Do Media Richness and Visual Anonymity Influence Learning? A Comparative Study Using Skype™

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Abstract

This study examines the differences between audio conferencing and traditional face-to-face learning. We investigated whether the characteristics of audio conferencing – media richness (Media Richness Theory, Daft & Lengel, 1984), media naturalness (Media Naturalness Hypothesis, Kock, 2005) and visual anonymity-determine students' learning efficacy, perception, satisfaction, participation, and willingness to take risks. 42 undergraduates were randomly allocated to face-to-face and to audio conferencing groups, receiving a 20-minutes lesson in groups of three. As we hypothesized, there was no significant difference between students' achievement and perception of learning. Distance learning through audio conferencing was as effective as face-to-face learning. Significant differences, in favor of face-to-face communication, were found in the emotional-experiential aspects of learning: amount of students' attention and interest, learning satisfaction, and enjoyment from the interaction with tutor or peers. The findings indicated that visual anonymity decreased the fear of criticism which in turn, increased the amount of participation and risk-taking. These findings are explained in terms of differences in media naturalness and of the effect of visual anonymity. The results suggest a distinction between the cognitive and emotional-experiential aspects of perceived learning.

Keywords: synchronous audio conferencing, media richness, media synchronicity, media naturalness, visual anonymity, learning efficacy, learning satisfaction, participation.

Introduction

The current paper compares different aspects of learning and students' behavior while utilizing audio conferencing and traditional face-to-face learning environments. Synchronous tools such as audio conferencing provide real-time distance interaction between tutors and students in order to engage in learning activities. Russell (1992; 1999) summarized hundreds studies and reported that most of them did not find significant differences between the learning effectiveness of distance and "on-site" lecture classrooms. On a theoretical level, Clark (1994) claimed that media per se cannot influence learning, but rather the instructional methods that are implemented with these media. Kozma (1994) argued that media and instructional methods are inextricably interconnected, thus differences in learning while utilizing different media are expected. The current study used the same instructional methods for online and on-site lessons in order to examine if the media features influence students' learning and behavior.

Media differ in the amount of information they can transmit, and some theories link the features of a medium and the quality of communication this medium affords. Media Richness Theory

(MRT; Daft & Lengel, 1984; Daft, Lengel & Treviño, 1987) ranks different media from richest to leanest according to their capability to provide immediate feedback, to transmit verbal and non-verbal communication cues, to provide a sense of personalization, and to simulate natural language. Based on the MRT approach it is reasonable to conclude that the use of a lean communication medium for learning purposes may have a *negative* effect on the learning process and students' satisfaction.

The Theory of Media Synchronicity (TMS; Dennis & Valacich, 1999) extended the original dimensions suggested by MRT and defined five media capabilities: immediacy of feedback, parallelism, symbol variety, reprocessability, and rehearsability. According to the TMS approach it is reasonable to conclude that the use of a medium providing low feedback and high parallelism for learning purposes may have a *positive* effect on the learning process in which "the dissemination of a diversity of information from many sources, information not previously known to participants" (Dennis & Valacich, 1999, p.4) is the goal.

A new approach, the Media Naturalness Hypothesis (MNH; Kock, 2005), refers to the naturalness of a medium instead its richness. MNH ranked different media from natural (face-to-face is the most natural way of communicating) to virtual. MNH claims that a decrease in the degree of media naturalness leads to an increase in cognitive effort [defined as "the amount of mental activity… involved in communication interaction" (Kock, 2005, p.122)], an increase in communication ambiguity, and a decrease in physiological arousal that derives from the communication interaction. According to this approach, using high and low naturalness media may result in similar learning outcome, because cognitive effort while using the low naturalness medium increases, and thus compensates for its virtuality. But even though a decrease in media naturalness may not have a negative effect on learning outcome quality, decreased physiological arousal may lead to lower learning satisfaction. Marcus (1994) found that, other things being equal, users perceived Computer-Mediated Communication (CMC) as less "exciting" and more "dull" than face-to-face communication.

CMC may occur under conditions of visual anonymity, which may have an important impact on the individual's behavior. According to the Social Identity model of Deindividuation Effects (SIDE; Spears, & Lea, 1992; Spears, Postmes, Lea, & Wolbert, 2002) anonymity induces a shift in an individual's focus from his personal identity toward his social identity as a member of a group. Visual anonymity combined with salient group identity increases the adherence to group norms and causes greater attraction to the group's members (Lea, Spears, & de Groot, 2001; Tanis & Postmes, 2007). In an online learning environment this process may enhance students' participation (Blau, 2007). Additionally, visual anonymity and isolation from other students may decrease fear of criticism, which consequently both enhances participation and leads to a more risky behavior, for example by answering questions. Rosell-Aguilar (2005) claim that the visual anonymity in synchronous CMC may serve as a "shield" for students who are afraid of making mistakes in a face-to-face learning situation (see also Caspi, Chajut, Saporta & Beyth-Marom, 2006).

Some empirical findings concerning learning efficacy, satisfaction, perception and participation in audio conferencing generally support the MNH's predictions. Chen, Wu and Yang (2006), who investigated learning performance in 46 small groups, found that neither decision-making nor intellectual tasks had an impact on cooperative learning outcomes in audio conferencing and textual chats. Nevertheless, they found significantly higher learning satisfaction in audio conferencing in comparison to textual chat, exactly as MNH predicted. Lower teacher satisfaction was reported by Rapanotti, Blake and Griffiths (2002) who found that in audio conferencing, tutors felt more discomfort and reported that they put in extra effort in order to be understood relative to face-to-face lessons. A study of Rosell-Aguilar (2006) supported the

claim that more cognitive effort is perceived while utilizing a less natural medium. Students in this study reported that visual anonymity in synchronous languages lessons led them to use listening skills more effectively. Support for the impact of visual anonymity on participation emerged from a study of Hampel (2006). Hampel found that the use of audio conferencing in language courses increased student interaction and participation relative to face-to-face learning. Recently, Blau and Caspi (2007) reported that students' relative participation in Skype lessons was higher than in face-to-face lessons.

The current study examines learning efficacy, learning perception, satisfaction, participation, and risk taking in two different communication modes. Specifically we focused on the influence of the richness, naturalness, and level of visual anonymity of communication media on learning efficacy, learning perception, satisfaction, participation, and question answering. To do so, we compared audio conferencing and traditional classroom learning.

According to the MNH approach and the SIDE model we hypothesized that audio conferencing learning will have a positive effect on students' participation and risk-taking, will not have a negative effect on learning efficacy and learning perception (in terms of learning conceptions), and will negatively affect students' satisfaction, relative to face-to-face learning. Specifically we hypothesized that student participation and answering questions will be higher in audio conferencing compared to face-to-face learning. We also hypothesized that students' achievement and their perception of learning will be at least the same for audio conferencing and for face-to-face learning. Last, we hypothesized that students' learning satisfaction through audio conferencing will be lower relative to a face-to-face environment.

Method

Participants: 42 undergraduates (71% women) from the Department of Psychology and Education at the Open University of Israel received an academic credit for participation in this research. The participants' ages ranged from 14 to 42, mean age was 28 years, and the median was 26.

Instruments and procedure: The participants were randomly allocated to face-to-face and to audio conferencing communication conditions. Every triad received a 20 minute Music lesson, a subject matter that was unfamiliar for all participants. All groups were taught by the same teacher. We adopted Frank, Kurtz and Levin's (2002) suggestion and our audio conferencing participants met the teacher and each other face-to-face before and after the lesson. The lessons were recorded for analysis. Audio conferencing was done using Skype™, an Internet application that allows rich synchronous communication. In the current study, only the auditory channel was used. Achievement was measured by computing the difference between pre- and post-tests. In addition to the content-related post test, the participants were asked to evaluate their perception of learning. The questionnaire (see Appendix) relates to the five conceptions of learning (Marton, Dall'Alba & Beaty, 1993; Marton & Säljö, 1976a,b), and to learning satisfaction. Participation and risk-taking were measured using quantitative content analysis of the lessons' records. Participation was measured by the speaking frequency of each student and the teacher, and risk-taking was measured by testing the frequency of answering the teacher's questions.

Results

As Table 1 shows, achievement was similar in the audio conferencing and face-to-face conditions.

Table 1. Learning efficacy: face-to-face versus audio conferencing

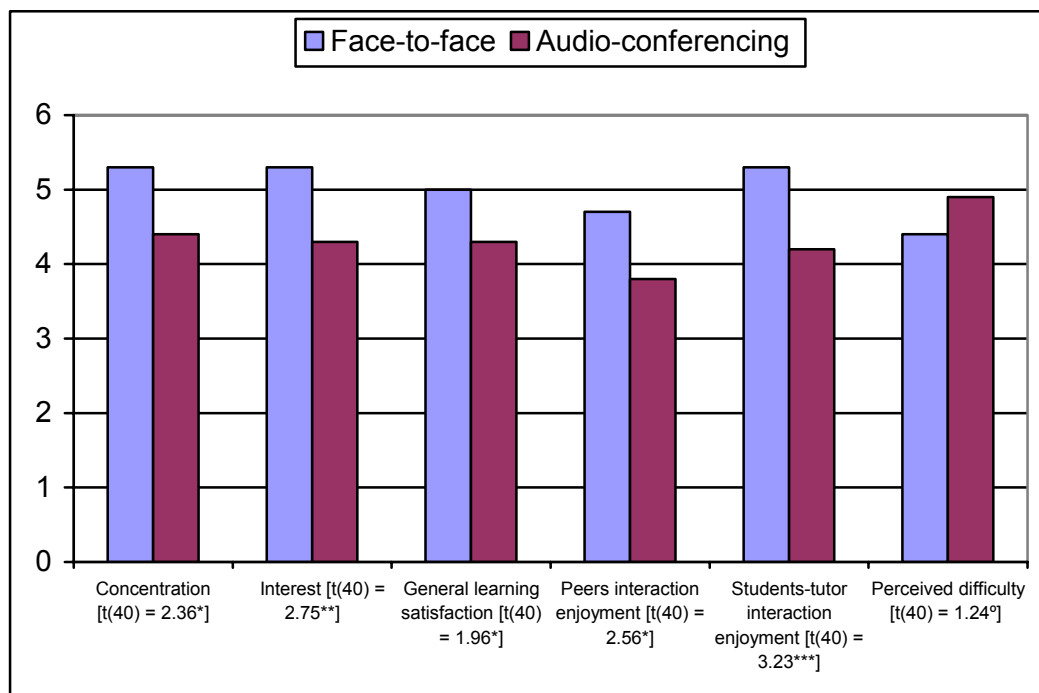|	Face-to-face		Audio conferencing		*t*-test
	Mean	St. dev.	Mean	St. dev.	
Pretest	1.6	0.8	1.6	1.2	n.s.
Posttest	8.6	1.0	8.2	1.4	n.s.
Difference	7.0	1.3	6.6	1.6	n.s.

As the data appearing on Table 2 indicates, there were no significant differences in the self-evaluated achievement and in learning perception between the two conditions. One exception is memorization, of which students in the face-to-face groups perceived to have a higher level.

Table 2. Learning perception in face-to-face versus audio conferencing

Learning perception	Face-to-face		Audio conferencing		*t*-test results
	Mean	St. dev.	Mean	St. dev.	
Conceptions of learning:					
Achievement: self-evaluation	8.5	1.2	8.5	1.4	n.s.
Learning: general evaluation	5.2	0.8	5.2	0.7	n.s.
Quantitative increase in knowledge	5.3	0.8	5.1	0.7	n.s.
Memorization	5.2	0.9	4.6	1.0	$t(40) = 2.10*$
Implementation	3.1	0.9	2.7	0.9	n.s.
Making sense	5.1	1.0	4.7	1.1	n.s.
Perspective changing	3.3	0.8	3.2	1.5	n.s.
Difficulty clarification	4.7	1.0	4.3	1.1	n.s.

* $p < 0.05$

However, as presented in Figure 1, we found significant differences in learning satisfaction between the two communication conditions, all in favor of face-to-face learning.

° n.s.; * $p \leq 0.05$; ** $p < 0.01$; *** $p < 0.005$

Figure 1. Learning satisfaction in face-to-face versus audio conferencing

The teacher's participation in face-to-face lessons (Mean: 67.4, SD: 19.5) was statistically lower than in audio conferencing lessons (Mean: 81.6, SD: 16.9), $t(6) = 2.87$, $p < 0.05$, but the students' participation was statistically not lower (face-to-face – Mean: 25.7, SD: 14.5; audio conferencing – Mean: 32.6, SD: 16.8, $t(40) = 1.43$, $p > 0.1$). In terms of risk-taking, students in the audio-conferencing groups answered significantly more questions (Mean: 20.6, SD: 4.5) than students in the face-to-face groups (Mean: 13.5, SD: 3.7), $t(40) = 2.46$, $p < 0.05$.

Discussion

As predicted, we found no significant difference in students' achievement and in almost all aspects of conception of learning. Distance learning through audio conferencing was as effective as face-to-face learning. These findings coincide with hundreds of similar research studies that find non-significant difference (Bernard et al., 2004; Russell, 1999). The null difference between the two media contradicts the MRT prediction that a lean medium will result in a worse performance relative to a rich medium. It is also contradicts the TMS prediction that use of a medium that provides low feedback and high parallelism will lead to better performance.

Significant differences, in favor of face-to-face communication, were found in what we consider the "peripheral" aspects of learning, such as students' concentration and interest, learning satisfaction, and enjoyment from the interaction with tutor or peers. Contrary to the claims of both Clark (1994) and Kozma (1994), these differences can not be attributed to differences in instructional methods, as the same teacher used the same instructional method for both learning conditions. Our results support the media naturalness hypotheses. According to MNH prediction (Kock, 2005), the lack of medium naturalness may be compensated by more focused attention, better structured contribution, and better thought out communication. Therefore communicators may reach the same or an even better quality outcome, and nevertheless feel less satisfaction from the interaction. The fact that the students *reported* having more difficulties in concentrating in the audio conferencing lessons, although they reported similar difficulty of the content, may be seen as further support for this claim.

As hypothesized, visual anonymity and isolation increased participation and risk-taking (by answering questions). We suggest that this occurred because visual anonymity decreased fear of criticism. This result supported the predictions of SIDE, and corroborated our earlier findings (Blau, 2007; Blau & Caspi, 2007).

In sum, our data offers a distinction between the cognitive and the emotional-experiential aspects of learning. Although the online audio conferencing class is as effective as the on-site face-to-face one, learning is more enjoyable through a more natural communication medium. Nevertheless, participation and risk-taking are higher through a less natural medium where there is visual anonymity.

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Appendix

הערך : על כמה מהשאלות השבת נכון בשאלון האחרון?

10	9	8	7	6	5	4	3	2	1	0
על כולן										על אף אחת

למדתי במידה מרובה מאוד	5	4	3	2	לא למדתי כלום		
למדתי במידה מרובה מאוד	5	4	3	2	לא למדתי כלום	הערך באיזו מידה למדת מהשיעור שקיבלת	1
הוסיף לי במידה מרובה מאוד	5	4	3	2	לא הוסיף לי דבר	הערך באיזו מידה השיעור שקיבלת הוסיף לידיעתך	2
סייע לי במידה מרובה מאוד	5	4	3	2	לא סייע לי כלל	הערך באיזו מידה השיעור שקיבלת סייע לך לזכור את הנושא	3
עזר לי במידה מרובה מאוד	5	4	3	2	לא עזר לי כלל	הערך באיזו מידה השיעור שקיבלת עזר לך להפוך את הנושא שהוסבר ליישומי בתחומים אחרים	4
סייע לי במידה מרובה מאוד	5	4	3	2	לא סייע לי כלל	הערך באיזו מידה השיעור שקיבלת סייע לך להבין טוב יותר את הנושא	5
במידה רבה מאוד	5	4	3	2	בכלל לא	הערך באיזו מידה בעקבות השיעור שקיבלת אתה מסתכל כעת על דברים אחרת	6
במידה רבה מאוד	5	4	3	2	בכלל לא	הערך באיזו מידה היו פעמים בהם איבדת את ריכוז במהלך השיעור שקיבלת	7
במידה רבה מאוד	2	1	-1	-2	בכלל לא	הערך באיזו מידה חשת שאתה משתעמם במהלך השיעור	8
עזר במידה רבה מאוד	2	1	-1	-2	הערים קשיים חדשים	באיזו מידה השיעור שקיבלת עזר לך להבהיר קשיים שבנושא שנלמד	9
גרם לי הנאה רבה	2	1	-1	-2	גרם לי סבל	הערך באיזו מידה נהנית מהשיעור שקיבלת	10
נהניתי במידה רבה	2	1	-1	-2	גרמה לי סבל	באיזו מידה נהנית מהאינטראקציה בין הסטודנטים בזמן השיעור	11
נהניתי במידה רבה	2	1	-1	-2	גרמה לי סבל	הערך באיזו מידה נהנית מהאינטראקציה בין המנחה והסטודנטים בזמן קבלת השיעור	12
קל ביותר	2	1	-1	-2	קשה ביותר	הערך באיזו מידה התוכן שנידון בשיעור קשה להבנה	13