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The effect of computer-based learning on distance learners' self regulated learning strategies

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Abstract

The present research was done to compare self regulated learning strategies (SRLS) between computer-based and print-based learning students. To do so, 53 participants as experimental group and 50 participants as control group from Payame Noor University were selected randomly. The experimental group was taught via computer and control group was taught via printed materials for 8 weeks. The instrument of this research was the self regulated learning strategies (SRLS) questionnaire modified by Zimmerman and Pons (1986). Reliability of questionnaire computed via cronbach's Alpha ($\alpha=0.93$). In view of cultural differences and to avoid any misunderstanding regarding the content of the questionnaire for Iranian students, the translated version of this questionnaire was employed. In this study the reliability of the translated version was found to be high ($\alpha = .89$). Research method was quasi experimental. Data analyzing was done by using univariate analysis of variance. Some of the most important results are: The rate of self regulated learning strategies within computer-based group was higher than rate of self regulated learning strategies within print-based group. Considering this variables and components is very vital role in distance education, administrators and managers of distance education are suggested to provide training via new instructional technologies.

Keywords: Self regulated learning strategies; Computer-based; print-based; distance education

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1. INTRODUCTION

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Distance education is growing rapidly. This method of education is neither a recent nor new phenomenon. Distance education provides access to individuals in different geographical locations, individuals unable to attend classes on campus, and individuals who prefer to control the timing and pace of their learning (Latanich, Nonis, & Hudson, 2001; Moore, 1989; Willis, 1995). Today, Computer-mediated communications and the internet have resulted in rapid and explosive interest in distance education (Larreamendy, & Leinhardt, 2006). The interest towards a more media-based teaching methodology underlines the harmony between society and educational system. The advantage of computer-mediated communication (CMC) into the formal education setting has heightened the emphasis placed on participation as an important dimension of the teaching-learning process in open and distance learning.

In recent years in Iran, Payame Noor University is one of the greatest universities that established distance education, so day to day, in the total process of students' registration, learning material, delivery and evaluation and then process of students' graduating use computer-mediated communications on the one side in order to success of students in distance education, need to some circumstances e.g. students' psychological characteristics, and on the other side, learning environment effects on students' psychological characteristics. One of these characteristics is self regulated learning strategy.

In the other word as computer-mediated and online distance learning has grown as self-regulated learning is important (Boekaerts, Pintrich, & Zeidner, 2000). Some researchers showed that the importance of the environment and its influence on personal factors is in keeping with social cognitive views of self-regulation (Artino, 2008; Pintrich, 2000). In the moor's theory of transactional in distance education learner's autonomy is the important factor. Learner autonomy involves the learner's ability to create a learning plan, find resources that support study, and self-evaluate (Moor, 2007). Most researchers refer to autonomy as involvement and choice in learning, self direction, acting independently, setting goals, and measuring progress (Hurd, 2005). In the other word autonomy involves metacognition, strategic competence, and decision-making (Hurd, Beaven, & Ortega, 2001). According to concept of self directed learning strategies, could be said that learner's autonomy need to this variable.

The term self-regulated can be used to describe learning that is guided by metacognition (thinking about one's thinking), strategic action (planning, monitoring, and evaluating personal progress against a standard), and motivation to learn (Butler, & Winne, 1995; Perry, Phillips, & Hutchinson, 2006; Pintrich, 2000). In summary self-regulated learning is one of several strategies that learners can apply. It refers to students who can (Zimmerman, 1990):

... approach education tasks with confidence, diligence, and resourcefulness. They are aware of when they do or do not know something. They seek out information when needed and follow the necessary steps to master it. When they encounter obstacles such as poor study conditions, confusing teachers, or abstruse text books they find a way to succeed. (4)

Zimmerman (2002) indicated that self-regulated is a self directive process by which learners monitor personal, behavioral, and environmental situations to establish effective learning strategies, set goals, observe, reflect, and alter mental aptitude into academic aptitude.

Through the use of SRL strategies, people are able to navigate unstable and unfamiliar environments often created by a revolving door of policies, students, and technologies within the school system (Moenikia, & Abtin, 2006). Researches support the idea that self-regulation skills can be taught, and once used, will be predictive of academic success (Pintrich, & De Groot, 1990; Schunk, 1991; Zimmerman, 1990).

Skills which lead to SRL are not innate personality traits and can therefore be learned through experience and self-reflection. Boekaerts, Pintrich, and Zeidner (2000) assert that although SRL can be complex, it can be taught. Although self-regulation does not occur overnight, there are numerous strategies instructors can use to promote effective self-regulation in learners. Pintrich (2000) proposed a theoretical framework based on a socio- cognitive perspective; its objective is to classify and analyze the different processes which play a part in self- regulated, as asserted by scientific literature. In this model, regulatory processes are organized according, to four phases: a) planning; b) self- monitoring, c) control; and d) evaluation. Within each of these phases, self- regulation activities are in turn structured into four areas: cognitive, motivational/ affective, behavioral and contextual. For Pintrich, these four phases represent a general sequence which the steps through as he or she carries out the tasks, but they are not hierarchically or linearly structured. The phases can occur simultaneously and dynamically, producing multiple interactions among the different processes and components included therein. Furthermore, Pintrich indicates that not all academic tasks explicitly involve self- regulation: sometimes, the performance of certain tasks does not require the student to strategically plan, control and evaluate what he or she is going to do; rather, the execution can be performed more or less automatically (or implicitly), as a function of the students, prior experience with the same (Pintrich, Wolters, & Baxter, 2000).

Many other authors mentioned that one of the other most important models about self-regulated learning strategy belong to Zimmerman and Martinez-Pons (1986). Their model summarized in Table 1:

The effectiveness of each of the fourteen self-regulated learning strategies described in Table 1 can be explained on the basis of the proposed triadic model. The purpose of each strategy is to improve students' self-regulation of their (a) personal functioning, (b) academic behavioral performance, and (c) learning environment. For example, the strategies of organizing and transforming, rehearsing and memorizing, and goal setting and planning focused on optimizing personal regulation. Strategies such as self-evaluation and self-consequences were designed to enhance behavioral functioning. The strategies of environmental structuring, seeking information, reviewing, and seeking assistance were intended to optimize the students' immediate learning environment.

Table 1: Component of self regulated learning strategy (Zimmerman & Martinez-Pons, 1986)

Categories/ Strategies	Definitions
1-Self – evaluating	Statements indicating student – initiated evaluations of the quality or progress of their work
2-Organizing and transforming	Statements indicating student – initiated overt or covert rearrangement of instructional materials to improve learning
3-Goal- setting and planning	Statements indicating student – setting of educational goals or sub goals and planning for sequencing, timing, and completing activities related to those goals
4-Seeking information	Statements indicating student – initiated efforts to secure to secure further task information from nonsocial sources when undertaking an assignment
5-Keeping records and monitoring	Statements indicating student – initiated efforts to record events or results
6-Environmental structuring	Statements indicating student – initiated efforts to select or arrange the physical setting to make learning easier
7-Self- consequating	Statements indicating student arrangement or imagination of rewards or punishment for success or failure
8-Rehearsing and memorizing	Statements indicating student – initiated efforts to memorize material by overt or covert practice
9-11. Seeking social assistance	Statements indicating student – initiated efforts to solicit help from peers (9). Teachers (10), and adults (11)
12-14. Reviewing records	Statements indicating student – initiated efforts to reread notes (12), tests (13), or textbooks (14) to prepare for class or further testing

Finally, students who are self-regulated learners believe that opportunities to take on challenging tasks, practice their learning, develop a deep understanding of subject matter, and exert effort will give rise to academic success (Dweck, 2002; Perry, et al. 2006).

The other type of environmental influence on student self-regulated learning that will be considered is the structure of the learning context, particularly such elements as the academic task and setting. According to social cognitive theory (Winters, Greene, & Costich, 2008), human learning remains highly dependent on the social environmental context from which it sprang. Changing an academic task to increase the difficulty level or changing the academic setting from a noisy to a quiet place to study or changing delivery tools is expected to affect self-regulated learning.

Each of the environmental influences just described is assumed to be reciprocally interactive with personal and behavioral influences. When learners become self-directed, personal influences are mobilized to strategically regulate behavior and the immediate learning environment. Self-directed learners are assumed to understand the impact of the environment on them during acquisition and to know how to improve that environment through the use of various strategies.

Zimmerman and Martinez-Pons (1986) found evidence of students' use of fourteen types of self-regulated learning strategies that were very similar to strategies that had been studied in laboratory

research. Students' use of these strategies was found to be highly correlated with their achievement indices and with teachers' ratings of their degree of self-regulation in class. For example, students' reports of using these self-regulated learning strategies accounted for 93% of the variance ($R = .96$) of their achievement track placement in school, and 13 of the 14 strategies discriminated significantly between students from the upper achievement track and students from lower tracks. Lee (2008), Lee and Lee (2007) found that the relation between self-regulated learning strategy and real record performance is significantly.

Distance Education students are a special group. They are separated from the institution. They are working in a learning environment that is different that what they may see as comfortable. There are two specific groups which appear in this category. The first group is made up of adult learners. They have been trained for traditional face-to-face lecture style of learning. Many have been away from the school system for a long time. Their learning skills may be rusty and they may be unfit for a new style of learning. Usually their motivation level is high. They have a will to learn, a desire to improve job or social standing, and possess a craving for knowledge.

In distance education students do not have the same support systems as institution-based learners. They do not have a face-to-face instructor. They may not have other immediate classmates, or a tutor. Those who work or live in isolated settings may have only themselves to rely upon. This is where the importance of self-regulated learning is an important issue. Not only do they have to be made aware of how to become successful they often have to develop these skills independently.

Many studies imply that traditional learning environments do not prepare students for the high degree of self regulated learning in comparison of computer-based ore web-based environments (Hartley, & Bendixen, 2001). Self regulation learning strategies are strongly associated with motivational factors. One of the advantages of computer- based instruction over traditional environment is its potential to allow students to study the program at their own rates. For students a technology-based environment is a suitable learning environment to take charge of their own learning since they can control their own learning process. Applying technology to improve learners, motivation has been mentioned by a number of researchers (Chen, 2002).

Change and Lehman (2002) evaluated the relevance on learners, motivation in a multi-media based language learning instruction. The outcomes demonstrated that the group with higher level of motivation had the highest score on motivation perception. As the internet gained popularity and acceptance, the focus on self-regulation research shifted from the context instruction to computer-based and web-based instruction (Hodges, 2005). MoeniKia and Abtin (2006) found that in secondary schools, students who used ICT highly, had self regulated learning strategy more than students who didn't use ICT. In this research sited that females' self regulated learning strategy is more than males significantly. Winters and et al (2008) found that students, self regulatory learning strategy mediate the positive relations between computer- based learning and academic performance. DeBorgh (2002) describes that online course systems promote self regulated learning strategies.

Summarily, researches have mentioned self-regulated learning strategies and components is important element for success in e-learning such as computer-based, web-based and online learning; and these instructional technologies and such environments promote the students' self regulated learning strategies.

In present research, self regulated learning strategies between computer-based and print-based learning students With regard to gender as a moderator variable have been compared.

2. METHODS

2.1. Participants

The population of this study consisted of Ardabil Payame Noor University in 2008-2009 academic year, both print-based and web-based students. Among these students, 53 subjects (28 females and 25 males) aged between 19 and 26 ($M= 23.2$, $SD=5.3$) as experimental group and 50 subjects (27 females and 23 males) aged between 18 and 27 ($M= 22.8$, $SD=7.8$) as control group were selected randomly.

2.2. Materials

The instrument of this research was the self regulated learning strategies (SRLS) questionnaire modified by Zimmerman and Pons (1986). Reliability of questionnaire computed via chronbach's Alpha ($\alpha=0.93$). According to scoring model, maximum mean score fore every component were 4 and minimum was 1. In several researches the validity of the questionnaire was confirmed.

In view of cultural differences and to avoid any misunderstanding regarding the content of the questionnaire for lower-level students, the translated version of this questionnaire was employed. With the translated version (From English into Persian), administered in Iran, the Cronbach's alpha coefficient was found to be .88, and the results of factor analyses provided some support for the inventory's hypothesized structure (MoeniKia, Abtin, 2006). In this study the reliability of the translated version was found to be high ($\alpha = .89$).

2.3. Procedure

Because of the inability to controlling some variables, research method was quasi experimental. The experimental group was taught via computer and control group was taught via printed materials for 8 weeks. Instructional content for both groups were similar and had the same academic curriculum. After 8 weeks in the end of instruction, subjects of both groups filled up the questionnaire. For comparing self regulated learning strategies between computer-based and print-based learning students With regard to gender as a moderator variable gathered data analyzed by using univariate analysis of variance via SPSS software.

3. RESULTS AND DISCUSSION

According to Levine's Test of Equality of Error variance $F_{(3, 99)} = .93$, $P > .05$ showed that the variances of groups is equal. Therefore, t tests can be used to compare means of groups.

Table 2: Description of self regulated learning strategies among groups

gender	male			Female			Total		
	Group	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean
Experimental	25	2.18	.753	28	3.28	.62	53	2.78	.87
Control	23	2.27	.78	27	2.23	.75	50	2.25	.76
Total	48	2.22	.76	55	2.76	.86	103	2.51	.86

Experimental: computer-based group **control:** print-based group

According to table 1, the mean score of self regulated learning strategies within experimental female group (3.28), within control female group (2.23), within experimental male group (2.18), and finally within control male group (2.27) was obtained. In view of cultural differences and to avoid any misunderstanding regarding the content of the questionnaire for lower-level students, the translated version of this questionnaire was employed.

In order to compare the levels of comparing self regulated learning strategies between computer-based and print-based learning students With regard to gender as a moderator variable gathered data analyzed by using univariate analysis of variance.

Table 3: Test of between subjects effect

Source	Type III sum of squares	df	Mean square	F	Sig
Correct Model	22.561	3	7.520	14.291	.000
Intercept	634.233	1	634.233	1.205	.000
Group	5.848	1	5.848	11.112	.001
Gender	7.125	1	7.125	13.540	.000
Group* gender	8.245	1	8.245	15.667	.000
Error	52.097	99	.526		
Total	723.920	103			
Correct Total	74.658	102			

Dependent variable: self regulated learning strategies

Table 3, indicated that in comparing of two groups (computer-based and print-based learners), $F_{(1, 99)} = 11.112$, $P < .01$ showed that there was difference between experimental and control groups statistically significant. So self regulated learning strategies within computer-based group (2.78) was more than print-based group (2.25) significantly.

As earlier mentioned, findings showed that students who taught via computer mediated had self regulated learning strategies more than students who taught via print based materials. This finding is in compliance with the findings of Boekaerts, et al (2006); Change and Lehman (2002); Chen (2002); Deborgh (2002); Moenikia and Abtin (2006); Orhan (2007); and Perry, et al (2006). In cited researches in compliance with present research instructing and learning based on computer, promotes self regulated learning strategies. In justify this finding could be said that students feel autonomy in computer-based learning environments, so their SRLS promote.

As well as, according to Table 3, comparing mean score of self regulated learning strategies between females and males showed that $F_{(1, 99)} = 13.540$, $P < .01$. It means that self regulated learning strategies within females (2.76), was more than self regulated learning strategies within males (2.22) statistically significant. This finding was confirmed by some researches in Iran (MoeniKia and Abtin, 2006).

Finally, based on Table 3, computed $F_{(1, 99)} = 15.667$, $P < .01$ demonstrated that interaction between group and gender was statistically significant. Interaction between group and gender could be seen in Figure 1:

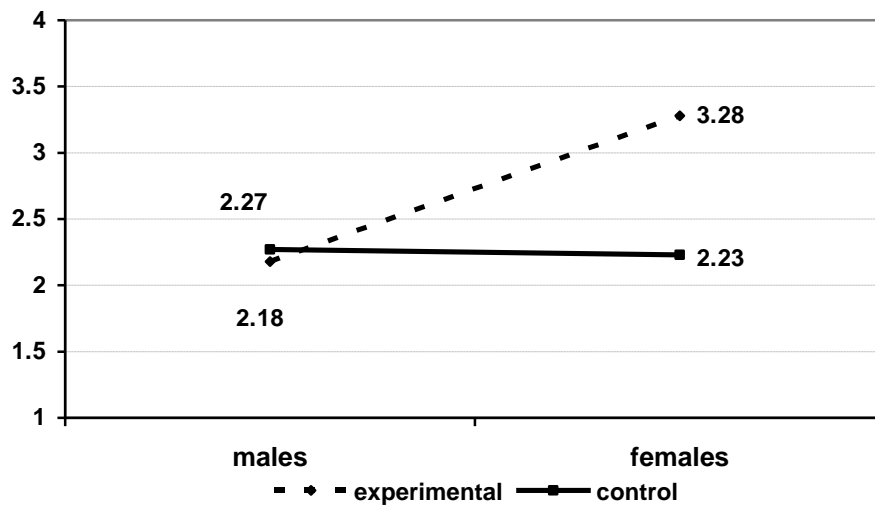


Figure 1. SRLS based on interaction between groups and gender

The components of SRLS in which mean score of computer-based group was more than print-based group significantly (both male and female) contain: Self evaluation, $F_{(1,99)}= 9.66$, $P<0.01$; seeking information, $F_{(1,99)}= 18.06$, $P<0.01$; organizing and transforming, $F_{(1, 99)}= 12.66$, $P<0.01$; seeking social assistance (teachers), $F_{(1, 99)}= 12.2$, $P<0.01$; seeking social assistance (Peers), $F_{(1, 99)}=12.18$, $P<0.01$.

In the opposite of, The components of SRLS in which mean score of print-based group was more than computer-based group significantly (both male and female) contain: Rehearsing and

memorizing, $F_{(1,99)} = 10.43$, $P < .01$; reviewing records (text books), $F_{(1,99)} = 18.16$, $P < .01$; keeping records and monitoring, $F_{(1,99)} = 14.16$, $P < .01$.

Differences between two groups in other components (goal setting and planning, environmental structuring, self-consequating, seeking social assistance from adults, reviewing records to tests and to prepare for class) are not significant ($P > .05$). SRLS and its total components among female are more than male both computer-based group and print-based group significantly ($P < .01$).

The Components of SRLS: Self evaluation, seeking information, organizing and transforming, seeking social assistance (teachers), and seeking social assistance (Peers) among computer based learners is higher than Print based learners. Inverse the Components of SRLS: Rehearsing and memorizing, reviewing records (text books), and keeping records and monitoring among Print based learners is higher than Print based learners. Circumstance of learning in e-tools mediated environments effect on students' seeking information, organizing and transforming, and seeking social assistance especially from peers and teachers. But these environments don't promote characteristics such as reviewing records (text books), and keeping records.

4. CONCLUSION AND RECOMMENDATION

The findings of this study suggest several implications for managers and decision makers. Universities and institutions with distance education methods must note that these system learners tend to be different from the traditional learners and this difference helps them continue learning successfully, one of these differences could use new technologies, including computer-based instruction. As results of this study showed that use of computer as a means of delivering education could increase self regulated learning strategies. This variables and components is very vital role in distance education (Artino, 2008).

In this study, experimental group were trained to use the technology and the possibility of using technology to provide for them. One of the limitations of this study was that some students did not provide IT facilities at home and some can not use the technology. Researchers suggest that in distance education based on e-tools, students should be empowered for working with computer and web, and promote their ability in goal setting and planning, environmental structuring, self-consequating, seeking social assistance from adults, reviewing records to tests and to prepare for class.

REFERENCES

- Artino, A.R. (2008). A conceptual model of self-regulation online. *Academic Exchange Quarterly*, 12 (4), 4 1-54.
- Boekaerts, M., Pintrich, P.R., & Zeidner, M. (Eds.). (2000). *Handbook of self-regulation*. San Diego: Academic press.
- Butler, D. L., & Winne, P.H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 65, 245-281.

- Chang, M.M. & Lehman, J.D. (2002). Learning foreign language through an interactive multimedia program: An experimental study on the effects of the relevance component of the ARCS model. *CALIGOJ*, 20(1), 81-98.
- 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.
- DeBourgh, G. A. (2002, June). Simple elegance: Course management systems as pedagogical infrastructure to enhance science learning. *The Technology Source*. Retrieved May 1, 2009, from <http://ts.mivu.org>.
- Dweck, C. S. (2002). *Beliefs that make smart people dumb*. In R. J. Sternberg (Ed.), *Why smart people do stupid things*. New Haven: Yale University Press.
- Hartley, K., & Bendixen, I. (2001). Educational research in the Internet age: Examining the role of individual characteristics. *Educational Research*, 39(9), 22-26.
- Hodges, C. B. (2005). Self regulation in web- based courses: A review and need for research. *The quarterly Review of Distance Education*, 6(4), 375- 383.
- Hurd, S. (2005). Autonomy and the distance language learner. In Holmberg, B., Shelley, M. and White, C. (eds). *Distance education and languages: Evolution and change pp. 1-19*. Multilingual Matters , Clevedon.
- Hurd, S., Beaven, T. & Ortega, A. (2001). Developing autonomy in a distance language learning context: Issues and dilemmas for course writers. *System*, 29:(3), 341-355.
- Larreamendy, J., & Leinhardt, G. (2006). Going the distance with online education. *Review of Educational Research*, 76, 567-605.
- Latanich, Gary, Nonis, Sarath A. & Hudson, Gail I. (2001). A profile of today's distance learners: An investigation of demographic and individual difference variables of distance and non-distance learners. *Journal of Marketing For Higher Education*, 11(3), 1-16
- Lee, J.K. (2008). The effects of self- regulate learning strategies and system satisfaction regarding learner's performance in e- learning environment. *Journal of Instructional Pedagogies*. Retrieved June 1, 2009, from <http://www.aabri.com>.
- Lee, J.K., & Lee W.K., (2008). The relationship of e-learner's self-regulatory efficacy and perception of e-Learning environmental quality. *Computers in Human Behavior*, 24(1), 32-47
- Moenikia, M. , & Abtin, J. (2006). *Relationship between using of ICT and psychological characteristics in Ardabil secondary schools' students*. Iran, Ardabil, educational organization.
- Moore, M. G. (1989). Distance education: A learner's system. *Lifelong Learning*, 2(8), 8-11.
- Orhan,f. (2007). Applying self regulated learning strategies in a blended learning instruction. *World Applied Sciences*, 2(4), 390-398.
- Moore, M. G. (2007). The theory of transactional distance.in Moore, M. G. (ed) *Handbook of distance education pp. 89-105. 2nd ed.*, Lawrence Erlbaum , Mahwah, NJ.
- Perry, N.E., Phillips, L., & Hutchinson, L.R. (2006). Preparing student teachers to support for self-regulated learning. *Elementary School Journal*, 106, 237-254.
- Pintrich, P.R. (2000). *The role of goal orientation in self-regulated learning*. In M. Boekaetrs, P.R. Pintrich, & M. Zeidner (Eds), *Handbook of self-regulation* (pp.451-502). San Diego: Academic.

- Pintrich, P. R., & De Groot, E. (1990). Motivational and self regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*, 33-40.
- Pintrich, P.R., Wolters, C., & Baxter, G. (2000). *Assessing metacognition and self-regulated learning*. In G. Schraw and J. Impara (Eds.), *Issues in the measurement of metacognition* (pp. 43-97). Lincoln, NE: Buros Institute of Mental Measurements.
- Schunk, D.H. (1991). Self-efficacy and academic motivation. *Educational Psychologist, 26*, 207-231.
- Willis, B. (1995a). Distance education: An overview. In *Distance Education at a Glance: Guide#1*. University of Idaho, Engineering Outreach. [On-line] Available at: [http:// www. uidaho. edu/ evo/dist1. Html](http://www.uidaho.edu/evo/dist1.html).
- Winne, P.H. and Perry, N.E. (2000). *Measuring self-regulated learning*. In P. Pintrich, M. Boekaerts, & M. Seidner (Eds.), *Handbook of self-regulation* (p. 53 1-566). Orlando, FL: Academic Press.
- Winters, F.I., Greene, J.A., & Costich, C.M. (2008). Self- Regulation of learning within computer-based Learning environments: A critical analysis. *Educational Psychology Review, 20(4)*, 26-38.
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*, 3-17.
- Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self learning strategies. *American Educational Research Journal, 23*, 6 14-628.
- Zimmerman, B. J. (2002). Becoming a self-regulated learning: An overview. *Theory into Practice, 41 (2)*, 64-70.