RESEARCH PAPER | Biochemical | Volume : 2 | Issue : 1 | October 2012 | ISSN - 2249-555X

Effect of Metamemory Strategies on Learning Bio-Chemical Cycle Among Higher Secondary School Students

KEYWORDS: Metamemory strategies and Bio-chemical cycle

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ABSTRACT *This study is an attempt to find out the effect of metamemory strategies on learning Bio-chemical cycle among higher secondary school students. Meta memory strategy can contribute a lot, not only in learning Bio-chemical cycles but also in the day today life of an individual. The knowledge of one's own memory strength can make an individual to rearrange, reallocate and reschedule the information, in the cognitive field. The sample consists of eighty higher secondary students. Experimental study was conducted. Descriptive analysis, Relational analysis, Differential analysis, Omega Square analyses were used for analysis of data. The findings of this study support the effectiveness of metamemory strategies on learning.*

Introduction:
Biology is an inevitable subject in school education especially in higher secondary level since it has an important role in medical entrance examination. The investigator identified the problem that exists in the teaching learning process of this subject. This problem arises mainly in the areas of Bio-chemical cycle as it is very difficult to understand, memorize and reproduce. This area deals with Biology and Chemistry and most of the students skip this area and hence it indirectly affects their higher studies. The teachers also find it difficult to teach, mainly because of negative attitudes of the students. When teachers evaluate the answer papers in the class test they come to know that more than fifty percent of the pupils have omitted questions regarding Bio chemical cycle. The omission of this portion is not good for the future of the student, because Bio-chemistry and Bio informatics is a promise of this century.

Even though Bio-chemical cycle is very difficult to understand, remember and reproduce, the teacher has been using traditional teaching strategies and students apply any one of the learning strategy without considering the possibility of its success. They are not ready to give emphasis, analyze and manage time effect. Nothing worthy can be done by learning without knowing their memory efficiency and cognitive field. Hence there is an urgent need to motivate the student to reconsider their learning strategy to get maximum benefits.

RATIONALE
The Bio-chemical cycle has very important role in higher secondary education. A stark exist that Bio-chemical cycle is a difficult area. The investigators wanted to find the effectiveness of metamemory strategy in learning. Previous researches reveal that there is a positive correlation between metamemory and student achievement in various other disciplines. Meta memory strategy can contribute a lot, not only in learning Bio-chemical cycles but also in the day today life of an individual. The knowledge of one's own memory strength can make an individual to rearrange, reallocate and reschedule the information, in the cognitive field. This process would enable an individual to cope with the difficulties they find while studying.

THEORETICAL BACKGROUND OF THE PRESENT STUDY
A memory strategy on the part of the learner is a course of action or plan, often but not always undertaken with the goal of remembering (Brown, 1975; Flavell, 1970; Meacham, 1972; Pressley, Forrest-Pressley, & Elliott-Faust, in press). Such activities can be aimed at encoding, storizz Zng, or retrieving information (Brown, 1975). The intelligent adult possesses a variety of memory strategies, with strategy development continuing into adulthood (e.g., Poon, Foxard, Cermak, Arenberg, & Thompson, 1980; Pressley, 1982; Pressley, Heisel, McCormick, & Nakamura, 1982; Pressley, Levin, & Bryant, 1983). Strategies entail basic cognitive processes organized in specific ways (Borkowski & Biichel, 1983; Pressley, Heisel, McCormick, & Nakamura, 1982). An additional, essential aspect of strategic action is the knowledge that a learner must have about the value of a strategy, its range of applicability, and mode of execution. From this perspective, specific strategy knowledge-a major component of metamemory-may be enhanced by providing strategy-relevant information, either before or after training of the strategy.

Moynahan (1978) examined the development of other metamemory milestones, seeking to determine if developmental differences existed in first, third, and fifth grade children's ability to judge memory performance and select appropriate strategies for given situations. Children were given paired associate tasks (in which a child must remember which "response" word has been paired with a particular stimulus word in word pairs such as frog-purse or snowman-ring) and were instructed to use one of two strategies, either a simple repetition strategy or an interaction strategy which required children to imagine the two words interacting in some way. After the task, children were asked to reflect on the usefulness of the strategy they were instructed to use. Finally, the children were given a third paired associate task in which they could use any strategy or none at all.

Results showed that the older children recognized the effects of strategy use, whereas the younger ones did not. In addition, the older children were more likely than the younger children to attribute success to a particular strategy. Thus, developmental differences were found in children's knowledge that strategies are useful and that some are more beneficial than others.

According to Schneider and colleagues (Schneider, 2008: Schneider & Pressley; 1997), as children age their metamemory improves. Several investigators (Bjorklund & Zeman, 1982; Lovett & Flavell, 1990; Moynahan, 1978; O'Sullivan, 1996; O'Sullivan, Howe, & Marche, 1996; Schneider, 1986; Wellman, 1977; and Yussen & Bird, 1979) have documented developmental changes in children's metamemory knowledge and monitoring.

SCOPE OF THE STUDY
The scope of the study is not restricted to the effectiveness of metamemory strategy in learning bio chemical cycle. It has a wide range of scope in education as well as in day to life. They are to exploit the strength of cognitive field of a student,drawing out of the explicit knowledge, understanding the efficacy of the different strategies, overcome the discrepancies of task and time and to create a progressive and harmonious memory pattern.

OBJECTIVES
1. To develop metamemory among students.

Volume : 2 | Issue : 1 | October 2012 | ISSN - 2249-555X

2. To use metamemory strategy in learning Bio-chemical cycle.
3. To evaluate the effectiveness of metamemory learning strategy in learning Bio-chemical cycle.
4. To find out the relationship between metamemory learning strategy and academic achievement of the student.
5. To find out the differences in the scores of post test between control group and experimental group.

HYPOTHESES

1. Applications of metamemory strategy will enhance learning Bio-chemical cycle among the experimental group.
2. There will be a significant difference between the pre-test scores and post-test scores in the experimental group.
3. There will be a significant mean difference between pre-test scores and post-test scores among the experimental group students in learning Biochemical cycle because of the implication of metamemory strategy
4. There will be a significant relationship between learning Bio-chemical cycle and application of metamemory strategy.

SAMPLE

The investigators selected higher secondary students for the study as they felt the need for the improvement of learning outcome. The researcher took 80 samples with equal importance to boys and girls. At first a pretest on Bio-chemical cycle was administered to all the students. The students were grouped into two as control and the experimental. Each group contains forty students.

RESEARCH DESIGN

Experimental design was selected for the study. The pre test— post test control group design developed by Jack.R. Fraenkel has been used. This design involves two groups both of which were selected based on the scores of the pre-test. Low score achievers were considered as experimental groups and others control group. Experimental group received the experimental treatment while others did not. The output of both groups were tested again (post test).

RESEARCH PHASE

To attain the objectives, the researcher has planned his research programme as the following ways by constructing a test to find out the present knowledge level of the students in Bio-chemical cycle (pre-test tool)

The pre test tool was designed for 50 marks, later the score were converted into percentage. While the development of the tool, the investigator considered three domains they are knowledge, understanding and application.

Learning strategies of the experimental group as well as the metamemory strategies have been analysed. The researcher realized that the students were unable to perform well in their academics without the knowledge of their own memory strength and memory processes. This could help them to know how far they have learned and organize the content. This is where the role of metamemory emerges. The motive of the researcher is to create an ability in students to apply the strategies of metamemory. The metamemory strategy awareness given to the learner's in this study include general strategy knowledge, learner's strategy (single item repetition, cumulative rehearsal, differential effort allocation, meaningful organization, hierarchical allocation, imagery elaboration, verbal elaboration and keyword method) specific strategy knowledge relative strategy knowledge and metamemory acquisition procedure. With the accompaniment of varied examples, the researcher made the students aware of the strategies above mentioned. It could also be effectively seen that the students internalized the strategies and were successful in applying them (the strategies) in their learning.

Then the students were given instructions about the strategies and were given motivation for effectively using the strategies. Demonstrate, model, and lead students using many examples to ensure their complete understanding the strategy component training. The students were provided instances and non-instances of correct usage and made them identify and correct any incorrect examples. They were provided with ample amount of modeling and practice with students, attributing their successes to the use of strategies.

They were provided models during which examples and thinking processes are said aloud. Demonstrated how an expert proceeds with his thinking while generating a strategy for specific examples. Opportunities were given to practice orally and provided corrective feedback. Practice several examples with the class as a whole. Allowed students work in small groups and practice generating strategies and brainstorming. Then students worked with partners to develop strategies before working independently. Arranged guided practice with relevant feedback on both strategy usage and attribution feedback. Give students additional items to practice using the mnemonic and other learner's strategies. Provide corrective feedback and allow opportunities for students to share their thinking with one another about how they developed their strategies.

The awareness programme included positive reinforcement and attribution training for completing the tasks and remembering the information correctly. The researchers provided reviews and practices with information that was learned using strategies.

Post test was conducted to find out the effect of strategies training.

ANALYSIS AND INTERPRETATION OF DATA

The researcher collected data from both the control and experimental group of students the Demographic particulars , Pre test tool ,Post test tool and Metamemory assessment tool.

Data obtained on the above tools were subjected to statistical analysis for getting mean scores and also to find out the influence of independent variable on dependent variable. Descriptive analysis, Differential analysis and Relational analysis were applied.

MEAN AND STANDARD DEVIATION OF THE POST- TEST SCORES OF CONTROL AND EXPERIMENTAL GROUP STUDENTS

Group	Mean	S.D
Control Group	29.15	7.20
Experimental Group	39.05	10.05

The above table shows that there is difference between the control group and experimental group students in their mean score on learning biochemical cycle in the post test. Mean score of control group is 29.15 and for experimental group it is 39.05.

MEAN AND STANDARD DEVIATION OF THE METAMEMORY SCORE OF CONTROL AND EXPERIMENTAL GROUP STUDENTS

Group	Mean	S.D
Experimental Group	65.20	07.22
control Group	62.01	6.71

The mean score on awareness on metamemory strategies in experimental group is higher than the control-group.. Mean of control group is 62.01 and for experimental group it is 65.20.

MEAN AND STANDARD DEVIATION OF PREMETA MEMORY SCORE AND POST METAMEMORY SCORE OF EXPERIMENTAL STUDENTS

Experimental Group	Mean	S.D
Pre metamemory	30.05	6.70
Post metamemory	60.01	7.42

Volume : 2 | Issue : 1 | October 2012 | ISSN - 2249-555X

The above table shows that there is a significant difference between the Mean score on metamemory pre tests (30.05) and post tests (60.01)among experimental group students.

The correlational values were calculated by using Pearson's Product Movement Correlation. The correlation analysis shows that there exists positive correlation (0.79) between the pretest and post test of control group students. It shows that they are using same strategies and move in a balanced way.The coefficient of correlation reveals that there exists a positive correlation (0.89) between the scores of post test and awareness on metamemory strategies.

FINDINGS

1. There is an improvement in achievement of experimental group. It shows that metamemory strategy can improve Bio-chemical cycle learning. The mean score of the experimental group in the pre-test was 16.05 where as in post test it is 29.15. This shows the effectiveness of metamemory strategies in learning.
2. Control group students unknowingly use metamemory strategy. The control group also possess above average score (62.01) on metamemory awareness. That might be due to the corrective feedback getting from the educated parents and guidance programme that they attended and also due to the high intelligence.
3. The coefficient of correlation reveals that there exists a positive correlation (0.89) between the scores of post test and awareness on metamemory strategies.
4. There is significant difference between mean scores of pre-metamemory test and post metamemory test among experimental group. The mean score of metamemory at the time of pretest, it was 30.5 and it was at the time of post test 60.01. It shows that metamemory awareness programme was able to improve learner's metamemory this in turn scores in post test.

DISCUSSION :

Metamemory is the awareness of one's own memory and memory process. This study highlights the awareness of one's own memory and memory process helps the learner to improve the memory and thereby learning outcomes. Luchangeli et al. (1995) proved that metamemory training improves memory of a learner. Knowledge of efficacy of a specific strategy is a major component of metamemory and this specific strategy knowledge can adopt appropriate situation. One of the major objectives of this study in to get better specific strategy knowledge of learners'.

Recalling is a memory function, if the memory is more effective, recalling also becomes effective. This study shows that improvement in academic achievement is due to metamemory training given to the learners'. Weed and Keri (1990) found that, if metamemory training is given recalling is more effective. Organizing the content matter in the cognitive field makes it easy to be retrieved. Organization of the content in a meaningful way is more effective. The present study emphasized the role of metamemory in organizing the content. The studies of Gaultney, et al, (1993) support the present study.

Differential effort allocation is an effective strategy for the betterment of academic achievement of a learner. Managing the time with effort helps an individual to a large extend. Knowing the memory process, a learner can allocate his time and effort successfully (Santiago et al. 1993). The present study shows that feedback can help individual to manage the time effectively. Usage of verbal elaboration and metamemory are related. The findings of the present study has place of interest that knowledge of memory strength, i.e., metamemory of a learner helps to effectively apply the verbal elaboration strategy successfully. Metamemory results in a better academic achievement (Kurtz 1982).

The ability to visualize the object (textual or pictorial form) can improve the memory strength (Sadoski 1983). This imagination capacity helps the learner to effectively represent the content. One of the objectives of this study was to make aware of the learners' to use imaginary fruitfully. Metamemory also helps individual to solve his problems by using sequential procedures which has been used earlier (Uhlflder 1985). Hierarchical allocation procedures, which used as a learning strategy, can help the individual to visualize the problem in sequential order and it becomes easy solve.

CONCLUSION :

Teachers should be aware that children do not automatically benefit from specific types of prompts or instructions to use strategies. Training children to use a strategy may only benefit them during an immediate task. Simply teaching a strategy and requiring students to practice it may not have any long-term effect on the children's ability to use the strategy in the future. Instead, children must be taught monitoring skills, coupled with specific strategies. Borkowski & Muthukrishna (1992) advise that teachers use explicit instruction to make strategies, "overt, sensible, and purposeful.

Today's class room is multicultural and multilinguistic in nature. The thinking patterns, emotionalities, imagination capacities and learning methods vary according to the students. Education psychology aims at identifying and catering individual characteristics. Education also aims at bringing out the best and nurturing the individual potentialities. This context, educators especially school education should know the nature of the learner, contents, curricular objectives and teaching learning methods. The educator needs to understand that particular teaching method cannot take effect in a heterogeneous group. Sometimes it will not work within the learner. The teacher should identify the strength of one strategy, how it works, how it can incorporate with other learning strategies.

Various researches on metamemory emphasize the educational implications of metamemory strategies. The teacher can facilitate metamemory enhancement among students through various activities. The teacher-student relationships can improve the feedback and hence it enhances metamemory. The findings of this study also support the effectiveness of metamemory strategies in learning Bio-chemical cycle.

Research findings from the theme we discussed provide evidence that, with help, children can improve their metamemory skills and, thus, become better learners. Some investigators have stressed the need for more explicit instruction of metacognitive knowledge and skills (Pintrich, 2002) and others have found that effective teaching includes the consistent use of strategy instruction (Schnieder, 2008). It is hoped that the themes provided in the present paper will allow a greater understanding of children's knowledge of metamemory and memory strategy and provide a greater context for teachers to help their students become more strategic learners.

REFERENCES

1. Andreassen, C., & Waters, H. S. (1989). Organization during study: relationships between metamemory, strategy use, and performance. Journal of Educational Psychology, 81, 190-195. | 2. Metacognition, Motivation, and Understanding (pp. 239-266). Hillsdale, NJ.: Lawrence Eribaum Associates, Inc. | 3. Flavell, J., & Wellman, H. (1977). Metamemory. In R. V. Kail, & J. W. Hagen (Eds.). | 4. Perspectives on the Development of Memory and Cognition (pp. 3-30). Hillsdale, NJ.: Lawrence Eribaum Associates, Inc. | 5. Pressley, M., Ross, K. A., Levin, J. R., & Ghatala, E. S. (1984). Increasing the use of strategy-utility knowledge in children's strategy decision making. Journal of Experimental Child Psychology, 38, 491-504. | 6. Salatas, H., & Flavell, J. H. (1976). Behavioral and metamnemonic indicators of strategic behaviors under remember instructions in first grade. Child Development, 47, 81-89. | 7. Schneider, W. (1985). Developmental trends in the metamemory-memory behavior relationship: An integrative review. In D. L. Forrest-Pressley, G. E. | 8. MacKinnon, & T. G. Waller (Eds.), Metacognition, Cognition, and Human Performance (vol. 1, p. 57-109). | 9. Short, E., Schatschneider, C., & Friebert, S. (1993). Relationship between memory and metamemory performance: a comparison of specific and general strategy knowledge. Journal of Educational Psychology, 85, 412-423. | 10. Weed, K., Ryan, E. B., & Day, J. (1990). Metamemory and attributions as mediators of strategy use and recall. Journal of Educational Psychology, 849-855.