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ABSTRACT

In business, decision technologies are commonly and widely used among managers and analysts. The lack of skills surrounding this decision technology can create organization disadvantages. Therefore, effective training would hopefully prevent these disadvantages from such ubiquitous technology and potentially provide a competitive advantage for those organizations adopting training. Based on behavior modeling, "Improving Computer Training Effectiveness of Decision Technologies: Behavior Modeling and Retention Enhancement" Yi and Davis (2001) indicated that a combination of retention enhancement and hands-on practice produced better cognitive outcomes. Since information technology is dynamic, and time sensitivity is its critical issue, the effects of age among participants were examined.

KEYWORDS

Foundation Courses, Age, Decision Technology, Training.

INTRODUCTION

For decades, organizations have used information technology to support their business processes. Different organizations may use different information systems for various purposes. Employing sound decision-making is one of the most critical business procedures because it may ultimately lead to success or failure. Decision technology has a great potential to help managers to generate more successful results for decisions made. Although decision technologies are available, whether the managers can effectively use them is still an issue. It is critical to the organization that managers or analysts use decision technology wisely, otherwise, a large amount of computer-based system investments could be wasted (McCarroll 1991; Ganzel 1998). Therefore, training for decision technologies could potentially improve an organization's performance and allow it to more effectively compete.

In a business setting, managers and analysts have different backgrounds. Some may have graduate school degrees, while others may have only high school diplomas. Whatever their path, they have worked their

ways to a managerial position. This real world situation points out that generic computer training may not be suitable for everyone due to their diverse backgrounds. McDowell (1995) indicated that if the students want to be successful in higher education courses or a professional career, they need to start from a good foundation of knowledge, skill, and ability. It is possible to apply this suggestion to certain parts of computer training for better outcomes. Since previous research has not focused on trainee diversity, this suggests that the outcomes be improved by including the appropriate foundation courses to adjust their background and optimize the end-user computer training. Surprisingly, the fastest growing segment of computer users are people over age 65 (Mayhorn et al. 2004). It is interesting to investigate the performance of people in different ages.

The purpose of this study is to understand the impacts of foundation courses and age on the computer training outcomes for decision technology. The next section discusses cognitive and skill-based learning followed by the foundation course and age. The paper ends with discussion and conclusion.

LITERATURE REVIEW

Social cognitive theory has been used as a basis of behavior-modeling training. It also suggests how people learn new behavior observationally (Bandura, 1969; 1977; 1986). Four component processes govern observational learning. These processes are attention, retention, production, and motivation (Yi & Davis 2001). Attention refers to observing behavioral skills whereas retention refers to transforming the observed skills into symbolic codes. Production means practicing the skill physically while motivation means getting motivated to use something for a period of time. However, several studies emphasize the case of retention and production more than other procedures (Bandura & Jeffery 1973; Jeffery 1976).

Cognitive and Skill-based Learning

Three dimensions of learning recommended by Kraiger, Ford, and Salas (1993) to measure training effectiveness are cognitive, skill-based, and affective. Cognitive outcomes include verbal knowledge, knowledge organization, and cognitive strategies. Skill-based outcomes include skill compilation and automaticity. Lastly, affective outcomes include self-efficacy, goal, and attitude toward a targeted object. From reviewing the computer training literature, studies used comprehension of declarative knowledge to measure cognitive outcomes, accuracy of procedural skill compilation (task performance) to measure skill-based outcomes, and perceptions of the system's ease of use and usefulness to measure the affective outcomes (Yi & Davis 2001). A study separated training outcome into three categories including performance (cognitive and skill-based performance outcome), behavior, and attitude (Galletta et al. 1995). This included both learning and behavior training outcomes. Since a review of the computer training literature indicated that cognitive and skill-based learning outcomes have been studied, this study will particularly emphasize these two types of outcomes to further understand the depth of the existing literature. However, how effective the training outcome is depends on the methods used in the training program.

Retention Enhancement and Hands-on Practice

Yi and Davis (2001) indicate that the use of symbolic processing of information can greatly contribute to learning beyond and above the effect of physical practice. The results from a study suggested that people who transformed the model's actions verbally or numerically and immediately rehearsed achieve greater learning than those who did not have any codification or transformation before the rehearsal (Bandura & Jeffery 1973). The reproduction of modeled supervisory skills can be facilitated by retention enhancement or cognitive rehearsal performed prior to physical practice, and the reproduction decay was minimized

when it measured one week after training (Decker 1980). The results from these studies support the social cognitive theory. Therefore, learning is effectively attained as Bandura (1977 p. 27) said "the highest level of observational learning is achieved by first organizing and rehearsing the modeled behavior symbolically and then enacting it overtly."

It is typical in behavioral-modeling studies that trainees are required to observe the operations of a computer demonstration and then physically perform them. Nevertheless, these trainees are not mandated to symbolically perform any coding or mentally rehearse what they observed (Compeau & Higgins 1995; Gist, Rosen, & Schwoerer 1988; Gist, Schwoerer & Rosen, 1989; Simon et al.1996; Simon & Werner 1996). Unlike observational learning studies, computer skills are more cognitively complex. Because of different types of media couple with a set of component actions to be accomplished, inexperienced users tend to be overwhelmed and to feel overloaded with information. Therefore, adequate time is critical in order to grasp the material presented during training program (Singer 1980).

As discussed above, there is a great potential that retention enhancement of symbolic coding and cognitive rehearsal can help improving computer training. Yi and Davis (2001) studied these relationships and found that combining retention enhancement with hands-on practice produced better cognitive learning outcomes than practice alone. However, the study also found that the same approach does not produce better skill-based outcomes than retention enhancement alone. Since previous studies did not focus on the details of the samples in their studies, it is questionable whether the diversity of trainees can create different outcomes of computer training. The trainees in a training session probably have different educational backgrounds, ages, genders, and so on. Next will be the discussion of foundation course.

Foundation Course

For education at the university level, foundation courses or prerequisites are required for most majors, if not all. A prerequisite refers to a course or other body of knowledge that would enhance the student's chance of success in another course. This shows that they are important to students in order to move on to the higher level or more advanced courses. Bashford (2000) suggests that passing prerequisite courses does not guarantee that students are sufficiently prepared for the next course in the sequence. However, the results from this study only apply to regular courses in academic institutions. It is interesting to investigate whether foundation courses will have the same effect upon computer training.

Lukens (1999) indicated that availability of prerequisite courses ensured the most productive later course work. Therefore, it can be implied that a foundation course can influence the outcome of the subsequent courses or, in this particular case, training.

Hypothesis 1:	Retention enhancement with hands-on practice will produce better cognitive learning and skill-based learning outcomes when a foundation course is provided, controlling for total training time
Hypothesis 1a:	Retention enhancement with hands-on practice will produce better cognitive learning outcomes when a foundation course is provided, controlling for total training time
Proposition 1b:	Retention enhancement with hands-on practice will produce better skill-based learning outcomes when a foundation course is provided, controlling for total training time

Kauffman and Gilman (2002) pointed out there were non-traditional students who are successful in the advanced course without taking a prerequisite. Some of these students have worked in the field over the

eight-year period. Therefore, the conclusion implies that age of the student can influence performances or outcomes.

Age

Over the years, practitioners and researchers have had a significant interest in age difference (e.g., Girard, 1993; 1993; Minton & Schneider 1980; Rhodes 1983). Much research uses age in creating theory (Venkatesh et al. 2003; Iivari & Igbaria, 1997; Morris & Venkatesh, 2000). In most cases, it plays the role of a moderating variable. Morris and Venkatesh (2000) explicitly stated that there is some evidence that age significantly influences technology usage. Since this study is about computer training, which is directly related to the use of technology, it is imperative to better understand the impact of age difference in this context. Because information technology is very dynamic and grows exponentially, it is probable that older people might not be able to catch up with advanced technology. Therefore, age difference can be hypothesized as follows:

Hypothesis 2:	Retention enhancement with hands-on practice will produce better cognitive and skill-based learning outcomes when trainees are younger, controlling for total training time
Proposition 2a:	Retention enhancement with hands-on practice will produce better cognitive learning outcomes when trainees are younger, controlling for total training time
Proposition 2b:	Retention enhancement with hands-on practice will produce better skill-based learning outcomes when trainees are younger, controlling for total training time

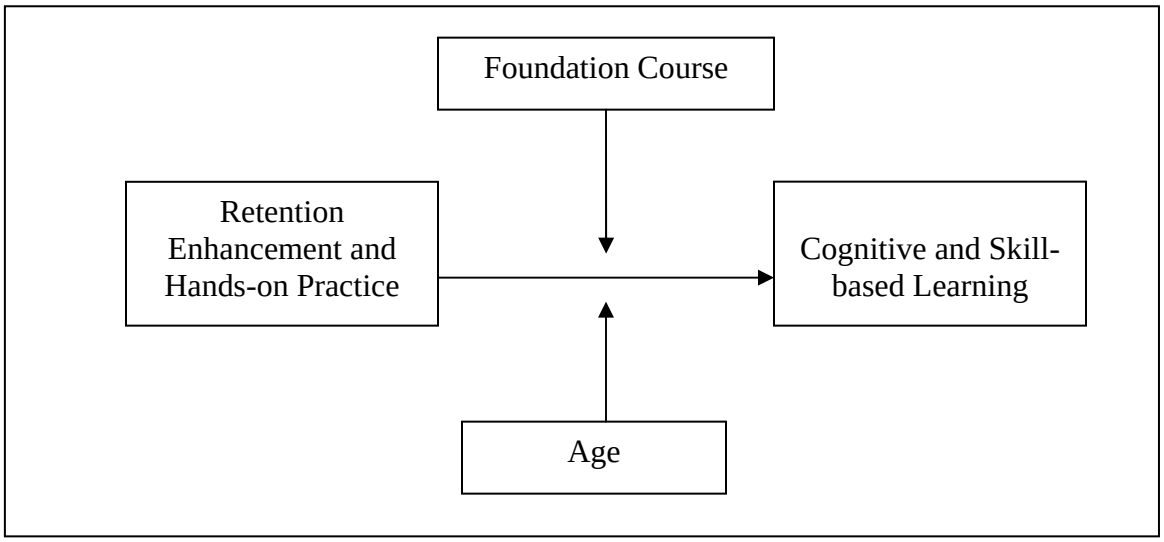

Figure 1. Research Framework

CONCLUSION AND FUTURE RESERCH

The results of this study suggest methods to improve computer training. If the first hypothesis is supported, a foundation course may be a necessary component in the overall training program for better decision-making. Support for the second hypothesis would heighten attention for researchers to find methods to train managers of different ages.

Conducting this research also opens the door for future research. Since this study is done in an interpersonal training setting, researchers can further investigate outcomes in different settings, such as online training. Another area to be considered is personality traits of trainees. For example, an experiment could be performed where a group of subjects can chose a time preference, but the other is not given an option. Thus, the results may be able to suggest the significance of time preference to training outcomes. Gender is also an interesting issue that has been used to theorize in a number of studies. In further study, the gender of the trainer may be theorized. Therefore, the findings may be able to investigate the role of gender in training outcomes. The replication of this study with different types of decision technologies is also useful to verify the results; otherwise, the results may not be consistent with other technologies.

REFERENCES

Bandura, A. *Principles of Behavior Modification*, Holt, Rinehart & Winston, New York, 1969.

Bandura, A. *Social Learning Theory*. Prentice Hall, Englewood Cliffs, NJ, 1977.

Bandura, A. *Social Foundation of Thought and Action: A Social Cognitive Theory*, Prentice Hall, Englewood Cliffs, NJ, 1986.

Bandura, A., and Jeffery, R. W. "Role of Symbolic Coding and Rehearsal Processes in Observational Learning," *Journal of Personality and Social Psychology* (26:1), 1973, pp. 122–130.

Bashford, J. "How Well Do Prerequisite Courses Prepare Students for the Next Course in the Sequence?," *Reports—Descriptive* (141), 2000, pp. 14–28.

Compeau, D. R., and Higgins, C. A. "Application of Social Cognitive Theory to Training for Computer Skills," *Information Systems Research* (6:2), 1995, pp. 118–143.

Decker, P. J. "Effects of Symbolic Coding and Rehearsal in Behavior-modeling Training," *Journal of Applied Psychology* (65:6), 1980, pp. 627–634.

Galletta, D. R., Ahuja, M., Hartman, A., Teo, T., and Peace, A. G. "Social Influence and End-user Training," *Communications of the ACM* (38:7), 1995, pp. 70–79.

Ganzel, R. "Feeling Squeezed by Technology?," *Training* (35:4), 1998, pp. 62–70.

Girard, C. "Age, Gender, and Suicide: A Cross-national Analysis," *American Sociological Review* (58:4), 1993, pp. 553–574.

Gist, M. E., Rosen, B., and Schwoerer, C. "The Influence of Training Method and Trainee Age on the Acquisition of Computer Skill," *Personnel Psychology* (41:2), 1988, pp. 255–256.

Gist, M. E., Schwoerer, C., and Rosen, B. "Effects of Alternative Training Methods on Self-efficacy and Performance in Computer Software Training," *Journal of Applied Psychology* (74:6), 1989, pp. 884–891.

Iivari, J., and Igbaria, M. "Determinants of User Participation: A Finnish Survey," *Behaviour & Information Technology* (16:2), 1997, pp. 111–121.

Jeffery, R. W. "The Influence of Symbolic and Motor Rehearsal in Observational Learning," *Journal of Research in Personality* (10:1), 1976, pp. 116–127.

Kauffman, C. E., and Gilman, D. A. "Are Prerequisite Courses Necessary for Success in Advanced Courses?," *Reports—Research* (143), 2002, p. 31.

Kraiger, K., Ford, J. K., and Salas, E. "Application of Cognitive, Skill-based, and Affective Theories of Learning Outcomes to New Methods of Training Evaluation," *Journal of Applied Psychology* (78:2), 1993. pp. 311-328.

Lukens, W. E. "ONR Developing Technology Insertion Curriculum for New S&T Component of DoD's Acquisition Workforce," *Program Manager* (28:5), 1999, p..38.

Mayhorn, C. B., Stronge, A. J., McLaughlin, A. C., and Rogers, W. A. "Older Adults, Computer Training, and the Systems Approach: A Formula for Success," *Educational Gerontology* (30:3), 2004, pp. 185–203.

McCarroll, T. What New Age? *Times* (138:12), 1991, pp. 44–46.

McDowell, L. “Effective Teaching and Learning on Foundation and Access Courses in Engineering, Science, and Technology,” *European Journal of Engineering Education*, (20:4), 1995, pp. .417–425.
Minton, H. L., and Schneider, F. W. *Differential Psychology*, Waveland, Prospect Heights, IL,1980.
Morris, M. G., and Venkatesh, V. “Age Differences in Technology Adoption Decisions: Implications for a Changing Work Force,” *Personnel Psychology* (53:2), 2000, pp. 375–403.
Rhodes, J. “Age-related Differences in Work Attitudes and Behavior: A Review and Conceptual Analysis,” *Psychology Bulletin* (93:2), 1983, pp. 328–367.
Simon, S., and Werner, J. “Computer Training Through Behavior Modeling Self-paced, and Instructional Approaches: A Field Experiment,” *Journal of Applied Psychology* (81:6), 1996, pp. 648–659.
Simon, S., Grover, V., Teng, J., and Whitcomb, K. “The Relationship of Information System Training Methods and Cognitive Ability to End-user satisfaction, Comprehension, and Skill transfer: A Longitudinal Field Study,” *Information Systems Research* (7:4), 1996, pp. 466–490.
Singer, J. L. "The Powers and Limitation of Television," in *The Entertainment Functions of Television*, P. H. Tannenbaum (Ed.),. Erlbaum, Hillsdale, NJ, 1980, pp. 31–66.
Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. “User Acceptance of Information Technology: Toward a Unified View,” *MIS Quarterly* (27:3), 2003, pp. 425–478.
Yi, M. Y., and Davis, F. D. “Improving Computer Training Effectiveness for Decision Technologies: Behavior Modeling and Retention Enhancement,” *Decision Sciences* (32:3), 2001, pp. 521–544.