

## Differences of Using Learning Strategies in Higher Education: By SAT, GPA, and On/Off line Environments

Hye-Jung Lee and Hyoseon Choi

Seoul National University, South Korea

*It is controversial whether the most critical learning achievement factor is biological brain ability (intelligence) or environmental treatment (strategies). However, nobody would deny that both of them are very influential on learning anyway and if so educators need to focus on how to provide better external treatment such as learning strategies as an environmental factor. This research started from the question if there is any difference of using learning strategies especially in higher education. And if any, how are these different by SAT, GPA, and online/offline environments. To find out the answer, data on using learning strategies were collected from high SAT group (within top 0.5%) and low SAT group (within 25%-75%), from high GPA group and low GPA group within a same SAT group, and from traditional offline students and online distance students. Findings indicated higher SAT group students, higher GPA students within a same SAT group, and online distance learners use more autonomous, independent, self-regulated learning strategies than lower SAT group students, lower GPA group students, and traditional offline learners. And critical cognitive learning strategies of excellent students were found. Implications and suggestions of the results were discussed.*

**Keywords:** learning strategy (skill), learning style, higher education

### INTRODUCTION

Learning strategies are defined as behaviors and thoughts that students use to select, organize, and integrate new knowledge or to facilitate learning more efficiently and effectively (Dansereau, 1978; Weinstein & Mayer, 1986). But it's not only focused on cognitive aspect. In more comprehensive way, many researchers say that Learners spontaneously use specific pattern or combinations of learning activities, which are called learning strategies (Hadwin, Winnie, Stockley, Nesbit & Woszczyna, 1997; Vermunt, 1996).

Many studies report the significance and effectiveness of learning strategies for effective learning (Clark, 1993; Day & Elksnin, 1994; Kiewra, 2002; McCann & Turner, 2004). First, learning strategies are said to be important to improve academic achievements or learning outcomes (Everson, et al., 2000; Hofer, & Yu, 2003; Garavalia & Gredler, 2002; Meltzer, et al., 2004; Weinstein & Mayer, 1986; Zhang, 2005). Garavalia & Gredler (2002) insist that learning strategies are factors which can predict university students' learning achievements. Everson et al. (2000) also showed the factor of learning strategies affect to increase GPA and verbal achievements. Zimmerman & Martines-Pons (1986) guessed that learning strategies can affect learning achievements because learners with higher GPA used 13 factors more actively than lower GPA students out of 14 learning strategies. Second, learning strategies affect to learners' critical thinking (Kuhn, 1999). Kuhn's research reported that learning strategies can facilitate learners' critical thinking and improve their learning. Third, learning strategies lead to facilitate learners' self-regulated, continuing learning (Zimmerman, Bonner, & Kovach, 1996). Considering these various reports, Kesici, Sahin, & Akturk (2009) indicated research on learning strategies are very important since learning strategies play a critical role in cognitive learning.

Learning strategies are emphasized not only in K-12 school education. Cornford (2002) said that learning strategies are essential for effective lifelong learning as well as school learning because it is difficult to learn something without learning strategies even for adult learners. Recently learning strategies are critically considered in distance learning environment specifically (Kerr, Rynerson, & Kerr, 2006). Since

online distance learners should have more learning strategies such as learning management and regulation of cognition (Hong, 2009), online institutes provide e-learning contents on learning strategies for students and even offer a credit course on learning strategies as a requirement.

In a university as well, learning strategy programs are no more new these days. Center for Teaching and Learning or Learning Center in a university provides learning programs including workshops, online programs, learning strategy guidebook, and so on. Although these learning centers need to provide students with more effective, more critical learning strategy, however, they just distribute all kinds of learning strategies universally. In addition, most of universities nowadays are using online environment as well as offline classroom, but they can't guide students to appropriate learning strategies for a blended e-learning environment.

Therefore, this research is to find out how learning strategies are used differently by different achievement levels and what implications we can get from this research in higher education. For this question, this research investigated if there is any difference in using learning strategies between excellent students and poor students, by SAT scores and by GPA. How the excellent students with higher SAT score and even higher GPA within a same SAT group are using different learning strategies is the basic research question in this paper. Also we need to uncover how online learners use learning strategies differently from traditional offline learners. Learning strategies in this research are extended concepts including learning skills, tactics, and learning styles as well. If the more critical and effective learning strategies of excellent students are found, learning centers in a university would be able to provide students with more appropriate guide and students would be able to apply their learning strategies more efficiently and effectively. The research questions in detail are as follows;

- 1) Is there any difference in using learning strategies by SAT levels?
- 2) Is there any difference in using learning strategies by GPA within a same SAT group?
- 3) Is there any difference in using learning strategies between offline and online learners?

## RESEARCH METHOD

### Participants

#### *Study 1: Use of learning strategies by SAT*

For the first research question, data were collected from high and low SAT group. High SAT learners in this research were S university students, who were within top 0.5% of SAT score in the country (Munwhailbo, 2009), while other universities' students in this research were mostly 25%-75% of the SAT score in the country (Jinhaksa, 2009). The participants in this study were 304 students from seven universities with face to face offline format. Courses were basic general subjects such as "Introduction to Educational Technology" or "Improvement of Learning Competency."

That is to say, the "S" university in Korea, rather than other six universities, has required significantly higher SAT scores for admission. Therefore, S university and the other six universities are discretely distinguished because the SAT scores between S university and the other six universities are remarkably different. However, students from seven universities are all homogeneous with respect to subject and major since students are all taking a similar course with similar qualification as a teaching profession. For the review of study 1, t-test analysis is conducted with SPSS 17.0.

**Table 1.** *Participants of Study 1*

Group	High SAT (S university)	Low SAT (other universities)	Total
No. of students	31	273	304

**Study 2: Use of learning strategies by GPA within a same SAT group**

In order to investigate the differences of using learning strategies by GPA, 1,213 students in S university which are within top 0.5% of SAT score in the country, were surveyed about use of learning strategies. GPA is classified by 6 categories. The differences of using learning strategies by GPA were analyzed by ANOVA.

**Table 2. Participants of Study 2**

GPA	Under 2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	Over 4.0	Total
No. of Students	14	52	134	398	488	127	1,213

**Study 3: Use of learning strategies in offline and online learning**

To investigate the differences of using learning strategies between offline and online learners, 273 students were participated in this study. The data were compared between face-to-face offline and online students to examine the characteristics of their learning strategies. Three classes were face to face traditional courses and three were online courses. Data were collected from 192 traditional offline and 81 online learners.

**Table 3. Participants of Study 3**

Group	Face-to-face universities			Online universities			Total
	B	C	D	E	F	G	
No. of universities	3			3			6
No. of students	148	20	24	30	8	43	273
	192			81			

**Questionnaire**

In order to analyze students' use of learning strategies, a survey was conducted with the questionnaire on learners' learning strategies. This survey included 18 questions shown in Table 4. Questions related to learning strategies were drawn out from Zhang (2005) and GRASHA-RIECHMANN student learning style scales (GRSLSS), and were translated into Korean and modified. The questionnaires with Likert 5 point scale (1=strongly disagree, 2= disagree, 3=normal, 4=agree, 5=strongly agree) were posted online so that all answers were collected on the web site.

**Table 4. Questionnaire**

Categories	Question items
Learning strategies	I tend to take notes all that teachers say in the class
	I tend to cram for my exams
	I prefer self-planning for my learning to teacher's pre-set learning pace
	When I do not understand something, I do not ask others' help but try to solve a problem for myself
	I prefer a course with well-structured plan
	I organize the contents during the reading rather than after the reading
	I try to grasp of the point when I study
	I tend to make a time plan when I study
	I tend to overview learning materials first for planning a study process before study
	I tend to set objectives before study
	GPA is very important to me
	I am interested in the subject
	I tend to study to verify my potential
Personal information	University
	Grade
	Gender
	Age
	Preference of media for interaction

## RESULT

### Study 1: Use of Learning Strategies by GPA

This study aimed to investigate differences of using learning strategies between high and low SAT group. As a result of t-test analysis, there were some differences showed between the high and low SAT group (Table 5). Learners in low SAT group tend to cram more for examinations or assignments compared with high SAT learners ( $p < .05$ ). Low SAT group students also prefer a course with well-structured plan more than learners with high SAT scores do ( $p < .01$ ). Moreover, learners of high SAT level have more learning skills such as grasp of the point, time management, overview the learning material first before starting study than others ( $p < .01$ ,  $p < .05$ ). And students with low SAT level were apt to consider getting better GPA as very important thing ( $p < .05$ ).

**Table 5. T-Test between High and Low SAT Group**

Questions	High SAT group		Low SAT group		t	P
	Mean	SD	Mean	SD		
I tend to take notes all that teachers say in the class	3.23	.884	3.29	1.033	-.337	.737
I tend to cram for my exams	3.86	0.965	3.96	.987	-2.156	.032*
I prefer self-planning for my learning to pre-set learning pace	3.35	.950	3.02	.912	1.878	.062
When I do not understand something, I do not ask others' help but try to solve a problem for myself	3.65	1.018	3.63	.899	.079	.937
I prefer a course with well-structured plan	3.94	.772	4.31	.700	-2.689	.008**
I organize the contents during the reading rather than after the reading	2.87	1.231	2.91	1.168	-.173	.863
I try to grasp of the point when I study	4.42	.620	4.03	.754	2.712	.007**
I tend to make a time plan when I study	3.94	.892	3.24	.949	3.792	.000**
I tend to overview learning materials first for planning a study process before study	4.39	.558	3.97	.950	2.365	.019*
I tend to set objectives before study	4.19	.792	3.87	.852	1.970	.050
GPA is very important to me	3.16	1.157	3.83	.889	-3.043	.004**
I am interested in the subject	3.65	.920	3.38	.860	1.603	.111
I tend to study to verify my potential	2.77	.920	3.10	.920	-1.691	.092

\* <.05, \*\*<.01

## Study 2: Use of Learning Strategies by GPA within a Same SAT Group

To find out the differences of using learning strategies by students' GPA within a same SAT group, data were collected from 1,213 learners in S university. ANOVA analysis showed significant differences by GPA in most of the question items. The results of Turkey post test showed that students with high GPA scores, especially over 4.0 GPA, tended to take a note carefully than learners with low GPA scores ( $p < .01$ ). Students with low GPA tended to cram more often than high GPA learners before exams ( $p < .01$ ). Learners with high GPA preferred to plan their learning ( $p < .05$ ), solve learning problems for themselves ( $p < .01$ ), and well-structured courses ( $p < .01$ ). Additionally, high GPA students tried to grasp of the point when they read learning materials, manage their time, and overview the learning contents first before their study ( $p < .01$ ).

With respect to motivation, students with high GPA scores have more tendency to set their learning objectives first before doing ( $p < .01$ ). And they were interested in their learning subjects and tended to verify their potential through learning and exams ( $p < .01$ ). By GPA, using learning strategies are different as shown in Table 6.

**Table 6. ANOVA Analysis on Using Learning Strategies by GPA**

Questions	Mean /SD	Over 4.0	3.5-4.0	3.0 - 3.5	2.5 - 3.0	2.0-2.5	Under 2.0	total	F	p
I tend to take notes all that teachers say in the class	Mean	3.52	2.99	2.76	2.75	2.31	2.79	2.91	15.65	0.000**
	SD	1.17	1.02	1.02	0.92	0.94	1.12	1.06		
I tend to cram for my exams	Mean	3.29	3.61	3.87	3.98	4.25	4.57	3.74	15.098	0.000**
	SD	1.18	0.99	0.93	0.90	0.79	0.65	1.00		
I prefer self-planning for my learning to pre-set learning pace	Mean	3.39	3.34	3.18	3.17	3.04	2.79	3.26	2.565	0.026*
	SD	1.13	1.03	1.05	1.04	1.22	0.89	1.06		
When I do not understand something, I do not ask others' help but try to solve a problem for myself	Mean	3.83	3.73	3.80	3.55	3.15	3.93	3.72	5.916	0.000**
	SD	0.94	0.90	0.91	0.98	1.04	1.00	0.93		
I prefer a course with well-structured plan	Mean	4.35	4.10	3.99	3.86	3.83	3.79	4.05	7.558	0.000**
	SD	0.71	0.73	0.83	0.85	0.88	0.70	0.79		
I organize the contents during the reading rather than after the reading	Mean	3.28	3.24	3.20	3.21	3.25	3.07	3.23	0.198	0.963
	SD	1.08	1.08	1.04	1.02	1.06	1.07	1.06		
I try to grasp of the point when I study	Mean	4.13	4.06	3.91	3.81	3.71	3.36	3.97	7.422	0.000**
	SD	0.76	0.72	0.80	0.74	0.87	1.08	0.77		
I tend to make a time plan when I study	Mean	3.50	3.23	2.93	2.79	2.58	1.79	3.07	17.64	0.000**
	SD	1.13	1.04	0.96	0.89	1.07	0.70	1.04		
I tend to overview learning materials first for planning a study process before study	Mean	4.21	3.93	3.74	3.50	3.71	2.86	3.83	13.502	0.000**
	SD	0.87	0.87	0.93	0.91	1.11	1.17	0.93		
I tend to set objectives before study	Mean	4.00	3.86	3.60	3.41	3.33	2.64	3.70	15.863	0.000**
	SD	0.92	0.83	0.88	0.93	1.02	1.39	0.91		
GPA is very important to me	Mean	3.87	3.27	3.03	3.05	2.90	3.50	3.22	14.709	0.000**
	SD	0.96	1.01	1.03	1.07	1.24	1.09	1.06		
I am interested in the subject	Mean	3.83	3.61	3.31	2.99	3.00	2.57	3.43	19.343	0.000**
	SD	0.99	0.90	0.91	1.02	1.30	1.02	0.98		
I tend to study to verify my potential	Mean	3.94	3.78	3.63	3.69	3.54	3.07	3.72	4.335	0.001**
	SD	1.07	0.89	0.94	0.97	0.98	1.21	0.95		

\* <.05, \*\*<.01

### Study 3: Use of Learning Strategies in Offline and Online Environments

For the third question of this research, we analyzed learners' using learning strategies affected whether they are in a traditional face-to-face university and an online university. Table 7 shows the result of t-test analysis. Online distance learners tended to cram significantly less than traditional offline learners ( $p < .01$ ). And online learners were apt to try to solve problems by themselves independently when they were confronted with a difficult task ( $p < .01$ ) and they prefer self-planning for their learning to teacher's pre-set learning pace ( $p < .05$ ). There was a difference between offline and online learners in motivation by the interest of subjects ( $p < .01$ ).

**Table 7.** *T-Test on Using Learning Strategies between Offline and Online Environments*

Questions	Offline Learners		Online Learners		t	P
	Mean	SD	Mean	SD		
I tend to take notes all that teachers say in the class	3.27	1.014	3.22	0.962	0.395	0.693
I tend to cram for my exams	3.86	0.965	3.56	0.851	2.515	0.012**
I prefer self-planning for my learning to pre-set learning pace	3.07	0.913	3.32	1.105	-1.987	0.048*
When I do not understand something, I do not ask others' help but try to solve a problem for myself	3.61	0.914	3.99	0.75	-3.698	0.000**
I prefer a course with well-structured plan	4.23	0.716	4.17	0.685	0.671	0.504
I organize the contents during the reading rather than after the reading	2.93	1.145	3.19	1.108	-1.745	0.082
I try to grasp of the point when I study	4.08	0.743	4.16	0.715	-0.836	0.404
I tend to make a time plan when I study	3.35	0.941	3.41	0.946	-0.471	0.638
I tend to overview learning materials first for planning a study process before study	4.00	0.908	3.91	0.778	0.722	0.471
I tend to set objectives before study	3.89	0.842	3.81	0.743	0.732	0.465
GPA is very important to me	3.66	0.982	3.59	0.946	0.528	0.598
I am interested in the subject	3.47	0.863	3.98	0.591	-4.902	0.000**
I tend to study to verify my potential	3.04	0.972	2.84	1.042	1.527	0.128

\* <.05, \*\*<.01

## CONCLUSION AND IMPLICATION

This research is to find out which learning strategies are more critical for better learning achievement in higher education. For this research question, learning strategies were compared between high SAT group and low SAT group, and between traditional offline students and online distance students. Also learning strategies were analyzed by GPA within a same SAT group. Conclusions and implications are as follows;

- 1) **Online environment can be a good treatment to train learning strategies;** Higher SAT students and higher GPA students are better in time management by autonomous self regulation. This shows that autonomous self regulated time management is a critical strategy for excellent student as previous literature (Mandinach, 1987; Shapiro, 1988; Zimmerman & Shunk, 1989) reported. But the result in this research that online learners showed similar pattern on this factor regardless of their achievement level implies that online environmental factor would influence learners' learning pattern and it can be a good treatment to train some learning strategies. Corno (1989) and Shapiro (1988) insisted that using learning strategies can produce better learning achievement and we can teach students those learning strategies. But it has not been clearly showed yet what makes students use the learning strategies. In this context, we can suggest a university use online environment appropriately in a traditional class so to make students use a useful learning strategy for autonomous self regulation.

- 2) **Environmental factor matters for using learning strategies;** this research showed that higher GPA students and online students are more independent using similar learning strategies in their learning than lower GPA students and offline students. This result provokes where the attributes for excellent achievements come from. Zimmerman & Shunk (1989) described that self-regulated learning theories assume that certain learning strategies are used on purpose for better achievement. But it's not clarified yet whether using learning strategies comes from a learner's genetic ability or from an environmental factor. Researchers on learning strategies reported excellent achievement comes from using learning strategies which seem to be different from genetic potential of a student. But this is basically a matter of a chicken and egg issue; neither 'an excellent genetic brain makes a student use a certain learning strategy so to get an excellent achievement' nor 'using a certain learning strategy (environmental factor) produces an excellent achievement so to make an excellent student'. In this context, this research shows the possibility of environmental influence. Regardless of achievement level, online environment makes student use similar learning strategies to higher achievement group in this research. This implicates that providing an environment requiring such self-regulated learning strategies like e-learning can be a useful treatment for students to use learning strategies. That is, environmental factor matters to train learning strategies.
- 3) **A tailored learning strategy than a universal learning strategy;** Regarding of cognitive learning strategy, higher SAT students and higher GPA students within the highest SAT group showed similar pattern especially picking up a point and overview first before reading carefully. Higher GPA students also take notes all of teacher's saying rather than summarizing. This means excellent students are using certain cognitive learning strategies different from poor students and there are still differences using learning strategies even for the highest excellent students. But universities have been providing universal learning strategy workshop programs for all students at a time. So learning centers in a university need to provide more tailored 'learn how to learn' program considering individual students rather than a universal learning strategy program.

Meanwhile, Lower SAT group and higher GPA group - even within the highest SAT group - prefer well-structured course. This result could be confusing since the pattern is not consistent by learning achievement level. However, this is found to be exactly same as the pattern of "GPA is very important to me". Lower SAT students and higher GPA students perceive that getting better GPA is very important to them. That is, we can assume that the more students regard GPA highly, the more they prefer well-structured course, maybe because well-structured course makes them plan and design their learning much easier. It would be very confusing in planning their learning pace if the course is not well structured.

Findings and implications in this paper can be developed in further study considering limitations of this research. First, the learning strategies applied in this research are not all of learning strategies. Further research with other various kinds of learning strategies would enrich the interpretation of this research. Second, it would be very interesting to investigate differences of using learning strategies by GPA as well in online universities only. It is expected to show some meaningful pattern especially in autonomous and independent self regulation. Third, an experimental study can be designed to find out if a same learner shows any difference of using learning strategies in an offline environment and in an online environment. Then it would be more firmly verified whether the online environment is a critically useful factor in using more self-regulatory learning strategies. Fourth, this study is based on a large amount data. Large sample size promotes the differences in t test or F test. Therefore this study could have limitations to increase Type I error. Consequently, more studies of differences according to learners' characteristics are suggested for further study.



## REFERENCES

- Clark, T. (1993). Attitudes of higher education faculty toward distance education: a national survey. *The American Journal of Distance Education*, 7(2), 19-33.
- Cornford, I. R. (2002). Learning-to-learn strategies as a basis for effective lifelong learning. *International Journal of Lifelong Education*, 21(4), 357-368.
- Corno, L. (1989). Self-regulated learning: a volitional analysis. In B. J. Zimmerman & D. H. Shunk, (Eds.), *Self-regulated learning and academic achievement: theory, research and practice* (pp. 111-141). New York: Springer-Verlag.
- Dansereau, D. F. (1978). The development of a learning strategies curriculum. In O'Neill, H. F. (Eds.), *Learning strategies* (pp. 1-29). New York: Academic Press.
- Day, V. P., & Elksnin, L. K. (1994). Promoting strategic learning. *Intervention in School and Clinic*, 29, 262-270.
- Everson, H. T., Weinstein, C. E. & Laitusis, V. (2000). Strategic learning abilities as a predictor of academic achievement. Paper presented at the Annual Meeting of the American Educational Research Association. New Orleans, LA. April 24-28.
- Garavalia, L. S., & Gredler, M. E. (2002). Prior achievement, aptitude, and use of learning strategies as predictors of college student achievement. *College Student Journal*, 36(4), 616-625.
- Hadwin, A. F. Winne, P. H., Stockley, D. B., Nesbit, J. C. & Woszczyna, C. (2001). Context moderates students' self-reports about how they study. *Journal of Educational Psychology*, 93, 477-487.
- Hofer, B. K., & Yu, S. L. (2003). Teaching self regulated learning through a learning to learn course. *Teaching of Psychology*, 30(1), 30-33.
- Hong, S. Y. (2009). *Online learner competency modeling for improving learner support system in distance university*. Doctoral dissertation, Seoul National University.
- Jinhaksa (2009). *University SAT scores data* [Data file]. Retrieved from <http://www.jinhak.com/>
- Kerr, M. S., Rynerson, K., & Kerr, M. C. (2006). Student characteristics for online learning success. *Internet and Higher Education*, 9, 91-105.
- Kesici, S., Sahin, I., and Akturk, A. O. (2009). Analysis of cognitive learning strategies and computer attitudes, according to college students' gender and locus of control. *Computers in Human Behavior*. 25(2), 529-534.
- Kiewra, K. A. (2002). How classroom teachers can help students learn and teach them how to learn. *Theory into Practice*, 41, 71-80.
- Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher*, 28(2), 16-25.
- McCann, E. J., & Turner, J. E. (2004). Increasing student learning through volitional control. *Teachers College Record*, 106, 1695-1714.
- Mandinach, E. B. (1987). The Use of Simulations in Learning and Transfer of Higher-Order Cognitive Skills. Paper presented at the *American Educational Research Association* (Washington, DC, April 20-24, 1987).
- Meltzer, L., Reddy, R., Rollica, L. S., Roditi, B., Sayer, J., & Theokas, C. (2004). Positive and negative self-perceptions: is there a cyclical relationship between teachers' and students' perceptions of effort, strategy use, and academic performance? *Learning Disabilities Research & Practice*, 19(1), 33-44.
- Shapiro, B. P. (1988). *Effects of written metacognition and cognitive strategy instruction on the elementary algebra achievement of college students in a remedial mathematics course*, Columbia University, Doctoral dissertation.
- Song, K. (2009, 12, 21). 0.1% of students with the highest SAT scores for admission to Seoul National University in Korea: College of Humanities-623, College of Natural Science-586. *Munwhailbo*. Retrieved from <http://www.munhwa.com/news/view.html?no=20091221010708271050041>
- Vermunt, J. (1996). Metacognitive, cognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Journal of Higher Education*, 31(1), 25-50
- Weinstein, C. E., & Mayer, R. E. (1986). The teaching of learning strategies. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching* (pp.315-327). New York: Macmillan Publishing Company.
- Zhang, T. (2005). *Perceived gains in critical thinking of online learners: Effects of motivation and learning strategies*. Pennsylvania State University. Doctoral dissertation.
- Zimmerman, B. J., Bonner, S., & Kovach, R. (1996). *Developing self-regulated learners: beyond achievement to self-efficacy*. Washington, D. C.: American Psychological Association.

- Zimmerman, B. J., & Martines-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, 23(4), 614-628.
- Zimmerman, B. J. & Shunk, D. H. (1989). *Self-regulated learning and academic achievement: theory, research and practice*. New York: Springer-Verlag.