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Martin Hassell

*University of Arkansas*, mhassell@walton.uark.edu

Moez Limayem

*University of Arkansas*, mlimayem@walton.uark.edu

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# Working In the New Way: A Preliminary Study of Media Synchronicity and Job Satisfaction

**Martin Hassell**  
University of Arkansas  
mhassell@walton.uark.edu

**Moez Limayem**  
University of Arkansas  
mlimayem@walton.uark.edu

## ABSTRACT

For many organizations, it is not feasible to expect all or some of the members to be able to meet physically. Members of organizations use different types of media to communicate information and to make decisions. In this paper, we completed an initial study that looked at how the type of media, specifically the level of synchronicity supported by the media, influenced individuals' job satisfaction. We used two different levels of media synchronicity represented by two systems, virtual worlds and email. We predicted that individuals perceive greater job satisfaction when they use media higher in media synchronicity. We also predicted that presence and social presence would play a role this relationship. In a study consisting of 56 participants, we used vignettes to manipulate perceptions of using one of the two systems. We found support for our main hypothesis that when there is higher media synchronicity, individuals perceive greater job satisfaction.

## Keywords

Job satisfaction, media synchronicity, presence, social presence, virtual worlds.

## INTRODUCTION

It can be difficult or costly for managers and employees to physically meet together when there is distance or time constraints. Even within close proximity, individuals sometimes choose to communicate and make decisions through electronic media. However, we do not fully understand how the characteristics of the media influence individuals' perceptions of their work. Much of the research on mediated communication is based on understanding communication performance (Daft and Lengel, 1986; Dennis, Fuller, and Valicich, 2008; Miranda and Saunders, 2003), but little has been done on job perceptions or outcomes. In this paper, we conduct an exploratory study looking specifically at how the media used for communication influences job satisfaction.

Drawing from the Media Synchronicity Theory (Dennis et al., 2008) and presence and social presence, we study the relationship between media synchronicity and job satisfaction. Media synchronicity is defined as "the extent to which the capabilities of a communication medium enable individuals to achieve synchronicity" (Dennis et al., 2008, p. 581). Synchronicity is defined as "a state in which individuals are working together at the same time with a common focus" (Dennis et al., p. 581). We also consider how perceptions of presence and social presence may influence job satisfaction.

Job satisfaction is important because individuals that feel greater satisfaction with their jobs perform better and have less turnover (Hackman and Lawler, 1971). Additionally, job satisfaction has a positive relationship with organizational citizenship behaviors (Organ and Ryan, 1995). These outcomes benefit the organizations in which the individuals are a part.

The objective of this research is to study the link between media synchronicity and job satisfaction. We also consider other potentially important factors, presence and social presence. We predict that individuals that use a system higher in media synchronicity will perceive greater job satisfaction. By studying these relationships, we hope to further our understanding of the role of media synchronicity and the link between mediated communication and job satisfaction. The results may also help to justify organizations' investments in alternative types of media.

## THEORY

### Media Synchronicity Theory

An important piece of this research is the Media Synchronicity Theory (MST) (Dennis et al., 2008). MST explains how different media influence communication performance. One of the important differences between MST and other media

theories is the reconceptualization of task into two communication processes: conveyance and convergence. By looking at the level of these processes, rather than at the task as a whole, we better understand the influence of media on communication performance.

Conveyance processes involve the exchange of large amounts of new information. Because of the amount of the information, the sender benefits from having more time to prepare and transmit the information. Additionally, the receiver of the information benefits from having more time to process the information and to integrate the information into his or her mental model (Dennis et al., 2008).

Convergence processes involves coming to a shared understanding of information that is possessed, but the meaning is not agreed upon. With this process, communicators must share small amounts of non-novel information in order to resolve on a shared meaning. This involves discussions about the participants' interpretations of the information, and includes the rapid exchange and confirmation of short messages. In order for communication to be successful, individuals must engage, to some extent, in both transmission and processing activities (Dennis et al., 2008).

Although there may be differences in task duration and intensity, most tasks consist of conveyance and convergence processes. In order for communication to be successful, individuals must properly convey information and converge on the meaning of the information. "Without adequate conveyance of information, individuals will reach incorrect conclusions. Without adequate convergence on meaning, individuals cannot move forward to other activities as they will lack a shared understanding" (Dennis et al., 2008, p. 580).

The type of medium used for the communication plays a role in the effectiveness of these communication processes. Some media are inherently better at transmitting large amounts of information and others are better for rapid exchanges of small amounts of information—convergence. For example, detailed instructions on how to create a Web page are best communicated through paper documents or electronic text such as email. In the first place, the creator of the information can reread and rehearse the information thoroughly in order to check for accuracy and completeness. This ensures better transmitted information. In the second place, the receiver can reread and reference the instructions if the instructions are in written text. Compare this medium with a telephone call. The sender may relay a long list of instructions to the receiver of the information. The sender cannot rehearse the message, nor can s/he check it for accuracy or completeness before it is transmitted. Additionally, the receiver cannot replay the conversation, nor can s/he reference the original information.

An additional component of MST is synchronicity. When multiple people work together at the same pace at the same time and with a shared focus, they are working synchronously. Media influence the ability for individuals to achieve synchronicity (Dennis et al., 2008). Consider two individuals, for example, that are exchanging messages by email. There is time that passes between the time the sender of information creates and sends a message and the time that a receiver receives and opens the message. Their ability to work synchronously is hindered by the delays in message generation, transmission, and processing. Conversely, individuals communicating through video conference instantly send and receive information. They are able to work on the same issues at the same time. Synchronicity enhances the convergence process, but it diminishes the conveyance process (Dennis et al., 2008). This is because with convergence, the individuals involved can quickly exchange small information and gauge the level of agreement and respond to questions and misunderstandings immediately (i.e., more interaction and shared focus) (Ballard and Siebold, 2004). With conveyance, synchronicity does not allow the individuals to think about and craft the proper message, nor does it allow the receiver to take time to reprocess or integrate the information.

In order to understand communication performance of media, it is necessary to look at the objective capabilities of different media. MST defines five media capabilities (Dennis et al., 2008). These capabilities are

- transmission velocity: the speed to which a medium is capable of transmitting a message.
- parallelism: the capability of a medium to allow two or more messages to be conveyed at the same time.
- rehearsability: the extent to which a medium allows a sender to rehearse a message before it is sent to a receiver.
- reprocessability: the extent to which a receiver can reprocess a message one or more times.
- symbol sets: the number of ways in which a medium can convey a message.

In general, faster transmission velocity leads to greater synchronicity; greater symbol sets leads to greater synchronicity; more parallelism leads to less synchronicity; and more rehearsability and reprocessability lead to less synchronicity (Dennis et al., 2008).

The full MST has not been empirically validated as of yet; however, the theory argues that communication performance is based on fitting the media to the communication process and the participants appropriating the technology faithfully. Many factors influence the fit, including team and task familiarity (Dennis et al., 2008).

### **Presence and Social Presence**

We also rely on the literature on presence and social presence. Presence is a psychological phenomenon that occurs when individuals become engaged in an interaction with a medium and forget that they are being mediated by a technology (Lombard and Ditton, 1997). Presence has been shown to increase enjoyment with a system (Heeter, 1995), influence mood and arousal, and enhance memory (Lee, 2004). These consequences have relevance for job satisfaction.

Social presence is related to presence. It is the extent to which people believe that a technology, or actors within an electronic environment, are personable and humanistic (Short, Williams, and Christie, 1976). Social presence is more a characteristic of the technology rather than a psychological phenomenon. Social presence has been found to enhance communication performance (Short et al., 1976) and increase enjoyment (Hassanein and Head, 2007).

## **HYPOTHESES DEVELOPMENT**

### **Media Synchronicity and Job Satisfaction**

Media that supports synchronicity has the increased capacity to convey a greater amount of symbol sets, and individuals should find these systems to be more similar to our learned pattern of communication (Kock, 2004). Thus, it should be more enjoyable and natural. Furthermore, synchronicity reduces the cognitive load associated with transmitting and processing information (Dennis et al., 2008; Miranda and Saunders, 2003; Zmud, Lind, and Young, 1990); a reduced cognitive load also contributes to more enjoyment. This enjoyment with the media should carry over to enjoyment with the job.

Systems that have higher media synchronicity may also increase the skills and the challenge involved with using the system. This is because of the symbol sets available for encoding the message. This increased challenge and the associated skills to succeed in this challenge will increase individuals' intrinsic motivation to use the system (Deci and Ryan, 1985). The fulfillment of the intrinsic motivation should also increase the individuals' satisfaction with the system and the task.

In prior research, job satisfaction has been found to be influenced by social cues (White and Mitchell, 1979). That is, when others give positive cues about a job or task, individuals perceive the job to be more satisfying. We believe that higher media synchronicity benefits social cues. Higher media synchronicity is associated with faster transmission velocity and greater symbol sets. The faster velocity will provide social cues related to the immediate conversation. This should contribute to the cues having more salience for the individuals. Additionally, greater symbol sets provide for a wider variety of cues.

Finally, because higher media synchronicity allows individuals to know the results of the group's decisions immediately, and because they can discuss differences in beliefs and opinions immediately, they will perceive the system to be more effective. This in turn should contribute to the individuals perceiving more success on the task. These perceptions of success and effectiveness should also contribute to job satisfaction.

Hypothesis 1 (H1). *Higher media synchronicity will lead to higher job satisfaction than will lower media synchronicity.*

### **Media Synchronicity, Presence, and Social Presence**

Because of the capabilities of different media, some media are better contributors to presence and social presence. Based on those capabilities described in MST (Dennis et al., 2008), we expect that transmission velocity, symbol sets, and parallelism are especially related to presence. If transmission velocity is sufficiently high, individuals will perceive a natural experience with the mediated environment. The velocity of the information exchanged between the person and the system, or the person and other persons will have the same velocity that occurs naturally. This will increase individuals' sense of presence and social presence. Conversely, if transmission velocity is low, presence and social presence will be difficult to perceive because the information transmission will be unnatural and distracting. High parallelism will probably also distract individuals and be perceived as unnatural.

There is an inherent difference between many systems used for mediated communication. Systems that have more realistic features and interaction will be perceived to be more real and personable. Those systems that provide more stimuli, more realistic display configurations, greater numbers of sensory outputs, more interaction, and aural stimuli will lead to greater perceptions of presence and social presence (Lombard and Ditton, 1997). More symbol sets allow for more realistic

environments because of the inclusion of different images and sounds. More visual and audible features may contribute to individuals forgetting that they are in a mediated environment (Lombard and Ditton, 1997; Venkatesh and Johnson, 2002).

Hypothesis 2 (H2). *Higher media synchronicity will lead to higher perceptions of presence than will lower media synchronicity.*

Hypothesis 3 (H3). *Higher media synchronicity will lead to higher perceptions of social presence than will lower media synchronicity.*

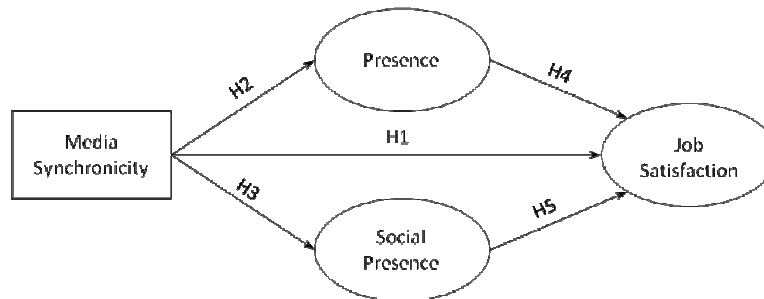


Figure 1. Research Model

### Presence, Social Presence, and Job Satisfaction

Individuals enjoy using mediated environments more when they experience higher levels of presence (Heeter, 1995). One reason for this is because of the playfulness that is created by systems that promote presence (Venkatesh and Johnson, 2002). This enjoyment should also lead to greater job satisfaction because the individuals are using these systems for job-related tasks. Presence enhances memory (Lee, 2004) and increases learning satisfaction (Hassell, Goyal, Limayem, and Boughzala, 2009). Individuals that experience presence may remember details of the communication better than those who do not experience presence. This should contribute to better perceptions of performance and satisfaction.

Finally, individuals that perceive presence focus on the mediated environment. They also lose awareness of the fact that their interaction with the environment is being mediated. Based on this, we expect that individuals will exert less cognitive effort to communicate and deliberate with others about the task than will those people using a system that does not contribute to presence. This lightened cognitive load should help individuals to experience more satisfaction with their jobs.

Hypothesis 4 (H4). *Higher perceived presence will lead to higher job satisfaction.*

Individuals that perceive social presence will engage in more social interaction. In the context of training, social interaction was found to increase intrinsic motivation (Venkatesh 1999). As we proposed previously, intrinsic motivation should positively influence job satisfaction. Additionally, higher levels of social presence increase individuals' enjoyment (Hassanein and Head, 2007). Because the evaluation of social presence is in the context of the job tasks, we expect this enjoyment will carry over to job satisfaction. Finally, when technology represents other people in which one is interacting with, individuals likely will feel more connected with other people. These connections should help increase the individual's perceptions of how the work s/he does influences others. People feel more satisfied with their jobs when they perform tasks that positively impact other people (Hackman and Oldham, 1976).

Hypothesis 5 (H5). *Higher perceived social presence will lead to higher job satisfaction.*

## METHODOLOGY

### Media Synchronicity

We conducted an experiment to evaluate our hypotheses. Our experiment consisted of two different vignettes designed to manipulate the conditions of media synchronicity. We chose to compare a virtual world collaboration system with an email system. The objective of this comparison was to select systems that have different media capabilities. These capabilities relate to the level of synchronicity supported by the systems (i.e., media synchronicity). We argue that a virtual world collaboration system has a higher level of media synchronicity than does an email system. Thus, we use a virtual world as the higher media synchronicity condition and email as the lower media synchronicity condition.

This virtual world program possesses media capabilities that are better for supporting synchronicity, whereas the email system has media capabilities worse for supporting synchronicity. Transmission velocity (positive for synchronicity) is high for the virtual world and low-high for email depending upon how it is used. Email is higher on parallelism than is the virtual world. (Parallelism reduces synchronicity.) The virtual world has more symbol sets than does email; more symbol sets is better for synchronicity. Email possesses more rehearsability and reprocessability than do virtual worlds. More rehearsability and reprocessability is worse for synchronicity. Based on these capabilities, we argue that virtual worlds are better at supporting synchronicity than is email. Therefore, we also argue that virtual worlds are higher on media synchronicity than is email (Dennis et al., 2008).

It is important for us to point out that email can be used somewhat synchronously, and it can be appropriated to convey more symbol sets. Therefore, based on how individuals use email, it could support synchronicity. However, it is generally used simply as textual, asynchronous communication. We assume that those participating in our study perceive to use email asynchronously.

### **Participants**

Participants in the study were undergraduate business students from a large university. Fifty nine students agreed to participate in the study. However, we chose to drop three of the observations because the participants simply filled in the same score straight across. Our final sample size was 56. Participants were randomly assigned to one of the two treatments. The higher media synchronicity group had 20 participants, and the lower media synchronicity group had 34 participants. A small majority of the participants were male (54%). The median age of the participants was 20 years old. The median amount of completed college for the students was 2 years. The students were given a small amount of extra credit for participating in the experiment.

### **Task and Treatment**

The experiment consisted of two treatments: perceptions of completing a task either in a virtual world or by email. Because of time and resource constraints, we used vignettes to simulate the experience. The participants were asked to imagine using one of the two systems to perform an information processing task. All of the participants first watched a short video presentation on virtual worlds or on email, depending on their assigned condition. The virtual world video presentation consisted of images and video detailing IBM's collaboration environment. The email treatment group watched a short video presentation about email etiquette.

For the task, the participants were asked to imagine themselves as part of a college admissions committee. As part of the committee, they were responsible for selecting a number of applicants to admit into the university. The participants were told that they had to make the decision in conjunction with two other committee members. They were given some hypothetical information on several applicants. From the pool of applicants, they selected four students to admit into the university.

We allowed different time requirements for the two treatment groups. Naturally, asynchronous communication requires more time than synchronous communication. For the vignettes, we wanted to maintain a logical time expectation. The group collaborating by email would require more time than would the group collaborating in the virtual world. Therefore, we informed the participants using the virtual world that they completed the task in three hours. The email group was given one week to complete the task.

### **Measures**

After participants read through the vignette, we provided them with a Web-based survey. We used questions to measure their perceptions of presence, social presence, and general job satisfaction. We combined two presence scales to form an 11 question presence measure. These measures came from Kim and Biocca (1997) and Slater, Usoh, and Steed (1994). We used social presence measures from Short et al. (1976). Finally, we used the general job satisfaction measures used by Hackman and Lawler (1971). We also controlled for participant age, gender, and college experience.

## **ANALYSIS AND RESULTS**

### **Analysis and Results**

We first did a factor analysis on the items in our survey. We used maximum likelihood factor analysis with a Promax rotation. After an initial analysis, we had several items that had weak loadings. We removed three of the presence items, one social presence item, and two job satisfaction items. The rotated factor pattern is contained in Table 1, and the final list of

measures is in the appendix. Using Cronbach’s alpha, the reliability for the presence items was 0.84; for social presence 0.73, and for job satisfaction, 0.64.

We tested our hypotheses using multiple regression. We tested two regression models for the impact of the variables on job satisfaction. The first model included only the control variables: age, gender, and college experience. In the second model we added media synchronicity, presence, and social presence. There was a significant change in  $r^2$  from the first model to the

Variables	Factor 1	Factor 2	Factor 3
Pres9	0.77940	.	.
Pres11	0.70223	.	.
Pres5	0.70169	.	.
Pres7	0.60325	.	.
Pres3	0.59397	.	.
Pres1	0.54660	.	.
Pres10	0.53171	.	.
Pres8	0.49708	.	.
SocPres1	.	0.85779	.
SocPres2	.	0.69513	.
SocPres4	.	0.52352	.
JobSat2	.	.	0.65864
JobSat6	.	.	0.64190
JobSat1	.	.	0.53266
JobSat4	.	.	0.45805

\*Values less than 0.3 are not printed

**Table 1. Rotated Factor Pattern**

second model ( $p < 0.05$ ). We tested for the direct effects of media synchronicity on job satisfaction, presence, and social presence. We also looked at the effects of presence and social presence on job satisfaction. The standardized regression coefficients are displayed in Table 2.

Condition	N	Presence		Social Presence		Job Satisfaction	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Lower Media Synchronicity	36	3.66	0.97	3.46	1.03	5.30	0.65
Higher Media Synchronicity	20	3.82	1.17	3.50	0.21	5.84	0.72

**Table 2. Presence, Social Presence, and Trust for Media Synchronicity Conditions**

We tested our first hypothesis by looking at the relationship of media synchronicity and job satisfaction. We found significant evidence ( $p = 0.0065$ ) to conclude that higher media synchronicity is associated with higher levels of job satisfaction. Thus, H1 was confirmed. Our next two hypotheses (H2 and H3) looked at how higher or lower media synchronicity influences individuals’ perceptions of presence and social presence. There was not enough evidence to conclude that presence or social presence were influenced by media synchronicity in this case. A study of the means shows that there were no significant

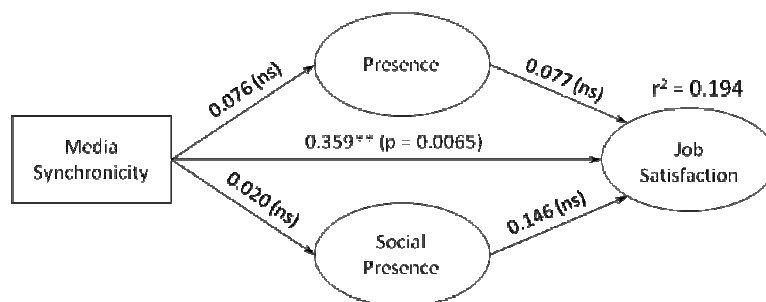
differences between the presence and social presence levels of the two conditions. Table 3 shows the means and standard deviations of the variables. Consequently, we did not find support for either hypothesis 2 or hypothesis 3. There is a strong possibility that without more experience with the media and the task, the participants were unable to correctly assess their perceptions of presence and social presence.

Variable	Model 1 ( $\beta$ )	Model 2 ( $\beta$ )
Gender	0.143	0.170
Age	0.205	0.056
College Experience	-0.026	-0.057
Media Synchronicity		0.359**
Presence		0.077
Social Presence		0.146
$r^2$	0.055	0.194
Change in $r^2$		0.139*

\* $p < .05$ , \*\* $p < .01$

**Table 3. Predicting Job Satisfaction**

The other hypotheses, H4 and H5, looked at the indirect effects of media synchronicity through presence and social presence. In this study, we did not find significant relationships between presence and job satisfaction or social presence and job satisfaction. Therefore, H4 and H5 were unsupported. Figure 2 displays the results of the model. The overall variance explained by the variables in the model is 0.194.



**Figure 2. Regression Results Model**

**DISCUSSION**

Our objective was to study how job satisfaction is influenced by media synchronicity. Although job satisfaction is based on many factors, we have shown that media synchronicity may have an influence on individuals’ job satisfaction. We tested our hypotheses by using two different systems that differ on their ability to support synchronicity. We also argued that media synchronicity would affect people’s perceptions of presence and social presence, and these perceptions would also influence job satisfaction.

We found strong support for our main hypothesis: media synchronicity has a direct effect on job satisfaction. The implication of this is systems that support synchronicity may contribute to employees being more satisfied with their jobs. We acknowledge, however, that these results are influenced by individuals’ personal perceptions. Additionally, some media may have a poor fit with the communication process needs (Dennis et al., 2008), and the media in that case may not be satisfying.

In exploring other factors that contribute to job satisfaction, we did not find evidence that presence and social presence play a role in how media synchronicity influences job satisfaction. We believe that the lack of support for these hypotheses may be



due to the limitations of our study. Without actually using the media to perform the tasks, the participants were unable to accurately perceive presence and social presence. As a result, there was not enough variance in those variables to study the effects. We hope to better test these impacts in future research.

In addition, there may be more important variables than presence and social presence. There is obviously a link between media synchronicity and job satisfaction, but there appear to be other factors involved in the relationship. Perhaps users perceive greater enjoyment in using a more interactive media, or they recognize less cognitive strain associated with higher media synchronicity. Additional research is necessary to explore other important variables that are playing a role in this relationship.

Future research can also overcome some of the other limitations of this study. By relying on individuals to perceive satisfaction with a job that they have not performed, there may be some errors in our assessments of job satisfaction. Future research could strengthen the support for the relationship between media synchronicity and job satisfaction by surveying people that actually use these systems in their work. This would likely capture a more robust measure of job satisfaction.

The results of this study have implications for individuals that use electronic media to perform their jobs. When individuals use media with higher media synchronicity, they experience greater satisfaction with their jobs. Organizations may improve their employees' job satisfaction by adopting media that have greater symbol sets and transmission velocity. This study justifies organizational investments in alternative types of communication systems.

An assumption that we acknowledge is that the task and the communication process may contribute to the link between media synchronicity and job satisfaction. If the task requires more convergence than conveyance, higher media synchronicity will improve the communication performance. People may feel more job satisfaction because the media fit the needs of the communication. Conversely, they might experience frustration with high media synchronicity if the communication is more conveyance oriented. We believe that more research is required to reconcile this.

## CONCLUSION

The objective of this research was to study the link between media synchronicity and job satisfaction. We also were interested in the role of presence and social presence in this relationship. We have found that individuals perceive that when they use systems higher in media synchronicity in their work, they will be more satisfied with their jobs. Apart from other advantages or benefits from using different communication media, the type of media used has implications for job satisfaction. This is an initial step in understanding more about media capabilities, synchronicity, and job satisfaction.

## REFERENCES

1. Ballard, D. I. and Siebold, D. R. (2004) Communication-related organizational structures and work group temporal experiences: The effects of coordination method, technology type, and feedback cycle on members' construals and enactments of time, *Communication Monographs*, 71, 1, 1-27.
2. Daft, R. L. and Lengel, R. H. (1986) Organizational information requirements, media richness and structural design, *Management Science*, 32, 5, 554-571.
3. Deci, E. L. and Ryan, R. M. (1985) *Intrinsic motivation and self-determination in human behavior*, Plenum Press, New York.
4. Dennis, A. R., Fuller, R. M. and Valacich, J. S. (2008) Media, tasks, and communication processes: A theory of media synchronicity, *MIS Quarterly*, 32, 3, 575-600.
5. Hackman, J. R. and Lawler III, E. L. (1971) Employee reactions to job characteristics, *Journal of Applied Psychology Monograph*, 55, 3, 259-286.
6. Hackman, J. R. and Oldham, G. R. (1976) Motivation through the design of work: Test of a theory, *Organizational Behavior and Human Performance*, 16, 2, 250-279.
7. Hassanein, K. and Head, M. (2007) Manipulating social presence through the Web interface and its impact on attitude towards online shopping, *International Journal of Human-Computer Studies*, 65, 8, 689-708.
8. Hassell, M., Goyal, S., Limayem, M. and Boughzala, I. (2009) Being there: An empirical look at learning in 3D virtual worlds, *Proceedings of the Fifteenth Americas Conference on Information Systems*.
9. Heeter, C. (1995) Communication research on consumer VR, in Frank Biocca and Mark R. Levy (Eds.) *Communication in the Age of Virtual Reality*, Erlbaum, Hillsdale, New Jersey, 191-218.

10. Kim, T. and Biocca, F. (1997) Telepresence via television: Two dimensions of telepresence may have different connections to memory and persuasion, *Journal of Computer-Mediated Communication*, 3, 2.
11. Kock, N. (2004) The psychobiological model: Towards a new theory based on Darwinian evolution, *Organization Science*, 15, 3, 327-348.
12. Lee, K. M. (2004) Why presence occurs: Evolutionary psychology, media equation, and presence, *Presence, Teleoperators, and Virtual Environments*, 13, 494-505.
13. Lombard, M. and Ditton, T. (1997) At the heart of it all: The concept of presence, *Journal of Computer-Mediated Communication*, 3, 2.
14. Miranda, S. M. and Saunders, C. S. (2003) The social construction of meaning: An alternative perspective on information sharing, *Information Systems Research*, 14, 1, 87-106.
15. Organ, D. W. and Ryan, K. (1995) A meta-analytic review of attitudinal and dispositional predictors of organizational citizenship behavior, *Personnel Psychology*, 48, 4, 775-802.
16. Short, J., Williams, E. and Christie, B. (1976) *The social psychology of telecommunications*, John Wiley and Sons, New York.
17. Slater, M., Usoh, M. and Steed, A. (1994) Depth of presence in virtual environments, *Presence: Teleoperators and Virtual Environments*, 3, 2, 131-144.
18. Venkatesh, V. (1999) Creating favorable user perceptions: Exploring the role of intrinsic motivation, *MIS Quarterly*, 23, 2, 239-260.
19. Venkatesh, V. and Johnson, P. (2002) Telecommuting technology implementations: A within- and between-subjects longitudinal field study, *Personnel Psychology*, 55, 3, 661-687.
20. White, S. E. and Mitchell, T. R. (1979) Job enrichment versus social cues: A comparison and competitive test, *Journal of Applied Psychology*, 64, 1, 1-9.
21. Zmud, R. W., Lind, M. R. and Young, F. W. (1990) An attribute space for organizational communication channels, *Information Systems Research*, 1, 4, 440-457.

**APPENDIX**

**Measures**

<i>Presence</i>	
<i>(Presence 1-8 adapted from Kim and Biocca, 1997; Presence 9-11 adapted from Slater et al., 1994)</i>	
Presence (1)	When the [virtual meeting or email communication] ended, I felt like I came back to the "real world" after a journey.
Presence (3)	During the [virtual meeting or email communication], I felt I was in the world the [virtual world or email] created.
Presence (5)	During the [virtual meeting or email communication], my body was in the room, but my mind was inside the world created by the [virtual world or email].
Presence (7)	The [virtual world or email]-generated world seemed to me only "something I saw" rather than "somewhere I visited."
Presence (8)	During the [virtual meeting or email communication], my mind was in the room, not in the world created by [virtual world or email].
Presence (9)	Please rate your sense of being there in the [virtual world or email]-generated world on the following scale from 1 to 7: In the [virtual world or email]-generated world I had a sense of "being there" ____.
Presence (10)	To what extent were there times during the experience when the [virtual world or email]-generated world became the "reality" for you, and you almost forgot about the "real world" outside?: There were times during the experience when the [virtual world or email]-generated world became more real or present for me compared to the "real world" ____.
Presence (11)	When you think back about your experience, do you think of the [virtual world or email]-generated world more as something that you saw, or more as something that you visited? Please answer on the following 1 to 7 scale: The [virtual world or email]-generated world seems to me to be more like ____.
<i>Social Presence</i>	
<i>(Social Presence measures adapted from Short et al., 1976)</i>	
Social Presence (1-4)	Using the virtual world (or email) and interacting with others created a . . . environment for communication. (1. Impersonal-personal; 2. unsociable-sociable; 4. cold-warm)
<i>Job Satisfaction</i>	
<i>(Job Satisfaction measures from Hackman and Lawler, 1971)</i>	
Job Satisfaction (1)	I feel a great sense of personal satisfaction when I do my job well.
Job Satisfaction (2)	Doing my job well increases my feeling of self-esteem.
Job Satisfaction (4)	Generally speaking, I am very satisfied with my job
Job Satisfaction (6)	Generally speaking, I am very satisfied with the kind of work I have to do on my job.