

Learning Instructional Technology for an Online Course: An Analysis of the Relationship between Adult Students' Self-Directed Ability and Instructional Technology Competency

Olga Shinkareva and Angela Benson
University of Illinois

The main purpose of this research is to clarify the relationship between adult students' self-directed learning (SDL) ability and instructional technology (IT) competency. The research involves surveying 199 students who take online courses in a large Midwest state university. Preliminary results indicate a considerable positive correlation between SDL and level of IT competency in the students, with above average SDL ability. These students also utilize cognitive and metacognitive strategies for learning IT.

Keywords: Online Learning, Instructional Technology, Self-Directed Learning

Problem Statement

Online learning continues to gain popularity (Allen & Seaman, 2004). Its highly competitive features, affordability, and accessibility often make online or e-learning the favorite choice for providing training and development needs in an organization. Online learning also allows working adults to pursue their education without interrupting a career. Hence, a growing number of employees participate in online training and learning (ASTD & MESIE Center, 2001; Tabs, 2003). Many of them continue their education by taking online courses or programs offered through higher educational institutions. At the same time, online learning is relatively new. It involves advanced features that influence learning process. These features could discourage adults to participate and to be successful in learning.

Online learning is different from the "in-class" mode of learning in numerous ways. One of distinguished and important feature of online learning is utilization of instructional technology (IT) (Lea et al., 2001; Waxman, Lee, & Michko, 2003). However, IT alone cannot effectively facilitate the learning process. Moreover, the vast choices and fast changes of IT create the need to learn technology utilized in an online course or program. This need often demands from the students to learn IT for the course independently, with little or no formal training, and while learning the course material (Larson, Dutt-Doner, & Broyles, 2002; Weston et al., 1999).

Consequently, IT creates challenges that are especially influence adult students. Herrmann, Fox and Boyd (2000) highlighted that overall, adults feel more personally responsible for their learning than younger people do. They tend to consider unsuccessful experiences with IT as a personal failure. This can discourage adults from participating and being successful in learning. To provide effective online instructions and to meet greater expectations of organizations and employees, current research is challenged to offer new approaches for learning online (Johnson et al., 2000; McGorry, 2003; Mungania & Reio, Jr. 2005).

IT changes the learning process. It creates special conditions for the students. These conditions highlight the importance of students' IT skills and qualities that help them to be more proactive and to plan and monitor learning independently (Howland & Moore, 2002). Likewise, self-directed learning (SDL) and motivation have been reported as helpful for learning IT skills. Overall, a summary of the relevant literature leads to the conclusion that online learning demands from students a certain level of IT skills and self-efficacy, as well as an ability to learn IT simultaneously with the course content and to be self-directed in this process (McCoy, 2001; Rene, 2003; Van Loon, 2001). The summary also suggests interdependency between an individual's IT skills, self-efficacy, and self-directedness. However, existing research on the subject is somewhat contradictive, and the issue of the relationship between students IT competency and SDL ability needs further clarification.

This study focuses on continuing education professionals (further students) who participate in online master degree courses. It investigates the relationship between the students' level of SDL ability and IT competency. It also explores the motivation and learning strategies that the students use to learn IT for an online course.

Theoretical Framework

IT creates a learning situation different from traditional ("in-class") learning situation. Generally, in the case of an online course, the learning situation has two distinctive sides. One side includes formal instructions and course objectives that the students learn online. The second side includes IT that the students have to learn and utilize during the course.

This side involves lots of the independent learning and decision making about the learning process. It requires the students to be more independent in learning, and it generates circumstances that Knowles called “needs for learning” (p. 11), and Kolb described as participation in continuous progression of learning experiences (Knowles, 1975; Kolb, 1991). This study concentrates on the second side.

Synthesis of the relevant literature points out three components that could help to describe and analyze learning IT. They are students’ IT competency, SDL ability, and motivation and learning strategies.

IT competency can help to reflect and to assess the progress of learning IT for an online course. In his experiential learning theory, Kolb (1991) described competency (or adaptive competency) as a mechanism that “effectively matched task demand and personal skills” (p.93). He considered competency as the most specific and direct force that shapes learning. Based on this idea, Kolb offered an assessment of a job or educational task by adaptive competency. Ayersman et al. (1996), using the term ‘computer competency’ interchangeably with the term ‘computer literacy’, defined computer literacy as the minimum level of computer skills, which a student needs to learn with IT.

SDL is the second component, which seems to be involved in the learning IT for an online course. While learning IT, the students are responsible for planning, participating, and committing to this process. Equally, they can immediately benefit from learning, while utilizing IT for the course objectives. Candy (1991) characterized such learning as instructions with predominant learner control. He, as many other authors, believed that the SDL ability of the students largely determines the success of such learning, and that the learning further promotes this ability (Brockett & Hiemstra, 1991; Candy, 1991; Knowles, 1975).

The third component is comprised of the motivation and learning strategies implemented to learn IT. Motivation and learning strategies along with personal ability to learn independently are among the most important factors that influence how an individual views and approaches a particular learning task (Bolhuis, 2003; Candy, 1991). Howard (1989) noticed that learner’s motivation might be influenced by actual learning experiences or situations. Motivation and learning strategies are also related to and influenced by self-regulated learning or SDL (Pintrich, 1999). While learning and practicing IT for an online course, the students utilize specific motivation and strategies in order to succeed. An assessment of the students’ motivation and learning strategies could help to explore learning IT.

Overall, many factors influence learning IT for an online course. However, based on the variables discussed above, this process could be fairly described by using an open system approach. Dechant (1999) applied an open system approach for the investigation of the SDL process in the workplace and in the MBA program for continuing education professionals. A similar approach can also be applied for analysis of learning IT for an online course.

Usually, students learn IT for an online course independently with little or no formal instructions. At the beginning of the course, the students possess a certain level of IT competency and SDL ability. While learning IT, they participate in informal and formal learning experiences and utilize certain motivation and learning strategies. As a result, students could obtain a new level of IT competency and could improve their SDL ability (see Figure 1).

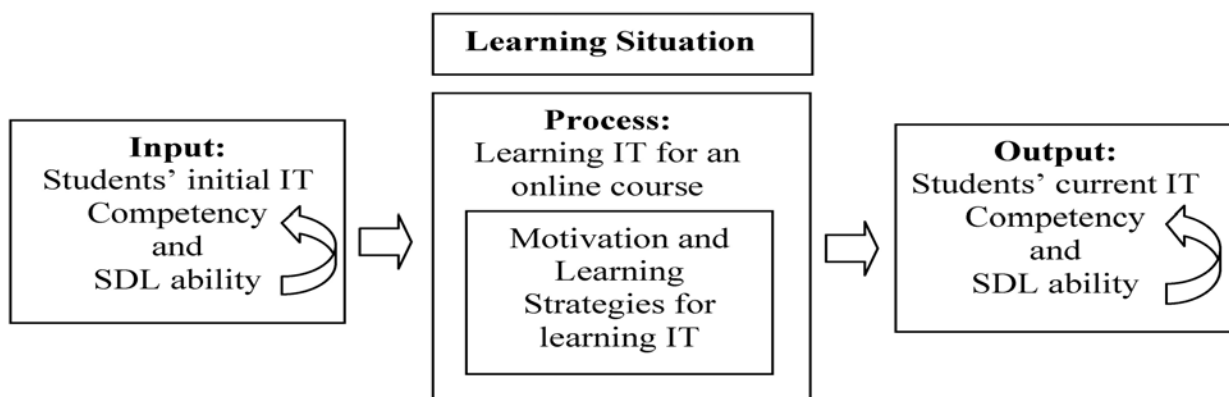


Figure1. *Process of Learning IT for an Online Course*

Purpose of the Study and Research Questions

The purpose of this study was to investigate the relationships between the students’ IT competency and their SDL ability, as well as motivation and learning strategies the students use to learn the technology for an online course. More specifically, this research intended to answer the following questions.

- Question 1: What is the degree and direction of the relationship between students’ level of SDL ability and their IT competency?

- Question 2: Are there any differences between students' IT competency at the beginning and the end of an online course?
- Question 3: Are there any differences between students' SDL ability at the beginning and the end of an online course?
- Question 4: What motivation and learning strategies do students employ to learn IT in an online course?

Research Methodology

The research utilized pre/post - test design to assess changes of the students' IT competency and SDL ability, and it involves self-reflected assessment of the students' SDL ability and motivation and learning strategies for learning IT.

Instruments for Data Collection

The following instruments were used in the study:

1. Oddi Continuing Learning Inventory, OCLI, for measuring students' SDL ability (Oddi, 1984);
2. Motivated Strategies for Learning Questionnaire, MSLQ, for measuring students' motivation and learning strategies (Pintrich et al., 1991);
3. Test of IT Competency for measuring students' IT knowledge and skills. The test is based on the O'Hanlon (2002) Internet Skills Proficiency Test.

Overall, the chosen instruments met the purpose and the requirements of this research. They are validated instruments that have been utilized in numerous studies. Additionally, the MSLQ and the IT Competency test were slightly adjusted to fit the purpose of this research.

The MLSQ instrument consists of separate modules that can be used independently (Pintrich et al., 1991). The particular modules of the instrument were chosen to satisfy the purpose of this study (Shinkareva, 2005). Additionally, the wording of some questions was slightly changed to accommodate the purpose of the research. In particular, the word "technology" was added to the questions to focus on the process of learning IT. Content validation was provided by a panel of two experts who are involved in developing and teaching online courses at the university level. The panel concluded that the changes did not affect the meaning of the chosen modules of the instrument.

IT Competency Test is a version of the Internet Skills Proficiency Test (O'Hanlon, 2002). The IT Competency Test takes into account an integrated approach to the IT competency requirements (Eisenberg & Johnson, 2002). It consists of multiple-choice questions designed to measure entry level of computing and information competency required for online learning. It includes 38 validated items of the original instrument and 11 additional questions developed for this research. The additional questions reflect basic knowledge of computer hardware and software and basic concepts of IT that are absent in the original instrument. The panel of two experts, who are actively involved in developing and teaching online learning courses at a major university, and a group of graduate students, who have extensive successful experiences with online learning, provided validation of content and level of difficulty of the additional questions. The panel concluded that the questions are valid, and that they have an acceptable level of difficulty (mastery level of additional questions is 80%). In addition to the described above instruments, thirteen questions were developed in order to assess the participants' demographic characteristics (Shinkareva, 2005).

All the instruments were tested during a pilot test. A group of graduate students with instructional technology experiences completed the questions and provided feedback on the instruments. The test confirmed that the questions and the instructions of the instruments were understandable. It is also confirmed that the online versions of the instruments were easy to access, complete, and submit, and that they are secure and reliable.

Data Collection

Data were collected three times during the semester for the each of the chosen courses. First, at the beginning of the semester, the students' SDL ability, IT competency, and demographic characteristics were assessed using OCLI, IT Competency Test, and demographic questionnaire. Then, during the second half of the semester, the participants completed the MSLQ questionnaire to identify motivation and learning strategies utilized for learning IT. Finally, at the end of the semester, Test of IT Competency and OCLI instruments were administered one more time to assess the students' progress with mastering IT competency and SDL ability.

Population and Sample

This research concentrates on the working professionals who decide to advance or change their career through online master degree programs. The target population comprises of adult students who continue their education through online programs of a large Midwest university. This university is among leaders in the Internet-based distance education (The Institute for Higher Education Policy, 2000). It has extensive experiences with online education and offers advanced online programs. Working professionals from different businesses and government organizations as well as from different states participate in the university online programs.

The research utilized a pre-selected sampling procedure (Schonlau, Fricker, & Elliott, 2002). To meet the conditions of the study, yield legitimate findings, and to minimize the number of the factors that could influence validity, certain criteria were employed to insure similarity of the courses in terms of structure, technology used, and students' characteristics.

As a result of the sampling procedure, thirteen online programs of the university that satisfied requirements of the research were solicited for the study. Among them, five programs agreed to participate and to give access to their students. All students of these programs, who were registered for credit online courses for the first time and who were working adults, were solicited for the study. The sample comprised of 199 students from online master's degree programs. Response rate was 73.6%. Among the respondents 28.6% (n= 57) of the participants have already completed all the questionnaires. The findings presented below are mainly based on the data collected from these participants. Data collection is ongoing with the other participants.

Data Analysis

To test the research questions, this study utilized the following analyses: descriptive statistics; paired t-test, for assessing mean differences between students' IT competency at the beginning and the end of the online course and their SDL ability accordingly; as well as correlation analysis, for assessing the degree and the direction of the relationships between variables of interest. For analysis of motivation and learning strategies that the students employ for learning IT, two common factor analyses were considered. They are principal component analysis (PCA) and exploratory factor analysis (EFA). Results included in this report are based on PCA (Fabrigar et al., 1999). The level of significance equal to 0.05 was assumed for all the analyses (Glass & Hopkins, 1996).

Limitations of the Study

One limitation of this study is the sampling procedure. The sample was drawn from one university. It would be beneficial for generalization of the results, if the sample were drawn from different higher educational institutions, as well as if the sample size were larger. Additionally, extension of the study with a longitudinal component, such as assessing the students' learning of IT during one or two years instead one semester, could help to clarify more the relationship between students' SDL ability and IT competency.

Results and Findings

The following findings are based on the data collected from 57 respondents, who finished all the phases of the data collection.

The Participants' Demographic Characteristics

Among those who already responded to the questionnaires, 29.6% were male and 70.4% were female; 42.7% were between 21-30, 41.9% were between 31-45, 12.95% were between 46-55 years old, and 2.4% were 56 or older; 68% have bachelor's, 24% master's, 4.8% doctoral degrees; 90.4% are currently employed and 9.6% were employed and currently are searching for a job. Majority of the participants, 61.6%, indicated that they have decided to take online programs to advance their career, 27.2% to change career path, and 6.4% for personal interest, while for 4.8% it was required by their current job.

The participants were also asked to rate from 1 to 3 the reasons for choosing online mode of learning. 83.6% gave the highest rating, 3, to the convenience of online learning, including ability to continue work while studying. 66.1% rated as 3 the ability to choose a program of interest and an educational institution, and 79.9% rated as 3 or 2 an interest in instructional technology, such as to learn new technology and skills and to become more comfortable in an online environment.

Research Questions 2 and 3 (Differences in IT competency and in SDL ability)

Pair t-test showed no significant differences between IT competency of the students at the beginning and the end of an online course ($t = -1.16$, $p = .25$). Likewise, it showed no significant difference between the students' SDL abilities at the beginning and the end of the course ($t = -.86$, $p = .39$).

Research Question 1 (The relationship between students' level of SDL ability and their IT competency)

The analysis of the relationship between IT competency and SDL ability (OCLI score) identified two groups of the respondents. For the group with OCLI score above the average ($\mu = 122.8$, $\sigma = 15.9$), the analysis shows a considerable positive correlation between this score and IT competency ($r = 0.395$). However, for the group with OCLI score lower than average, correlation is negative and insignificant ($r = -0.01$) (see Figure 2). Average scores of IT Competency Test for the groups are $\mu = 68.9$, $\sigma = 12.2$ ($\mu_{\text{OCLI}} \leq 122.8$) and $\mu = 67.6$, $\sigma = 9.6$ ($\mu_{\text{OCLI}} > 122.8$).

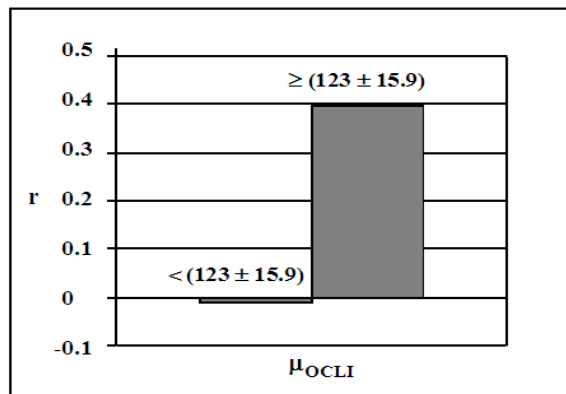


Figure 2. Relationship between IT Competency and OCLI Score

Research Question 4. (Motivation and learning strategies students employ to learn IT)

The analysis indicated that overall PCA is applicable to the sample, (the sampling adequacy KMO=0.79 and Bartlett's Test $\chi^2=271.88$, $p=0.00$) as well as to the participants with $\mu_{OCLI}>122.8$ (KMO=0.69 and Bartlett's Test $\chi^2=157.17$, $p=0.00$).

For the all respondents PCA revealed three components that explain at least 74.3% of all the variances. Very similar result was obtained for the respondents with $\mu_{OCLI}>122.8$ i.e. three components explained at least 73.1% of all the variances. The tables of communalities for the both groups indicated that the factor model was working well, or may be interpreted as a reliable for the most of the variables (h^2 varies from 0.51 to 0.86). The number of the items (variables) to consider was chosen based on 0.65 cut off criteria.

Table 1. Major Components Important for Learning IT (after rotation)

Motivation and learning	Sample, all			Sample, $\mu_{OCLI} > 122.8$		
	Components (loadings)			Components (loadings)		
	1	2	3	1	2	3
Control L Beliefs	.839	.035	.177	.834	.252	-.010
Self Efficacy LP	.729	.127	.343	.805	.179	-.147
Task Value	.864	-.076	.169	.800	.310	.004
Intrinsic Goal Orientation	.665	.438	.268	.688	.238	.370
Elaboration	.461	.311	.606	.610	.363	.039
TS Environment	.169	.296	.790	.243	.802	.075
Metacognitive SR	.492	.373	.587	.431	.771	.089
Effort Regulation	.115	-.285	.744	.103	.717	-.401
Critical Thinking	.547	.458	.545	.437	.682	.344
Peer Learning	.092	.866	.266	.102	.136	.910
Help Seeking	-.348	.793	.008	-.314	-.103	.817
Rehearsal	.565	.725	.081	.551	-.006	.718

The analysis identified three components important for learning IT. The major component accounted for the sample – 30.6% and for the ($\mu_{OCLI} > 122.8$) – 30.7%. This component indicated that among total variance explained, variables that reflect motivation to learn IT play a central role for the both groups. The second component accounted for the sample – 22.8% and for the ($\mu_{OCLI} > 122.8$) – 21.9%. The third component accounted for the sample – 20.9% and for the ($\mu_{OCLI} > 122.8$) – 20.5% of total variance accordingly. Components 2 and 3 indicated for the both groups resource management and rehearsal strategies as considerable for learning IT. Additionally, for the respondents with

($\mu_{OCL1} > 122.8$) component 2 indicated variables that reflect metacognitive and cognitive strategies as important for learning IT. Table 1 shows the major components identified and the variables that contribute to these components.

Conclusions and Discussion

Relationship between Students' Level of SDL Ability and Their IT Competency

Many researchers agree that online mode of learning demands from the students to be more independent and self-directed in learning. Some of them also agree that one of the reasons for these qualities is utilization of IT (Chen, 2002). Existing research shows moderate to strong positive correlation between students' self-directedness and their technology self-efficacy, knowledge or skills (McCoy, 2001; Rene, 2003; Van Loon, 2001). However, the evaluation procedure of many studies is based on self-reflected assessment and one-time measures. This study utilized a thorough procedure to evaluate such relationship by assessing variables of interest twice, at the beginning and at the end of the online course, and by supporting this assessment with analysis of motivation and learning strategies the students use during online course. This approach enhanced the quality of data collection and allowed to clarify issues of the relationship between learning IT for an online course and SDL further.

First, the results show that a majority of the participants had positive attitude and interest in learning IT for an online course. Yet, overall, there is no positive relationship between the students' SDL ability and their IT competency. Instead, the research accounted for two distinguished groups of the respondents, depending on their level of SDL ability. For those students, who have SDL ability below the average, the results show no correlation between SDL and IT competency. However, for the students, who have SDL ability above the average, the results show considerable positive correlation between their SDL ability and level of IT competency (see Figure 2). Additionally, the latter group of the students utilized high-level strategies to learn IT. The results also show that there was no significant improvement in IT competency after completion of an online course for the both groups of the students. The same result was obtained for these groups on their average SDL ability score.

Overall, the findings suggest that expected benefits from SDL ability played a considerable role in learning IT only for the students, who have already possessed relatively high level of this ability. As far as the enhancement of IT competency of the students due to their level of self-directedness or online mode of learning, the timeframe of the one online course seems to be not enough for such improvement.

Motivation and Learning Strategies for Learning IT in an Online Course

Previous research on SDL that utilized MSLQ instrument reported different strategies that influence learners' success. At this point, Chen (2002) suggested that for different subjects of study the effective learning strategies might be different. This research is somewhat consistent with Chen (2002). It points out that the variation of the strategies applied for learning IT for different subjects of study depends on the students' level of self-directedness. To some extent, this research also confirmed the influence of the above average level of self-directedness on the strategies applied for learning IT.

The findings identified motivation and strategies that seem to be common for learning IT. Overall, the analysis suggests that, regardless of the students' level of self-directedness, motivation could play a substantial role and could be the major factor in learning IT for an online course. The results of the study accounted for the task value, intrinsic goal orientation, control of learning beliefs, and self-efficacy for learning (expectancy) as the major component of the factors that are significant for learning IT. Additionally, resource management strategies i.e. peer-learning and help seeking (that could be identified as social learning strategies) and rehearsal seem to be frequently utilized by all the students for learning IT.

However, for the second and third components of the factors, which could dominate in learning, the analysis accounted for the different strategies, for the students with above average of self-directedness and for all the students (Table 1). Students with SDL above average seem to utilize intensively cognitive and metacognitive strategies, including critical thinking, effort and metacognitive self-regulation, as well as time and study environment strategies. While, for all students only effort regulation and time and study environment strategies are accounted as the third component of the factors. These results are consistent with Howland and Moore's (2002) proposition that, for adult students, successful strategies for online learning in higher education settings should take into the account their SDL abilities such as self-management, monitoring, and assessment of the learning process.

Generally, these findings could contribute to the design of online instructions that will take into consideration differences in the students' SDL ability and IT competency. Such instructions will support the students in developing and applying effective learning strategies in order to be successful with IT and to improve their SDL ability. The findings could also help to create awareness among instructors and students of online courses about the role of IT and SDL in online learning. In other words, findings of this study could help the students to reflect on learning preferences, to evaluate learning strengths and weaknesses, to encourage usage of effective learning strategies, and to be adoptive and flexible in learning, or, according to Berings, Poell, and Simons (2005), to increase awareness about their learning capabilities.

Implications for the HRD Field

Technology has become significant for HRD activities at many levels (Benson, Johnson, & Kuchinke, 2002). In the area of training and education, HRD is challenged to provide effective online learning (or e-learning) under the conditions when the role of IT increases continuously, when the market routinely offers new, advanced technology, and when some of the training and learning activities could be outsourced through higher educational institutions (Daley & Jeris, 2004). Similarly, growing numbers of working professionals "...are increasingly being challenged to assume more responsibilities for their own learning and development." (Ellinger, 2004, p.158). Given these conditions, it is hard for HRD professionals to overestimate the importance of IT and SDL in online training and learning, as well as the importance of helping the learners to develop effective strategies for learning and utilizing IT.

This study could help HRD professionals with the issues involved in learning IT and the role of SDL in this process. Likewise, it could help developing training programs that will target learning skills necessary to keep up and be successful with ongoing technological changes in an organization. While designing or choosing online training or learning activities, HRD professionals should take into the consideration inexplicit requirements to learn IT for the instructions and provide the best of the possible conditions that accommodate learning of the technology and promote SDL.

References

- Allen, I. E., & Seaman, J. (2004). Entering the Mainstream: The quality and extent of online education in the United States, 2002, 2004. *The Sloan Consortium*. Needham, MA: SCOPE.
- ASTD & MESIE Center (2001). E-learning: If we build it, will they come? *Report* Alexandria, VA: ASTD.
- Ayersman, D. J., Ackerman, E., & Zisman, P. (1996). Creating a computer competency requirement for Mary, Washington College students. In D. Larson et al (Ed). *Association of Small Computer Users in Education 29 th Summer Conference Proceedings* (pp.140-147). North Myrtle Beach, SC: Association of Small Computer Users in Education.
- Benson, A. D., Johnson, S. D., & Kuchinke, K. P. (2002). The use of technology in digital workplace: A framework for human resource development. *Advances in Developing Human Resources*, 4(4), 393-404.
- Berings, G. M. C., Poell, R. F., & Simons P. R-J. (2005). Conceptualizing on –the job learning styles. *Human Resource Development Review* 4(4), 373-395.
- Bolhuis, S. (2003). Toward process-oriented teaching for self-directed lifelong learning: A multidimensional perspectives. *Learning and Instruction* 13(3), 327-347.
- Brockett, R. G., & Hiemstra, R. (1991). *Self-Direction in Adult Learning: Perspectives on Theory, Research, and Practice*. London and New York: Routledge.
- Candy, P. C. (1991). *Self-direction for lifelong learning: A comprehensive guide to theory and practice*. San-Francisco: Jossey-Bass Inc.
- Chen, C. S. (2002). Self-regulated learning strategies and achievement in an introduction to information systems course. Information technology. *Learning and Performance Journal*, 20(1) 11-25.
- Daley, B. J., & Jeris, L. (Eds.) (2004). Boundary spanning: Expanding frames of reference for human resource development and continuing education. *Advances in Developing Human Resources*, 6(1).
- Dechant, K. (1999). How managers learn in the knowledge era. *Advances in Developing Human Resource*, 3, 42-51. Williamsburg, VA:
- Dringus, L., P., & Terrell, S. (1999). The framework for directed online learning environment. *The Internet and Higher Education*, 2(1), 55-67.
- Ellinger, A. D. (2004). The concept of self-directed learning and its implications for human resource development. *Advances in Developing Human Resources*, 6(2), 158-177.
- Eisenberg, M. B., & Johnson, D. (2002). *Learning and Teaching Information Technology--Computer Skills in Context*. ERIC Digest. Syracuse: NY Clearinghouse on Information and Technology. Retrieved October 13, 2003 from http://www.ericfacility.net/databases/ERIC_Digests.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4, 272-299.
- Glass, G. V., & Hopkins, K. D. (1995). *Statistical method in education and psychology*. Needham Heights, MA: Allyn & Bacon.
- Herrmann, A., Fox, R., & Boyd, A. (2000). Unintended effects in using learning technology. *New Direction for Adult and Continuing Education*, 88, 38-48.
- Howard, K. W. (1989). A comprehensive expectancy motivation model: Implications for adult education and training. *Adult Education Quarterly*, 39(4), 199-210.

- Howland, J. L., & Moore, J. L. (2002). Students' perceptions as distance learners in Internet-based courses. *Distance Education, 23*(2), 183-195.
- Johnson, S. D., Palma-Rivas, N., Suriya, C., & Downey, S. (2000). Examination of critical issues of development and implementation of online instructions In P. Kuchinke (Ed.), *Proceedings of the Academy for Human Resource Development* (pp. 434-442). Baton Rouge, LA: Academy for Human Resource Development.
- Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Englewood Cliffs, NJ: Prentice Hall.
- Kolb, D. A. (1991). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs NJ: Prentice-Hall Inc.
- Larson, D., Dutt-Doner, K. M., & Broyles, I. (2002) Don't Ask; Don't Tell: A flawed approach to technology standards in higher education. *Journal of Information Technology for Teacher Education, 11*(2), 123 -141.
- Lea, L., Clayton, M., Draude, B., & Barlow, S. (2001). The impact of technology on teaching and learning. *Educause Quarterly, 2*, 69-71.
- McCoy, C.W. (2001). *The relationship of self-directed learning, technological self-efficacy, and satisfaction of adult learners in a digital learning environment*. (Doctoral dissertation, University of Michigan). Ann Arbor, MI: Bell & Howell Information and Learning Company.
- McGorry, S. Y. (2003). Measuring quality in online programs. *The Internet and Higher Education, 6*(2). 159-177.
- Mungania, P., & Reio Jr., T., G. (2005). If E-learners get there, will they stay? The role of e-learning self-efficacy. In M. L. Morris and F. M. Nafukho (Eds.), *Proceedings AHRD 2005 Conference* (pp. 1110-1117). Estes Park CO: Academy of Human Resource Development.
- Rene, C. J. (2003). Online technology self-efficacy, self-directed learning readiness, and locus of control of learners in a graduate -level web-based distance education program. *Digital Dissertations International* (UMI No. AAT 3094002), Ann Arbor, MI: Bell & Howell Information and Learning Co.
- O'Hanlon, N. (2002). Net knowledge: performance of new college students on an Internet skills proficiency test. *The Internet and Higher Education 5*, 55-66.
- Oddi, L. F. (1984). *Development of an Instrument to Measure Self-Directed Continuing Learning*. Unpublished Dissertation Abstract. Decalb, IL: Northern Illinois University.
- Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*(6), 549-470.
- Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie W. J. (1991). *A Manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. Ann Arbor MI: National Center for Research to Improve Postsecondary Teaching and Learning.
- Shinkareva O. N. (2005). *Instructional technology and self - directed learning: An analysis of the relationship between online students' SDL ability and IT competency*. Unpublished proposal of doctoral dissertation, University of Illinois Urbana.
- Schonlau, M., Fricker, R.D., & Elliott, M.N. (2002). *Conducting research surveys via e-mail and the Web*. Santa Monica, CA: Rand.
- Tabb, E. D. (2003). *Distance education at degree-granting postsecondary institutions: 2000-2001*. National Center for Education Statistics, Washington DC: U.S. Department of Education.
- The Institute for Higher Education Policy (2000). *Quality on the line: Benchmarks for success in internet-based distance education*. Washington DC: The Institute for Higher Education Policy.
- Van Loon, W. O. (2001). *Correlates of computer literacy among adult learners*. Digital Dissertations, Ann Arbor, MI: Bell & Howell Information and Learning Company.
- Waxman, H. C., Lee, M. F., & Michko, G. M. (2003). *A meta- analysis of teaching and learning with technology on student outcomes*. Naperville, IL: Learning Point Ass. Retrieved January 23, 2005, from <http://www.learningpt.org>
- Weston, C., Gandell, T., McAlpine, L., & Finkelstein, A. (1999). Designing instruction for the context of online learning. *The Internet and Higher Education, 2*(1), 35-44.