

**AC 2004-555: CREATING MORE TIME IN A DAY: EFFECTIVE USE OF
E-COMMUNICATION TO ENHANCE STUDENT LEARNING AND OPTIMIZE
INSTRUCTOR TIME**

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Creating More Time in a Day: Effective Use of e-Communication to Enhance Student Learning and Optimize Instructor Time

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Abstract

The communication landscape grows increasingly complex with each passing year. Since teaching is, at its root, communication, it is essential that we understand the available technologies and the implications of each new mode as it emerges. In this paper, the authors examine the complex and evolving communications opportunities provided by a variety of technologies, paying particular attention to the emergence of Instant Messaging (IM) and its cousins. Uses and misuses of this suddenly ubiquitous technology are discussed, and student attitudes are surveyed. Student use profiles and communication preferences are discussed as well as anecdotal cases from a recent semester where e-communications were used extensively as a means of student – professor interaction. Lastly, the appropriate uses of a number of communication modes (i.e. phone, e-mail, in-person, etc) are discussed and the advantages and disadvantages of each are compared and contrasted with regard to meeting the learning goals and accommodating participant locations.

Introduction

The communication landscape grows increasingly complex with each passing year. Since teaching is, at its root, communication, it is essential that we understand the available technologies and the implications of each new mode as it emerges. One strongly gaining mode in terms of student use is America Online's Instant Messenger (IM) and its cousins, which are basically text-based messaging with embedded file-sharing capabilities. Aarons (2003) suggests strongly that IM is well on its way to replacing telephone and e-mail as the fundamental communication mode for persons with internet connections. Further, IM appeals mainly to younger users, and overall usage is up from 39 million in 2000 to 52 million in 2002 (Madden, 2003). Using these services is often referred to as "chatting", and if you hear one student saying that she has chatted with another student, it is highly likely that she is speaking of a virtual, or IM-based "chat". The emergence of these text-messaging systems as a basic, even preferred, method of communication among young people is an important occurrence, and most engineering instructors have yet to fully grasp the possibilities offered in terms of student interaction. However, when contemplating the use of any new technology, it is important to moderate enthusiasm with careful consideration of the limitations of that technology, and to think about how existing, well-established technologies might accomplish the same tasks with less effort. This paper presents a short discussion of observed student attitudes and preferences,

and compares and contrasts 4 basic modes of student-instructor communication; IM, e-mail, telephone and face-to-face meetings.

Goals of Student Communication

Ideally, all communication with students, in and out of the classroom, should be focused towards accomplishing a few key goals:

- Goal 1:** The student's understanding of the specific material being discussed should be increased. This is Imparting Knowledge.
- Goal 2:** The student's perception of the interaction should be positive. He should feel comfortable about approaching the instructor in the future. This is Comfort Level.
- Goal 3:** The seeds of desire for further knowledge should be planted, and the student should feel excited about in-depth pursuit of the subject. This is Intellectual Excitement.

While one could certainly argue the utility of additional communication goals, in the opinion of the authors, the three listed above must form the backbone of successful student interaction. When the topic of poor communication is discussed with students, they often respond in the order listed above when describing the aspects of the interaction that they disliked. Typical progressions begin with "That did me no good. I left more confused than I came in!" (Imparting Knowledge) followed by "I don't think that instructor was very happy to see me; he seemed kinda mad or interrupted or something. I'll go to a classmate for help in the future" (Comfort Level) and finish with "I'm a complete idiot... I'll never understand this stuff" (Intellectual Excitement). Clearly, every attempt should be made to avoid these examples of student reactions, and knowing the modes of communication preferred by students is a key step towards that avoidance.

Face-to-Face Interaction

Clearly, there are many advantages AND disadvantages to face-to-face communication, and many papers have been written on the topic. For the purposes of this overview, we'll consider only the most basic elements. In terms of Goal 1, Imparting Knowledge, successful face-to-face communication is excellent. First, many resources are available that might not be present electronically: shared textbooks, color sketches, chalkboards, side-by-side viewing of data or internet information, etc. Second, the instructor can receive essentially instant feedback as to the effectiveness of the instruction by observing the student's reaction. The communication of emotions (confusion, joy, agony and all the others) is most clear in person, and is often completely lost in electronic mediums. It is, for instance, difficult to tell if ☺ is meant ironically. The only drawback to the in-person meeting for Imparting Knowledge is the lack of a transcript or record of the meeting. Most informal, out-of-classroom meetings do not involve extensive note-taking, and the student may sometimes have trouble recalling details of the conversation. This can be mitigated somewhat by keeping a record with sketches and notes, but creation of this record can drag out the meeting and interrupt the free flow of ideas.

That said, it is often true that in-person communication lags behind electronic forms for Goal 2, Comfort Level. The comfort level of many students simply isn't sufficient to get them into the

office for a discussion, and during the discussion, the student might feel awkward or discomforted when problems arise, like not knowing one of the most basic equations or recalling simple definitions. This awkwardness can turn into hostility, frustration or humiliation if the instructor does not tread very carefully. Thus, the threat level of face-to-face communications is fairly high, making it risky for student and instructor, particularly in the building phase of their relationship.

In terms of Goal 3, Intellectual Excitement, face-to-face communication only wins out when the student and instructor are very comfortable interacting with one another AND when the instructor has lots of time to spend with that student. The best indicator that a student wishes to dig in deeper and really embrace the topic is when the question volume from the student is high. However, high question volume takes time to address, and students are quick to perceive when a professor is out of time. Further, instructors have legitimate demands on their time, and this can suppress the pursuit of Goal 3.

This discussion leads to the real disadvantage of face-to-face communication: time. For personal discussions to occur, they must take place at a time when both parties are available and in the same location. Demands on student and instructor time are typically very high, especially in engineering disciplines, and this puts a real damper on in-person discussion. Lack of professor availability is a chronic student complaint at many institutions. If face-to-face interaction is the only real method of communicating with an instructor, a busy student might feel justifiably frustrated by even an open-door policy; they would use the open door if they could only get there!

In summary, while the effectiveness of face-to-face communication can be very high, particularly for Imparting Knowledge, there are barriers to using this mode. These barriers include student comfort levels and availability.

Telephone

The telephone is a well-established technology that is available to essentially all students, but is falling out of favor with young people despite the prevalence of cell phones. Further, growth rates of telephone users are far behind growth in internet and IM use (Aarons, 2003). There are good reasons for this besides the simple “GeeWhiz” factor of IM which are outside the scope of this paper. From an educational perspective, telephonic communication does only a fair job of accomplishing the three goals. In terms of Imparting Knowledge, the phone is generally “poor” for engineering applications. The lack of a means of showing the user anything like a sketch and the lack of any coherent transcript are in most cases the principal failings.

The Comfort Level of telephone communication is variable among students. Many students refuse to call instructors, and the reason often cited by students of the authors is “I don’t want to bug you”. Even in cases where good rapport exists between the student and instructor, students still refuse to call when stuck on a problem or confused while preparing for an exam. This discomfort may also be related to the students perception that the telephone “just doesn’t work” for additional instruction, and is likely related to problems cited in Imparting Knowledge above. Further, telephone has most of the disadvantages of in-person communication (threat level, etc), but lacks the critical feedback loop (“I can see that you are confused...”) of in-person

communications. It is sometimes difficult or impossible to pick up social and emotional cues over the phone, and this degrades the quality of the communication. However, the phone does provide some immediate feedback (tone of voice, long pauses), unlike e-mail and IM.

Phone conversations score “fair” for Intellectual Excitement. Without sketches and pictures, it is sometimes difficult to get motivated, and the communication of more difficult topics often requires visual aids. However, because of the importance of speech pace and tone of voice, the instructor can convey enthusiasm for the topic more readily than with the electronic formats.

It is also worth discussing availability and time issues related to telephones. Availability is excellent, or can be made so with sharing of numbers. Virtually everyone is near a phone at any given time, particularly with the propagation of cellular telephones. This makes telephone use an essential component of distance learning courses. While instant availability might not be a plus in the minds of many instructors, it is theoretically possible. In terms of time spent, the phone varies from very good (easy problems requiring a quick, readily-explained answer) to very poor (complex issues where the student has a fundamental misunderstanding).

In summary, the phone is a mediocre tool for out-of-classroom additional instruction. Simple questions are answered quickly with great satisfaction for both parties involved and tremendous time savings, yet complex questions often lead to the end of the phone conversation being “What time can I come by your office to discuss this?”

E-Mail

E-mail has become as ubiquitous on campus as phones, and most instructors and students are very familiar and comfortable using the technology. This is a critical feed into Comfort Level, as almost all students feel comfortable dashing off a quick e-mail to a professor. The student can consider the question carefully and write it out clearly before sending, greatly decreasing the chances of embarrassment or humiliation as compared to face-to-face or telephone, especially for the poor student. The student thus doesn’t feel that he is “Wasting the instructors time” or exposing his ignorance. E-mail is thus a very low-threat form of communication, and highly preferred by students. Further, the instructor’s response can be considered and careful, and can now carry a variety of media, to include sketches, references to internet sites, photos, etc. All of this helps to increase both the Imparting Knowledge and Intellectual Excitement goals. Additionally, the file trail that e-mail creates can be helpful for the student to refer back to later.

However, e-mail is both slow and feedback-free. Response times can vary from instant to never, depending on the instructor, and those responses also vary wildly in terms of quality and clarity. With e-mail, the quality of the additional instruction delivered is very much in the hands of the instructor. This is a good thing, because it means that the user rather than the technology typically constrains the quality. However, time on task is a real problem. A carefully crafted response to a student inquiry, especially if it includes visuals, can take a long time to generate, costing the instructor time and leaving the student hanging, waiting for a response while the enthusiasm that generated the initial inquiry dies a slow death. Further, the follow-up, give-and-take and general academic pursuit typically suffer with e-mail, which in the author’s experience usually involves a simple query-answer series of events rather than the exchange which is so critical to academic inquiry. It is also often difficult for an instructor to communicate their

enthusiasm for the topic via e-mail. Both of these factors tend to damp out intellectual excitement somewhat.

Instant Messaging

There are two primary networks that now dominate the Instant Messaging arena, and the growth of this communication mode is nothing short of phenomenal. According to PR Newswire (2002), an authoritative study of internet use predicts “IM accounts will grow from 225 million in 2002, to reach 989 million in 2006. It also predicts that Instant Messaging will become increasingly commonplace in corporate environments over the next four years, projecting that worldwide IM accounts for business purposes will grow from 35 million in 2002, to reach 118 million in 2006”. When combined with the observations of the authors, and Madden’s 2003 study, the picture is clear-IM use is ballooning, and young people are the most likely adopters and users. In fact, high-school age students are rapidly replacing the telephone completely with the use of IM. This is because IM is in many ways better than either telephone or e-mail.

One of the principal differences between phone and IM is multitasking. IM users are often chatting with multiple persons simultaneously, and these separate chats can be combined into rooms for group chats or kept separate based on user preference. This multitasking aspect is important, as it allows the user to check on information, think about responses and basically reflect before responding, while simultaneously using the internet to gather information, writing e-mails or chatting with other persons. That brings up the second key point: while the basic mode of communication is an interchange of ideas, etiquette allows for this interchange to have large gaps or pauses. Thus, the more knowledgeable participant is not held up while the receiver is processing the information transmitted. In a typical instructor-student exchange, the student will ask a couple of questions, get an instant response, then think about or work with the information received before asking further questions. Further, the student can look at a complete transcript of the interaction rather than asking the same question twice or interrupting the flow of the conversation to take notes.

For the reasons listed above, IM is a very good tool for Imparting Knowledge. It allows for succinct and timely interchange, has a high degree of precision, can transmit visual aids, and provides the student with a complete transcript of the session. IM is also the only method listed that ranks excellent in terms of Comfort Level. Current college students are extremely familiar and comfortable with the technology, and the threat level is perceived as near zero. Lastly, in terms of Intellectual Excitement, IM is good, but not very good. The communication of emotional content, like enthusiasm, through a chat window is difficult to impossible, but the ability to dig deeper is there. Sending a student to websites and answering more in-depth questions with free interchange is one of the key strengths of IM.

IM does relatively well at accomplishing the three instructional goals as compared to other forms of communication, but the big advantages of IM to the student and the instructor have to do with availability and time. Basically, the instructor is available via IM any time that she is sitting at a computer connected to the internet, but can choose when to turn the service on or off. Thus, rapid availability of additional instruction is possible with the option of shutting down that channel of communication when necessary. Also, as the computer has become the principal productivity tool for engineers, it is possible for both the instructor and student to participate in

effective IM-based additional instruction while simultaneously working on other tasks. This makes IM a quicker and more effective instructional tool than e-mail, particularly because of the rapid response capability. Lastly, IM is a nearly ideal tool for distance learning, having many obvious advantages.

It is worth noting here that webcams are becoming more common with time, and both of the major IM networks intend to support direct video mode very soon. This will hopefully improve the level of communication possible via IM, adding interpersonal content to the interactions. Whether the webcams detract from student Comfort Level remains to be seen.

Conclusions

There are many modes of communication available to an instructor, and each has its advantages and disadvantages. However, IM is emerging as a critical tool for instruction outside the classroom. The key findings of this study are summarized in the table below.

Communication Mode	Goal 1: Imparting Knowledge	Goal 2: Comfort Level	Goal 3: Intellectual Excitement	Efficiency/ Time Spent	Availability/ Rapid Response
Face-to-Face	Excellent	Poor to Good	Very Good	Fair	Poor to Fair
Telephone	Poor	Fair	Fair	Fair	Excellent
E-mail	Good	Excellent	Fair	Fair	Good
Instant Messaging	Very Good	Excellent	Good	Very Good	Very Good

Table 1: Ratings of Communication Modes

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Biography

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