Media Naturalness Reduction and Compensatory Channel Expansion:
A Study of Online and Face-to-Face Sections of the Same Course

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ABSTRACT

This study provides a combined test of the media naturalness and channel expansion theories with a study of communication media perceptions and use outcomes in the context of a college information systems course delivery. Data was collected from undergraduate students at the middle and end of a long semester. Approximately half of the students took the course face-to-face, and the other half online. As predicted, based on media naturalness theory, grades were significantly higher in the face-to-face condition than the online condition at the middle of the semester. Consistent with predictions based on channel expansion theory, the difference between grades obtained at the middle of the semester disappeared at the end of the semester. This study shows that online course delivery may lead to both negative and positive effects in the same semester, leading to a final outcome that is generally positive. It provides a more nuanced view of online course delivery effects, and clarifies previous empirical findings that appear paradoxical at first glance.

Keywords: *Channel Expansion Theory, General Linear Modeling, Media Naturalness Theory, Media Richness Theory, Online Learning, Partial Least Squares*

INTRODUCTION

One of the most widely cited theories of communication in professional and education contexts is media richness theory (Daft & Lengel, 1986; Daft et al., 1987). Even though the theory was developed well before the emergence of online learning in university contexts, its key propositions can be used to predict the performance of students in those contexts. Among other predictions, media richness theory argues that if equivocal, or knowledge-intensive, tasks are accomplished through media of low richness, task outcomes will be negatively affected (Daft & Lengel, 1986). Electronic media in general are considered less rich than face-to-face media. It is reasonable to assume that the task of learning university subjects is equivocal. Therefore one

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can conclude based on media richness theory that students learning about university topics online will perform more poorly in tests covering those topics than students learning about the same topics face-to-face.

This type of deterministic prediction usually follows logically from media richness theory, even though Daft and Lengel (1986) might not have intended this. Many studies in the past departed from this type of prediction, and reached conclusions that suggest little or no support for media richness theory (Bélanger & Watson-Manheim, 2006; Burke & Aytes, 2001; Crowston et al., 2007; Dennis & Kinney, 1998; El-Shinnawy & Markus, 1998; Hasty et al., 2006; Kock et al., 2006; Markus, 1994). Moreover, the widespread use of online learning in universities (Newlin et al., 2005; Summers et al., 2005) is an indication that this type of deterministic prediction cannot be correct. It would be unlikely that online learning would be widespread in universities if student learning outcomes were being negatively affected in a material way.

Media naturalness theory (Kock, 2004, 2005) is an attempt to move away from the deterministic predictions of media richness theory. The theory explains an intuitive finding; most people have the perception that media that suppress face-to-face communication elements (e.g., the ability to use tone of voice) pose obstacles for the effective communication of knowledge (Daft et al., 1987; Kock & DeLuca, 2007; Kock et al., 2006). It does so by arguing that the biological communication apparatus of modern humans, which includes various brain modules, is largely "designed" for face-to-face communication (Kock, 2004). It follows from this argument that the removal of face-to-face communication elements from a medium will lead to increased communication ambiguity, increased cognitive effort, and reduced excitement associated with knowledge communication interactions (Kock, 2005).

Can one argue based on media naturalness theory that students learning about university subjects online will perform more poorly in tests covering those subjects than students learning about the same subjects face-to-face? The answer is no, for at least two reasons. The first is that media naturalness theory does not make predictions about task outcomes. The second is that media naturalness theory itself argues that low media naturalness effects (e.g., increased cognitive effort) can lead users of unnatural media to develop mental schemas that will make them better users of those unnatural media. That is, users of unnatural media will adapt to those media in a compensatory way. This adaptation is predicted by Carlson and Zmud's (1999) channel expansion theory, and is thus called here compensatory channel expansion.

This paper discusses a study that tests the predictions of the media naturalness and channel expansion theories, and finds general support for them. Data was collected from undergraduate students at the middle and end of a long semester. The students took an introductory course in management information systems; approximately half of the students took the course face-to-face, and the other half took the course online. As predicted based on media naturalness theory, perceived communication ambiguity and cognitive effort were higher in the online than in the face-to-face communication medium condition. As predicted based on channel expansion theory, the difference between mean grades obtained at the middle of the semester, which was significant, subsided at the end of the semester.

The design of this study is similar to that employed by Kock et al. (2007), in that both are longitudinal studies that analyze data at different points of a long semester. However, the data set for this study is both different and much larger, providing a significantly more elaborate test of the underlying theories and related hypotheses. Moreover, the data analysis methods used in this study are considerably more sophisticated than those employed by Kock et al. (2007). The latter study used primarily nonparametric comparison of means tests, whereas this study employs general linear modeling and partial least squares analyses. Nevertheless, in spite of these differences, the results of this study