</tr>
<tr>
<td>Example or analogy – provides example or analogy to support argument</td>
<td>Case: Data Warehousing at Canadian Tire – Analogy: “I think part of the problem is the mysticism associated with technology and computers. I think that many executives treat computers as witchcraft or religion. They realize that it doesn’t have all the answers, but are too afraid of being cursed if they say no.”</td>
</tr>
<tr>
<td>Reference – points to other knowledge sources</td>
<td>Case: Thawte Consulting – Explicit: “See my post under ‘I wanna work for Mr. Shuttleworth…’ I talk about this very issue…”</td>
</tr>
<tr>
<td>Information request – contains a request for information from other participants</td>
<td>Case: Frito-Lay, A Strategic Transition – [Student], I am confused with your response, just because you sell something easier in different locations doesn’t mean it is a commodity or not. Or I am wrong? In my opinion, neither coke nor shirts or sweaters are commodities, but they are marketed very differently, what do mean by that?”</td>
</tr>
<tr>
<td>Humor – contains humorous content</td>
<td>Case: Homegrocer.com – Stud. #1: “I’d pay up to $40 in delivery charges…” Stud. #2: “If you want, for $40 I’ll pick up your groceries for you next time I go to Loblaws. I’ll even pick out the good, unblemished, peaches…”</td>
</tr>
<tr>
<td>Social – contains social or personal content</td>
<td>Case: Providian Trust – “It’s crazy in here!!! Join the cool club!!”</td>
</tr>
</tbody>
</table>

The average length of the 500 randomly-selected messages selected for coding in Phase I was 475.7 characters (s.d. 264.4). The distribution between sections was fairly evenly split, with 224 (44.8%) messages originating from the 68 students in Section 1, and 276 (55.2%) messages originating from the 69 students in Section 2. Fewer comments were posted in the first 11 classes (187, or 37.4%) compared with the final 11 classes (313, or 62.6%).

Over 300 comments (60.4%) contained a novel comment, and 15.2% of these were deemed to be “substantially” novel. Most comments made reference to an earlier post, with 38.6% agreeing, and 24.2% disagreeing with the earlier comment. A total of 33
TABLE 2: Coding results

<table>
<thead>
<tr>
<th></th>
<th>Random</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average message length (chars)</td>
<td>475.7</td>
<td>476.9</td>
</tr>
<tr>
<td>(s.d. 264.4)</td>
<td>267.27</td>
<td></td>
</tr>
<tr>
<td>N messages</td>
<td>500 (100.0%)</td>
<td>2113 (100%)</td>
</tr>
<tr>
<td>Total messages from section #1 (68 participants)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>section #2 (69 participants)</td>
<td>224 (44.8%)</td>
<td>860 (40.7%)</td>
</tr>
<tr>
<td>section #2 (69 participants)</td>
<td>276 (55.2%)</td>
<td>1253 (59.3%)</td>
</tr>
<tr>
<td>Total messages from first 11 classes</td>
<td>187 (37.4%)</td>
<td>782 (37.0%)</td>
</tr>
<tr>
<td>remaining 11 classes</td>
<td>313 (62.6%)</td>
<td>1331 (63.0%)</td>
</tr>
<tr>
<td>Novelty of comment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>226 (45.2%)</td>
<td>949 (44.9%)</td>
</tr>
<tr>
<td>substantial</td>
<td>76 (15.2%)</td>
<td>312 (14.8%)</td>
</tr>
<tr>
<td>Agreement with prior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>agreement</td>
<td>193 (38.6%)</td>
<td>782 (37.0%)</td>
</tr>
<tr>
<td>disagreement</td>
<td>121 (24.2%)</td>
<td>529 (25.1%)</td>
</tr>
<tr>
<td>Messages containing example/analogy</td>
<td>104 (20.8%)</td>
<td>472 (22.3%)</td>
</tr>
<tr>
<td>Messages containing ?-marks</td>
<td>140 (28.0%)</td>
<td>561 (26.5%)</td>
</tr>
<tr>
<td>Messages containing !-marks</td>
<td>88 (17.6%)</td>
<td>371 (17.6%)</td>
</tr>
<tr>
<td>Messages containing request for info</td>
<td>34 (6.8%)</td>
<td>115 (5.4%)</td>
</tr>
<tr>
<td>Messages containing references</td>
<td>33 (6.6%)</td>
<td>117 (5.5%)</td>
</tr>
<tr>
<td>Messages containing humor</td>
<td>33 (6.6%)</td>
<td>177 (8.4%)</td>
</tr>
<tr>
<td>Messages containing social</td>
<td>16 (3.2%)</td>
<td>89 (4.2%)</td>
</tr>
</tbody>
</table>

Over one-quarter of the comments (28.0%) contained one or more question marks (?), and 17.6% contained one or more exclamation marks (!). Approximately one-fifth (20.8%) of the comments included an example or analogy, 6.8% contained a request for information, 6.6% contained humor, and 3.2% contained social communication. These 10 categories, then, formed the basis for analysis of the entire sample in Phase II.

Coding results for the full sample (N=2113) are also provided in Table 2. As expected, results are nearly identical to that of the random sub sample used to generate the coding scheme, in terms of average message length, proportion of novel comments, proportion of comments that agree/disagree with previous comments, and so on.

Next, we explored the evolution of these factors over time. The purpose of this analysis was to determine what kinds of content might increase, decrease, or remain the same over a three-month, 22-session period of GSS usage. The following graphs display frequency of occurrences for each characteristic, along with a trend line and linear regression metric.

**Message Volume.** As indicated by the trend line in figure 3, message volume increased steadily throughout the course, from approximately 60 to 140 unique messages per session (R²=.33). Splitting the course in half, an independent t-test confirmed that the average number of messages posted per class in the first 11 sessions, 71.1, was significantly lower than the average number of messages posted per class in the last 11 sessions, 121.0 (t=3.00, p<.01 – see Table 3).

**FIGURE 3: Message Volume**

Message volume increased as participants became more comfortable and began to enjoy using the system. For some, we believe it provided a diversion from oral classroom participation, yet allowed them to stay plugged in to the discussion. At the same time, we suspect that the rising volume had a “feedback effect” – for example, when a participant observed that over 100 comments had been posted, she or he likely felt pressure to contribute.

**Message Length.** The trend line in figure 4 shows that average message length decreased marginally, from approximately 500 characters per message at the start of the course, to approximately 450 characters per message at the end of the course (R²=.09). Splitting the course sessions in half, average message length dropped from 493.1 characters in the first 11 sessions, to 455.5 characters in the final 11 sessions (t=1.79, p<.10).

The gradual decrease in message length over time may have been the result of students perceiving that posting shorter messages more frequently was a superior grade-generating strategy compared to posting longer messages less frequently. Alternatively, it could also be that as students became more proficient with the technology, they needed fewer words to communicate, thereby also taking less time to type messages, leaving more time to participate orally, or to listen to the discussion.

**Novelty.** As figure 5 shows, postings of “moderately” novel ideas nearly tripled across the 22 sessions, from approximately 20 to 60 messages per session (R²=.23). This increase was confirmed when we used a t-test to compare the 33.2 moderately novel postings in the second half of the course (t=2.27, p<.05). Conversely, “substantially” novel ideas stayed relatively flat over the
TABLE 3: Tests of differences - first 11 vs. last 11 sessions

| Per session: | Class 1-11 | Class 12-22 | t | p *
|--------------|------------|-------------|---|-----
| Avg length per msg (chars) | 493.1 (49.6) | 455.5 (48.8) | 1.79 | .10
| Total messages/session | 71.1 (48.7) | 121.0 (26.0) | 3.00 | **
| Novel comments | | | | |
| moderate | 33.2 (24.4) | 53.1 (15.9) | 2.27 | *
| substantial | 14.0 (12.6) | 14.4 (6.7) | .09 |  
| Agreement comments | | | | |
| agreement | 29.1 (19.2) | 42.0 (12.7) | 1.86 | *
| disagreement | 18.0 (11.4) | 31.7 (11.7) | 2.73 | *
| Examples/analogies | 18.7 (21.0) | 24.2 (13.9) | .72 |  
| ?-mark messages | 21.1 (15.8) | 29.9 (8.0) | 1.65 |  
| !-mark messages | 12.0 (8.7) | 21.7 (6.2) | 3.02 | **
| Request for info messages | 5.6 (5.6) | 4.8 (3.1) | .42 |  
| Reference messages | 5.0 (6.2) | 5.6 (2.6) | .31 |  
| Humorous messages | 4.3 (5.2) | 11.8 (6.0) | 3.16 | **
| Social messages | 2.0 (3.5) | 6.1 (4.4) | 2.39 | **

* p<.10  • p<.05  •• p<.01

22 sessions (R²=.01), and no difference was found in the mean number of substantially novel postings in the first half (14.0) versus the second half (14.4) of the course (t=.09, n.s.).

It was interesting to find that the frequency of “moderately” novel comments increased significantly over time, while “substantially” novel comments remained static. This may imply some form of bandwidth limitation, such that for any particular topic, participants could conceive of only a limited number of truly novel comments. Once the basic unique comments had been aired, other participants found it increasingly difficult to contribute substantially new ideas, and so they resorted to agreeing or disagreeing with the novel content others had posted.

Agreement / Disagreement. Figure 6 shows an increase in the number of messages containing a statement that is explicitly in agreement with a prior post (from approximately 25 to 45 messages per session, R²=.14), and an increase in the number of messages containing a statement that is explicitly in disagreement with a prior post (from approximately 10 to 35 messages per session, R²=.28). Independent t-tests comparing first-11 versus last-11 sessions confirmed the increase over time for both agreements (t=1.86, p<.01) and disagreements (t=2.73, p<.05).

We suspect that the increase in agreements and disagreements over time occurred as participants became more familiar with the technology, the subject matter, and one another, and were thus increasingly better equipped and predisposed to develop and communicate a strong opinion.
Example / Analogy. The average number of examples and analogies per class increased marginally, from approximately 18 to 28 over the 22 sessions ($R^2=.04$); however, the difference between the first-11 and last-11 sessions was not significant ($t=.72$, n.s.). As these were undergraduate students with limited work experience, we hypothesize that they had little in the way of meaningful examples to share, or were unwilling to share their experiences extensively. Alternatively, the absence of an increase might suggest that students as a whole were performing to capacity in this regard.

Question marks. The average number of questions per class increased marginally, from approximately 18 to 32 over the 22 sessions ($R^2=.13$). However, the difference between the first-11 and last-11 sessions was not significant ($t=1.65$, n.s.). This might be due to a social-desirability bias, which made students reluctant to appear unknowledgeable in front of their peers and instructor, as questions, like comments, were not posed anonymously.

Exclamation marks. The frequency of exclamation marks increased from approximately 10 to 25 per session ($R^2=.32$). This increase was confirmed by comparing the number of messages containing an exclamation mark in the first 11 sessions (12.0) to the last 11 sessions (21.7) ($t=3.02$, $p<.05$). We suspect that, as total message volume increased significantly throughout the 22 sessions, participants were driven to make stronger, increasingly emphatic statements in order to be “heard above the noise.”

Request for information. An average of approximately 5 request for information messages per session across all 22 sessions ($R^2=.01$). No difference was discovered when comparing the average number of requests for information in the first-11 and last-11 sessions ($t=.42$, n.s.). As was the case for questions, it appears students were reluctant to appear ignorant.

References. Students typed-in an average of approximately 5 messages per session that made reference to some external information source (e.g., another course or magazine article) ($R^2=.00$). No difference was discovered when comparing the average number of references in the first-11 and last-11 sessions ($t=.31$, n.s.).

Humor. The frequency of humorous messages increased from zero to about 15 per session ($R^2=.44$). This increase was confirmed by comparing the average number of humorous messages in the first-11 and last-11 sessions ($t=3.16$, $p<.01$). As with use of exclamation marks, the increase of total message volume may have driven participants to use humor in order to be heard above the noise. It may also be an indicator of students’ increasing familiarity and comfort with one another and the instructor.

Social. The frequency of socially-oriented messages increased from approximately zero to 7 per session ($R^2=.20$). This increase was confirmed by comparing the average number of social messages in the first-11 and last-11 sessions ($t=2.39$, $p<.05$). Again, increasing presence of social communication suggests that students were becoming more familiar and comfortable with one another and with the GSS.

4.2 Qualitative analysis of post-course interviews

Semi-structured interviews were conducted with a random set of 20 students (10 from each section) after all class sessions were completed and marks assigned and submitted. These interviews focused on the use of technology in the classroom for case discussion. Students were asked about the strengths and weaknesses of the technology for this type of classroom support.

Space limitations for this conference paper preclude a detailed description of the analysis of these interviews, but several findings add to the quantitative analysis of the electronic comments. First, most respondents felt that using the GSS to post comments allowed them to contribute more frequently and freely, and that more points were brought out about the case than would have occurred with the traditional verbal method alone. They found the system itself easy and fun to use, and felt that it offered a good way to earn marks.

However, many respondents also stated that it was difficult to participate in the class and e-forum discussions simultaneously, particularly given the considerable and increasing volume of messages on the forum, and that one sometimes distracted from the other. They frequently felt overloaded as they attempted to “multi-task” many competing demands (technology, case details, peer relationships, instructor comments and questions, etc.). This created frustration for participants, who felt they had to make a choice about which medium to use, adding additional pressure to the case discussion situation. Furthermore, some students felt that others were plagiarizing ideas from the forum and then introducing them during verbal class discussions as their own ideas.

On the whole, the interviewees found the experience to be positive, but with some notable drawbacks. Among their suggestions for improvements: (1) do not use this technology during class (before or after only); (2) require students to do some research before posting; (3) cap the allowable number of comments per student per class; (4) make it voluntary (not graded).

5. Discussion

As case instructors, we face the constant challenge of including as many students as possible in classroom discussions. To avoid repetition, we deliberately limit and structure participation. One effect of doing so is to ‘shut out’ students who might have valid and valuable comments. The single biggest contribution of the e-forum
has been to afford those students who might not otherwise get a chance to speak with an equal voice in the proceedings. This finding is very consistent with others in GSS work [c.f. 5, 10]. In-class oral participation decreased marginally in terms of quantity and quality, but e-forum participation largely made up for the difference, and in certain cases, prompted an increase in oral participation as well. In fact, for one controversial case discussion, one of the instructors reported record-breaking e-forum and oral discussion! In this case, the e-forum allowed all students to air their viewpoints and to fully respond to one another.

As such, the net effect was to increase the level of participation in the class. Interestingly, as students became more familiar with the system, the course, and each other, the number of comments made on the forum increased significantly. Students showed a willingness to engage and support each other, and to conduct verbal and computer-mediated conversations simultaneously.

However, the effects of increased participation were not entirely positive. Some participants found it difficult to manage class and online discussions as message volume increased. For example, some students mentioned that they had difficulty keeping abreast of verbal and forum conversations in class, and deliberately limited the length of their comments so as to not be away from the discussion too long.

When looking at results on a class-by-class basis, we found a net decrease in the relative frequency of novel messages, agreement messages, and information-seeking messages (as well as ?-marks). We suspect that this situation may have been partly exacerbated by the students’ highly-competitive nature; rather than reducing the total information flow by posting fewer messages individually, they responded “competitively” to the higher overall volume by posting even more messages. In other words, they might have been driven to submit a comment, any comment, so as to be “heard” and perceived as a frequent contributor by their instructor and peers. Case instructors considering adopting a GSS for use in class might consider and be prepared for such impacts arising out of increased message volume.

From a student viewpoint, the “best practices” of strong participants seemed to boil down to either participating in class, or on the e-forum. Few students were highly successful in both media, as measured by their participation grades. Those who did perform well in both media were disciplined in alternating the form of their participation from class to class. It is interesting to note, and reiterate that the most successful students did not alternate equally between the e-forum and oral participation within a given class, but rather adopted a strategy of contributing primarily on the forum or orally in any one given session.

This leads us to suggest that instructors wishing to adopt such a system might opt to structure their class sessions to include separate ‘technology’ and ‘human’ moments [2], much like is done for most facilitated GSS meetings. Gallupe defines “technology moments” as “…those activities…such as access to a company web site …or an electronic brainstorming session.”[2:274].

In a technology moment, the instructor would direct the class to type comments on the e-forum and make no verbal remarks for a number of set time periods during class. These comments, and others might then be discussed. This would have the effect of forcing students to concentrate on typing without having to keep track of a discussion. The ensuing discussion could embody both typed and oral comments. However, one potential cost to this approach might be to impede the free-flowing discussion that characterizes the case method.

As suggested in student interviews, instructors might also set other kinds of limits, such as the number of comments a student might make on the e-forum. Most case instructors already do so for verbal discussion, albeit covertly, by selecting students on that basis of some frequency heuristic. This would again have the effect of forcing students to focus separately on the class and the computer.

Traditional classrooms might also benefit from using an online discussion group. We see three possibilities, though others may exist. First, instructors could use an e-forum to engage students with different learning styles (e.g., visual versus oral learners). In fact, an e-forum could become the primary delivery vehicle for a course, with posted lecture notes and slides to act as supplemental material.

Secondly, a lecturer could seed the e-forum with discussion questions and challenge students to post answers during the class. This would actively engage students in the lesson and serve as a performance check.

Third, the instructor might also create a forum for questions to be posed or clarifications to be requested. This would have a dual effect: students would obtain answers in a quietly effective manner (lower potential for classroom embarrassment), and instructors would obtain continual feedback as to the degree to which students were understanding and learning.

For researchers, this extends previous studies into technology in the management classroom, and affords opportunities for future research. We did not test learning effects, nor did we measure other traditional metrics of GSS success such as satisfaction, commitment, or efficiency. Future studies might implement a higher-order GSS, and determine success using baseline groups. Conversely, future research might test other components of the model of case learning we present in Figure 1 to determine the relative weight and impact of each of the contributing factors we present. They might also include
other factors like age, sex, and racial background to determine if this technology overcomes or perpetuates limitations to participation.

Unlike many studies, this research examined the impact of the technology over time. Our results show that participants did not immediately take to the e-forum, but that usage increased as they became more comfortable with the technology and each other over time. We would counsel other instructors and researchers employing such GSS technology to allow enough time for students to become accustomed to the technology before expecting performance effects.

6. Limitations

Because we did not capture any measures of satisfaction or learning, it is difficult to determine the exact nature and extent of the technology’s final effects. However, the sheer number of in-depth e-forum comments posted by participants leads us to conclude that GSS in the classroom holds considerable potential for enhanced learning.

It could also be argued that by grading the quantity and quality of participation, we created a demand effect. However, not one student asked to be excluded from the research study, nor has any student appealed or questioned their grade (assigned e-forum grades varied from 1.0 to 9.5 out of 10 marks).

Lastly, the group we studied is limited in terms of generalizability. We studied two classes of undergraduate students solely in the context of their core MIS course. Future studies will have to be done in order to assess the boundaries of the results.

7. Conclusion

On the whole, we are moderately pleased with the way our students used the e-forum, and surprised at the extent to which they embraced this technology and added it to their arsenal of learning tools.

The case method is at once one of the most difficult and most rewarding of pedagogies. For instructors to successfully use it as the central part of their curriculum implies a willingness to forego some of the control and rigidity associated with lecture-based approaches, since a case discussion cannot be ‘scripted’ in the same way as a lecture. The addition of the e-forum exacerbated both the highs and lows of the case method. On the one hand, it wrested even more control from the instructor, as it is impossible for the instructor to monitor both verbal and computer conversations in the classroom in real-time. Meanwhile, it introduced new demands on students, requiring them to split their attention between the face-to-face and electronic fora, leading to increased frustration for some. At the same time, the e-forum allowed for all students in the class to become engaged in the material, and to find their voice – irrespective of its form. The e-forum eased the frustration that came from being stifled, or not called upon when one is certain they have the ‘killer’ remark.

In conclusion, we encourage instructors, both case- and lecture-oriented, to carefully explore GSS in the classroom as an additional or alternative teaching method, and then to share their findings as we have done here. We believe that the immediate challenge facing instructors and researchers is one of balancing technology moments with human ones (a challenge facing most GSS facilitators). Despite some roadblocks, introducing GSS into the classroom has been an exciting and enjoyable experience for both instructors and students – an experience that we wholeheartedly recommend.

8. References


