Exploratory Study of the Relationship between Self-Directed Learning and Academic Performance in a Web-Based Learning Environment

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Abstract

Through literature review, this paper examines six empirical studies. Three cases are from the United States and the other three are from studies conducted in Asian. The purpose of this study is to identify whether or not self-directed learning is a key factor leading to successful academic performance in web-based learning environments. The in-depth analysis and discussion of each study finds that the effect of self-directed learning on academic success in web-based environments is divergent among six case studies. Follow-up studies should exclude potential problems identified in this paper.

Introduction

The concept of self-directed learning originated in the field of adult education (Roberson, 2005). In the literature, closely related terms include independent learning, self-planned learning, autonomous learning, self-education, and so forth (Hiemstra, 1996). Due to the benefits for learning outcomes, school environments and corporate settings strongly emphasize the importance of self-directed learning, including its value as a required skill needed for work in the 21st century (Murane & Levy, 1996). Likewise, one of the most important tasks for teachers is to enhance students' abilities for accessing self-directed learning (Taylor, 1995).

From adult education experts' perspectives, self-directed learning contains three dimensions: motivation, metacognition, and self-regulation (Long, 2000). Learners with high levels of self-directed learning are active learners who have strong desires for learning, make use of problem-solving skills, have the capacity to engage in independent learning activities, and autonomously mange their own learning (Knowles, 1975; Brockett & Hiemstra, 1991; Candy, 1991; Merriam & Caffarella, 1991; Guglielmino & Guglelmino, 1991; Gibbons, 2002).

In the literature, self-directed learning had been used as a correlation for students' academic performance and even as a perfect indicator of predicting academic success in traditional learning settings or non-web-based distance learning (Long, 1991). In this case, Darmayanti (1994) found a positive relationship

between self-directed learning and academic success in the traditional classroom setting. A recent study also showed self-directed learning is a strong factor for predicting learners' academic achievement in non-web-based distance learning (Hsu & Shiue, 2005).

Today, due to the emergence of convenient, high-speed Internet technologies, people who choose on-line learning as their primary learning method is extremely popular. In formal school settings, the number of students enrolling in online courses reflects the phenomenon of online learning. For example, according to Penn State World Campus, at the end of the 2006 academic year, more than 5500 students had enrolled in online courses. That enrollment is 31 percent higher than the pervious year (Penn State World Campus, 2007).

With the growing trend toward on-line learning, the concept of self-directed learning has received widespread attention again. For this reason, in the book "147 Practical Tips For Teaching On-line Groups: Essentials of Web-based Education," Hanna et al. (2000) believed self-directed learning is a key factor to successful on-line learning. Similarly, Guglielmino and Guglielmino (2003a) contended that although the students' technical skills are important for e-earning, self-direction is even more vital in the successful e-learning environment.

Although on-line learning is categorized according to one of the delivery methods of distance education, the features of on-line learning are extremely different from traditional commercial television broadcast or telecommunication courses. Therefore, this paper examines six empirical case studies concerning self-directed learning in a web-based environment. Three cases are from Asia; the other three occurred in the United States. Only one of the cases is not from a school setting. The purpose of the study is to identify whether or not self-directed learning is a key factor leading to successful academic performance in web-based learning environments.

Related Literature Review

Characteristics of a Self-directed Learner

The literature described the characteristics of a self-directed learner as many and varied; several characteristics interrelated. The following summarizes the general aspects that appear in the literature (Knowles, 1975; Brockett & Hiemstra, 1991; Candy, 1991; Merriam & Caffarella, 1991; Guglielmino & Guglelmino, 1991; Gibbons, 2002):

1. Independence. Self-directed learners are fully responsible people who can independently analyze, plan, execute, and evaluate their own learning activities.
2. Self-management. Self-directed learners can identify what they need during the learning process, set individualized learning goals, control their own time and effort for learning, and arrange feedbacks for their work.
3. Desire for learning. For the purpose of knowledge acquisition, self-directed learners' motivations for learning are extremely strong.
4. Problem-solving. In order to achieve the best learning outcomes, self-directed learners make use of existing learning resources and feasible learning strategies to overcome the difficulties which occur in the learning process.

The four characteristics discussed above seem to construct a concept which separates self-directed learners from others because self-directed learners will autonomously control their own learning. Despite the autonomous nature of self-directed learners, they need to interact with peers and fellow learners in order to exchange valuable information (Brookfield, 1985).

Self-directed Learning and Academic Performance

In order to fully understand related empirical studies regarding the effect of self-directed learning on academic performance, Table 1 summarizes the literature's findings that occurred in traditional classroom settings and non-web-based contexts.

Table 1 Related Empirical Studies

Selected Study	Subject	Findings
Savoie (1980)	Nursing students	Positive relationship between self-directed learning and course grade
Harriman (1990)	Distance education students	Self-directed learning related to achievement
Anderson (1993)	Social and political science students	Self-directed learning related to academic performance
Darmayanti (1994)	Distance education students	Positive correlation between self-directed learning and GPA
Morris (1995)	Business students	Predicting academic success by self-directed learning
Horng (1995)	Distance education students	Positive relationship between self-directed learning and course grade
Ogazon (1995)	Business, communication, public administration, and hospitality management students	Self-directed learning is one of the key factors leading to academic success
Haggerty (2000)	Biology students	Positive relationship between self-directed learning and achievement
Hsu & Shiue (2005)	Distance education students	Predicting academic success by self-directed learning
Stewart (2007)	Engineering students	Self-directed learning related to learning outcome

From Table 1, the finding results between self-directed learning and academic performance in different disciplines remain unchanged from the past to the present. If this concept can be applied to on-line environments, on-line learning administrators must be able to use instructional strategies and activities to enhance student's self-directed learning and further, successful on-line learning outcomes can be expected. Indeed, Long (2003) suggested that on-line course facilitators should use diagnostic instruments such as SDLRS (discussed later) to identify learners' abilities for self-directed learning and then should implement appropriate instructional strategies.

Methodology

Case Selection

This research gathered empirical studies from different databases, including ERIC, ProQuest Dissertation & Thesis (International), Professional Development Collection (Education), and Wilson Educational Abstract. Searching the terms "self-directing learning," "online," "academic," "performance," and "success" in combination revealed fewer than 30 articles. However, excluding the studies not related to the academic success or performance in asynchronous web-based environments and not having specific scales for measuring self-directed learning, left only three studies remaining. In order to expand case selection and allow comparison of western studies with studies elsewhere, three other cases from Taiwan arose from the Thesis & Dissertation Database.

Instruments for Measuring Self-directed Learning

The five quantitative approach case studies discussed in this paper all use the same instrument (i.e. SDLRS) to measure students' self-directed learning. Only one case used another instrument (i.e. OCLI).

One of the instruments used for measuring self-directed learning, Self-Directed Learning Readiness Scale (SDLRS), is developed by Dr. Guglielmino in her doctoral dissertation. The SDLRS uses a 58-item 5-point Likert scale. Through factor analysis, the scale includes eight factors: openness to learning opportunities, self-concept as an effective learner, initiative and independence in learning, informed acceptance of responsibility for one's own learning, love of learning, creativity, positive orientation to the future, and ability to use basic study skills and problem-solving skills. Higher scores occurring from using the scale represent higher readiness for self-directed learning (Guglielmino, 1977).

Since development of the scale by Guglielmino, a number of studies have supported its reliability and validity (Guglielmino, 1989). According to Guglielmino and Guglielmino (2003b), "This instrument has consistently demonstrated strong reliability and validity in identifying those who are ready for self-directed learning in its 26-year history"(p.5). However, a recent study conducted by Hoban et al. (2005) conflicts with this statement. They found that SDLRS can not truly assess medical students' self-directed learning. They further explained that other methods for exploring self-directed learning should be considered.

In this paper, three cases from Asia use the Chinese edition of SDLRS. Dr. Deng from Taiwan is the first expert to translate the SDLRS into a Chinese edition. Through numerous subsequent studies, the Chinese edition of SDLRS supports the reliability and validity just as the western studies did (Deng, 1995).

The other instrument for assessing self-directed learning, developed by Dr. Oddi in her doctoral dissertation, is Oddi Continuing Learning Inventory (OCLI). The OCLI is a 24-item 7-point Likert scale and contains three domains established by factor analysis: proactive/reactive learning drive, cognitive openness/defensiveness, and commitment/aversion to learning. Higher scores in the scale indicate having greater characteristics of a self-directed continuing learner. In this scale, the reliability coefficient also achieves a higher level (more than 0.8) (Oddi, 1984, 1986). However, factor analysis conducted by a recent study suggested that Oddi's three domains should be extended to four domains. The new four factors they created are: learning with others, learner motivation/self-efficacy/autonomy, ability to be self-regulating, and reading avidity (Harvey et al., 2006).

Case Analysis

Case 1 (A Mid-western University in the US)

In order to investigate the factors correlated with academic performance in a web-based learning environment, Pachnowski and Jurczyk (2000) employed the SDLRS to explore learners' attitudes and readiness for self-directed learning. In this study, the academic performance, defined as a final course grade, consisted of students' technical skills and attitudes/habits according to the course instructor's standards (The course name and content was not reported). As for the SDLRS, the instrument, transformed into digital format, was e-mailed to all on-line learners during the online course, however, only 17 students returned their completed SDLRS.

The result of the study showed no significant relationship between self-directed learning and academic success. In other words, highly self-directed learners would not obtain higher scores in the web-based class. Obviously, in this study, the self-directed learning could not be an indicator predicting a learner's success in the web-based class.

By carefully examining this study, one questionable situation emerged. The number of participants for the study is insufficient to an extreme degree – only 17 learners responded the measurement. Whether or not the small number of subjects affected the study's result needs further exploration.

Case 2 (A Western College in the US)

One of the purposes of Doherty's (2000) study was to find the existence of a relationship between self-directed learning and academic performance as defined by a final course grade. The study subjects were the college students who enrolled in on-line courses delivered by a web learning platform called WashingtonONLINE. After distributing SDLRS to all on-line learners via e-mail, Doherty only collected 147 valid questionnaires (the course name and content was not reported).

The result of the study showed that self-directed learning did not relate to academic performance. In this case, according to Doherty, the final course grades of sample subjects were positively skewed. The reason is unknown.

A notable point is that Doherty attributed the failure between self-directed learning and academic performance to the lack of reliability and validity of the SDLRS among the subject population.

Case 3 (A Southern University in the US)

In Corbeil's (2003) study, the instrument for measuring student's self-directed learning is the OCLI. The subjects, 191 graduate-level online learners, participated in this semester-long study, however, only 98 students submitted the end-of-course surveys. In this study, the academic performance measure was the final grade for the course (the course name and content was not reported).

The result of the study showed a significantly positive relationship existed between self-directed learning and academic performance (r=0.51; p<0.01). In addition, subsequent regression analysis also showed that self-directed learning is one of the key indicators for predicting online academic performance (R2=0.55; p<0.01).

In this study, the statistical data confirmed a strong relationship between self-directed learning and on-line academic performance. However, if the researcher had chosen the SDLRS as the measurement rather than the OCLI, the result may have differed. Further in-depth studies should explore this possibility.

Case 4 (A College in the Northern part of Taiwan)

In Chou's (2003) study, 38 students, who majored in electronic engineering, enrolled in an interactive programming course. The course was evenly divided into two parts. The first part was an eight-week online class in the web-based training system, focusing on coding structure. The second part was eight-week face-to-face class in which students employed what they learned in the online class into practice.

Before the online class, the SDLRS was distributed to the learners. Fortunately, all 38 students returned valid surveys. In this study, the academic performance measure was the score from a test administered during the final class of the first-part of the course. After the online class, learners' web behaviors, recorded in the web-based system, SDLRS, and academic performance were analyzed.

The result of the study showed that no significant relationship between self-directed learning and scores activated on the test. Besides, a significant relationship did not appear for self-directed learning and students' web behaviors. For instance, highly self-directed learners would seldom engage in online discussions (the instructor would post course-related questions on the discussion board). Thus, in this

study, the score for self-directed learning would not correspond to the scores for academic performance.

From Chou's study, the questionable point is the same as for Case 1. The sample size is very small. Whether or not a sufficient sample size would change the result of the study is unknown. Further, Chou attributed the failure between self-directed learning and academic performance to students' learning style not suited to web-based learning environment and the quality of online learning materials.

Case 5 (A University in the Southern part of Taiwan)

In Chung's (2001) study, the scope was larger than that of the four earlier cases. Three web-based courses, introduction to information technology, multimedia design, and programming, were investigated. A total of 177 subjects participated in this 3-month study.

In the final week of the three courses, the SDLRS was e-mailed to all students and117 valid surveys were returned. In this study, the academic performance measure was the cumulative score for the course, consisting of assignment scores and final test scores.

The result of the study is similar to Case 2. A significantly positive relationship appeared between self-directed learning and academic performance ($r=0.21$; $p<0.05$). In other words, highly self-directed learners could be expected to perform well in the final course score; less self-direction produced lower expectation.

This study seems to confirm the effect of self-directed learning. However, the confounding factor is that the correction coefficient is below 0.5 and further ANOVA analysis or regression analysis was not executed. Therefore, whether or not self-directed learning is a good indicator for predicting successful web-learning remains uncertain.

Case 6 (A Company in the Southern part of Taiwan)

Compared to the above five cases, Tsai's (2005) study was conducted in a corporate setting. In this study, more than 400 employees in a power plant participated in business e-learning. Due to company policy, the learning performance of participants in the web-based environment could not be obtained and the course content was not reported. Instead, the researcher for this corporate study employed the "learner self-report learning performance scale" to substitute for traditional academic performance measure. Through a pilot study, the scale reached high reliability and validity. After the e-learning class, the SDLRS and a learner self-report learning performance scale were distributed to all learners. Learners responded with 401 valid surveys.

The result of the study showed a significantly positive relationship between self-directed learning and learning performance ($r=0.56$; $p<0.05$). In other words, highly self-directed learners perceived that they would do well in learning performance; lower level learners had lower expectations.

However, in this study, the questionable point is that learning performance is self-reported rather than assessed by the course instructor. Thus, what might happen to the results of data analysis if formal, traditional learning performance measures of each learner were obtained is well worth contemplating.

Discussion

Based on related literature reviewed earlier, self-directed learning and academic success will positively correlate. Among six cases mentioned above, however, strictly speaking, only Case 3 shows the positive relationship. The potential major problems that can explain this phenomenon appear in Table 2.

Table 2 Potential Major Problems Among Six Case Studies

Potential problems	Explanation
Reliability on Academic Performance	Perhaps the test can not test students' full understanding. For example, some test format easily confused learners.
Students' learning style	Although students engage in the online learning, their learning style will not suited to web-based learning environments.
Time for distributing the SDLRS or OCLI	In some cases, the researchers distributed the scale before the on-line course. Perhaps those identified earlier as low self-directed learner will be motivated by web-based learning contents and then perform well on the academic test.
Quality of on-line learning materials	Perhaps high self-directed students will be demotivated by low quality of on-line learning materials and perform poorly in the academic performance.
Sample subjects	Scores on self-directed learning will be skewed. For instance, most people are identified as highly self-directed learners.
Learner's educational background	Those students who are familiar with on-line learning and have good computer skills will perform well in academic performance. Follow-up studies need to exclude this factor.
Prior knowledge for content	Perhaps low self-directed learners with some prior knowledge about course content will perform well on the academic test. Follow-up studies need to exclude this factor.
Measurement of self-directed learning	In Case 3, the researcher used different kinds of scales to measure learners' self-directed learning. If the researcher chooses SDLRS, the result may be different.
Sample Size	Since the subjects volunteered in the studies, the researchers need to increase the response rates for the scale.

Future researchers can not only conduct similar studies from perspectives discussed in the Table 2, but also can adopt three approaches for in-depth analysis of the effect of self-directed learning:

1. New measurement for self-directed learning. In addition to the two measurements described earlier, a scale called Bartlett-Kotrlik Inventory of Self Learning has been newly developed. This measurement is a 49-item 7-point Likert scale and contains 11 factors. According to the developers, social and environment variables, which are not included in SDLRS or OCLI, were added to the scale. The developers also reported the measurement had high estimates for internal consistency (Bartlett & Kotrlik, 1999). Therefore, future studies can employ this new scale to see if differences appear between the scales.
2. Qualitative Research. In order to obtain in-depth understanding of self-directed learning on academic performance, qualitative research should be employed. Until now, few articles use qualitative approach to investigate on-line learners. One related article, conducted by Howland and Moore (2002), explored learners' successful experiences in online courses via open-end

survey questions. The finding showed that self-directed learning is an important attribute for a successful learning experience. Thus, future studies can adopt the same research model but use interview methods to examine those who perform well as measured by the final course score.

3. Meta-analysis: Until now, quantitative studies regarding the effect of self-directed learning on academic performance in a web-based context are sparse. Once the relevant studies accumulate to a certain level, meta-analysis can explore the findings via statistical methods.

Conclusions and Implications

In theory, a reasonable link exists between self-directed learning and academic success. Whether the learning environment is a traditional classroom or older style distance learning (e.g. telecommunication and TV program), numerous studies support the theoretical statement (Savoie, 1980; Harriman, 1990; Anderson, 1993; Darmayanti, 1994; Morris, 1995; Horng, 1995; Ogazon, 1995; Haggerty, 1995; Hsu & Shiue, 2005; Stewart, 2007). However, from six quantitative studies regarding the relationship between self-directed learning and academic performance in the web-based environment, the results are not consistent. Only one case showed a strongly positive relationship between self-directed learning and academic success (excluding Case 4 with a low relationship coefficient and Case 5 with no instructor-assigned grade). Thus, the results of the effect of self-directed learning on academic success in web-based environments are divergent.

Disclaiming the effect of self-directed learning too quickly is unwise because a number of factors could affect the result of such a study. These factors could be reliability of academic performance as a measure, students' learning style, time for distributing the SDLRS or OCLI, quality of on-line learning materials, sample subject's demographics, learner's educational background, prior knowledge for contents, measurement of self-directed learning, or sample size. For this reason, follow-up empirical studies are needed to test for those factors.

Recently, Bishop-Clark et al. (2007) conducted a similar study. In this study, students' personality preferences, as measured by Myers Briggs Type Indicator, and academic performance were analyzed for a Web-based course. The result of the study showed that personality factors did not relate to academic success. Therefore, instead of self-directed learning and personality styles, which relates to the characteristics of the learner, the need exists for exploring other critical factors affecting learners' academic performance.

E-learning (or Web-based learning) is growing at an exponentially rapid rate around the world. Once the factors affecting successful e-learning are found, empirically, researchers and instructors must be able to find feasible instructional strategies to deal with these aspects, such as using online activities to enhance self-directed learning. In the long run, the costs of e-learning will decrease and learning outcomes will increase.

References

Anderson, M. R. (1993). *Success in distance education courses versus traditional classroom education courses*. Unpublished doctoral dissertation. The Oregon State University, Corvallis, OR.

Bartlett, J. E., & Kotrlik, J. W. (1999). Development of a self-directed learning instrument for use in work environments, *Journal of Vocational Educational Research*, 24, 185-208.

Bishop-Clark, C., & Dietz-Uhler, B., & Fisher, A. (2007). The effects of personality type on web-based distance learning. *Journal of Educational Technology Systems*, 35(4), 491-506.

Brockett, R. G., & Hiemstra, R. (1991). *Self-direction in adult learning: Perspectives on theory, research, and practice. London*, UK: Routledge.

Brookfield, S. (1985). Self-directed learning: A critical review of research. In S. Brookfiled (Ed.), *Self-directed learning from theory to practice* (pp.5-16). San Francisco, CA: Jossey-Bass.

Candy, P. C. (1991). *Self-direction for lifelong learning: A comprehensive guide to theory and practice*. San Francisco, CA: Jossey-Bass.

Chou, P. N. (2003). *A study on the development of competency-based and web-based interactive streaming video material and analysis of self-directed learning effects*. Unpublished master thesis. The National Taipei University of Technology, Taipei, Taiwan.

Chung, Y. C. (2001). *The effect of self-directed learning readiness in the asynchronous distance learning. Unpublished master thesis*. The National Kaohsiung Normal University, Kaohsiung, Taiwan.

Corbel, J. R. (2003). *Online technologies self-efficacy, self-directed learning readiness, and locus of control of learners in a graduate-level web-based distance education program*. Unpublished doctoral dissertation. The University of Houston, Houston, TX.

Deng, Y. L. (1995). *Adult education and self-directed learning*. Taipei, Taiwan: Wunan.

Darmayanti, T. (1994). *Readiness for self-directed learning and achievement of the students of Universitas Terbuka (The Indonesian Open Learning University)*. Unpublished master thesis. The University of Victoria, British Columbia, Canada.

Doherty, P. B. (2000). *Success factors among community college students in an online learning environment*. Unpublished doctoral dissertation. The Nova Southeastern University, Fort Lauderdale-Davie, FL.

Gibbons, M. (2002). *The self-directed learning handbook: Challenging adolescent students to excel*. San Francisco, CA: Jossey-Bass.

Guglielmino, L. M. (1977). *Development of the self-directed learning readiness scale*. Unpublished doctoral dissertation. The University of Georgia, Atherns, GA.

Guglielmino, L. M. (1989). Reactions to field's investigation into the SDLRS. *Adult Education Quarterly*, 39(4), 235-245.

Guglielmino, L. M., & Guglielmino, P. J. (1991). *Expanding your readiness for self-directed learning*. Don Mills, Ontario: Organization Design and Development Inc.

Guglielmino, L. M., & Guglielmino, P. J. (2003a). Are your learners ready for e-learning? In G. M. Piskurich (Ed.), *The AMA handbook of e-learning: Effective design, implementation, and technology solutions* (pp.87-95). New York: AMACOM.

Guglielmino, L. M., & Guglielmino, P. J. (2003b). Identifying learners who are ready for e-learning and supporting their success. In G. M. Piskurich (Ed.), *Preparing learners for e-learning* (pp.18-33). San Francisco, CA: Jossey-Bass.

Hanna, D. E., Dudka, M. G., & Runlee, S. C. (2000). *147 practical tips for teaching online groups: Essentials of web-based education*. Madison, WI: Atwood.

Haggerty, D. L. (2000). *Engaging adult learners in self-directed learning and its impact on learning styles*. Unpublished doctoral dissertation. The University of New Orleans, New Orleans, LU.

Harriman III, J. K. (1990). *The relationship between self-directed learning readiness, completion and achievement in a community college telecourse program*. Unpublished doctoral dissertation. The University of Georgia, Atherns, GA.

Harvey, B. J., Rothman, A. I., & Fredker, R. C. (2006). A confirmatory factor analysis of the ODDI continuing learning inventory (OCLI). *Adult Education Quarterly*, 56 (3), 188-200.

Hiemstra, R. (1996). What's in a world? Changes in self-directed learning language over a decade. *In Proceedings of the 1996 International Symposium on Self-Directed Learning*, West Palm Beach, FL. Retrieved [2007/3/13], from http://home.twcny.rr.com/hiemstra/word.html.

Hoban J. D., Lawson, S. R., Mazmanian, P. E., Best, A. M., & Seibei, H. R. (2005). The self-directed learning readiness scale: a factor analysis study. *Medical Education*, 39(4), 370-379.

Horng, S. C. (1995). *A study on the relationship between self-directed learning readiness and learning achievement of the students in National Open University*. Unpublished master thesis. The National Taiwan Normal University, Taipei, Taiwan.

Howland, J. L. & Moore, J. L. (2002). Student perceptions as distance learners in internet-based courses. *Distance Education*, 23 (2), 183-195.

Hsu, Y. C., & Shiue, Y. M. (2005). The effect of self-directed learning readiness on achievement comparing face-to-face and two-way distance learning instruction. *International Journal of Instructional Media*, 32 (2), 143-155.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Chicago, IL: Association Press.

Long, H. B. (1991). College students' self-directed learning readiness and educational achievement. In H. B. Long & Associates (Eds.), *Self-directed learning: Consensus and conflict* (pp. 107-122). Oklahoma, OK: Oklahoma Research Center for Continuing Professional and Higher Education of The University of Oklahoma.

Long, H. B. (2000). Understanding self-direction in learning. In H. B. Long & Associates (Eds.), *Practice & theory in self-directed learning* (pp.11-24). Schaumburg, IL: Motorola University Press.

Long, H. B. (2003). Preparing e-learners for self-directed learning. In G. M. Piskurich (Ed.), *Preparing learners for e-learning* (pp.2-18). San Francisco, CA: Jossey-Bass.

Merriam, S. B., & Caffarella, R. S. (1991). *Learning in adulthood: A comprehensive guide*. San Francisco, CA: Jossey-Bass, Pfeiffer.

Morris, L. S. (1995). *The relationship between self-directed learning readiness and academic performance in a nontraditional higher education program*. Unpublished doctoral dissertation. The University of Oklahoma, Norman, OK.

Murane, R. J., & Levy, F. (1996). *Teaching the new basic skills*. New York: Free Press.

Oddi, L. F. (1984). *Development of an instrument to measure self-directed continuing learning*. Unpublished doctoral dissertation. The Northern Illinois University, DeKalb, IL.

Oddi, L. F. (1986). Development and validation of an instrument to identify self-directed continuing learners. *Adult Education Quarterly*, 36, >97-107.

Ogazon, A. G. (1995). *The contribution of self-directed learning readiness to the achievement of junior students at a branch of the state of Florida university system*. Unpublished doctoral dissertation, Florida International University, Miami, FL.

Pachnowski, L. M., & Jurczyk, J. P. (2000). *Correlating self-directed learning with distance learning success*. Paper presented at The Annual Meeting of The Eastern Educational Research Association, Clearwater, FL. (ERIC Document No. ED441000)

Penn State World Campus. (2007). http://www.worldcampus.psu.edu.

Roberson, D. N. (2005). *Self-directed learning--Past and present*. (ERIC Document No. ED490435)

Savoie, M. M. (1980). Continuing education for nurses: Predictors of success in courses requiring a degree of learner self-direction. *Dissertation Abstracts International*, 40, 6114-A.

Stewart, R. A. (2007). Investigating the link between self-directed learning readiness and project- based learning outcome: The case of international masters students in an engineering management course. *European Journal of Engineering Education*, 32 (4), 453-465.

Taylor, B. (1995). *Self-directed learning: Revisiting an idea most appropriate for middle school students*. (ERIC Document No. ED395287)

Tsai, L. Y. (2005).*The interrelationships between self-directed learning readiness, computer attitude and e-learning effectiveness for business employees.* Unpublished master thesis. National Sun Yat-Sen University, Kaohsiung, Taiwan.