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The Effective Use of Multimedia Distance Learning Technology: The Role of Technology Self-Efficacy, Attitudes, Reliability, Use and Distance in a Global Multimedia Distance Learning Classroom

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This paper has not undergone formal review or approval of the faculty of the ILR School. It is intended to make results of Center research available to others interested in preliminary form to encourage discussion and suggestions.

ABSTRACT

According to the *1999 ASTD State of the Industry Report*, the use of multimedia distance learning (MDL) technology for training delivery has increased substantially over the past few years. However, few empirical studies have been conducted that rigorously examine the factors that determine the effectiveness of MDL courses. In this study, we examine participants' technology self-efficacy and attitudes toward technology (measured before/after training), and perceptions of technology reliability, effective use, and distance (measured after training) as antecedents to ratings of training effectiveness (general effectiveness, specific effectiveness, learning effectiveness; measured after training) in an international HRM course. In a sample of 52 participants from four countries we hypothesize that technology self-efficacy will affect participants' attitudes toward technology; attitudes toward technology will affect participants' perceptions of training effectiveness. In addition, we hypothesize that technology reliability and effective use will affect participants' perceptions of classroom distance; distance perceptions will affect participants' perceptions of training effectiveness. Finally, we hypothesize that both technology attitudes and distance perceptions will be related to participants' perceptions of training effectiveness controlling for technology self-efficacy, reliability, and effective use.

The results indicate that attitudes toward technology completely/partially mediated the relationship between technology self-efficacy and the three measures of effectiveness. Distance perceptions completely/partially mediated the relationship between technology reliability and effectiveness. Effective technology use was not significantly related to effectiveness. Finally, attitudes toward technology and distance perceptions explained a significant or marginally significant amount of variance in the effectiveness measures after controlling for technology self-efficacy, reliability, and effective use.

**The Effective Use of Multimedia Distance Learning Technology:
The Role of Technology Self-Efficacy, Attitudes, Reliability, Use and Distance in a Global
Multimedia Distance Learning Classroom**

According to the *1999 ASTD State of the Industry Report*, the use of multimedia distance learning (MDL) technology for training delivery has increased substantially over the past few years. However, the use of MDL technology in educational settings has been somewhat controversial. Some see MDL technology as enabling universities to become boundaryless, extending educational opportunities nationally and internationally beyond traditional in-residence programs. Others worry that MDL technology will have potentially negative influences on teaching effectiveness. They argue that MDL technology reduces the intellectual exchange that is so critical in university-level education. It is "...like watching television. It is a totally degraded form of university-level education." (Wall Street Journal, November 22, 1999, P. A-2). A better understanding of the factors that determine the effectiveness of an MDL technology delivered course will enable us to develop MDL courses that allow universities to reach students beyond their traditional borders in a manner that does not compromise, and may in fact enhance, the intellectual exchange of ideas and information.

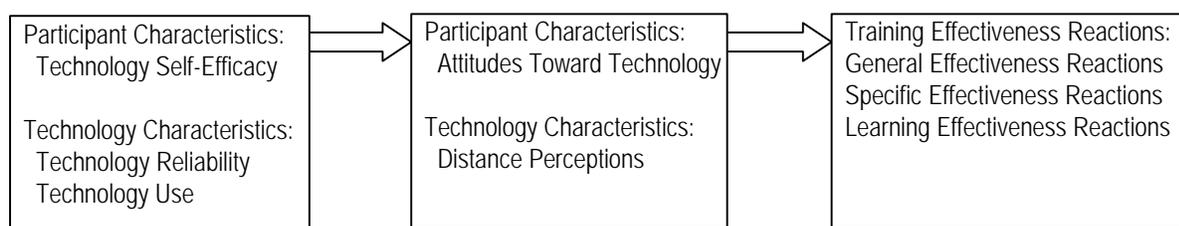
In this study we examine some of the factors that relate to an effective MDL technology delivered international worldwide human resource management course that combines both global and local classroom environments with participant groups from four different countries. Of specific interest in this study are the factors that relate to MDL effectiveness in the global classroom (i.e., the classroom that includes simultaneous instruction of participant groups from the four countries). In the following section, we provide support for the factors that we hypothesize to be of primary importance in the MDL technology delivered global classroom. These factors include (1) participant characteristics (e.g., technology self-efficacy and attitudes toward MDL technology) and (2) technology characteristics (e.g., reliability of the technology, the effective use of the technology, and perceived distance).

DEVELOPMENT OF THE MODEL AND HYPOTHESES

As our model of the Person-MDL Technology-Effectiveness Relationship indicates (see Figure 1), the factors of primary importance for MDL effectiveness include participant and technology characteristics. Previous research and practice suggests the importance of technology characteristics when examining the effectiveness of an MDL course [see Webster & Hackley (1997) for an initial attempt at the development of a model for distance learning]. However, what is often forgotten is the importance of participant characteristics (Spitzer,

1998). As noted by Spitzer (1998) there are two dimensions to distance learning: the technical and the human. Following Spitzer's framework, we propose that participant and technology characteristics will effect training effectiveness. Below we describe the components of our model. First we briefly describe training effectiveness, then we discuss the participant and technology characteristics of importance in our model.

FIGURE 1



Model of Person-MDL Technology-Effectiveness Relationship

Training Effectiveness

Researchers have recently noted that participants' reactions to training are important when measuring training effectiveness (Alliger, Tannenbaum, Bennett, Jr., Traver, & Shotland, 1997). According to Alliger et al. there are two broad categories of reactions: affective reactions and utility reactions. Affective reactions measure an individual's liking of a training program; utility reactions measure an individual's assessment of the usefulness of the training. Of the two forms of reaction measures, Alliger et al. found that utility reactions correlated more highly with learning and with the transfer of gained knowledge to on-the-job performance than did affective reactions. Moreover, utility reactions correlated more highly with transfer than did measures of immediate and retained learning. Given these findings, we examine training effectiveness through the use of participants' utility reactions. More specifically, we examine participants' perceptions of the usefulness of a MDL technology delivered course (general and specific effectiveness reactions) and learning due to MDL technology (learning effectiveness reaction).

Participant Characteristics

In this study, we examine two participant characteristics that we hypothesize to have an effect on training effectiveness. Specifically, we examine the effects of technology self-efficacy and attitudes toward MDL technology delivered courses.

Self-efficacy has received a great deal of attention lately. Self-efficacy is defined as, “people’s judgments of the capabilities to organize and execute courses of action required to attain designated types of performance. It is concerned not with the skills one has but with the judgment of what one can do with whatever skills one possesses” (Bandura, 1986, p. 391). Several researchers have suggested that self-efficacy is associated with learning and achievement (Gist & Mitchell, 1992; Campbell & Hackett, 1986; Wood & Locke, 1987) and training reactions and performance (Mathieu, Martineau, & Tannenbaum, 1993).

In this study we specifically examine technology self-efficacy, or individuals beliefs that they can effectively use MDL technology and learn from an MDL technology delivered course. As more generally supported in previous research (Mathieu et. al, 1993), we hypothesize that technology self-efficacy measured both at the beginning of the course (Time 1) and at the end of the course (Time 2) will be related to training effectiveness.

H1a: Technology Self-Efficacy at Time 1 and Time 2 will be significantly positively related to the Effectiveness Reactions at Time 1 and Time 2, respectively. That is, the greater the technology self-efficacy, the more positive the effectiveness reactions.

Attitude towards learning has also received recent attention (Webster & Hackley, 1997). Similar to research on self-efficacy, research on attitude towards learning has found a relationship between positive attitudes and positive evaluations of effectiveness (Webster & Hackley, 1997 examined attitudes and effectiveness reactions as dependent variables, thus this relationship was not specifically examined. However, their matrix of correlations suggests the existence of this relationship.) Self-efficacy and attitudes are different in that self-efficacy is concerned with individuals’ perceptions of their capabilities to perform a task or challenge; attitude is concerned with individuals personal feelings or beliefs toward that task or challenge. In this study, we examine attitudes toward MDL learning and hypothesize that attitudes will be related to the effectiveness reactions measured both at the beginning of the course and at the end of the course.

H1b: Attitudes Toward MDL at Time 1 and Time 2 will be significantly positively related to the Effectiveness Reactions at Time 1 and Time 2, respectively. That is, the more positive the attitudes toward MDL, the more positive the effectiveness reactions.

The preceding discussion suggests a more proximal relationship between self-efficacy and attitudes than between self-efficacy and effectiveness or between attitudes and effectiveness. That is, to the extent that an individual believes he or she is capable of being successful at a given task or challenge, he or she may have more

positive attitudes toward that task or challenge. Thus, we suggest that technology self-efficacy and attitudes toward MDL technology will be significantly related at both time periods.

H1c: Technology Self-Efficacy at Time 1 and Time 2 will be significantly positively related to Attitudes Toward MDL at Time 1 and Time 2. That is, the greater the technology self-efficacy, the more positive the attitudes toward MDL.

It follows that the relationships between technology self-efficacy and training reactions will be mediated by attitudes toward the technology. We hypothesize the following:

H1d: Attitudes Toward MDL will mediate the relationship between Technology Self-Efficacy and the Effectiveness Reactions.

Technology Characteristics

Our model proposes that technology characteristics are related to training effectiveness. Specifically, we examine the effects of technology reliability, the effective use of technology, and distance perceptions on training effectiveness reactions.

Previous research suggests that technology reliability is related to participants' evaluation of outcomes (Webster & Hackley, 1997). Reliability of the technology refers to the extent to which the technology is "up and running" throughout the course. In a global course that is delivered via MDL technology, unreliable technology may result in unintended interruptions and lost training time. This becomes even more complex as the global classroom includes participants from multiple global sites, as in the current study. Thus, technology reliability will play a significant role in participants' perceptions of training effectiveness.

Technology use refers to the extent to which instructors and participants effectively use the MDL technology. As noted by Collis, "It is not the technology but the instructional implementation of the technology that determines its effect on learning" (1995; p. 146). That is, even though the technology may be working reliably, if the instructors and participants' do not know how to effectively use the technology, training effectiveness will be impeded. Thus we hypothesize

H2a: Technology Reliability and Technology Use at Time 2 will be significantly positively related to the Effectiveness Reactions. That is, the greater the perception of technology reliability and effectiveness of technology use, the more positive the effectiveness reactions.

Little research has been conducted on distance perceptions of participants. We define distance perception as the distance that participants perceive between the environment they

are currently in (e.g., a remote site) and the environment in which the instructor is present (e.g., origination site). In our study of a worldwide application of MDL, including four continents and 11 time zones, we anticipate distance perspectives to matter. Further, according to adult learning theory, adult learners prefer experiential learning to lecture-based learning. One might expect that if participants view themselves as less distant from the origination site, they may view themselves as a more active participant in the learning environment and thus, evaluate the learning experience more positively.

H2b: Distance Perceptions at Time 2 will be significantly positively related to the Effectiveness Reactions. That is, the more the participants feel as though they are part of one classroom, the more positive the effectiveness reactions.

One might expect that to the extent that the technology is reliable and the instructors and participants use the technology effectively, the participants will perceive themselves as less distant from the global classroom. That is, technology reliability and effective technology use should result in a more seamless exchange of information. This, in turn, should lead to a closer perceived distance. We hypothesize

H2c: Technology Reliability and Technology Use will be significantly positively related to Distance Perceptions. That is, the greater the perception of technology reliability and effective technology use, the more the participants feel as though they are part of one classroom.

It follows,

H2d: Distance Perceptions will mediate the relationships between Technology Reliability and Technology Use and the Effectiveness Reactions.

Finally, we hypothesize that the two mediating variables, Attitudes Toward MDL Technology and Distance Perceptions will explain a significant amount of variance in the training effectiveness reactions after controlling for technology self-efficacy, technology reliability, and effective technology use.

H3: Attitudes Toward MDL Technology and Distance Perceptions will explain a significant amount of variance in the Effectiveness Reactions after controlling for Technology Self-Efficacy, Reliability, and Use.

METHODS

Participants and Procedure

The worldwide human resource management (WHRM) course under study was designed at Cornell University, in partnership with Shanghai Jiao Tong University (China), University of Ljubljana (Slovenia), and Universidad Metropolitana (Venezuela). The course

linked 95 participants from four continents and involved graduate students at four universities and corporate managers from ten companies worldwide. Every other week, the four global sites joined together for discussion sessions using synchronous (ISDN) video teleconferencing. On the intervening weeks, the classes were held locally in each of the different countries, and included collaborating on-line with a blend of technologies (course web site, internet, and chat rooms). The data was gathered from the participants at each of the four sites via survey on the course web page at two time periods [Stanton (1998) noted no significant differences in covariance structures between data collected via the internet and data collected via pencil and paper]. The time 1 survey (T1Survey) was distributed during the first week of class. The time 2 survey (T2Survey) was distributed upon completion of the course. Sixty-six participants completed T1Survey. Of those who completed T1Survey, 52 completed the T2Survey. There were no differences on the T1Survey variables of interest for those who completed the T2Survey and those who did not.

Measures

Effectiveness. General Effectiveness Reaction was measured with three items; one item was adapted from Webster and Hackley (1997) (sample item: "I would like to take other MDL courses in the future;" 1=strongly disagree to 7=strongly agree; alpha=.79_{T1}, .84_{T2}).

Specific Effectiveness Reaction was measured with four items; one item was adapted from Webster and Hackley (1997) (sample item: "I believe that I will be able to use the WHRM course content in the future;" 1=strongly disagree to 7=strongly agree; alpha=.82_{T1}, .73_{T2}).

Learning Effectiveness Reaction (Time 2 only) was measured with one item ("I learned more in this course than I do in traditional courses due to the use of MDL technology;" 1=strongly disagree to 7=strongly agree).

Participant Characteristics. Technology Self-Efficacy was measured with eight items; one item was adapted from Armstrong-Stassen, Landstrom, and Lumpkin (1998) (sample item: "I am confident that I will be able to use the technology in this course to communicate with instructors electronically via videoconferencing;" 1=strongly disagree to 7=strongly agree; alpha=.83_{T1}, .72_{T2}). Attitudes Toward MDL was measured with six items adapted from Armstrong-Stassen, Landstrom, and Lumpkin (1998) (sample item: "MDL technology is a good tool in educational settings;" 1=strongly disagree to 7=strongly agree; alpha=.79_{T1}, .84_{T2}).

Technology Characteristics. Technology Reliability (Time 2 only) was measured with three items adapted from Goodhue and Thompson (1995) (sample item: "We could count on the distance learning network to be 'up' and available;" 1=strongly disagree to 7=strongly

agree; $\alpha=.87$). Technology Use (Time 2 only) was measured with three items (sample item: "Overall, the instructors were able to handle the technical equipment effectively during the global sessions;" 1=strongly disagree to 7=strongly agree; $\alpha=.82$). Distance Perception (Time 2 only) was measured with two items (items: "I felt personally involved in the seminar during the global sessions" and "It felt as though the other participants were all in the same classroom during the global sessions;" correlation=.39**).

Controls (Time 1 only). Controls variables that have been previously shown to be related to self-efficacy (e.g., in this case the prior experiences of interest include experience with DL technology and proficiency in communicating with others in an international class) and to perceptions of technology reliability (e.g., computer expertise) were utilized. Previous experience with DL Technology was measured with the following item: "I have had ___ classes using DL technology". Computer Expertise was measured with the following question, "I would consider myself a ___ computer user; 1=do not use a computer; 5=expert. English Proficiency was measured with three items (sample item: "I am proficient in speaking English;" 1=strongly disagree to 7=strongly agree; $\alpha=.91$).

RESULTS

Descriptive statistics of all variables including means, standard deviations, and country differences are reported in Table 1. Country differences were found for General Effectiveness Reaction (Time 2), Attitudes Toward MDL Technology (Time 1 & 2), Technology Reliability (Time 2), Distance Perception (Time 2), and the control variables. For a majority of the variables, Slovenia was the country that was significantly different (lower) from the other countries.

TABLE 1: Means by country, overall means and standard deviations, and differences by country

	All Groups	Std. Dev.	U.S.	Venezuela	Slovenia	China	F	p
General Reactions (Time 1)	5.43	0.98	5.41	5.33	5.06	5.80	1.49	0.23
General Reactions (Time 2)	5.15	1.04	5.27	5.33	4.42 ^a	5.51 ^a	3.08	0.04
Specific Reactions (Time 1)	5.93	0.77	5.84	5.94	5.56	6.29	2.38	0.08
Specific Reactions (Time 2)	5.67	0.87	5.58	5.81	5.25	6.04	2.11	0.11
Learning Reaction (Time 2)	4.42	1.26	4.63	4.44	3.92	4.60	0.88	0.46
Technology Self Efficacy (Time 1)	5.60	0.81	5.71	5.84	5.56	5.31	1.37	0.26
Technology Self Efficacy (Time 2)	5.98	0.79	5.91	6.25	5.98	5.91	0.38	0.77
Attitude Toward MDL (Time 1)	5.83	0.75	6.01 ^a	6.01 ^b	5.10 ^{a,b,c}	6.00 ^c	5.80	0.00
Attitude Toward MDL (Time 2)	5.56	0.97	5.77 ^a	5.79	4.76 ^{a,b}	5.86 ^b	4.21	0.01
Technology Reliability (Time 2)	5.12	1.22	5.24 ^a	5.96 ^b	4.00 ^{a,b,c}	5.40 ^c	6.96	0.00
Effective Technology Use (Time 2)	5.53	1.01	5.54	5.67	5.31	5.60	0.26	0.85
Distance Perceptions (Time 2) ^d	4.63	1.12	4.19	5.33	4.17	5.07	4.08	0.01
Prior Experience with DL Technology (Time 1) ^d	0.89	2.87	0.29	2.53	0.17	0.39	2.74	0.05
Computer Expertise (Time 1) ^d	3.35	0.77	3.71	3.06	3.08	3.47	2.92	0.04
English Proficiency (Time 1)	6.14	0.86	6.61 ^a	6.41 ^b	5.83	5.63 ^{a,b}	6.10	0.00
Prior Experience with MDL Technology (Time 1)	0.50	1.63	0.06	0.94	0.17	0.72	1.11	0.35
Prior Knowledge of Course Material (Time 1)	5.33	1.22	5.24	5.41	5.17	5.47	0.20	0.90

^{a-c} Similar lettered means are significantly different from each other according to Tukey honest significant difference (HSD) for unequal N

^d None of the individuals means were significant at $\leq .05$ according to Tukey HSD for unequal N.

In addition, we examined country differences for those variables that measured prior experience with MDL technology and knowledge of the course content (the components to be learned in this course). No significant country differences were found.

Participant Characteristics

As indicated in Table 2, Technology Self-Efficacy at Time 1 was only marginally significantly related to Effectiveness Reaction at Time 1; Technology Self-Efficacy at Time 2 was significantly related to all of the Effectiveness Reactions at Time 2. Hypothesis 1a was partially supported.

TABLE 2: Correlations Among Technology Self-Efficacy, Attitudes Toward MDL, and Effectiveness Reactions at Time 1 and Time 2

	Technology Self Efficacy	Attitude Toward MDL	General Reactions	Specific Reactions	Learning Reactions
Technology Self Efficacy	0.35*	0.49**	0.44**	0.50**	0.31*
Attitude Toward MDL	0.45**	0.76**	0.80**	0.52**	0.50**
General Reactions	0.16	0.62**	0.60**	0.59**	0.66**
Specific Reactions	0.22t	0.30*	0.54**	0.68**	0.35*

Lower diagonal-Time 1 correlations; Upper diagonal-Time 2 correlations; On the diagonal-Time1 by Time 2 correlations.

In support of Hypothesis 1b, Attitudes Toward MDL at Time 1 and Time 2 were significantly related to the Effectiveness Reactions measured at Time 1 and Time 2, respectively.

Hypothesis 1c stated that Technology Self-Efficacy at Time 1 and Time 2 would be related to Attitudes Toward MDL at Time 1 and Time 2. Table 2 reveals that Technology Self-Efficacy at Time 1 and Time 2 were significantly related to Attitudes Toward MDL at Time 1 and Time 2, respectively, in support of Hypothesis 1c.

Contrary to Hypothesis 1d, Attitudes Toward MDL did not mediate the relationship between Technology Self-Efficacy and the Effectiveness Reactions measured at Time 1 (Table 3a). However, in partial support of Hypothesis 1d, Attitudes Toward MDL mediated or partially mediated the relationships between Technology Self-Efficacy and the Effectiveness Reactions measured at Time 2 (Table 3b).

TABLE 3A: Hierarchical OLS regression of the Effectiveness Reactions on Technology Self-Efficacy and Attitudes Toward MDL (Time 1)

	General Reactions Beta	Specific Reactions Beta
Step 1		
Technology Self Efficacy	0.14	0.21
Prior Experience with DL Technology	0.12	0.13
English Proficiency	0.07	-0.09
R ²	.05	.07
Step 2		
Technology Self Efficacy	-0.13	0.00
Prior Experience with DL Technology	0.19t	0.19
English Proficiency	-0.09	-0.21
Attitudes Toward MDL	0.66**	0.50**
Change R ²	.32**	.18**
R ²	.37**	.25**

TABLE 3B: Hierarchical OLS regression of the Effectiveness Reactions on Technology Self-Efficacy and Attitudes Toward MDL (Time 2)

	General Reactions Beta	Specific Reactions Beta	Learning Reactions Beta
Step 1			
Prior Experience with DL Technology	-0.08	-0.04	-0.19
English Proficiency	0.10	-0.07	0.18
Technology Self Efficacy	0.44**	0.51**	0.31*
R ²	.19*	.25**	.14t
Step 2			
Prior Experience with DL Technology	0.03	0.01	-0.13
English Proficiency	-0.09	-0.15	0.08
Technology Self Efficacy	0.01	0.31*	0.07
Attitudes Toward MDL	0.86**	0.40**	0.47**
Change R ²	.52**	.11**	.16**
R ²	.72**	.36**	.30**

Technology Characteristics

In partial support of Hypothesis 2a, Technology Reliability was significantly related to all of the Effectiveness Reaction measures (Table 4). Technology Use was significantly related to General and Specific Effectiveness Reactions. Technology Use was not related to Learning Effectiveness Reaction.

TABLE 4: Correlations among Technology Self-Efficacy, Attitudes toward MDL, and Effectiveness Reactions at Time 2

	1.	2.	3.	4.	5.	6.
1. Technology Reliability	1.00					
2. Effective Technology Use	0.64**	1.00				
3. Distance Perceptions	0.46**	0.42**	1.00			
4. General Reactions	0.49**	0.40**	0.50**	1.00		
5. Specific Reactions	0.37**	0.30*	0.45**	0.59**	1.00	
6. Learning Reactions	0.31*	0.18	0.42**	0.66**	0.35**	1.00

In support of Hypothesis 2b, Distance Perception was significantly related to all three of the Effectiveness measures.

Hypothesis 2c suggests that Technology Reliability and Technology Use would be significantly related to Distance Perception. Table 4 indicates that Hypothesis 2c was supported.

Hypothesis 2d suggests that Distance Perception would mediate the relationships between Technology Reliability and Technology Use. In partial support of the hypothesis, the relationship between Technology Reliability and Effectiveness Reactions was partially mediated by Distance Perception. Distance Perception did not mediate the relationship between Technology Use and Effectiveness Reactions (Table 5).

TABLE 5: Hierarchical OLS regression of the Effectiveness Reactions on Technology Reliability and Use and Distance Perceptions (Time 2)

	General Reactions Beta	Specific Reactions Beta	Learning Reactions Beta
Step 1			
Computer Expertise	0.47**	0.16	0.40**
Technology Reliability	0.36*	0.33t	0.31t
Effective Technology Use	0.13	0.02	-0.05
R ²	.46**	.16t	.26**
Step 2			
Computer Expertise	0.46**	0.16	0.39**
Technology Reliability	0.26t	0.21	0.19
Effective Technology Use	0.07	-0.03	-0.12
Distance Perceptions	0.32**	0.33*	0.35**
Change R ²	.08**	.09*	.10**
R ²	.54**	.24*	.36**

Lastly, Hypothesis 3 suggests that Attitudes Toward MDL Technology and Distance Perception will explain a significant amount of variance in the Effectiveness Reactions after controlling for Technology Self-Efficacy, Reliability, and Use. Table 6 indicates that Attitudes Toward MDL Technology and Distance Perception explained a significant amount of variance in Effectiveness Reactions. Both Attitudes Toward MDL and Distance Perception were significantly related to General Effectiveness Reaction, Attitudes Toward MDL was significantly related to Specific Effectiveness Reaction, and Distance Perception was significantly related to Learning Effectiveness Reaction.

TABLE 6: Hierarchical OLS regression of the Effectiveness Reactions on Technology Self-Efficacy, Attitudes, Reliability, Use and Distance Perceptions

	General Reactions Beta	Specific Reactions Beta	Learning Reactions Beta
Step 1			
Prior Experience with DL Technology	-0.11	-0.03	-0.16
Computer Expertise	0.24t	0.19	0.21
English Proficiency	0.07	-0.15	0.21
Technology Self Efficacy	0.04	0.04	-0.04
Technology Reliability	0.38*	0.44t	0.31
Effective Technology Use	0.20	-0.07	-0.03
R ²	.38**	.19	.22
Step 2			
Prior Experience with DL Technology	-0.03	0.06	-0.13
Computer Expertise	0.15	0.11	0.20
English Proficiency	0.00	-0.26t	0.25
Technology Self Efficacy	-0.10	-0.15	-0.04
Technology Reliability	0.04	0.05	0.14
Effective Technology Use	0.21	-0.01	-0.09
Attitudes Toward MDL	0.53**	0.63**	0.03
Distance Perceptions	0.26*	0.21	0.37*
Change R ²	.25**	.28**	.11t
R ²	.63**	.47**	.33t

DISCUSSION

The purpose of this study was to examine the effectiveness of an MDL technology delivered international HRM course. Generally, we hypothesized that the factors that relate to the MDL effectiveness in the global classroom include (1) participant characteristics (e.g., technology self-efficacy and attitudes toward MDL technology) and (2) technology characteristics (e.g., reliability of the technology, the effective use of the technology, and perceived distance).

The results suggest that several of the hypotheses were supported. The hypotheses and the findings for participant characteristics and technology characteristics are discussed in the following sections.

Participant Characteristics

The participant characteristics' hypotheses were supported for the Time 2 data but only partially for the Time 1 data. More specifically, at Time 2 technology self-efficacy was significantly related to all effectiveness reaction measures and to attitudes toward MDL technology; attitudes toward MDL technology was related to all effectiveness reaction measures. At Time 1, technology self-efficacy was related to attitudes toward MDL technology,

but only marginally related to specific effectiveness reaction; attitudes toward MDL technology was related to both effectiveness reaction measures. Thus the difference between Time 1 and Time 2 is the relationship between technology self-efficacy and the effectiveness reaction measures. Similar differences were found for the regression analyses.

One explanation for the Time 1-Time 2 discrepancy is that the two measures of self-efficacy may be measuring two different forms of self-efficacy: existing and developed (Christoph, Schoenfeld, & Tansky, 1998). Existing self-efficacy is the self-efficacy that individuals enter with into a training program. Developed self-efficacy is the self-efficacy that individuals develop throughout the course of a training program. To determine whether this might be one explanation for the discrepant findings, additional analyses were run. First, the relationship between prior experiences and self-efficacy were examined via correlations. Second, the change in self-efficacy between Time 1 and Time 2 was examined (i. e., dependent t-test). Third, a factor analysis was run to determine whether the items for the two self-efficacy measures formed separate factors.

The results of the correlational analyses suggest that self-efficacy at Time 1 was significantly related to prior DL experience ($r=.25$; $p<.05$) and to English proficiency ($r=.29$; $p<.05$; English proficiency was examined due to the multicultural characteristic of the classroom experience); self-efficacy at Time 2 was not significantly related to prior DL experience ($r=.21$; $p>.05$) nor English proficiency ($r=.07$; $p>.05$). The results of the dependent t-test suggests that self-efficacy at Time 2 was significantly higher than self-efficacy at Time 1 ($Mean_{T1}= 5.6$; $Mean_{T2}=6.0$; $t=2.74$, $p<.01$). Finally, the results of the factor analysis suggests that four factors explained 74% of the variance. Two factors resulted for both the Time 1 and the Time 2 measures. The factors contained only Time 1 or only Time 2 items.

These additional findings suggest the existence of existing and developed self-efficacy. Existing self-efficacy resulted from prior experiences with distance learning technology and English proficiency. However, developed self-efficacy resulted from experiences within the course. Future research should continue to examine the factors that relate to an individual's change in self-efficacy throughout a training experience.

Technology Characteristics

The results for the technology characteristics suggest the reliability of the technology was significantly related to all three effectiveness reaction measures and distance perception. Although effective technology use was related to distance perception, it was related only to the general and specific effectiveness reactions. Moreover, the regression analyses suggest that

once technology reliability was controlled for (as well as computer expertise), effective technology use was not significantly related to any of the effectiveness reaction measures. This suggests that the reliability of the technology was more proximal to training effectiveness.

One explanation for this finding is that the students may have attributed any problems dealing with technology to a technology problem as opposed to an instructor or participant problem. Making an attribution such as this may result in individuals' reduced efforts to seek assistance with technology use difficulties. Future research should examine the attributions that participants make in courses that utilize MDL technology.

Lastly, the results suggest that attitudes explain a significant amount of variance in general and specific effectiveness reactions; distance perception explains a significant amount of variance in general and learning effectiveness reactions. In closer examination of the effectiveness measures, this finding is not surprising. The general effectiveness reaction measure measures general reactions to the use of the MDL technology in the global classroom. The learning effectiveness reaction measure measures reaction to MDL technology for learning purposes. Both of these effectiveness reaction measures examine the importance of the MDL technology. Thus it is not surprising that distance perception is more closely related to the general and learning effectiveness reactions, controlling for other factors.

The significance of distance perception suggests that the context in which learning takes place is important in MDL courses. Specifically, it suggests that the technological aspects of the course should be developed in such a way that participants perceive themselves to be in the same learning environment as participants from other sites. To the extent that participants perceive less distance, training effectiveness reactions will be more positive.

In contrast, the specific effectiveness reaction measure measures aspects more specific to the course such as the use of the course content in the future, performance improvement as a result of the course, and the interactions within the course. Thus it is not surprising that attitude toward MDL was significantly related to general and specific effectiveness reactions, controlling for other factors.

The finding of significance between attitude toward MDL and general and specific effectiveness might suggest that participants should be evaluated on the basis of their attitude toward MDL learning (perhaps as part of determining trainee readiness) prior to entering an MDL course. This type of assessment along with pre-training programs developed to facilitate the development of positive attitudes (perhaps through increasing self-efficacy) will help to

enhance the effectiveness of MDL courses. Future research should build upon this study to determine other factors that may be of importance in an MDL delivered course.

Limitations

As with any study, there are several limitations to be noted. First, the focus of this study was the global classroom environment. As previously noted, the course involved both global and local classroom experiences. This study does not provide us with insight into the differences between these two classroom environments and their relationship to overall effectiveness reactions. Future research should examine more fully the importance of both environments to the overall learning experience.

A second limitation is the selected sample that was used. All participants volunteered to participate in the international human resource management course. Thus, our sample may include individuals with greater self-efficacy and more positive attitudes toward this type of course. However, if this is the case, we would be less likely to find an effect for self-efficacy and attitudes. As discussed previously, we found an effect despite this potential limitation.

Lastly, our sample included participants from several different countries. Our relatively small sample size did not enable us to control for country differences in the regression analyses (i.e., not enough power), but we recognize that differences in response patterns may have occurred. For example, the One-Way ANOVAs that examined differences by country for the perceptual variables (Table 1) indicated that the Slovenia participants responded lower than the other countries. This may be a result of differences in responses to Likert-type scales as opposed to actual differences in attitudes or perceptions (Ryan, Chan, Ployhart, & Slade, 1999). Although differences in mean values may exist, we found that differences in the relationships among the variables are minimal. We conducted separate correlational analyses for each country for which we found no substantial differences. Nevertheless, future research should examine construct differences that may exist across samples from several different countries (Riordan & Vandenberg, 1994; Ryan et.al, 1999).

This study has helped us to understand the factors that are important in an MDL delivered course: technology self-efficacy, attitudes toward MDL technology, technology reliability, and distance perception. In summary, attitudes toward technology completely/partially mediated the relationship between technology self-efficacy and the three measures of effectiveness. Distance perceptions completely/partially mediated the relationship between technology reliability and effectiveness. Effective technology use was not significantly related to effectiveness. Finally, attitudes toward technology and distance perceptions

explained a significant or marginally significant amount of variance in the effectiveness measures after controlling for technology self-efficacy, reliability, and effective use. Thus, both technical and participant characteristics are important to the effectiveness of an MDL delivered course.

This study suggests specific strategies that can be used to enhance training effectiveness. Technical strategies include pre-course technical testing sessions to ensure the reliability of the technology, pre-training sessions to ensure that all participants and instructors can use the equipment effectively, and planned classroom activities that facilitate the interaction among and between participants and instructors to lessen the perceived distance among sites. Participant strategies include readiness assessments to facilitate greater technology self-efficacy and positive attitudes toward MDL learning and pre-training sessions to increase self-efficacy and attitudes when efficacy and attitudes are low.

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