2005

Instructional Uses of Instant Messaging (IM) During Classroom Lectures

Mabel B. Kinzie
University of Virginia

Stephen D. Whitaker
University of Virginia

Mark J. Hofer
College of William and Mary

Instructional Uses of Instant Messaging (IM) During Classroom Lectures

Mable B. Kinzie
Department of Leadership, Foundations & Policy
Curry School of Education
University of Virginia
Charlottesville, VA 22904-4277 USA
kinzie@virgina.edu

Stephen D. Whitaker
Department of Human Services
Curry School of Education
University of Virginia
Charlottesville, VA 22904-4270 USA
whitaker@virginia.edu

Mark J. Hofer
Department of Reading, special Education, and Instructional Technology
Towson University
Towson, MD 21252 USA
mhofer@towson.edu

ABSTRACT

Can "Information Age" learners effectively multi-task in the classroom? Can synchronous classroom activities be designed around conceptually related tasks, to encourage deeper processing and greater learning of classroom content? This research was undertaken to begin to address these questions. In this study, we explored the use of instructionally-related instant messaging (IM) discussions during undergraduate university lectures. Over the course of three weeks, students practiced with and then employed hand-held computers for brief, synchronous class discussions in response to assigned questions related to the lectures. Students were observed during these sessions, and students and the instructors were interviewed separately afterwards. The contents of students' discussions indicate that they were capable of engaging in on-task discussions and of expressing opinions and exploring instructionally relevant topics. However, even though students routinely multi-task in classrooms as they attend to lectures, process the contents, and record notes for later study, both students and the instructors expressed some discomfort with discussion occurring synchronously with classroom lectures. In this paper, we describe student discussion behavior, and reflect on possible applications of multiple sequential (rather than simultaneous) tasks during classroom instruction.

Keywords

Computer-mediated communication, Instant messaging (IM), Interactive learning environments, Multi-tasking, Classroom discussion

Introduction

Frand (2000) suggests that today's "Information Age" students have come to expect constant connectivity and real-time dialogue from anywhere, and that they are used to multi-tasking (performing multiple tasks simultaneously), particularly multi-tasking involving chat or instant messaging (IM) sessions. Use of IM is a preferred on-line activity for teens, with 76% of high school-age respondents to a recent NetDay survey (2004) reporting use of at least one IM screen name. Findings presented in a recent Pew Report mirror these numbers: 74% of teens use IM, with 69% using IM at least several times a week (Lenhart, Rainie, & Lewis, 2001). Teens use IM for homework support as well as for socializing, and often engage in multiple simultaneous conversations (Grinter & Palen, 2002). As the information age mindset becomes the norm among our students, we have the opportunity to adapt our teaching and learning pedagogies to fit students' characteristics and help to encourage an active community of learners (Frand, 2000). Can the connectivity and real-time discussion facilitated by Chat or IM sessions and the multi-tasking capabilities of students contribute to new learning opportunities in the classroom? We designed and undertook a research inquiry to begin this exploration.

Past research on "divided attention" in cognitive psychology suggests that splitting one's attention between simultaneous tasks results in decreased performance on one or both tasks (Hembrooke & Gay, 2003). While the

tasks employed in this line of research generally appear to be unrelated (e.g, reading a list of words while listening to a string of digits), Hembrooke and Gay obtained similar results when their range of multi-tasking included content-related web browsing in addition to un-related web browsing, e-mail, and IM. However, if student multi-tasking was conceptually related and specifically aimed at encouraging reflection on the lecture contents, it is possible that deeper processing and greater learning of classroom content might occur, in the same way that "dual processing" (e.g., employing both verbal and visual media) (Clark & Paivio, 1991) and active learning (Grabinger, 1996; CTGV, 1992) can positively influence learning.

In the typical college classroom, lecture prevails as an instructional medium. While class discussion can encourage thoughtful reflection and deeper student processing, often there isn't time for everyone in the class to participate, and there certainly isn't time to discuss everything that could productively be explored. In larger classes, separate "discussion sections" meet to perform at least part of this function. With the advent of on-line learning technologies, some of these discussions are moving to asynchronous venues such as threaded discussion boards, and even to synchronous chat-based discussions. A downside to these discussions, at least those that are intended to build on a classroom lecture, demonstration, or other activity, is that are that they are generally removed in time and place from the classroom events. Concepts, topics, and questions that students might want to explore can be lost in the process.

Synchronous interactions while still in the learning environment have clear appeal for students. For instance, Guernsey (2003) describes college students at the University of Maryland who requested IM access during lectures. More than a dozen students participated at a time, and they used the opportunity to ask questions about the lecture, to support or refute points being made, and to provide relevant links to their classmates.

We were curious about students' ability to engage in meaningful discussions that took place concurrently with the instructor's presentation. We wanted to encourage students to more deeply process the contents of what was presented to them by engaging in synchronous on-line discussions with assigned chat partners.

Methods

Participants and Procedures

The setting for this research was a university course for preservice teachers on the use of instructional technology. The class was held for three separate sections each week; students in all sections were offered the chance to participate; 36 students elected to participate and 3 students declined (students declining participation engaged in the same activities but their chat participation was not analyzed and they were not observed during class sessions). A preliminary survey of the students indicated that 76% of the students used IM every day, while another 11% used IM weekly (5% reported only one or two uses of IM and 8% had never used IM). Of the students who used IM, session lengths ran from 5 minutes to "all the time, literally." Conversely, no students reported daily use of a hand-held computer or personal digital assistant (PDA); only 5% reported weekly use, another 5% having used these devices only once or twice, and 89% reported no experience in using them.

Outside of the weeks reserved for this research, a typical class meeting consisted of several components. First, a brief model lesson was presented to students, asking them to think of themselves as K-12 students in a content area such as social studies or language arts. The lessons all incorporated technology to teach content. After the lessons were finished, students would be asked to reflect upon the role of technology in the lessons, and to critically evaluate the role it played. After this discussion, time was reserved for teaching the skills necessary to use the technology demonstrated (software, for example). The class focused upon teaching practice rather specific technology competencies.

Students participating in the project were assigned a chat partner for each week of the study (to accommodate an odd number of students, several three-person groups were used over the duration of the study). During week one, a practice chat was held for a portion of the class session, to enable participants to become familiar with the hand-held computers they would be using (students *all* reported familiarity with the on-line chat environment). During weeks two and three, students engaged in on-line discussions during class sessions: As a lecture/demonstration was presented to the students, they were asked to respond to two specific questions as the focus of their online conversations: "What are possible instructional applications of the technology being demonstrated?" and "What concerns do you have about use of the technology?" The chat sessions lasted for an average of 16 minutes during both weeks. During the chat sessions, we observed students at two minute intervals

and recorded the numbers of students looking up at the instructor, and the number of students looking down at the handheld computers.

After each of the chat sessions, students saved transcripts of their discussions and we collected the hand-held computers and transferred the transcript files to a single location. Students' chat performance did not contribute to their grade for the class (and instructors would not review the chat transcripts until after the end of the semester, when the transcripts were anonymized).

Following the chat session in week three, students were broken into small groups for a follow-up interview, with chat partners separated and placed into different groups where possible. The same interview questions were asked in all groups and these questions served as a springboard for discussion of the experience. Interview questions included:

> Did you find it useful to be able to discuss the instructor's presentation while it was underway?
>
> Was it distracting to have multiple tasks to accomplish (listen to the instructor; chat with your partner)? *and*
>
> In what ways could this activity be more effective, as a way for you to reflect on what is being presented?

These interviews were tape recorded and then transcribed. The instructors each prepared a written reflection about teaching these class sessions while students multi-tasked, and also participated in a follow-up interview.

Data Analysis

To preserve the anonymity of the participants, each was assigned a four-character pseudonym. Any occurrence of a student's real name within the transcripts was replaced with the corresponding pseudonym. After the transcripts were anonymized, instructors were allowed to review students' chat discussions and the data analysis began.

Analysis of the transcripts began with a qualitative approach. We read through the transcripts and sought to identify the broad groupings into which participant comments could be sorted. This method, based in Glaser and Strauss' grounded theory (1967), allows researchers to sort data "into categories and then, through constantly comparing the content of them, [define] the properties of the categories until they have taken on an abstract form" (Tesch, 1991). Such a process helps ensure that identified themes are grounded in, and defined by, data. Four main categories of chat comments were identified through the analysis:

> Greetings and directions,
> On-task conversation about the class,
> On-task conversation directly related to the assigned discussion questions, and
> Off-task remarks

We then began the process of assigning each of the participants' comments to one of these categories. Within each of the two "On-Task" categories, we further attempted to identify whether comments built upon one another, taking the conversation to a more reflective level (as opposed to comments made more spontaneously, without regard to the prior comments made in the context of the conversation). As we assigned comments to either of the On-Task categories, we assigned it a "level," with "1" assigned to an initial comment, a "2" awarded when a comment built upon a "1" comment by adding something new to the discussion, and a "3" assigned when a comment built upon a "2" comment by adding something new to the discussion. Perhaps due in part to the short duration of the discussion, there were no comments that took the discussion beyond a level 3. Comments that added nothing new to the discussion were assigned the same number as the comment to which they were responding. This analysis was performed initially by all three researchers working individually to code all of the transcripts. Although many comments fell squarely into one category or another, not all were as easy to assign. To achieve consensus and to try to increase the reliability of our assignments, the researchers then met as a group to examine all of the coded transcripts. During these meetings, "controversial" items were examined, and discussions were held concerning the best way to code these items. As a result, a number of guidelines were developed that served to guide coding strategies and to maintain consistency. Examples of these guidelines included the "same speaker rule," in which separate but immediately sequential comments by the same person were treated as continuations of the initial comment for the purposes of depth analysis; and the principle that when a speaker expressed two contradictory points of view in one comments (e.g., "I don't like this software, but

I can see how beneficial it would be to a classroom"), the last opinion would set the tone for the comment's categorization (needed for the "positive, negative, neutral, or question" follow-up analysis described below).

Although the results and discussion below include a brief analysis of the non-task-related comments (such as greetings), our primary focus of analysis was upon the on-task conversation related to the assigned discussion questions. Specifically, we were interested in examining the contents of the conversation. Repeated readings of this portion of the chat transcripts yielded three content-related categories:

Reflections on teaching practice,
Discussion of possible applications of the technology being demonstrated, and
Opinions about the software being demonstrated.

Comments in the "on-task, assignment-related" category were analyzed and assigned to one of these three categories. In a follow-up analysis, each of these assignment-related comments was studied to determine if it expressed a positive, negative, or neutral comment, or posed a question. We also explored a possible analysis method to examine the impact of interpersonal differences on chat behavior.

As noted, every two minutes during these on-line chat sessions, counts were made of the numbers of students looking up at the instructor or looking down at the hand-held computer. Overall percentages were computed for each week.

To analyze the transcripts from the follow-up interviews, we used a qualitative approach to look for themes across subjects. Participants' comments focused upon their comfort with using the handheld computers, their ability to focus on the lesson being delivered by the instructor, and their suggestions on the future use of synchronous on-line discussions in the classroom. Transcripts were coded for these themes, with favorable and unfavorable views identified.

Instructor reactions were analyzed in a similar way, with transcripts read first to identify themes and then reviewed to find supporting or refuting evidence for these themes. Instructor comments focused upon their comfort levels with teaching while students were engaged in on-line discussions and on their perceptions of the usefulness and appropriateness of the discussion activity.

Results

Chat Transcript Analysis

Table 1 displays the average numbers of the different kinds of comments made in each chat session, and the average numbers of words expressed.

Table 1. Categories of Student Chat Activity

	Greetings/Instructions		Off-Task		On-Task About Class		On-Task On Assigned Topics	
	Comments	Words	Comments	Words	Comments	Words	Comments	Words
Week 2								
number	3.1[a]	8.2	13.5	84.3	17.5	82.1	17.8	198.5
%	5.9%	2.2%	26.0%	22.6%	33.8%	22.0%	34.3%	53.2%
Week 3								
number	3.2	7.5	26.8	175.6	13.2	62.2	22.4	237.9
%	4.9%	1.5	40.8%	36.3	20.1%	12.9%	34.2%	49.2%

[a] Average for each chat session.

Greetings and Off-task Conversation

During week two of the study, the smallest proportion of student comments was devoted to greetings and instructions (M = 5.9% of all comments; M = 2.2% of all words expressed). A similar small proportion was devoted to greetings and instructions during week three (M = 4.9% of comments, M = 1.5% of words). Typical comments were simple, one- to three-word phrases such as "Hi!" "How you doing," and "Hey."

A much larger percentage of the conversation was made up of off-task remarks. In week two, over a quarter of comments (*M* = 26% of comments; *M* = 22.6% of words) made by students were off task. For week three, this number increased (*M* = 40.8% of comments; *M* = 36.3% of words). Off-task conversations ranged greatly in content; no "typical" off-task content was detected. Topics included students' boyfriends, girlfriends and other social considerations ("I've been getting so many random guys lately on AOL"); post-graduation plans ("I want to teach in Atlanta"); catching up on personal news ("How is your leg/ankle?"); and other courses ("I hate that stupid class").

On-Task Conversation About Class (Not Directly Related to the Discussion Assignment)

A sizeable portion of student comments was related to what was occurring in the classroom, but not directly related to the two discussion questions meant to frame the chat assignment. During the second week, these comments made up 33.8 percent of the comments made during the chats (*M* = 22.0% of words). In week three, on-task, non-assignment related comments dropped to 20.1 percent of the overall chats (*M* = 12.9% of words. This decrease seems to correlate with the increase in students' off-task conversation from weeks two to three (see above).

Topics of these conversational strands varied from comments about how a particular instructor was teaching a lesson ("Steve couldn't…do this effectively without Mark working the computer") to the functionality of equipment ("Good… [my handheld computer] is working now") to considerations of the actual *content* of the lesson being presented ("When he is talking about…[concept mapping for] fairy tales, [are] they supposed to be like classic fairy tales and not like Disney movies or what?").

On-task Conversation Related to the Assigned Discussion Questions

Overall, students devoted about one-third of their chat comments to the assigned discussion questions during weeks two (*M* = 34.3%) and three (*M* = 34.2%), but these categories encompassed about one-half of overall words (week two *M* = 53.2%, week three *M* = 49.2%). These on-task, assignment-related questions were the focus of our further analysis.

To help us explore individual student chat participation, we next considered average student behavior (in addition to the previously reported sums and percentages reported across students). During week two, there was an average of 7.7 comments related to the chat assignment made by each student (out of an average of 24 comments made per student). There was a wide range in the amount of participation, however (range = 2.0 - 18.3 comments/student made in this category). During week three, students averaged 11 assignment-related comments each (out of an average of 30 comments made per student), with an even wider range in participation (range= 2.3 – 40.5 comments/student). On average, student comments were made at a depth of 1.3 (1=initial comment, 3=maximum depth) during week two and a depth of 1.7 during week three.

During week two (when the instructors demonstrated instructional use of concept mapping software), students tended to devote more of their on-task, assignment-related comments to opinions about software (49.1% of these comments), as opposed to discussion of possible applications of technology (*M* = 30.0%) and reflections on teaching practice (*M* = 21.3%). During week three (when the instructors demonstrated instruction using spreadsheets), this focus shifted, with more attention paid to reflections on teaching practice (*M* = 44.0%) and discussion of possible applications of technology (*M* = 42.8%) than to opinions about software (12.7%).

Reflections on Teaching Practice

During the second week's discussion (accompanying demonstration of instruction with concept mapping software) students made an average of 2.5 comments related to teaching practice (range = 0 – 6 comments/student on this topic). The comments were at an average depth of 1.3. A typical comment at the "1" level was "I'm not used to this flow chart concept thing" with "Yeah, me too - i am still not seeing the overall point, unless it is just an organizer" following at level "2."

The discussion related to teaching practice increased during week three (when the instructors demonstrated integration of spreadsheet software in teaching practice), with students averaging 5.6 related comments (average range for most students was between 0 and 7.5 comments, however in one chat pair the average number of

student comments on this topic was 23). These discussions also tended to reflect more depth (M = 1.7). Typical level "1" comments such as "What are your feelings of technology in classrooms?" began the related exchanges, with responses such as "They will need more attention and one-on-one, than time with computers" made at level "2" in response. Some of the exchanges built to level "3," continuing, "It's not that i don't think computers have their place…I think the kids need to use them just so they're not afraid of them."

Discussion of Possible Applications of Technology

Students contributed an average of 2.7 comments (range = 0 – 7.7) related to possible applications of the technology being demonstrated during week two (concept mapping software), with an average depth of 1.4. Comments such "See, i'm doing elementary school. How are they supposed to use this thing?" were made at level "1," followed by "It would be like the 'webs' that you used to do in elementary school" at level "2." While comments related to this content area did not often rise to the "3" level there were several, including, "high schoolers think more in depth, and have to for their papers and such, so this would guide them a lot better than a 2nd grader who likes simple thoughts."

As was the case for reflections on teaching practice (above), the discussion related to technology applications in teaching increased during week three (spreadsheet software). During this class session, students averaged 3.8 related comments (average range = 0.5 – 8.0 for most students, but in two chat pairs, students averaged 16.5 and 22.5 comments each on this topic). These week three discussions also tended to reflect slightly more depth than during week two (M = 1.6). Chat groups began these exchanges with comments like "Ok, 3 fun ways to use this in teaching…," followed quickly by " comments such as "Height of Presidents past and present vs. People in the class… To predict who might be president one day" and "You could figure out the height of mountains in different places in the world to determine where you want to go hiking…"

Opinions About the Software Demonstrated

During the second week's discussion (demonstration of concept mapping software in teaching practice) students averaged 3.8 comments related to the software being demonstrated (range = 0.5 – 10). The comments were at an average depth of 1.2. Typical comments at the "1" level included, "So this would be hard to use in a classroom sometimes" followed by "Yeah, you need several people (one to type and keep up and mark and one to initiate conversation within the classroom)" at level "2." As the discussion built, level "3" comments included those such as, "It might be good in showing how to plan a paper - but it would be hard to do this and also ensure that the class would help."

Unlike the pattern noted for the discussions related to teaching practice and to applications of technology, the discussion related to the software being demonstrated decreased during week three (demonstration of instructional use of spreadsheet software). During week three, students averaged 1.8 related comments (range = 0 - 4.5 comments). These discussions reflected slightly more depth (M = 1.4) than during week two. Typical level "1" comments included, "Ok- concerns w/using spreadsheets?" and "Why would there be concerns- it's not like they are that controversial." Comments such as "It takes me like 10 times to get the right graph when i use them" emerged at level "2" in the discussion, while infrequent comments such as "It would take a whole lesson just to teach the kids how to use it" were made when the discussion evolved to level "3."

Positive, Negative, Neutral, and Questioning Comments

During week two (when the instructors demonstrated instructional use of concept mapping software), students tended to devote more of their on-task, assignment-related discussion to Positive (42.5% of the comments made) and Neutral (40%) comments, as opposed to Questions (10%) and Negative Comments (7.7%). While there were a higher proportion of Negative comments during week three (when the instructors demonstrated instruction using spreadsheets), there again were more Positive (37.5.%) and Neutral (34.2%) comments being made than Negative Comments (19.2%) or Questions (9.1%).

Individual/Group Dynamics

During our many readings of the chat transcripts, we observed some interesting differences in chat behavior between individuals, and wondered if assignment of partner might influence others' behavior. To explore how such an analysis might be undertaken, we conducted a sample analysis of the chat behavior of two individuals, one who exhibited high levels of on-task behavior, and the other who exhibited high levels of off-task behavior.

On-Task Student

During week two, "Cham" and her two chat partners focused 45% of their comments toward the assigned discussion questions, compared to the overall average of 38% for all groups. Cham herself contributed 26% of the group's comments, and over half of these (58.6%) were related to the assignment. This was a higher degree of on-task performance than her partners, who each devoted 40% of their comments to the assignment.

During week three, Cham and her partner spent 51% of their comments on the assigned discussion questions, and Cham continued to show her task focus, with 39.1% of her comments focusing on the assigned discussion questions. Her partner focused 57.8% of comments on the assigned topics, up 7.4% from her performance in week 2. Meanwhile, one of Cham partners from week two, when placed with a new partner during week three, evidenced a very low proportion of on-task comments in week three (3.6%) when placed with a different partner. Cham uses the chat to pose questions related to the assignment and raises issues concerning implications of the class discussion on an elementary classroom.

Off-Task Student

Conversely, "Hunz's" chat participation reflected the off-task end of the spectrum. Hunz and her chat partners devoted very little attention to the discussion questions during both weeks, with only 2.3% related comments in week two and 10.2% in week 3, compared to the 38% and 40.75% averages overall. Hunz uses the chat to tell jokes and engage in small talk.

Analysis of Interview Transcripts and Classroom Observation Data

Student Comfort with Technology

An examination of responses from the students about the experience provides further insight into their experience. The majority of students reported feeling comfortable using the handheld computers to engage in the on-line discussions, despite minor technical difficulties. "Instant messaging" (IM'ing) is an important part of their culture:

> "I can't imagine what life is like without it."
>
> "Because I usually IM all the time, it was so natural."

Some students mentioned difficulties such as typing with the foldable keyboards perched awkwardly on their laps, or the different navigation structure of the Pocket PC interface, but most adjusted quickly:

> "I think the first day I was kind of uncomfortable because I didn't know where all the menus were – they were weird and stuff – but by the third time I was pretty comfortable using it."

Distractions of Multitasking

Despite their comfort levels, students felt the instant messaging distracted them from the content of the instructor's lesson:

> "I have a finite capacity for attention. As it gets divided up between more and more tasks, there's less given to any individual thing. So then, I'm not grasping any single thing. The attention needs to go one place or the other for me to get something out of it."

The instructors mirrored the students in this regard. Both commented that they felt some discomfort while they were teaching. They attributed this to not receiving the usual levels of attention and non-verbal feedback (facial expressions, head nods, etc.) from the students, making it more difficult to assess students' understanding. Interestingly, both instructors reported their impression that, most of the time, the majority of students' attention was focused on the handheld computers and their on-line discussions and not on the instructors or the lesson. While classroom observation of student behavior indicates some division of attention, the observation data show that students were looking up and attending to the instructor more often (65.9% of the time during week two, and 56.1% of the time during week two) than not. Nonetheless, the division of students' attention was troubling to both the instructors and the students. A student summed up the nature of the problem:

> "I [am] definitely one who likes to multi-task, but as far as reading and listening simultaneously, I don't feel like I can do either one well unless I am giving one or the other my full attention."

Suggestions for On-Line Chats in the Classroom

While 68% of students reported that they would not recommend synchronous on-line discussions in the classroom, many of these students (50% of students overall) did offer suggestions for how to use on-line discussion to support classroom instruction. They proposed interspersing short "discussion periods" that would alternate with "lecture periods," or incorporating a discussion period at the conclusion of a lecture. Others offered a variant on this theme, endorsing synchronous on-line chats but only for asking short clarifying questions ("I only use it [IM] to communicate very brief thoughts"). A smaller, 12.5% of the participants voiced only negative opinions on their use in the classroom.

The instructor comments reflected similar thinking about intervals of instruction/demonstration and discussion. They also provided suggestions for use of on-line discussions for connecting students in multiple classrooms, or for interacting with a "guest speaker" unable to travel to the class in person.

Discussion

This study's small sample and limited time frame do not permit broad conclusions about the potential of online, synchronous classroom chats to enhance student learning during class time. However we can make some observations about students' effectiveness at on-line chat discussions, summarize student and instructor perceptions of the experience, and make some recommendations for future research and instructional practice.

Students' Effectiveness at On-line Chat Discussions

Students reported comfort with the use of the handheld computers and with the on-line chat medium (though they felt *discomfort* with the synchronous nature of the discussions, a finding we'll return to). While there was some off-task behavior both weeks, students were able to engage in effective discussions in response to the assigned questions, devoting a third of their comments (and half of the words they wrote) to these aspects of their chat participation. The depth of these assignment-related discussions (the degree to which their comments reflected and built on those of others) increased from weeks two to three. The focus of this assignment-related discussion shifted more towards issues of teaching practice and instructional applications of technology (the assignment for their chat discussions), and away from expressing opinions about the software being demonstrated. Whether these changes were due to greater comfort and facility with the chat activity or to the different technology application being demonstrated, or both, is not possible to say.

Students tended to make more positive and neutral comments than negative comments during both chat sessions, though students were more negative in week three than in week two, when they indicated that the software being demonstrated in week three (spreadsheets) was difficult to use, and that they saw little application for the software in their classrooms. Further research will be needed to examine the development of students' discussion skills and the evolution of their discussions over time. For instance, it is possible the individuals involved can significantly affect the quality and focus of the chat discussions they are engaged in, encouraging more or less task focus in their chat partners – as the performance of "Cham" and "Hunz" hints at. It will be interesting to explore this over an entire semester when such patterns may be followed and characteristics of on- and off-task individuals may be identified.

Perceptions of Synchronous Discussion During Lecture

After their experiences in this pilot study, both students and instructors recommended against the use of synchronous discussions during classroom instruction. Both reported difficulties related to students' divided attentions. What was at the root of the problem? We suspect that the difficulties did *not* emerge from asking students to synthesize the instructor's presentation and make related observations—research on note-taking indicates that students can engage in this synchronous activity effectively and usefully (Beecher, 1988). Instead, it seems likely that the difficulties were the result of the task requirements to process input simultaneously from two sources: the instructor and the discussion partner(s). While research suggests that teens regularly do multi-task with IM, teens also report possession of a "personal threshold" for the amount of attention they can devote to keeping track of multiple threads of conversation and thought (Grinter & Palen, 2002) and college students indicate some "disorientation" when returning to a lecture after following a related IM discussion thread (Guernsey, 2003).

It may also be that multi-tasking IM behavior is more natural for younger cohorts of students than our college undergraduates. Our college undergraduates indicated frequent use of IM, a behavior underscored by a recent Pew Report (Jones, 2002) in which college students were often observed using IM while multi-tasking in computer labs. But it may be an even more natural habit for younger individuals. Alan Kay (Jones, 1983) proposes that technology is that which happened after you were born. For teens in high school, IM may be less a technology and more "a fundamental way … to interact and relate with their peers" (NetDay, 2004, p. 21). Based on their extensive survey results, NetDay researchers suggest that the ninth-grade students of 2003 may be at the "leading edge in terms of acceptance and assimilation of IM technology" (p. 21). Still, students' predominant use of IM while multi-tasking (multiple IM windows open while also engaged in other tasks) may approximate asynchronous communication more than the synchronous communications employed in our current study--there is normally a lag time associated with typing and other on-line activity such as Web surfing (Reynolds, 2003), allowing time for cognitive processing and reflection.

Students and instructors participating in our study *did* endorse the use of on-line discussions in the classroom, but not at the same time as a lecture or other instructional presentation. Their suggestions for distinct periods of instruction and discussion, for instance, would reduce the channels of information students would have to attend to while still offering the opportunity for reflection and exploration of the content to be learned.

Recommendations for Instructional Practice

Our preliminary findings suggest that students can engage in productive on-line discussions during class time, that the depth of their discussions may develop over time, and that engaged students may have a positive effect on their discussion partners. Overall, participants in this pilot study used their discussion opportunities to explore their perceptions of the instructional content, making important observations that might not otherwise have been shared in the classroom setting. While on-line discussions *during* lecture presentation may not be advisable, participating students and instructors did feel that use of on-line discussion in the classroom was worth pursuing as a way to encourage deeper student engagement and processing. The question remains, however: Why not just break into student groups for the benefits of discussion and avoid the complications of a technology-assisted discussion? We can see several reasons for an on-line discussion:

> Students can engage in on-line discussions without needing to leave their seats, making efficient use of instructional time,
>
> Communication within large lecture classes may be enhanced without the noise associated with many students speaking aloud and, perhaps most importantly,
>
> Students would have a written record of their discussions which could be used for study notes or other instructional products.

There is one case in which we might recommend use of a simultaneous discussion during a classroom lecture: The asking of clarifying questions about a part of the instruction students don't understand or did not hear. These questions might be directed to a study partner, a teaching assistant who could respond immediately or collect questions for instructor review, or to the instructor, who might structure his/her classes to allow for periodic review of accumulated questions. In this way, students' questions would not be "lost" while they wait for an opportunity to ask them, and their understanding of subsequent instruction might be enhanced. There may be other similar kinds of simultaneous multi-tasking that could enhance learning while still being concluded rapidly, thus minimizing distraction: Recent research by Gay and colleagues (Grace-martin and Gay, 2001, and

Hembrooke and Gay, 2003) suggest that shorter, "staccato-like" tasks can be a more effective form of instructional multi-tasking than fewer but more focused simultaneous tasks.

Recommendations for Future Research

The methods we employed here for examination of students' chat transcripts (the qualitative analyses and the considerations of conversation depth and partner performance) should prove useful for future research. The obvious aspect of student performance that we did not pursue was the effect of students' discussions on the learning that took place. Examination of student performance on subsequent measures such as examinations or student projects would help us understand some of the benefits of this discussion activity.

Research inquiries over a longer time period would help illustrate development of students' on-line discussion abilities over time, and enable study of variation in student reactions to instructional content. Research by Spelke, Hirst, and Neisser (1976, cited by Hembrooke & Gay, 2003) suggests that practice can improve performance on simultaneous directed activity. In such future research, it may be useful to incorporate on-going instructor review and perhaps grading of student chat transcripts, as a way of encouraging greater levels of on-task behavior. It would also be of benefit to examine student discussions for evidence of multiple coding of the learning underway.

To understand how individual participants affect their on-line discussions, an examination of personality types might prove useful. For example, McCrae & Costa's five-factor model of personality may be useful to explore an individual's capability for on-line interaction (McCrae & Costa, 1999). A similar study with more chat sessions would enable us to examine how an individual affects his/her group's discussion performance, and how group size might moderate behavior.

Conclusion

To return to the opening assertion about "Information Age" learners and their multi-tasking ability, the results of this pilot research suggest that our university undergraduates were comfortable with the medium of instant messaging. They were capable of engaging in this synchronous discussion productively (half of the words they expressed were related to on-task instructional exploration) but they felt uncomfortable doing so. While it may be that future cohorts of students will be more comfortable engaging in this form of instructional multi-tasking, the students and instructors participating in this research recommended multi-tasking involving focused *sequential* attention to different related activities, rather than *simultaneous* attention. Use of brief alternating time periods for lecture and on-line discussion, for instance, would help us consider a sequential definition of multi-tasking. In addition, it may be that skills in instructional multi-tasking can be developed for individuals over time; related inquiries could productively explore patterns of student discussion activity over time and across types of content and student personality.

While we do know that this activity enabled students to engage in meaningful in-class discussion that might otherwise not have been possible, we cannot yet say whether instant messaging in the classroom can lead to greater learning. Follow-up research will be needed to examine the effects and not just the processes involved.

References

Beecher, J. (1988, December). Note-taking: What do we know about the benefits? *ERIC Digests, 37,* EDC-CS-88-12.

Clark, J. M., & Paivio, A. (1991). Dual coding theory and education. *Educational Psychology Review, 3*, 149-210.

CTGV (1992). The Jasper Experiment: An exploration of issues in learning and instructional design. *Educational Technology Research and Development, 40* (1), 65- 80.

Frand, J. (2000). The information-age mindset: Changes in students and implications for higher education. *Educause, 35* (5), 14-19,22,24.

Guernsey, L. (2003). In the lecture hall, a geek chorus. *The New York Times*, July 24.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Chicago: Aldine.

Grabinger, R. S. (1996). Rich environments for active learning. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology* (pp. 665-692), New York: Macmillan.

Grace-Martin, M., & Gay, G. (2001). Web browsing, mobile computing and academic performance. *Educational Technology & Society, 4* (3), 95-107.

Grinter, R. E., & Palen, L. (2002, November). Instant messaging in teen life. *Proceedings of the 2002 ACM Computer Supported Collaborative Work (CSCW) conference*, New Orleans, 21-30.

Hembrooke, H., & Gay, G. (2003). The laptop and the lecture: The effects of multitasking in learning environments. *Journal of Computing in Higher Education, 15* (1), retrieved April 2, 2005, from http://www.hci.cornell.edu/LabArticles/Multitasking_Hembrooke.pdf.

Jones, S. (2002, September). *The Internet goes to college: How students are living in the future with today's technology.* Pew Internet & American Life Project Report, Washington, DC: Pew. http://www.perinternet.org.

Jones, T. (1983). The Grand Old Man - Interview with Alan Kay. *Psychology Today, December*, 50-56.

NetDay (2004). *Voices and views from today's tech-savvy students,* retrieved September 29, 2004, from: http://www.netday.org/speakupday2003_report.htm.

McCrae R. R., & Costa, P. T. (1999). A Five-Factor Theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of Personality Psychology* (pp. 139-153), New York: Guilford.

Reynolds, B. (2003, April). *Making IM work for education*, retrieved September 29, 2004, from http://www.xplanazine.com/archives/2003/04/making_im_work.php.

Tesch, R. (1991). *Qualitative Research: Analysis Types and Software Tools*, London: Falmer Press.