



The Assessment of Academic Self-Regulation and Learning Strategies: Can they Predict School Ability?

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Abstract The present study assessed high school students' self-regulation and the use of learning strategies. The study also determined whether they can predict school ability. Based on the social cognitive theory, individuals' use of powerful learning strategies (i. e., self-regulation and learning strategies) can build on students' school ability. Three questionnaires that include the Academic Self-regulated Learning Scale (A-SRL-S), Learning Strategy Scale (LSC), and Otis Lennon School Ability Test (OLSAT) were administered to 350 high school students in Manila. Structural Equations Modeling (SEM) was used to test the effect of A-SRL-S and LSC on OLSAT. Contrary to our hypothesis both self-regulation as well as learning strategies did not have a significant effect on school ability. The overall model attained a good fit (RMSEA= .07; PGI= .94; GFI= .91; AGFI=.88). Results indicate that high self-regulation and usage of learning strategies do not predict school ability. However, the relationship between the A-SRL-S and LSC marked construct validity.

Keywords: self-regulation, learning strategies, school ability

Introduction

Assessing students' abilities is better understood by determining specific ways how individuals attain it. Over the past two decades, many studies have reported different assessment techniques to assess specific learning strategies and how it predicts specific outcomes such as performance. In the domain of educational psychology, learning strategies scales are administered to students determining how well they predict students' performance. Students performance is generally measured using students' grades at the end of a semester or quarter (Magno, 2011a; Zimmerman & Kitsantas, 2005, 2007). The assessment of students' use of learning strategies implies and advocates a more autonomous production of learning. This entails that the approach in teaching is scaffolding students not on content but rather on ways of acquiring and processing information better. It is an undeniable fact that many students pass through the educational systems without having an active role in their learning process (Magno, 2009a; Paris & Paris, 2001). Aside from looking at the benefits of such learning strategies on students' grades at the end of a semester or a school year, it is

about time to use other outcomes such as school ability (Magno, 2009b). Although it became a central topic of discussion among the educational researchers, the significance of both learning strategies and self-regulation in promoting students' school ability has not paid much attention in the existing educational patterns. Not all students are encouraged in pursuing specific academic tasks and learning methods especially if these are not espoused in the curriculum (Zimmerman, 2002). As a result, many students could not attain a better academic achievement (Güven, 2008). There are very few countries in Southeast Asia that make learning strategies and executive skills play a central role in their curriculum. For example, in the Singapore curriculum in learning mathematics, metacognition is one of the specific areas taught to students in all levels. The national curriculum explicitly explains how metacognition is beneficial especially in problem solving. The same is the case of Malaysia in their science curriculum where the use of learning strategies is mentioned in the production of science and technology. In the New South Wales curriculum, one of the skills in its language curriculum puts the acquisition of self-regulation and learning strategies. In the Philippines, the K to 12 policy report includes a recommendation in the integration of self-regulation across the subject areas but it was not emphasized in the new curriculum. The difference in the use of learning strategies are reflected in the inter country survey of mathematics and science ability such as the Third International Mathematics and Science Survey (TIMSS) and Programme for International Student Assessment (PISA). In these surveys of student abilities, the Philippines is one of the countries that are placed at the lowest ranks as compared to Singapore, Malaysia, and New South Wales. This reflects the lack of skills that students have acquired which made them less competitive with those coming from such countries.

Several researchers had shown consistent effects of self-regulation (Magno, 2009; Zimmerman, 2000; Kitsantas, Winsler, & Huie, 2008) and learning strategies (Lee, Lim, & Grabowski, 2010; Zumbunn, Tadlock, & Roberts, 2011) as predictors of academic achievement (Gettinger & Seibert, 2002; Soric & Palekcic, 2009). The present study mainly focuses on the direct influence of learning strategies and self-regulation on school ability.

The social cognitive theory explained the role of self-influence behind every human behavior (Bandura, 1991). The model of triadic reciprocal determinism describes the behavioral, cognitive, and environmental factors as interacting determinants which influences each other (Bandura, 1989). Cognitive factors such as self-regulation and learning strategies are both combined in the present study to assess their influence on students' school ability.

Learning Strategies

Learning strategies are learning behaviors that facilitate learners to process information. They are the techniques such as rehearsal, elaboration, comprehension, monitoring, etc. that students use in the learning process. Learning strategies help students monitor and adjust their learning strategies. It may include checking the content of the study, judging learning difficulties, assessing progress, and predicting learning outcomes (Cheng, 2011).

Learning strategies are the behaviors and thoughts of a learner in achieving their own learning goals. These strategies facilitate the learners encoding, storing, and retrieving of information (Weinstein & Mayer, 1986). Cheng (2011) explains learning strategies as 'learning to learn' process that involves effective management of time and information. Other learning strategies would involve effective note taking as a key to obtain maximum input in

the classrooms. Note taking resulted in the assimilations of one's prior knowledge and the current knowledge (Baldwin, 2010; Huxham, 2005). The practice of learning strategies can be integrated in making daily assignments and can further be developed starting from the primary schools. Once learning strategies are internalized, the student could 'fix-up' their own strategies and could practice it in appropriate situations. The students get ample chances in applying these strategies in the classroom curriculum (Gettinger & Seibert, 2002; Zimmerman, 2002).

According to Dembo and Eaton (2000), most of the students struggle without realizing a proper effective strategy. The students' attempt of choosing a learning strategy should be helped and facilitated by their teachers. Students that are successful and unsuccessful in accomplishing learning materials are greatly differentiated in their use organizational learning strategies (Soric & Palekic, 2009). Comparison between successful and unsuccessful students proved that reading comprehension rating is very high among successful students. Students who are successful in their reading comprehension were facilitated by teachers in the use of learning strategies.

The four phase model of Schunk (1995) and Zimmerman (1998) proposed the development of students' learning strategies. In this model, the first phase involves students being helped in developing certain skills such as writing and note taking strategies. The second phase mainly deals with making clear about the objectives and strength of having writing strategies. The third phase is the actual use of appropriate self-writing strategies. In the fourth phase, the student memorizes the steps of writing strategies and maintaining creative meanings.

Another perspective in developing learning strategies was proposed by Cheng (2011). The model uses a method of asking the students to demonstrate their own strategies to assess the mindfulness of each one of their learning strategies.

Zimmerman and Cleary (2004) on the other hand proposed that monitoring behaviors help the students identify the new learning strategies which can be used in the attainment of goals. Otherwise, there may have a tendency in continuing the same ineffective strategy.

Self-regulation

Self-regulation is a complex and multi-faceted process which assists students in regulating their own thoughts and behaviors which in turn helps them to be successful in their learning process (Zumbrunn, Tadlock, & Roberts, 2011; Zimmerman & Cleary, 2004; Lee, Lim, & Garbowski, 2010). It has several subsidiary cognitive processes such as self-monitoring, standard setting, evaluating judgment, self-appraisal, and affective self-reaction (Bandura, 1991). Zimmerman (2000) further explains that self-regulated learners are characterized to be "proactive in their efforts to learn because they are aware of their strengths and limitations and that they are guided by personally set goals and task-related strategies" (p. 66). Students who are self-regulated should be able to adapt their learning strategies by acquiring the necessary information. This helps them in tailoring several strategies in different context and in specific learning situations (Gettinger & Seibert, 2002). In other words, self-regulation is manifested by proactive learners who could regulate their behaviors and thoughts in three cyclical phases such as fore thought (before the learning efforts), performance control (during the learning efforts), and self-reflection (after the

performance) (Zimmerman, 2000). In the process of self-regulation, the students may sacrifice the short term outcomes when they aim at certain high achievement.

Previous studies have gradually showed that the students who are following the self-regulated learning strategies give more emphasis on the time management, learning environments, and the systematic use of behavioral strategies consistent with the social cognitive theory (Zimmerman, 1990; Kitsantas, Winsler, & Huie, 2008; Soric & Palekic, 2009; Corno & Boekernes, 2005).

Studies on self-regulation are consistent in some factors such as setting goals, monitoring the learning processes, evaluating the learning outcomes, and developing varied instructional methods in achieving the goals (Pintrich, 2000; Eaton, 2000; Zimmerman & Cleary 2004; Cheng, 2011; Schunk, 1995; Farsani, 2011; Lindlan, 2011; Magno, 2010). Zimmerman and Martinez-Pons (1987) started with 14 different strategies of self-regulation. Magno (2010) was able to extract seven self-regulation components in an academic setting: memory strategy, goal-setting, self-evaluation, seeking assistance, environmental structuring, learning responsibility, and organizing. These seven factors are used in the present study given that the participants are Filipino college students.

School ability is an important outcome in the study of self-regulation and learning strategies (Baird, 1982). The students who have high levels of school ability could implement and attain their academic goals more effectively (Magno, 2009). Majority of studies on self-regulation and learning strategies generally made use of academic achievement as the outcome (Baldwin, 2010; Hurk, 2006; Kitsantas, 2008; Seibert, 2002; Soric & Palekic, 2009). These studies were consistent in reporting that certain learning strategies such as organization-structuring materials, time planning, and rote learning are the significant predictors of academic achievement. The effective use of metacognitive learning strategies as opposed to ineffective use of it results in high achievement and the latter to low academic achievement. Several researches indicate the significance of adapting self-regulatory learning strategies both in traditional as well as web-based learning environments in order to attain a higher achievement (Boekaerts, 2005; Zimmerman, 1986; Zimmerman, 1990). Magno (2010, 2011) showed the predictive validity of the academic self-regulation scale on college students' GPA. He further explained the notion that these strategies help one to achieve better academic performance.

The Present Study

The present study combines both self-regulation and learning strategies in order to predict school ability. The idea of combining self-regulation and learning strategies will further support how powerful would the amalgamation be in predicting the desired outcomes. This supports the concept that covert self-regulation helps the learner enhance the learning outcome from their overt use of learning strategies (Lee, Lim, & Grabowski, 2010). Their combined effects clarify further how they interplay and appear similar with each other. Both the self-regulation and learning strategies conceptually share common characteristics such as goal attainment, monitoring, and organizing. These commonalities serves to construct validate each measure to prove the similarity in the components the two instruments used.

The most common outcome on the predictive studies of self-regulation and learning strategies is usually academic achievement as measured by students' grades. The studies are also consistent in reporting that the higher the use of self-regulation and learning strategies, the higher the students' achievement in school would also be. It is about time to consider

other measures for the outcome of self-regulation and learning strategies. The social cognitive framework allows a more general outcome for the effects of self-regulation. If self-regulation and learning strategies consistently predict academic achievement, they should be able to predict school ability which is a close measure of achievement. However, school ability is a more innate construct pertaining to students' ability in the areas of abstract thinking, logical reasoning, verbal, quantitative, and spatial skills (Beal, 1996). Students' achievement in school shapes their attained ability.

Assessing the effects of self-regulation and learning strategies on school ability would reflect how successful is schooling in developing students' use of such executive skills and whether these executive skills are able to translate into students' ability. Students who have properly developed self-regulation and learning strategies should not only reflect in what they can perform at the end of the course but rather how much internalization the strategies have been built as measured by their ability in school.

Self-regulation and learning strategies in the present study are correlated in order to determine their similarity and further prove their construct validity. Their prediction on school ability as measured by the Otis-Lennon School Ability Test (OLSAT) further supports their predictive validity on school ability outcomes. This prediction would also reflect how effective is the use of executive skills (self-regulation and learning strategies) for the sample selected.

Method

Research Design

The explanatory cross-sectional design was employed in the study (Johnson, 2001). The self-regulation and learning strategies are hypothesized to produce change in the explained variance for OLSAT. It is cross-sectional because the data were collected from the participants at a single point in time.

Participants

The participants in the study were 350 high school students from three private schools in Manila. The participants included students from first to fourth year (years 7 to 10). The sample consisted of 196 males and 154 females. The age of the participants ranged from 13 to 17 years.

Instruments

Learning Strategy Scale. Learning strategy Scale was developed by Guven (2008) based on Weinstein and Mayer's Learning Attitude and Study Strategies Inventory. The five factors of this scale cover elaboration, comprehension monitoring, organizational, affective, and rehearsal strategies. The internal consistency value between the main scale and subscale was found as acceptable. The item-total correlations coefficients range from .20 to .56. As a result of validity analysis, 35-item Learning Strategies Scale with five factors was developed and these five factors were consistent with the aspects of the learning strategies explained in previous studies. The variance value explained with five factors was calculated as 42.97% (Guyen, 2008).

Academic Self-regulated Learning Scale (A-SRL-S). The A-SRL-S was developed by Magno (2010) to measure self-regulation of students applicable for the high school to college level. Participants are instructed to indicate their level of agreement or disagreement with each statement on a four-point Lickert scale (strongly agree, agree, disagree, and strongly disagree). The seven factors of this scale include memory, goal setting, self-evaluation, seeking assistance, environmental structuring, learning responsibility, and organizing. The seven factor structure was confirmed using Confirmatory Factor Analysis (CFA) using both high school and college students. The internal consistencies for the seven factors range from .73 to .87. The seven factors also showed convergent validity where all the seven factors were highly intercorrelated (Magno, 2010). Using a polytomous Rasch model, the scale step functions were appropriate and all items showed to have appropriate MNSQ values that are within range. The predictive validity of the seven factors on students' grades at the end of a semester was also established (Magno, 2011a). The scale's construct validity was also established where the seven factors were significantly correlated with the LASSI and MSLQ (Magno, 2011b).

Otis Lennon School Ability Test (OLSAT). The OLSAT, one of the most widely used general school ability tests. It is designed to assess the cognitive abilities of a student's ability with levels for primary through college. The total score of the OLSAT is called the School Ability Index (SAI) which comprises the verbal and nonverbal scores. The main areas of assessment contain recalling, defining, classifying, solving arithmetic problems, and logical thinking. It is a structured test and difficult questions are followed by easier ones. The internal consistency of this test using the Kuder-Richardson gained coefficients between 0.90 and 0.94. Comparing the OLSAT scores and achievement scores also indicated the validity (Beal, 1996; Magno, 2009).

Procedure

Permissions were sought from the schools prior to the test administration schedule. The three questionnaires: Learning Strategies Scale, Academic Self-regulated Learning Scale (A-SRL-S), and Otis Lennon School Ability Test (OLSAT) were administered to the students during their class time. They were debriefed about the purpose of the study and were instructed as to how to answer each measure. They were told to answer all the questions without leaving any items blank. On completion, the questionnaires were gathered and the students were thanked for their cooperation.

In the analysis, the means and the standard deviations were used to determine the levels of the factors. The factors were intercorrelated to establish the relationship among the variables.

The Structural Equation Modeling (SEM) was used to test the model. In the SEM, learning strategies and self-regulation were the latent exogenous variables and Otis Lennon School Ability Test (OLSAT) was the endogenous latent variable. Rehearsal strategies (RS), elaboration strategies (ES), organizing strategies (OS), comprehension monitoring strategies (CM), affective strategies (AS) are used as the manifest variables of the learning strategy. The memory strategy, goal-setting, self-evaluation, seeking assistance, environmental structuring, learning responsibility, planning and organizing made up the manifest variables for self-regulation. Three parcels were created to serve as the manifest variables for the OLSAT. The

SEM was used as modeling technique where the effects of both LS and A-SRL-S on OLSAT were investigated. The goodness of fit was tested. The fit indices that were used were Chi-square, Root Mean Square Error Approximation (RMSEA), GFI (Goodness of Fit Index), Adjusted Goodness of Fit Index (AGFI), and Adjusted Population Gamma Index (APGI).

Results

Descriptive statistics for the measures of learning strategy, self-regulation, and school ability were obtained. Intercorrelations of the subscales were computed and the proposed model was tested using structural equation modelling.

Table 1
Means and Standard Deviations of LS, A-SRL-S and OLSAT

Variables	<i>N</i>	<i>M</i>	<i>SD</i>	Cronbach's alpha
Learning Strategies (LS)				
Elaboration (ES)	350	3.99	0.47	.78
Comprehension Monitoring CM	350	3.60	0.71	.77
Organising (OS)	350	3.32	0.58	.77
Affective (AS)	350	4.05	0.63	.79
Rehersal (RS)	350	3.94	0.78	.82
Self-Regulation (SR)				
Memory (MS)	350	3.03	0.39	.84
Goal-setting (GS)	350	3.19	0.57	.85
self-evaluation (SE)	350	3.24	0.39	.90
Seeking assistance (SA)	350	3.15	0.39	.91
Environmental structuring (NS)	350	3.15	0.54	.92
Learning Responsibility (LR)	350	3.13	0.51	.84
Planning and organising (PO)	350	3.22	0.48	.88
School Ability (OLSAT)				
Parcel 1	350	0.72	0.08	
Parcel 2	350	0.76	0.09	
Parcel 3	350	0.75	0.08	

Table 1 shows the means and standard deviations obtained for the subscales of learning strategy, self-regulation, and school ability. The means of the scores for the subscales of learning strategy range from 3.32 to 3.99. For self-regulation, the mean scores range from 3.03 to 3.22. The average score per item on the OLSAT is 0.77.

The obtained Cronbach's alpha for all the items of learning strategies is .76, for self-regulation is .86, and for OLSAT is .66. All Cronbach's alpha coefficients indicate a good internal consistency among the items.

Intercorrelation among the variables was also computed to establish the relationship of the variables. It helped to determine the variance accounted for by the variables comprising learning strategies, self-regulation, and school ability.

Table 2
Zero Order Correlation among Learning Strategy, Self-regulation, and School Ability

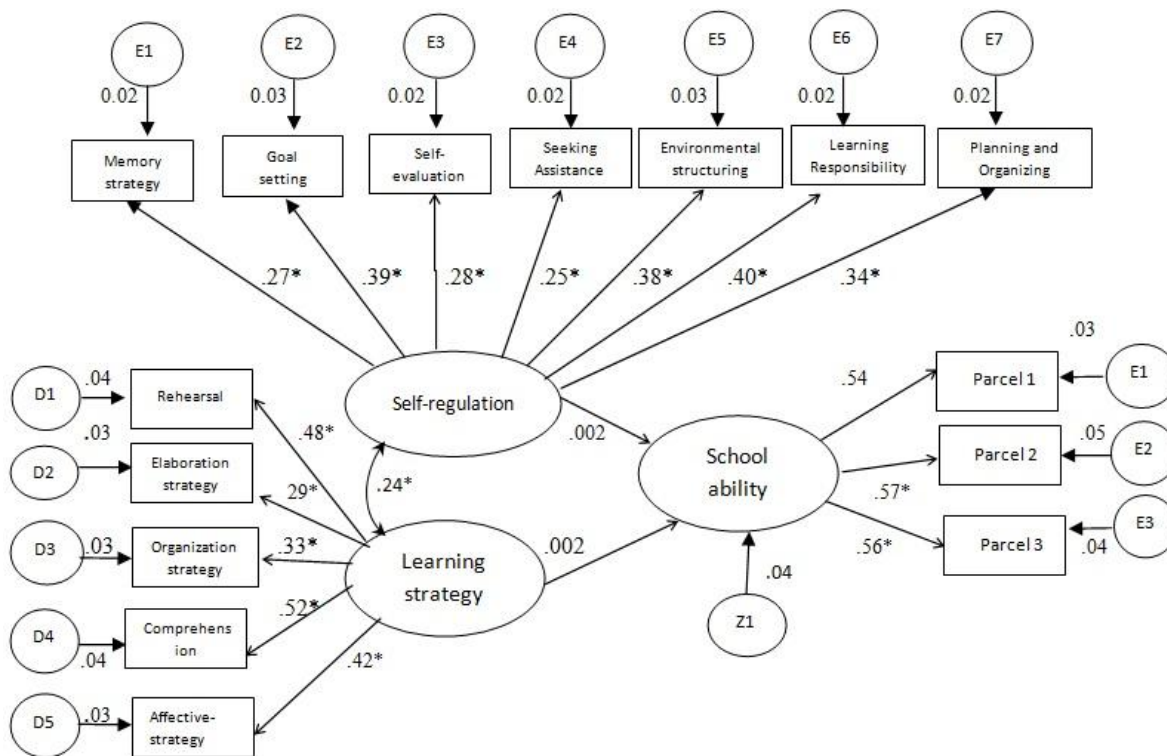
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Learning Strategies															
1 Elaboration															
2 Comprehension Monitoring	.43*														
3 Organizing	.44*	.41*													
4 Affective	.36*	.51*	.33*												
5 Rehearsal	.38*	.44*	.29*	.45*											
Self-regulation															
6 Memory strategy	.41*	.33*	.21*	.28*	.28*										
7 Goal-setting	.35*	.35*	.13*	.28*	.28*	.54*									
8 Self-evaluation	.37*	.29*	.17*	.32*	.29*	.52*	.55*								
9 Seeking Assistance	.30*	.27*	.14*	.31*	.18*	.43*	.37*	.50*							
10 Environmental Structuring	.28*	.31*	.39*	.26*	.21*	.47*	.48*	.45*	.41*						
11 Learning Responsibility	.36*	.32*	.16*	.26*	.26*	.53*	.53*	.49*	.44*	.60*					
12 Planning and Organizing	.34*	.26*	.27*	.25*	.25*	.52*	.38*	.49*	.51*	.49*	.62*				
OLSAT															
13 Parcel 1	.05	.01	.30	.01	.04	.02	.05	.02	.04	.07	.01	.01			
14 Parcel 2	.02	.02	.03	.02	.06	.01	.03	.03	.08	.03	.04	.03	.51*		
15 Parcel 3	.08	.07	.02	.08	.07	.06	.07	.08	.02	.01	.02	.01	.55*	.57*	

* $p < .05$

All correlation coefficients between learning strategy and self-regulation were found significant. School ability did not significantly correlate with the factors of learning strategy and self-regulation. Moderate to strong correlations were found among the subscales of learning strategies ($r=.29$ to $r=.51$) and self-regulation ($r=.13$ to $r=.60$). The intercorrelations within OLSAT was high for all three parcels ($r=.75$ to $r=.77$).

A model where both learning strategies and self-regulation were used to predict school ability was tested using SEM. In the analysis, all parameters of the learning strategy, self-regulation, and school ability were significant. All the manifest variables contributed significantly their respective latent variable.

Figure 1
Structural Equations Model Showing the Effect of Learning Strategies and Self-regulation on School ability



The results showed that the effect of learning strategy (0.002, $p = 0.758$) and self-regulation on school ability (.002, $p = .628$) are not significant. However, the relationship between learning strategy and self-regulation are significant. The significant relationship between the self-regulation and learning strategies indicates further the construct validity of each scale.

The goodness of fit was obtained as follows: RMSEA= .07; PGI= .92; GFI= .91; AGFI=.88. Overall, the model attained adequate fit. The values demonstrate that the indices are within the required estimates. The χ^2 (269.21, df=88) value was significant. The χ^2 test is very sensitive to large sample sizes which indicate bad fit (Hu & Bentler, 1995). However, the other absolute fit indices indicate that the model is a good fit.

Discussion

The present study assessed self-regulation and learning strategies to find if they can affect high school students' school ability. The results of the present study demonstrated that both self-regulation and learning strategies have no significant effect on school ability. The zero order correlation also showed that the two factors are not related to school ability. This results were not consistent as hypothesized (Dembo & Eaton, 2000; Magno, 2011; Soric & Palekic, 2009) explaining the effectiveness of both learning strategies and self-regulation to build student ability as an outcome. However, it was found in the study that both learning

strategies and self-regulation are significantly related both in the zero order correlation and Structural Equations Modeling.

The inability of the findings to support the predicted effects of both self-regulation and learning strategies could be attributed to the differences in the outcomes measured used. Previous studies commonly use achievement results such as performance on a specific task, grades, and other achievement indicators. In the present study, the outcome used is ability based which is more innate to the individual. The kind of outcome selected to study the effects of self-regulation and learning strategies can make a difference. This indicates that both self-regulation and learning strategies are meant to build on achievement skills of students and this becomes effective even at a short period of time. However, in such cross-sectional studies, ability would not become too sensitive in its change of variance. There is an indication that when self-regulation and learning strategies are sequentially assessed overtime and ability in school is the outcome perhaps the change in variance can be observed.

The lack of significant effect of both learning strategies and self-regulation on school ability is an indication that most of the students are not recognizing the need for varied approaches of studying and learning. There are specific strategies for different study tasks and the study tactics for each one is varied according to it. Students need to pay more attention in modifying and personalizing their own strategies in order for them to have a change in their abilities (Gettinger & Seibert, 2002).

The non-significant relationship between self-regulation and school ability may indicate the lack of proper instructions and modeling by parents, teachers, coaches and peers. Rather depending on socially isolated methods of learning, the self-regulated students will be more active in adopting the specific learning practices in social to improve their learning. They will be dynamic in social as well as solitary contexts with their perseverance, and adoptive skill. This results points out the need for teaching self-regulated learning processes.

Pedagogically speaking, the teachers have to focus on creating awareness among the students with regard to the need of having self-regulation and effective strategies which in turn promote not only academic achievement but the internalization of the strategies to make a difference in one's ability. Developing goal-oriented learning among the learners should be an object in the present education settings. This will increase the current level of academic ability among the students (see Zumbrunn, Tadlock, & Roberts, 2011).

The findings of the present study call for effective study strategy training and instructions that need to be introduced. The curriculum should make explicit that students should be encouraged to think and be organized in their thinking process to better perform in higher order tasks. Developing their own strategies and effective processing will enhance better ability among students.

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