

Training Transfer between CD-ROM Based Instruction and Traditional Classroom Instruction

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Abstract

Many research studies on the effect of organizational factors on training transfer have been conducted, but few studies have considered the effect that different training delivery methods have on training transfer. This study sought to identify if there is any difference in the perceived transfer of training between traditional classroom instruction learners and computer-based instruction learners. Other demographic variables (e.g., years of work experience, age, level of education, years of experience as a supervisor, online course experience, and gender) also were investigated to assess their influence of the transfer of training. The study results revealed that training delivery methods did not make any significant difference in the transfer of training while several demographic variables were associated with significant differences in some of the five subcategories of training transfer construct (organizational support, supervisory support, peer support, motivation, and self-efficacy).

As globalization increasingly affects the workplace, today's organizations are facing severe competition from around the world. Among many performance solutions to equip organizations and their employees with competitive organizational and individual competencies to lead the global business environment, learning has been considered one of the most promising solutions that strategically addresses performance issues at the individual, group, and organizational level (Poell & Krogt, 2003). For private sector organizations, the return on training investment has been a critical issue to verify the impact that training has on improved organizational performance (Phillips, 1997). As advancements in learning and performance technologies have created a strong impetus to use technology-driven learning solutions, more organizations utilize cost-saving learning technologies to improve performance in all domains of the organization (Clark, 1999). As a technology-driven learning solution, computer-based instruction (CBI) has been one of the most frequently used methods proven to be a cost effective and yet instructionally sound delivery method for learning (Blotzer, 2000; Wilson, 2000).

Millions of dollars are spent each year to deliver training programs in the workplace (Greengard, 1999). In a recent benchmarking survey, it has been estimated that the corporate expenditure for training in the United States was \$3.5 billion during 2002 (Levis, 2002). It is still unclear, however, what types of training methods have produced tangible results for organizations. Traditionally, instructor-led classroom training has been the dominant style of training delivery (Evuleocha, 1997; Lawson, 1999). Other studies indicate that technology-driven training programs continue to expand in public as well as private organizations (Filipczak, 1996). With more investment being made on technology-driven training programs, this would seem an appropriate time to measure whether it would be a better alternative to traditional classroom training.

Problem Statement

Computer-based Instruction (CBI) has been at the forefront of discussion among many researchers because of its cost effectiveness for learning and performance improvement (Mottl, 2000; Wilson, 2000; Lawson, 1999; Rand, 1996). Mottl (2000) asserted that traditional classroom instruction costs approximately \$75 an hour, where as CBI costs about half the traditional classroom instruction costs. Due to this cost ratio, the use of traditional classroom instruction declined, and technology-driven courses are predicted to rise. According to a recent survey, the volume of traditional classroom training decreased from 77 percent to 72 percent between 2001 and 2002 and training delivery via learning technologies increased from 10.5 percent to 15.4 percent between 2001 and 2002 (Thompson & Wellins, 2003). This kind of trend raises critical questions about the effectiveness and ability to transfer CBI compared to traditional classroom instruction (Filipczak, 1996; Mottl, 2000; Maul & Spotts, 1993; & Greengard, 1999).

There is an evident gap in the knowledge base when comparing CBI to traditional classroom instruction as it pertains to transfer of training. Since the advent of CBI, abundant amounts of research studies on technology-based training programs and their effectiveness have surfaced (Wilson, 2000; Greengard, 1999;

Fister, 1998; Filipczak, 1996; Rand, 1996). These studies document that the use of CBI in education results in higher learning retention rates (Kerr, 1998), higher return on investment (Allen, 1996), reduced learning time (Maul & Spotts, 1993), and reduced costs for training delivery (Lawson, 1999) compared to the use of traditional classroom instruction. Because traditional classroom training is still the dominant means of instruction in the corporate environment, little research has been done to compare the two types of training (CBI versus traditional classroom instruction) and measure the perceived barriers for effective transfer of training (Evuleocha, 1997; Lawson, 1999; Filipczak, 1996). Most of the research on CBI and traditional classroom instruction concentrated on the mere advantages and disadvantages of both training methods. Little evidence has been shown as to the transferability of CBI compared to the traditional classroom instruction. A comparison between CBI and traditional classroom instruction is necessary to differentiate which type of training would produce more appropriate results for the transfer of training that results in performance improvement.

Research Questions

1. The purpose of this study is to determine the motivational factors, support factors, self-efficacy, and demographic factors that affect the employees at a paper-production company in the United States and their intentions to transfer training as measured by the Training Performance Transfer Instrument (TPT). Several research questions were developed to address the research purpose.
2. Is there a significant difference in the transfer of training between the CD-ROM-based learners and traditional classroom-based learners based on the five training transfer variables of organizational support, supervisory support, peer support, motivation, and self-efficacy?
3. What demographic variables (e.g., age, job title, years of full-time experience, level of education, years of experience as a supervisor, and gender) affect learners' perceived training transfer?

Theoretical Framework

Training Transfer Models and Variables

Training transfer studies have focused on several meaningful constructs including individual and organizational variables that are believed to promote or hinder the transfer of learning in organizational settings. Baldwin and Ford (1988) proposed a training transfer construct in three domains of transfer: training inputs, training outputs, and conditions of transfer. Parry (1990) described three factors for improving training transfer: personal factors, instructional factors, and organizational factors. Foxon (1997) believed that transfer of training was a process rather than an outcome or product of training. Foxon's transfer model is expressed in terms of initiation of transfer, frequency of transfer, and overall transfer. This model contains several transfer factors: organizational climate, motivation to transfer, manager support, peer support, and action planning. Holton (1996) developed the Learning Transfer Systems Inventory (LTSI) expressing training transfer as a function of ability, motivation, and environmental factors at three outcome levels: learning, individual performance, and organizational performance. Geilen (1996) presented another training transfer construct containing transfer variables of training design characteristics, trainee characteristics, and work environment characteristics.

Apart from these integrated models of training transfer, other research studies were conducted to verify independent variables in work system factors and people factors (Rainey, 1993), organizational culture (Tracey, Tannenbaum, & Kavanagh, 1995), opportunity to use training (Ford, Quinones, Segó, & Sorra, 1992; Lim, 2001; Clarke, 2002), match between training and organizational goals (Montesino, 2002), availability of mentor (Richey, 1990), goal setting (Gist, Bavetta, & Stevens, 1991), identical elements between training and work setting (Garavaglia, 1993), and support from peers and supervisors (Ford et al., 1992; Tracey, Hinkin, Tannenbaum, & Mathieu, 2001). From the review of many transfer studies, the concept of transfer of training seems to contain some meaningful themes to expand the research study. First, the concept of transfer of training can be viewed either as process or outcome. Second, various transfer variables either promote or hinder the transfer process. The transfer variables can be categorized into personal factors (learning readiness, self-efficacy, goal setting, motivation, etc.),

instructional factors (transfer design, identical content, transfer strategies, action learning, etc.), work factors (opportunity to use training, availability of tools, availability of mentor, etc.), and organizational factors (peer support, supervisor support, reward system, organizational culture, etc.). Third, these transfer variables interact with each other to form situation-specific force of training transfer either with negative or positive influences.

Computer-based Instruction and Learner Variables

A CBI program generally includes tutorials, practice exercises, and case studies with more sophisticated interactions incorporating game-based activities and business simulations (Rand, 1996). Compared to traditional classroom instruction, several advantages of CBI include consistent learning content, anytime and anywhere learning, interactive learning to promote learners' interest, automated record keeping and tracking, multimedia content, self-paced learning, and reduced training time and costs (Kerr, 1998; Lawson, 1999). Some shortcomings of CBI, however, also exist. These include the lack of human aspects in interaction (Sullivan, 1998), ineffective hands-on practices and lack of instructor feedback requiring self-motivation for learning (Rodriguez, 1999), difficulty to update content change (Fister, 1998), lack of peer interaction (Rand, 1996), and computer literacy issues (Lawson, 1999). Despite these weaknesses of CBI, Goldstein (1998) advocates that CBI systems are learner-centered-environments that provide self-paced learning and interactive training sessions satisfying a user's learning style. Several features of CBI, such as video, audio, and interactive testing, are believed to maintain an individual learner's attention and can improve learning compared to traditional classroom instruction.

Among several learner variables that affect the transfer of training, motivation to transfer and self-efficacy were identified as ones that play a major role in learning transfer (Machin & Fogarty, 1997; Foxon, 1997; Facticeau, Dobbins, Russell, Ladd, & Kudish, 1995). First, self-efficacy refers to one's beliefs and feelings of self-worth regarding how well he/she can perform and be responsible in a learning task (Bandura, 1994; Foster, 2001). Bandura posited that confidence in one's ability for success will affect the learner's initial willingness to try, individual persistence, and the level of personal

investment. For concepts of motivation, Pinder (1998) described work motivation as a set of internal and external forces that initiate work-related behavior and determine its form, directions, intensity, and duration. Ambrose and Kulik (1999) claimed that there were two types of motivational forces: environmental forces (organizational reward systems, the nature of work being performed) and personal forces (individual needs and motives) on work-related behavior. Herzberg's two-factor theory of motivation distinguishes between intrinsic (motivators) and extrinsic (hygiene) factors (Herzberg, 1982). Other job-related motivation factors include opportunities for promotion and job challenges (Kaplan, Jayaratne, & Chess, 1994). Motivation is also influenced by such factors as trainees' confidence in their ability to use the new skills, by their perception of the relevance of the training to their work, by their ability to identify work situations where using the skills would be appropriate, and by their belief that using the new skill will improve their job performance (Baldwin, Magjuka, & Loher, 1991; Holton, 1996; Noe, 1986; Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991). A study conducted by Machin and Fogarty (1997) examined several individual characteristics (self-efficacy, motivation to transfer, training reactions, goals for transfer, and commitment to transfer goals) and concluded that self-efficacy and motivation to transfer training were significantly related to positive transfer intentions.

Methodology

This study utilized a quantitative approach to compare differences in perceived transfer of training between CD-ROM-based learners and traditional classroom learners. The sample for this study was the full-time employees of a branch mill of a paper-production company located in a southeastern state. The entire population of employees at the mill was surveyed. This sample was chosen based on its accessibility to the researchers. Approximately 370 questionnaires were distributed, and 278 responses were returned, which equaled a 75 percent return rate. The survey instruments were distributed in person at the morning and evening shift change meetings. Mail delivery was also used to reach employees who could not be contacted during team meetings. After two weeks, a follow-up e-mail was sent out to participants who had not finished the survey. Traditional learners were differentiated from CD-ROM-based learners

based on the amount of CD-ROM-based experience the person declared on his or her survey.

From a review of literature to find the most suitable instrument for the purpose of this study, three instruments were selected and compared: the Trainer's Assessment Proficiency (TAP), the Wechsler Memory Scale III, and the Training Performance Transfer (TPT). After further investigation of the three instruments, the researchers concluded that the TPT was a better fit for the purpose of this study. This instrument is subdivided into two sections. The first part consists of five sub-scales that included 42 performance statements to determine the identified factors or barriers in the transfer process. These five sub-scales are: (a) supervisor support, (b) organizational support, (c) peer support, (d) self-efficacy, and (e) motivation to transfer. The instrument uses a Likert-type scale ranging from one to five (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, and 5 = Always). The second part of the survey consists of eight demographic questions regarding age, gender, years of full-time work experience, job title, years of experiences as a supervisor, CD-ROM course experience, online course experience, and level of education. The TPT instrument was used with consent and permission. Data analysis revealed the Cronbach's alpha for the five sub-scales were all higher than .74.

The data analysis utilized descriptive statistics to interpret employees' demographic information and calculate the mean scores of the TPT's sub-scales. The independent variables in this study were the employees' demographic information. The dependent variables consisted of the five sub-scales that either inhibited or promoted the transfer of training as measured by the TPT instrument. A univariate analysis of variance (UNIANOVA) test was conducted to analyze the employees' perceptions of the transfer of training process according to the five descriptors (self-efficacy, peer support, organizational support, supervisor support, and motivation). The Tukey Honestly Significant Difference (HSD) post hoc test was used to analyze any differences that persisted among the eight demographic variables (age, gender, years of full-time work experience, job title, years of experiences as a supervisor, CD-ROM course experience, online course experience, and level of education).

Background Information about the Company

The paper mill, which was used for this study, is one of many paper mills located in the United States and abroad by this particular paper-production company. The mill was designed using high-performance work teams (HPWT). This type of work design allows teams and individuals to be more actively involved in the day-to-day decision-making process. The mill is operated with 12-hour rotating shifts in order for the mill to run 24 hours a day, 365 days per year. The employees of the mill have received traditional classroom training in the areas of team building, new hire orientation, leadership, and many other topics. All employees of the mill received competency-based training that combines traditional classroom instruction with on-the-job instruction. Some employees have received instruction on OSHA safety training via CD-ROMs and web-based instruction to teach the purchasing system at the mill.

Findings

Two research objectives were set for this study. The first objective was to identify differences that might exist between traditional classroom learners and CD-ROM-based learners based on the five descriptive factors and their perceptions of transfer of related training. The second objective was to determine any differences that might exist between traditional classroom learners and CD-ROM-based learners based on the eight demographic factors.

Demographic Characteristics

The demographic information collected for this study includes age, gender, years of full-time work experience, job title, years of experiences as a supervisor, CD-ROM course experience, and level of education. Data analysis revealed that 137 (49.3%) participants did not have any CD-ROM course experience, 80 (28.8%) participants had less than 20 hours of experience, and 61 (21.9%) participants had more than 20 hours of course experience. For the purpose of this study, the 141 respondents who had less than 20 hours and more than 20 hours were defined as CD-ROM-based learners (50.7% of all respondents). Regarding job title, 181 (65.1%) were machine operators, 41 (14.7%) were maintenance personnel, and 56 (20.1%) were resource personnel respectively. For the number of years of full-time work experience at the company, 43 (17.3%) respondents had less than one year of experience, 78 (28.1%) had one to five years of experience, and 152 (54.7%) had five or more

years of experience. In terms of level of education, there was only one respondent (0.4%) who had less than a high school diploma, 184 (66.2%) attained a high school degree or GED, 55 (19.8%) had two years of college or associate's degree, 27 (9.7%) had a bachelor's degree, and 11 (4.0%) had completed at least some graduate work. For the years of experience as a supervisor, 149 (53.6%) of the respondents reported no experience, 42 (15.1%) had less than two years of experience, 69 (24.8%) respondents had between two and eight years, and 18 (6.5%) had more than eight years of supervisory experience. Responses to gender revealed that there were 62 (22.3%) female and 216 (77.7%) male participants. The age of the respondents was also examined. Among all respondents, 22 (7.9%) were 20 to 26 years of age, 84 (30.2%) were between the ages of 27 and 35, 167 (60.1%) were between the ages of 36 and 55, and 5 (1.8%) were over 55 years old.

Difference in the Transfer of Training Between the Two Delivery Formats

In order to examine if there is any significant difference in the perceptions of transfer of related training between CD-ROM-based instruction and traditional classroom instruction based on the five subcategories of supervisor support, peer support, self-efficacy, organizational support, and motivation, a Univariate Analysis of Variance (UNIANOVA) was calculated. The analysis revealed there were no significant differences between CD-ROM-based learners and traditional classroom learners for the five subcategories. Table 1 shows the Cronbach's Alpha scores for the five subcategories.

Effect of Demographic Variables on Training Transfer

In order to investigate if there is any significant difference in perceptions of the transfer of training as measured by the TPT survey based on the eight demographic variables used in this study, a UNIANOVA was conducted. From the data analysis, the demographic variable of job title and years of work experience registered

a significant difference for the organizational support. For supervisory support, job title, years of work experience, and level of education indicated significant differences for the transfer of training. For peer support, only years in work experience showed a significant p-value. For motivation, job title, years of work experience, years of experience as a supervisor, and age indicated a significant difference. Lastly, for self-efficacy, job title, years of work experience, level of education, and age were found to have significant p-values. These findings are summarized in Table 2.

The Tukey HSD test was used to explore any further differences within some the subcategories of the demographic variables (age, years of full-time work experience, job title, and educational level). When the subcategories of the years of full-time work experience were compared with organizational support, respondents with less than one year perceived a significantly higher organizational support than either those with one to five years or those with more than 5 years of work experience. Respondents with one to five years of work experience also indicated a significant higher mean score for organizational support than those with over 5 years of work experience. For supervisor support, those with more than five years of experience were significantly different in their perceptions of supervisor support than respondents with less than one year and one to five years of experience. With respect to peer support, respondents with more than five years of experience reported significantly different perceptions of peer support compared to those with less than one year of experience and those with one to five years of experience. The Tukey HSD compared years of full-time work experience to motivation looking for significant differences. The analysis found that respondents with more than five years of experience were significantly different in their perceptions of motivation from those with less than one year of experience and those with one to five years of experience. Regarding

Table 1. Cronbach's Alpha for the Five Subcategories

	Organizational Support	Supervisor Support	Peer Support	Motivation	Self-Efficacy
Questions	1, 5, 6, 8, 11, 12, 16, 22, 29, 31, 35, 37	4, 9, 15, 20, 24, 27, 32, 33, 40, 41	10, 21, 34, 42	2, 13, 19, 26, 28, 30, 36, 38, 39	3, 7, 14, 17, 18, 23, 25
Cronbach's Alpha	.7427	.9214	.8561	.7146	.8590

Subcategories		Job Title	Yrs. Wrk. Exp.	Edu. Level	Yrs. Exp. Sup.	Age
Organizational Support	Sig.	.004*	.000*	.056	.575	.493
	F value	5.528	10.900	2.340	.664	.803
Supervisory Support	Sig.	.006*	.000*	.013*	.354	.442
	F value	5.248	12.782	3.235	1.090	.900
Peer Support	Sig.	.676	.004*	.332	.371	.069
	F value	.392	5.563	1.154	1.051	2.392
Motivation	Sig.	.000*	.000*	.139	.046*	.026*
	F value	14.168	13.170	1.754	2.708	3.152
Self-efficacy	Sig.	.026*	.025*	.047*	.067	.004*
	F value	3.718	3.736	2.446	2.412	4.546

*Significance at .05 level.

Note. Yrs. Wrk. Exp. = Years of full-time work experience, Yrs. Exp. Sup. = Years of experience as a supervisor.

Table 2. UNIANOVA for the Demographic Variables and the Transfer Subcategories

age, responses of those between the ages of 20–26 were significantly different than those ages 27–35 and those 36–55. Those ages 27–35 had significantly different responses from those ages 20–26. Respondents ages 36–55 were significantly different in their perceptions of motivation than respondents ages 20–26.

With regards to self-efficacy, respondents ages 20–26 were significantly different in their perceptions of self-efficacy as compared to those ages 27–37 and those 36–55. Those who were 37–55 were significantly different than those ages 20–26. Respondents with 36–55 reported significant differences in perception than those ages 20–26. Respondents with years of full-time work experience reported significant differences in their perceptions of self-efficacy. Respondents with less than one year of experience felt significantly different than respondents with more than five years of experience. Those

with more than five years of experience felt significantly different than those with less than one year of experience. In job title, there were significant differences reported in the respondents' perceptions of self-efficacy between machine operators and resource personnel. Table 3 presents the findings from the Tukey HSD tests.

Conclusion and Discussion

This study has sought to identify differences that might exist between traditional classroom learners and CD-ROM-based learners based on their perceptions of transfer of training for the five descriptive factors. It also tried to determine the effect of the eight demographic variables on the five training transfer factors. Several conclusions could be drawn from the study's findings. First, the study revealed there is no significant difference in the perception of the transfer of training between the employees who

Table 3. Tukey HSD Tests for the Subcategories of the Demographic Variables

Demographic Variables	Comparison Groups	Training Transfer Variables					
		OR Support	Supervisor Support	Peer Support	Motivation	Self-efficacy	
Job Title	Machine	Resource	.230	.099	.123	<.001*	.006*
	Resource	Maintenance	.324	.193	.087	.031*	.336
Yrs. Wk. Exp.	> 1 year	1-5 years	.015*	.071	.215	.068	.420
	> 1 year	< 5 years	.001*	<.001*	<.001*	<.001*	.021*
	1-5 years	< 5 years	.030*	.004*	.042*	.008*	.278
Age	20–26	27–35	.082	.557	.343	.007*	.028*
	20–26	36–55	.239	.463	.175	.006*	.012*

* Significance at .05 level.

had traditional classroom training and those with CD-ROM-based training. This implies that delivery methods may not influence the transfer of training of a specific training program. Rather, other variables (e.g., years in full-time work experience, job title, and age) were found to significantly influence the transfer process of a training program. Second, among the different variable categories, personal variables, such as motivation and self-efficacy, indicated more associations with the demographic variables than the organizational variables of organizational support, supervisory support, and peer support. Third, the fewer years of full-time work experience, the greater the chance to transfer training.

The study results reveal that there are no differences in the perceptions of transfer of related training between traditional classroom instruction and CD-ROM-based instruction within a manufacturing company. Therefore, this finding may justify using more CBI for training delivery in these types of organizations. The benefit of CBI would lower training costs for program development, delivery, and evaluation while keeping the same level of training transfer. One consideration, however, is that instructional designers of the CBI programs may need to tailor their training programs more closely to the demographic differences in their workplaces. According to the study's findings, aging workers with higher levels of work experience in the machine trades need more support from the organization, supervisors, and peers to transfer their training to jobs and tasks. Issues of motivation and self-efficacy for these aging workers should also be addressed to promote higher transfer of training. This implies that human resource development efforts and resources within a corporate environment should be balanced to address workplace performance issues between the existing human resources and the new hires. The existing workers also become a critical target population who need to learn and transfer their skills, otherwise they may become stagnant, and this can hinder the transfer of training.

Limitations of the Study

This study produced several meaningful findings regarding the transfer of training research. The major findings, however, may contain some limitations for generalization. The subjects of the study were limited to a specific industry—paper production, and data collection was undertaken at a paper mill. The study utilized subjects' perceptions about the transfer of training instead of actual transfer performance data. Due to these limitations, the generalization of the research findings may not be appropriate.

These data might serve as a baseline for future research in the area of transfer of related training pertaining to CD-ROM-based instruction and transfer of training studies. In order to broaden the scope of this study, future research studies should utilize larger populations from other manufacturing companies and other industry sectors. Also, gathering actual performance data to document the transfer of training is another extension of this study. More research should be conducted to explore CD-ROM-based instruction and other technology-based instruction (e.g., online instruction, simulation, and virtual reality). Research concerning technology-based instruction and its ability to transfer to the job should be conducted both qualitatively and quantitatively to further explore in-depth information about the training transfer process.

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