



SELF-REGULATED LEARNING STRATEGIES AS CORRELATES OF ACHIEVEMENT IN BIOLOGY AMONG SECONDARY SCHOOL STUDENTS

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ABSTRACT

The innovative learning strategies such as self-regulated learning strategies help the learners to become autonomous and attain higher achievement in the learning. The objective of the study was to find out the relationship between self-regulated learning strategies and achievement in biology among higher secondary school students. Survey method was conducted on a stratified random sample of 618 XII standard students of Kozhikode district. Result found that self-regulated learning strategies were much importance in achievement in biology among higher secondary school students.

KEYWORDS: Self-Regulated Learning Strategies, Achievement in Biology.

INTRODUCTION:

Education is the process of human empowerment to achieve better and higher quality of life. Education is the principle instrument of developing capabilities of an individual. One of the major aim of education is the all-round development of an individual.

The innovative learning strategies help to achieve higher grade and self-confidence among learners. Learning strategies refers to “students’ self-generated thoughts, feelings and actions, which are systematically oriented towards the attainment of their goals” (Hasenbegovic, 2016).

Self-Regulated Learning is an active self-guided learning. Zimmerman (1989) defined “self-regulation as the extent to which the students actively participate in their learning processes with respect to metacognition, motivation, and behavior”. One of the fundamental factors that affect the learning process based on self-regulation is self-regulated learning strategies. Self-regulated learning strategies are cognitive, metacognitive, motivational, contextual and behavioural strategies, (Pintrich & De Groot, 1990).

According to the researcher’s in this field, the students who are use self-regulated learning strategies in their learning, they acquire higher grade in their learning and are also different from other students. The implementations of SRL strategies in classroom will helps the learning became more enjoyable and easiest one. Today’s educational researches in society emphasis on how the students learn the subjects. In the last few decades, research has shown that learners have so much to contribute to the process of learning which, if acknowledged, accepted and supported by the system, would be deeply conducive to create a learning society. The renewed focus on the phenomenon of life-long learning also advocates nurturing autonomy among the learners in the initial stage itself.

NEED AND SIGNIFICANCE OF THE STUDY

Education is life itself. By education one should develop the capacities for successful life. Researchers indicated that well developed cognitive skills are very essential in the day to day life of person.

Science has become an integral part in the school curriculum. Science education promotes co-operation, tolerance, open mindedness, and spirit of inquiry. It helps to develop curiosity, creativity among learners.

The context of educational psychology has seen profound changes over the last 40 years; due to these, self-regulated learning has become a current focus for research, and one of the essential axes of educational practice (Pintrich, 2000; Reynolds & Miller, 2003) currently learning is conceived of as an active, cognitive, constructive, significant, mediated and self-regulated process (Beltran, 1996).

Today's classroom teaching is learner centered, but it cannot be implemented in proper way. Secondary school teachers concentrate on completing their portion within the prescribed time period. Teacher give emphasis on the grade awarded in the examination of the students, did not give attention to the student's all-round development. As the primary aim of education is the overall development of the students, to attain this aim Self-regulated Learning (SRL) strategies has to be adopted by the teachers in the classroom. By implementing SRL strategies learners become independent and autonomous in their learning. But these type of learning strategies are not included in the secondary level. The SRL strategies are important strategies for creating a constructivist class room. The teacher helps the children to take responsibility for their own learning and learning experiences. The children become more independent and self-confident in seeking new information. Self-regulated practices are helpful for increasing autonomy and independence.

Self-regulation is an important factor for effective learning. It is neither a measure of mental intelligence that is unchangeable after a certain point in life nor a personal characteristics that is genetically formed early in life. Students learn self-regulation through experience and self-reflection. Teachers can help the students to become self-regulated learners. Self-regulated learning is appropriate for students, as they have great control over their own time schedule and how they approach their studying and learning. According to social cognitive theorists students who are successfully regulate their effort initiate learning tasks, set goals, decide appropriate strategies to attain their goals, then monitor and evaluate their learning progress do better than students who do not (Pintrich 2003).

Self-regulated learning is an important factor of student learning and academic achievement in the class room performance. Researches shows that the students who are use the self-regulated learning strategies in their learning will perform better than the other students who are not in use of the self-regulated learning strategies(Broadbent & Poon, 2015; Nwafor, Abigail and Gabriel, 2015).From the review of related studies it is found that the self-regulated learning enhances the performance of the students. The self-regulated learning strategies will enhance the cognitive structure, academic performance and achievement of the students. The use of self-regulated strategies helps the learner become more independent, autonomous and lifelong learner.

OBJECTIVES

- To find out the relationship between self-regulated learning strategies and achievement in biology among higher secondary school students.

HYPOTHESES

1. There is no significant relationship between cognitive self-regulated learning strategies and achievement in biology among higher secondary school students.
2. There is no significant relationship between meta cognitive self-regulated learning strategies and achievement in biology among higher secondary school students.
3. There is no significant relationship between contextual self-regulated learning strategies and achievement in biology among higher secondary school students.
4. There is no significant relationship between motivational self-regulated learning strategies and achievement in biology among higher secondary school students.
5. There is no significant relationship between behavioural self-regulated learning strategies and achievement in biology among higher secondary school students.

Method & Sample

In the present study the investigator adopted survey method. The present study was conducted on a sample of 618 XII standard students of Kozhikode district. The sample was selected by stratified random sampling techniques.

Description of the Tools

Self-Regulated Learning Strategy Assessment scale

The investigator prepared the Self-Regulated Learning Strategy Assessment scale on the basis of the reviewed literature and decided to write 94 items in the draft scale. After editing and scrutiny 64 items were selected for final scale. This is Likert type 3-point scale indicating the level of self-regulated learning strategies, used by the students for their learning Biology.

On the basis of theoretical knowledge and expert's opinion the investigator selected the following components for the preparation of self-regulated learning strategy assessment scale. The components are the following.

1. Cognitive
2. Metacognitive
3. Contextual
4. Motivational
5. Behavioural

Each statement of self-regulated learning strategy assessment scale has three possible responses, viz., Always (A), sometimes (S) and never (N). The students have to put a '√' mark on the appropriate strategy in the provided response sheet according to their opinion. The frequencies of the responses were counted and the respective percentages were calculated.

Reliability

Reliability of the scale was found by test-retest method on a sample of 60 students. To find out the reliability of the scale the investigator readministered after 3 weeks time. The two sets of the scores are correlated by using the Pearson's Product Moment Coefficient of Correlation to obtain the reliability of the test. The reliability coefficient obtained was 0.79 (N=60). This suggests that the test is reasonably reliable.

Validity

The investigator established the face validity by showing the tool to educationists and other experts. Based on their opinion the tool was found to be valid.

Achievement Test in Biology

Test of Achievement in Biology was constructed and standardized by the investigator under the guidance of surprising teacher. The topics were selected for the preparation of Test of Achievement on biology from the Biology syllabus prescribed by the government for XII standard students.

When the test was constructed, the investigator gave proper weightage to objectives, content, form of question, and difficulty levels of items. The Difficulty level also has to be considered while preparing the test. The unit selected for this test was, Sexual reproduction in flowering plants, Reproduction in organisms and human reproduction. The investigator selected 50 items in the draft test. The investigator avoided the difficulty level of items and vague items, and prepared the test for 45 minutes, then selected 35 items for the final test on the basis of item analysis.

The Achievement Test in Biology is an objective type test, in which the answers are in the form of letters and words. A scoring key showing correct answer was prepared. One mark is given for each correct answer and zero for incorrect answer. The scores range from 0-35.

Item Analysis

Item analysis helps to detect the strength and weakness of the test and to find out the suitability of each item. Item analysis is a process of examination the student's answer to each test item to judge the quality of item, which is determined on the basis of discriminating power of each item. For item analysis, the scored answer papers were arranged in ascending order from which 207 answer sheets were randomly selected. The 27% of the higher group and 27% of the lower group for had taken for item analysis. The selection of the test items was based on the values of difficulty index and discriminating power, thus the items selected for the final test, in which the difficulty index of items lies between 0.4 and 0.6 the discriminating power which is greater or equal to 0.30. The investigator selected some more items. Thus 35 items were selected for the final test.

Reliability

Reliability of the test refers to the degree of consistency with which it measures what is intended to measure. Reliability of the scale was found by test-retest method on a sample of 60 students. To find out the reliability of the scale the investigator readministered after 3 weeks' time. The two sets of the scores are correlated by using the Pearson's Product Moment Coefficient of Correlation to obtain the reliability of the test. The reliability coefficient obtained was 0.84 (N=60). This suggests that the test is reasonably reliable.

Validity

The investigator established the face validity by showing the tool to educationists and other experts. Based on their opinion the tool was found to be valid.

Data Analysis

Table 1: Relationship between Cognitive Self-Regulated Learning Strategies and Achievement in Biology

	Strategy	χ^2	df	Level of Significance
Cognitive Strategy	Design of learning activities	4.08	4	0.05
	Divide the difficult portion in to subunits	4.87	4	0.05
	Revision for learning activities	7.69	4	0.05
	Answer sheet analysis	4.18	4	0.05
	Question paper analysis	2.73	4	0.05
	Retrieved information from bulletin board	10.84	4	0.05
	Historical events relate to year	4.06	4	0.05
	Utilization of text books tips	17.81**	4	0.01
	Topic revision	8.93	4	0.05
	Participation in school health club activities	7.43	4	0.05
	Problem solving ability	7.43	4	0.05
	Asking questions to myself	7.57	4	0.05
	Role playing	4.41	4	0.05
	Learning with the help of OHP sheets	9.51	4	0.05

***Significance at 0.01 level.*

Table-1 shows that χ^2 values of the dependence of the different cognitive self-regulated learning strategies with achievement in biology. It is clear that the calculated χ^2 value of strategies retrieved information from bulletin board (10.84), Utilization of text book tips (17.81), learning with the help of OHP sheets (9.51) are greater than the table value 0.05 level of significance for df 4. That means the bulletin

board points; tips from the textbooks and using OHPs are significant in the cognitive self-regulated learning strategies for the achievement in biology. Other strategies are not significant even at 0.05 level significance, that means which are not importance in achievement in biology.

Table-1 also depicts that the cognitive self-regulated learning strategies like retrieved information from bulletin board, utilization of text book tips, learning with the help of OHP sheets are significant in achievement in biology, while the other strategies are not significant for achievement in biology. The other strategies are not familiar with the students and teachers are not practicing these type of cognitive learning strategies in the regular classroom.

Table 2: Relationship between Metacognitive Self-Regulated Learning Strategies and Achievement in Biology

Metacognitive Strategy	Strategy	χ^2	df	Level of Significance
	Understanding the confusing concepts	3.026	4	0.05
	Lecture note preparation	7.728	4	0.05
	Relation with life experience	10.117	4	0.05
	Content in the table format	16.957**	4	0.01
	Using Code for memorization	8.130	4	0.05
	Day-to-day revision	5.634	4	0.05
	Self-questioning at the time of reading	13.602**	4	0.01
	Change in reading style	6.510	4	0.05

***Significant at 0.01 level.*

Table-2 reveals that the χ^2 values of the dependence of the different metacognitive self-regulated learning strategies with achievement in biology. It is clear that the calculated χ^2 value of relation with life experience (10.117), content in the table format (16.957), self-questioning at the time of reading (13.602) is greater than the table value at 0.05 levels of significance at the df is 4. That means using table format, relate to life experience and self-questioning are significant in the metacognitive learning strategies for the achievements in biology. The other strategies are not significant even at 0.05 level of significance, that means which are importance in achievement in biology.

Table-2 also shows that relation with life experience, content in the table format, self-questioning at the time of reading are significant metacognitive self-regulated learning strategies for achievement in biology and the other strategies are not significant. The metacognitive strategies are more effective strategies to attain higher achievement in biology, but the students are unable to use such strategies because these strategies are not much familiar by them.

Table 3: Relationship between Contextual Self-Regulated Learning Strategies and Achievement in Biology

Contextual Strategy	Strategy	χ^2	df	Level of Significance
	Summarizes the chapter	15.165**	4	0.01
	Note making on the basis of educational broadcast	9.572	4	0.05
	Observes the nature	8.069	4	0.05
	Summarizes the lessons	2.532	4	0.05
	Prepare brief notes on library books	3.369	6	0.05
	Preparing notes from group discussion	8.350	4	0.05
	Acquisition of knowledge	6.196	4	0.05
	Chapter wise note making	2.015	4	0.05

	Clarifying doubts	4.825	4	0.05
	Participation in Science debate	4.235	4	0.05
	Collecting scientific information from scientific survey	2.750	4	0.05

***Significant at 0.01 level.*

Table-3 shows that the χ^2 values of the dependence of different contextual self-regulated learning strategies with achievement in biology. It is clear that the calculated χ^2 value of the strategies summarizes the chapter (15.165), note making on the basis of educational broadcast (9.52), are greater than the table value at 0.05 levels of significance for df is 4. That means the topic summarizes and listening educational programs are significant in the contextual learning strategies for the achievements in biology. The other strategies are not much significant even at 0.05 level of significance, that means which are not importance in the achievement in biology.

Table-3 also depicts that summarizes the chapter, note making on the basis of educational broadcast are the significant contextual self-regulated learning strategies for achievement in biology. The biology teachers are doesn't provide proper awareness about the other learning strategies in the contextual level and students are doesn't practice such learning strategies in their own learning process.

Table 4: Relationship between Motivational Self-Regulated Learning Strategies and Achievement in Biology

	Strategy	χ^2	df	Level of Significance
Motivational Strategy	Utilization of group learning	2.160	4	0.05
	Collection of educational articles	4.324	4	0.05
	Participation in seminar & debate	3.551	4	0.05
	Using diagrams	6.722	4	0.05
	Preparing main points	19.810**	4	0.01
	Flow chart preparation	13.347**	4	0.01
	Understanding the concepts with the help of graphs	17.816**	4	0.01
	Preparation of slides and animations	11.984	4	0.05
	Album making	4.960	4	0.05
	Specimen collection	5.406	4	0.05

***Significant at 0.01 level.*

Table-4 reveals that the χ^2 values of the dependence of different motivational self-regulated learning strategies with achievement in biology. It is clear that the calculated χ^2 value of the strategies preparing main points (19.810), flow chart preparation (13.347), understanding the concepts with the help of graphs (17.816), preparation of slides and animations (11.984) are greater than the table value at 0.05 levels of significance for df is 4. That means the preparation of class notes, content in the form flow chart, using graphs, preparation of slides and animations are significant in the motivational learning strategies for the achievements in biology. The other strategies are not much significant even at 0.05 level of significance, that means which are not importance in the achievement in biology.

Table-4 also shows that the strategies like preparing main points, flow chart preparation, understanding the concepts with the help of graphs, preparation of slides and animations in the biology learning are more significant than the other motivational self-regulated learning strategies. The above mentioned motivational strategies are included in the text book of XII standard syllabus, but students are not in use of the all the motivational self-regulated learning strategies.

Table 5: Relationship between Behavioural Self-Regulated Learning Strategies and Achievement in Biology

	Strategy	χ^2	df	Level of Significance
Behavioural Strategy	Utilization of library	11.587	4	0.05
	Help seeking to the recourse persons	18.290**	4	0.01
	Participation in science club activities	3.376	4	0.05
	Memorize the equation	7.517	4	0.05
	Model making	6.857	4	0.05
	Doing scientific experiments	5.493	4	0.05
	Writing information from study tour	6.279	4	0.05
	Collecting scientific information	9.486	4	0.05
	Discovery of Scientists	4.187	4	0.05
	Study through mother tongue	5.085	4	0.05
	Selection of suitable environment	7.425	4	0.05
	Utilization of Internet	1.922	4	0.05
	Approaching knowledgeable persons	9.515	4	0.05
	Rhythmic learning	2.855	4	0.05
	Comparative study	3.812	4	0.05
	Keeping main points at question time	2.941	4	0.05
	Underline the main points	8.476	4	0.05
	Utilization of Information Technology	9.656	6	0.05
	Visiting science institution	6.132	6	0.05
	Memorize the key terms	3.362	6	0.05
Participation in school gardening and vegetable cultivation	1.354	6	0.05	

****Significant at 0.01 level.**

Table-5 depicts that the χ^2 values of the dependence of different behavioural self-regulated learning strategies with achievement in biology. It is clear that the calculated χ^2 value of the strategies utilization of library (11.587), help seeking to the recourse persons (18.290), collecting scientific information (9.486), approaching knowledgeable persons (9.515), utilization of information technology (9.515) are greater than the table value at 0.05 levels of significance for df is 4. That means the above strategies are significant in the behavioural learning strategies for the achievements in biology. The other strategies are not much significant even at 0.05 level of significance, that means which are not importance in the achievement in biology.

Table-5 also reveals that the behavioural strategies like help seeking to the resource persons, utilization of library, approaching knowledgeable persons, utilization of information technology are significant in the behavioural learning strategies for achievements in biology. These strategies are used by the students for their biology learning. The others are not significant for achievement in biology because these are not familiar with the students. These strategies are not included in the teaching learning process in the regular classroom and the teachers not give importance to these strategies in their teaching process.

CONCLUSION

The study revealed that some of the self-regulated learning strategies are used by the higher secondary school students for their biology learning. The result of the present study revealed that some of the self-regulated learning strategies have highly significant relationship with the achievement in biology and the other self-regulated learning strategies are not significant for biology learning. The calculated χ^2 value shows that some of the self-regulated learning strategies have significant relationship to the achievement in

biology among higher secondary school students. The other self-regulated learning strategies have not a significant relationship to the achievement in biology. According to Tasci and Yurdugul (2017) use of self-regulated learning strategies in teaching Biology have significant effect on the development of the cognitive structure of the learner? The result of the study revealed that students regularly used SRL strategies are goal setting, modelling, self-evaluation, seeking information, rehearsing, memorizing, social assistance, time management, reviewing records, tests and tutorials. Broadbent and Poon, (2015) published a paper Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review of SRL strategies as correlates of academic achievement the strategies of time management, metacognition, effort regulation, and critical thinking were positively correlated with academic outcomes, whereas rehearsal, elaboration, and organization had the least empirical support.

The findings of the study revealed that the self-regulated learning strategies were much importance in achievement in biology. Hence it is necessary to develop the use of self-regulated learning strategies among the higher secondary school students to achieve more. The teachers and parents have their own specific role to improve the use of Self-regulated learning strategies among students. Teacher should provide encouragement and enhance the use of self-regulated learning strategies by focusing them on assessing, understanding and evaluating their self, their system of beliefs and values. Teacher also helps to regulate their learning by themselves in the classroom context and provide feedback to them. Parents also have their own specific role to goal setting. Parents should provide a healthy environment and also evaluate the performance of students at all levels.

REFERENCES

1. Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students, *Learning and Instruction*, 7, 161-186.
2. Broadbent, J. & Poon, W.L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*, Vol. 27, 1-13.
3. Nikpay, S. Farakhsh & Yousef, L. (2017). Effects of self-regulated learning strategies (cognitive and Metacognitive) on goal orientation in second grade girl high school students by 60 follow up. *New educational approaches*.
4. Pajares, Frank. (2002). Gender and perceived self efficiently in self-regulated learning. *Theory into practice*, 41(2), 116-125.
5. Pintrich & De Groot. (1990). Motivational and Self-Regulated Learning Components of Classroom Academic Performance *Journal of Educational Psychology*, Vol. 82, No. 1, 33-40.
6. Schunk, D.H. (1990). Goal settings and self-efficacy during self-regulated learning. *Educational psychologist*, 25, 71-86.
7. Tasci, Guntayi. & Yurduga, Halil. (2017). Biology teaching through self-regulated learning and cognitive structure: An analysis of the effect of learning strategies for cognitive development via latent growth model. *Journal of Baltic Science Education*, Vol. 16, pp.20-31.
8. Winne, P.H. (1995). Inherent details. In self-regulated learning: *Educational Psychology*, 30, 173-188.
9. Zimmerman, B.J. (2002). Self-regulation cycles if learning. In: *Crerald. A. steaka (Ed) conception if self-directed learning Munster. Waxman*, 221-234.