

# A Survey of Communication Medium Utilized During IS Group Projects

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## Abstract

All business teams require a mode of communication between team members. In today's business world there are many ways to communicate including individual and group meetings face-to-face, net meetings, teleconferencing, land line phones, cell phones, pagers, e-mail, voice mail, and instant messaging as examples. This study sought to identify media choices for team communication. The means of communication depended upon the team members' selection of resources. Student groups in two team projects were analyzed in this study. Variables controlled in the study include difficulty of the task and group make-up. The groups varied in the amount of collaboration, cooperation, and length of time on task. The media choices were recorded via log entries. Analysis suggested that once a group started using a particular communication media, the trend of the group was to continue using that same method. This tendency appears to override other parameters such as group makeup or difficulty of task at hand.

**Keywords:** Media Choice, Media Richness, Social Presence, Teams

## 1. INTRODUCTION

In the business community, teamwork is of growing importance and a necessary skill. Employees must be able to work in teams and are expected to perform well on projects that require teamwork. How to work effectively in teams can be learned in the university class setting through group projects. Group projects allow students to prepare for successful work in the business environ-

ment. Group projects also improve the way in which students handle more complex tasks (Cohen, 1994).

During group work in the business environment, different forms of media will be available for use by the team members. Common business communication tools include face-to-face, teleconference, land line phone, cell phone, pagers, e-mail, and voice mail. In the university setting, these forms

of communication tools also exist. Two of the current forms of communication increasingly used in the business environment are the text messaging on cell phones, commonly known as short messaging systems (SMS) (Cherry, 2002) and instant messaging (IM) services on computers, also known as computer mediated communication (CMC) (Herring, 2004; Cameron and Webster, 2004; D'Ambra et al., 1998).

This study proposes to look at the media choice of students in a group project environment. The study seeks to extend the media richness theory proposed by Daft, Lengel, and Trevino (1987) by examining whether the task structure and immediacy of task, affect media choice. This study also examines whether there is a media inertia effect in group communication.

## 2. BACKGROUND

In previous research, the Media Richness Theory proposed that as uncertainty in the task increased, the communication choice would be for richer media (Daft and Lengel, 1984).

Media is considered to be richer when more senses are included to convey a message. Media is considered less rich when fewer senses can convey a message. The senses referred to are the five human senses: sight, smell, touch, sound, and taste. In this research the authors were concerned with sight, touch, and sound. The richest form of media is face-to-face because it is possible to communicate by sound, sight, and touch. One can convey messages via sound by talking. One can communicate via sight by using visual cues such as body language, facial expressions, and hand gestures. One can communicate via touch through physical touch such as hand shaking or simply touching. A less rich media is the telephone. In this communication medium, one has sound but no touch or sight. One can hear voice tones and voice inflection thus the telephone is richer media than e-mail. E-mail is an even less rich form of media than telephone, because one cannot get the tone or voice inflections in an e-mail that one gets in a telephone conversation.

Another aspect of the media richness theory concerns the time expected for a response. This is often referred to the immediacy of

the media. In face-to-face communication, one can expect immediate feedback since the norm of face-to-face conversation is to have a question answered or addressed on the spot. Because one does not expect immediate feedback from an e-mail message, e-mail is less rich than face-to-face. When one compares a cell phone call to a land line phone call, one is more likely to expect to get an immediate response from the cell phone, but not necessarily an immediate response from the land line phone, thus a cell phone is a richer medium than a landline phone call.

In this study, the participants are undergraduate university students with an average age of 25 years old. According to the literature (Cherry, 2002), the younger generations are more likely to have adapted to technologies such as the short messaging systems (SMS) and instant messaging (IM) services more rapidly than the rest of the population does.

## 3. RESEARCH QUESTION

This research seeks to determine if there is a commonality of media choice dependent upon the group project difficulty. The research also tries to identify other factors that might contribute to the media choice by the groups, namely the inertia effect. The research questions are as follows:

RQ#1: Whether media richness choice is influenced by the structure of a task?

RQ#2: Does media immediacy influence media choice?

RQ#3: Is there a media inertia effect seen in the group communication?

RQ#4: Is there a media choice inertia effect seen by the same individual from project to project?

## 4. METHODOLOGY

This study was conducted in an introductory computer information systems courses in Spring 2005 at a large urban university in the southeastern United States. This study was approved by the Institutional Review Board of the university where the authors were employed. All undergraduate students majoring in business were required to take this course and were provided with computer access on campus. There were no prerequi-

sites for the course, or requirement for students in the course to know about computers except the rudimentary skills in using a computer's word processor and spreadsheet programs. Five sections of the course were selected to participate in the study. In the beginning of the semester, students in those five sections completed a WebCT based survey to give permission to use their data after they were informed that their participation in the study was completely voluntary and would not affect their grade. WebCT is an online teaching tool that creates an environment for students and instructors to communicate with each other. Some features of WebCT are: assignment submission, email, bulletin board systems, survey instruments, and grading.

All students enrolled in the course were required to complete two group projects over the semester. The semester included 15 weeks of instruction and a final exam week (week 16). The first group project was conducted between weeks 9 and 11. At this point the students had taken two tests and finished an individual project and an individual paper. While completing their individual project, students acquired the skills necessary for them to conduct the first group project. The individual papers prepared students to perform the second group project. The first project was similar to the previ-

ously completed individual project as it required creating tables, queries, reports, and entries to a database using Microsoft Access. The first group project assigned to small groups of three students each. The second group project was a research paper on a topic in Information Systems with a format similar to that of the previously completed individual paper. The second project was assigned to small groups of two students after a third test and after the first group project was completed during weeks 12 through 15. The groups were allowed to select topics for the paper from a list provided by the instructor. The groups were also allowed to create their own paper topics, but were required to get instructor approval before working on their own topics.

During both group projects, all students, regardless of their participation status on the study, were required to keep a log of their communication and meetings individually. The log required the students to record every task that was conducted on the project, whether it was an individual task or a group task. No matter how small a task, such as sending out an e-mail, the task was required to be recorded. Figure 1 is a sample log with detailed instruction.

The <b>purpose</b> of this journal is to understand what work you did as a team and what you did by yourself for the Database Project.									
<b>My Name (Me):</b>									
<b>Partner #1 (P1):</b>									
<b>Partner #2 (P2):</b>									
<b>Definitions of communication choice found under "Communicated?"</b>									
Meeting when parties are physically present.						Face-to-Face			
Phone call with more than one person (3 way calling).						Teleconference			
Telephone plugged into the wall (home, work, or pay).						Phone(Land)			
Wireless cellular phone call.						Phone(Cell)			
Leaving a voice mail message.						Voice Mail			
Sending/receiving an e-mail message.						E-mail			
Short text message on a wireless PDA, cell phone, etc.						SMS			
Sending and receiveing instant messages by computer.						IM			
Posting project files to WebCT (project space).						WebCT			
Not on list? Please explain under 'Issues' column.						Other			
<b>Date</b>	<b>Started</b>	<b>Ended</b>	<b>Where?</b>	<b>Who was there?</b>			<b>Communicated?</b>	<b>What happened?</b>	<b>Issues?</b>
				<b>Me</b>	<b>P1</b>	<b>P2</b>			
3/15/2005	9:10 AM	9:15 AM	Classroom	Yes	Yes	Yes	Face-to-Face	Chose project leader, Discussed assignments,	none
3/16/2005	8:00 PM	8:15 PM	Home	Yes	Yes	Yes	E-mail	Emailed group schedule	mail down
3/18/2005	2:30 PM	4:30 PM	Library South	Yes	Yes	no	Phone(Cell)	Created files.	none

Figure 1. Sample Log with Instructions.

Although all students who submitted the completed logs received the same credit, only logs from students who had given permission to use their data were considered usable logs. During the semester, the first group project generated 100 valid usable logs from 45 groups, and the second group project produced 111 valid usable logs from 68 groups. The communication data from the usable logs were extracted by two researchers and analyzed in this study.

### Group Project One: Database Project

The database design project required the groups of three students to import, normalize, modify tables, and create specific tables, queries, reports, and forms using Microsoft Access. The groups were required to submit their project electronically via WebCT for assessment.

Student teams were formed after the drop date (week eight) to ensure minimal degradation of student teams due to students withdrawing from the course. Each group had a total of three weeks to complete its project. Students were expected to complete their work outside of class and submit their work electronically through WebCT for assessment.

The types of media choices expected by the researchers to be available to the students were face-to-face meetings, teleconference, land line phones, cell phones, e-mail, on-line bulletin board system, voice mail, personal digital assistant (PDA), SMS, or IM. Students were free to enter any other type of media that they might use, though none were expected. An example

of a student's condensed entries is illustrated in Figure 2.

The projects were graded using a grading rubric by all the instructors. Since the project was structured and the grading rubric was specific in what information needed to be present in the database file, no cross validation of grading was conducted.

Because this project was highly structured and all students had acquired the skills necessary to conduct the project, students were less uncertain completing the task. Thus, the data from Group Project One is expected to see students use less rich media and with less immediacy to communicate within their groups.

### Group Project Two: Research Paper

The second project required the group of two students to create a report and presentation on a topic of Information Systems. The project consisted of conducting research outside of class. The groups were required to submit their report electronically via WebCT for assessment. The presentation was conducted to the class by the groups during class hours. Both students were required to be actively involved in the presentation phase of the project. This would discourage students to split the project into a paper and presentation portion, and work on the portions individually creating two individual projects.

Since this project was a less structured written project, validation of grading was conducted. A rubric developed by the research team was used to grade the individual papers. Each of the three graders was given the submitted papers and gave

Date	Started	Ended	Where?	Who was there			Communicated?	What happened?	Issues?
				Me	P1	P2			
3/15/2005	9:10 AM	9:15 AM	Classroom	Yes	Yes	Yes	Face-to-Face	Chose project leader, Discussed assignments, Assigned tasks, ...	none
3/16/2005	8:00 PM	8:15 PM	Home	Yes	Yes	Yes	E-mail	Emailed group schedule	email down
3/18/2005	2:30 PM	4:30 PM	Library South	Yes	Yes	no	Phone(Cell)	Created files.	none
3/20/2005	6:45 PM	7:15 PM	Home	yes	Yes	Yes	Teleconference	We discussed the table breakdown and importing	Temporarily having problems importing my files
3/20/2005	7:30 PM	7:45 PM	Home	Yes	Yes	Yes	E-mail	Emailed each other back and forth	none
3/20/2005	9:30PM	10:00 PM	Home	Yes	No	No	Other	Separated the files on my computer	
3/21/2005	7:00 PM	8:00 PM	Home	Yes	no	no	Teleconference	Played around with the different relationships	Couldn't seem to incorporate the sales tabl correctly.
3/15/2005	3:00 PM	5:30 PM	Work	Yes	No	No	E-mail	Developed project plan and sent to group members via WebCt.	No
3/16/2005	11:43 AM	11:51 AM	Work	Yes	Yes	No	Phone(Cell)	Confirmed project plan and discussed everyone's involvement with P1.	No
3/19/2005	3:58 PM	3:59 PM	Work	Yes	No	No	E-mail	Sent an email inquiring about the status of the Normalized tables assigned to P2.	Yes, P2 did not submit his assignment as agreed.

Figure 2. Example of a log file submitted by a student.

his or her grade according to the rubric. Then, the graders met to discuss the grading to arrive at a consensus on the grading for each paper submitted for the five sessions.

In terms of difficulty of task, this project was considerably less structured than the first group project. Therefore, students should feel more uncertain when completing the task and were expected to use media that were richer and with more immediacy to communicate with their group members.

### Data Collection and Analysis

To make the data anonymous, each student's name was replaced with a unique identifier by a researcher. The communication data from each usable log was extracted by two other researchers who were not exposed to the names of the logs.

The communication data was coded to determine if the work was face-to-face (9), Tele-conference (8), cell phone (7), land line telephone (6), voice mail (5), e-mail (4), SMS (3), IM (2), or the WebCT Discussion platform (1). The numbers represent the weight of each communication. It is noted that the nine modes of communication are not spaced on the media richness line in equal amounts. However, to operationalize the average richness of the communication, equal spacing weighting was used to create a linear continuum from richest medium to least rich medium. The same scale was used in both projects.

Each individual entry of a communication event was considered one occurrence of that mode of communication. The number of times that each mode of communication used was totaled. Having the 'start time' and 'end time' data, allowed the computation of elapse time for each task in the log data line. But this approach was abandoned due to the fact that face-to-face meetings would be unduly weighted heavier than other communication media. The research question is concerned with the media choice when there is a need for communication. Thus each time that an e-mail was sent for a need of communication should be counted once, and another need of communication should be counted also. For example, if a group set up a meeting and an e-mail was sent to clarify and

where a meeting was scheduled, this would be considered one count in the data. If the individual deemed it necessary to send two separate e-mails to clarify the meeting location and time, this was considered two counts in the data. Thus the number of times that the mode of communication was used was considered.

The counts for each entry were multiplied by the media weight to get a 'count X media' entry. The 'count X media' entries were summed to get the 'total counts X media' entry. This total was divided by the number of entries in the log. This revealed a number between one and nine which is called the Media Choice Index (MCI). Thus, as an individual used the richer media (i.e., face-to-face) more often, the MCI would approach nine. As the individual used the less rich media (i.e., WebCT Discussion platform) more often, the MCI would approach one. This MCI was used to examine the media choices made by students during both projects.

The data were also analyzed to see if there was a media inertia effect in group communication. In other words did the group stick to certain communication method(s) throughout the project? Since all individuals worked in a fact-to-face group at least once, face-to-face was used as an anchor. A tally of each method of communication was examined for face-to-face only, one method plus face-to-face, two methods plus face-to-face, or three or more methods plus face-to-face.

## 5. RESULTS AND DISCUSSIONS

Even though the students were free to use any form of communication, only nine methods were utilized by students. These were: face-to-face, teleconference, land-line phone, cell phone, voice mail, e-mail, short message system (SMS), instant messaging (IM), and the WebCT Discussion platform. The results revealed that text messaging, short messaging systems, and instant messaging systems were reported infrequently. This may be due to the fact that even though this age group utilizes these tools the most as compared to people in other age groups, they do not view them as productivity tools. Students in this age group are likely to view instant messaging as a social networking tool.

Results of this study were presented and discussed according to the research questions.

RQ#1: Whether media richness choice is influenced by the structure of a task?

The MCI (Media Choice Index) for each individual and average for all students were calculated for Project One and Project Two. For project one, it was found that the average MCI was 7.212, while for Project Two the average was 6.722. Several methods of communication were not applicable in the second project. The first project was a three person group, thus there might be a need for a teleconference call to get three students on the phone at one time. Unlike the first project, the second project was a two person group. There was no need for a teleconference. Thus, there were minimal teleconference entries. The WebCT Discussion platform was also seen only scarcely in Project Two, while seen a handful of times in the first project. Sending an e-mail out to one's partner might be easier than using a WebCT Discussion platform when in a two person group.

The media richness theory indicates that as uncertainty increases, the choice of media moves to the richer sources (Daft & Lengel, 1984). This research utilized a highly structured database project and less unstructured written project with a presentation. The projected outcome of the study was to confirm that the richer media would be used more often for Project Two than that for project one. However, the data suggested otherwise. That is, the highly structured Project One had higher frequent use of richer media than the less structured Project Two did, whether teleconference data were kept or omitted.

One explanation of this phenomenon may be that groups tended to use one type of media and kept on using it (inertia). It was also possible that each individual used one type of media and kept on using it. This was addressed in research questions three and four below.

Another explanation is that there may be tendencies to use richer media when the group was larger. Even though the task was designed for a three person group and most of the groups were three person groups (84 individual logs), there were two

person groups (12 individual logs) and a four person group (4 individual logs) due to group reorganization after the groups have been formed. The MCI was 7.069, 7.257, and 8.5, respectively, for the two, three, and four person groups. As the groups became larger, the richer media were more likely to be used. The very small number of four person groups might have skewed the results. However, the comparison of MCI for the two person groups and three person groups appeared valid. Future studies need to further examine the effect of group size on media choice.

RQ#2: Does media immediacy influence media choice?

As discussed above, whether a task is highly structured or not does not seem to affect the media choice. According to the media richness theory, as uncertainty increases, the choice of media tends to be more immediate (Daft & Lengel, 1984). Because Project One was highly structured with less uncertainty, it required less immediacy, whereas Project Two was less structured with higher level of uncertainty, thus requiring more immediacy. Results of the study indicate that the MCI for Project One was higher, indicated more immediacy, than that for Project Two. This finding is contrary to the theory. This may be explained by groups that continue to work in the same manner (inertia).

RQ#3: Is there a media inertia effect seen in the group communication?

The data for both projects were combined for this analysis. The inertia effect was a measure of individual logs independent of project. Thus the total N for this dataset was 211.

The data analysis found that 41 individuals conducted face-to-face meetings only, 58 individuals communicated with one form of communication in addition to face-to-face meetings, 54 individuals communicated with two forms of communication in addition to face-to-face meetings, 38 individuals communicated with three forms of communication in addition to face-to-face meetings, 20 individuals communicated with four or more forms of communication in addition to fact-to-face meetings.

This result indicates that the majority of the students (73%) appear to have one or two favorite ways of communicating in addition to face-to-face meetings. This seems to indicate that there is some form of inertia effect, that is, when a form of communication works for someone, that person tended to use that communication medium consistently.

RQ#4: Is there a media choice inertia effect seen by the same individual from project to project?

Because each individual's data was tagged with an identifier, the authors were able to assess each individual's media choice in Project One and in Project Two. There were losses in data because some students did not turn in their log data. Also the set of students that did not turn in their log data for the first project was not the same set of students that did not turn in their log data in the second project. Thus the number of usable logs for this comparison was 76. Of these 76 usable logs, 16 (21%) had the same patterns of communication from Project One to Project Two. In other words, these students used exactly the same number of the same communication methods in Project One and Project Two. For example, if a student used e-mail, cell phone, and WebCT Discussion platform in the first project, the student also used the same three forms of communication, and only those three forms, in Project Two. Results also indicate that 33 students (44%) used one more or one fewer mode of communication in Project Two than they did in Project One; 14 students (18%) used two more or two fewer modes of communication in Project Two than they did in Project One; and four students (5%) used three or more or three or less modes of communication from Project One to Project Two.

These results suggest that students who found a favorite type of communication tended to use that method throughout the course. The results also suggest that those who use few modes (two or fewer) of communication in one project tend to use a few modes (two or less) of communication in a different project. It was found that the majority of the students (64%) used the similar number of choices of communication in both projects. That seems to

make sense since if one has a work group in which everyone tends to read e-mail, the group will tend to use e-mail consistently to communicate with each other. Moving to another project with a different teammate and finding cell phones were the better way to communicate, team members would use cell phones and dropped e-mails to communicate in the second project.

One interesting observation was that students who used three or more forms of communication in one project used two or more forms of communication in the other project. The fact that those who used three methods of communication tended to keep a high number of communication methods suggests that students who tend to use diverse methods of communication tend to continue to use diverse methods of communication.

The results seem to suggest there is an inertia effect seen by individuals. This inertia effect is seen in the choice of media by the individuals from project to project. The inertia effect is also seen in the amount of different communication media chosen from project to project.

## 6. CONCLUSIONS

Based on the results of this study, following conclusions can be drawn. First, contrary to what the media richness theory implies, individuals' media choice in this study does not seem to be dictated by the structure of a task, uncertainty, or immediacy. Instead, a relationship between the group size and media choice appears to exist. The larger the group the richer media was used. Second, there might be some form of inertia effect in media choices. Individuals appear to use the medium/media they are familiar with. Additionally, individuals appear to have a tendency to have the same media choice from project to project.

## 7. LIMITATIONS AND FUTURE RESEARCH

One limitation of this research is that the weighting of the media reported was arbitrarily assigned in order to compare the media choices between Project One and Project Two. This assignment of weights

was ranked in order assuming the distance between the media was uniform which is unlikely. However, since the media choice in both projects were examined using the same Media Choice Index (MCI) and this study is not designed to examine which medium is richer than the other or how much richer than the other, the authors believe the use of MCI in such cases is permissible and useful. Future study needs to be conducted to validate the usefulness of MCI in such cases.

Limits also existed in the log entries by the students, which were the data collection devices. Therefore, they were self reported data. There may be self-report bias. Such bias is common in studies like this. To address this limitation, a more structured instrument with detailed instruction needs to be developed.

Although students in this study were required to form small groups of three persons for Project One, a number of two person and four person groups. Future studies should purposefully allow students to form groups of two persons, three persons, and four persons as long as the number of groups with each size is kept the same or close to the same. The variance in group number will also address another limitation of this study. The observation that the larger the size of a group, the more likely the richer media is to be chosen may be addressed if there were equal number of groups of all three sizes. This can only be confirmed or rejected in the future studies.

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