Research Paper Education

A Study on the Relationship Between Problem Solving Ability and Workingmemory of Secondary School Students.

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ABSTRACT

This study is an attempt to findout the relationship between Problem solving ability and Working Memory of Secondary School students . Hence this study is concerned with secondary School students, ninety students of standard VIII were selected as sample. Tools used were Working memory- sentence span ,Real Life Problems A to Z developed by the investigator and Academic performance scores were collected from their class teachers. Responses were received and analyzed through SPSS 15.0. Descriptive analysis, relational analysis and differential analysis were used. Results showed significantly positive relationship exist between Problem solving ability and Working Memory of Secondary School students.

KEYWORDS Problem solving ability, working memory, secondary school students

INTRODUCTION:

Problem solving takes on an increasingly important role in the curriculum. Students cannot be considered "technologically literate" until they understand that technology involves making changes to our environment to solve problems or meet human needs. Equally important is that students appreciate that the solution to one problem often creates other problems and/or other benefits. Students should also be given the experience of locating and correcting problems . It is not enough to simply recognize that these problems exist, or even to discuss them in detail. A systematic method of identifying and dealing with these impacts must be developed. Problem-solving strategies to be used to facilitate work with problem-solving. This process should be seen as a dynamic, non-linear and flexible approach. Learning these and other problem-solving strategies will enable students to deal more effectively and successfully with most types of problems.

Working memory (WM) capacity is the ability to retain and manipulate information during a short period of time. This ability underlies complex reasoning and has generally been regarded as a fixed trait of the individual Attention and working memory may be crucial for different aspects of successful problem solving. Planning a number of moves in advance may be important to solve insight problems

NEED AND SIGNIFICANCE OF THE STUDY

Individuals differ in their ability to solve problems. Difference in working memory skills underlie differences in problem solving ability. Understanding the problem, devising a plan to solve the problem, implementing the plan, and reflecting on the problem and learning other problem-solving strategies will enable students to deal more effectively and successfully with most types of problems. These problem-solving processes could be very useful in mathematics, science, social sciences and other subjects. Students should be encouraged to develop and discover their own problem-solving strategies and become adept at using them for problem-solving. This will help them with their confidence in tackling problem-solving tasks in any situation, and enhance their reasoning skills. As soon as the students develop and refine their own repertoire of problem-solving strategies, teachers can highlight or concentrate on a particular strategy, and discuss aspects and applications of the strategy. As necessary, the students should develop flexibility to choose from the variety of strategies they have learned.

REVIEW OF RELATED LITERATURE:

Until quite recently researchers did not study directly the availability and accessibility of information stored in working memory during complex cognitive processes. Instead, they made inferences about working memory from studies of general memory capacity. Ever since Ebbinghaus 1913 researchers have concentrated on deriving general laws and capacities for memory from simple tasks explicitly designed to study memory performance for arbitrary sequences of information.

During free recall subjects are asked to retrieve a list they studied earlier. At the time of recall the subjects have no direct retrieval cues for the list in STM, and many theorists (Walter Schneider & Detweiler, 1987; Shiffrin, 1976) have proposed that recall must be mediated by the cues available in the current context. If some of the cues in the context for recall were still available in the context for study of the list, they should be part of the memory trace and thus serve as retrieval cues for items in the list to be recalled. Once some items have been recalled, they can serve as additional retrieval cues. Consistent with this proposed mechanism, free recall in most list-learning experiments is relatively poor and decreases as a function of the number of lists the subjects have previously studied and thus linked to the same contextual cues. In most of the prodigious research on memory, investigators have tried to isolate different memory systems and to specify their storage and retrieval characteristics with general measures that are independent of materials and of subjects' specific background knowledge. Researchers have focused on estimating maximal capacities by studying memory performance in simple tasks that test only memory. It is generally assumed that the same distinctions and capacity limitations observed for simple tasks apply to working memory in complex cognitive activities.

One view is that solving insight problems may not require different processes from solving non-insight problems such as mathematics problems (Weisberg & Alba, 1981; review in Mayer, 1995). Another view is that there are key differences between the two sorts of problems (e.g., Metcalfe and Wiebe, 1987). For example, participants can more accurately predict their future success given a second chance at an unsolved non-insight problem compared to an unsolved insight problem. Their ratings of how close they feel to a solution when they work on a non-insight problem exhibit an incremental pattern as they neared a correct solution, but for insight problems it remained uniformly low until a sudden increase just before the solution (Metcalfe and Wiebe, 1987).

Many studies have identified empirical differences between insight and non-insight problems (Schooler, Ohlsson and Brooks, 1993; Lavric, Forstmeier and Rippon, 2000; Gilhooly and Murphy, 2004; Jung-Beeman, Bowden, Haberman, Frymiare, Arambel-Liu, Greenblatt, Reber and Kounios, 2004). people need to keep in mind several alternative possibilities to solve insight problems (Murray and Byrne, 2005a). Individuals may have difficulty in keeping in mind alternatives because multiple possibilities can exceed their working memory capacity (Byrne, 2005; Johnson-Laird and Byrne, 1991; 2002).

OBJECTIVES OF THE STUDY

- To find out the problem solving ability among 8th standard students
- To enhance the working memory among 8th standard students
- To study the effect of problem solving training on

a) working memory
b) Academic Achievement

- To find out the impact of problem solving training on the academic score of 8th standard students
- To find out the differences in pre-test score and post test achievement scores.

HYPOTHESES OF THE STUDY

- There are significant differences between pre-test and post-test score of working memory
- There are significant differences in working memory before and after giving problem solving training
- There are significant differences between pre-test achievent score and post-test achievement score of 8th standard students.

VARIABLES UNDER STUDY

1. Problem-Solving

Problem-solving is a mental process that involves discovering, analyzing and solving problems. The ultimate goal of problem-solving is to overcome obstacles and find a solution that best resolves the issue.The best strategy for solving a problem depends largely on the unique situation.

2.Working memory

Working memory (WM) capacity is the ability to retain and manipulate information during a short period of time. This ability underlies complex reasoning and has generally been regarded as a fixed trait of the individual.

METHODOLOGY

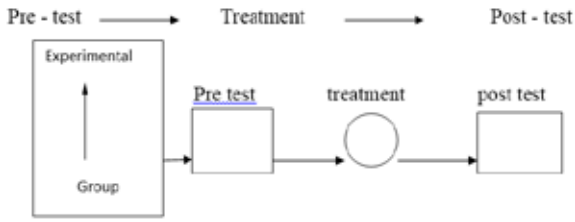
Since this study is an Experimental study, one group pre test post test design was selected. . The investigator contacted and obtained permission from the principals of the school . The willingness and co-operation of the respective class teachers were also sought. The data were collected personally by the investigator.The role of problem solving in students' growth in working memory (WM) was studied. (N =90). Tests were administered that assessed WM, problem solving and achievement in 8th standard students. Before the training a pre test was given to the sample to test the level of problem solving ability and working memory. Then the sample were given training for problem solving ability and working memory.

RESEARCH QUESTIONS:

- Will the training helps to increase working memory?
- Is there any significant difference between pre-test and post-test scores?
- Will it increase the ability to concentrate in the face of distractions?
- Is it increase the general reasoning ability?
- Is it increase the overall performance on measures of achievement?

EXPERIMENTAL DESIGN

One group Pre – test – post – test design



TOOLS USED FOR THE STUDY

1. Working memory: sentence span

2. Real Life Problems A to Z developed by the investigator

3. Academic performance scores collected from their class teachers.

METHOD OF STUDY

Before starting the first session the investigator wanted to build a rapport between the investigator and the students. Then the investigator started the session with a pre test to findout the scores of problem solving and working memory The test papers were collected after the scheduled period of time. The sample were taught about a new concept "Problem solving" by talking about the Six-Step Problem-Solving Process approch.It is an easy approach to dealing with issues and problems that face students. It is a simple, systematic way to approach a problem with clearly defined steps so that an individual or team doesn't get bogged down in, "WHAT DO WE DO NEXT?"

This problems-solving lesson provided a lot of information for an hour. It covers the steps in the six-step problem-solving process. This helps the students understand the logic and required thinking behind the step-by-step process. It provides a example of a classroom problem that used the method to select the best solution. It allows for the class to select a common issue or problem to focus on experimenting with the process.

The investigator wanted to teach the sample about "**working memory**". Meaning of working memory was explained to them. Concept of working memory was introduced to them .

What about your childhood memories? What about your memory for last week? To what extent are things you remember happening a week ago affected by intervening events and people? The beauty of asking questions shows how important other people can be in shaping our own memories. The researcher gave practice trial and started the work.

During the experiment participants were first presented with the insight and non-insight problems one at a time and were not allowed to write while attempting to solve the problems. Participants were tested individually and said aloud their answers to the experimenter when they were ready, within a two minute time limit. Scores on the twelve problems were compared with performance on the measures of working memory. All participants started with the insight problems, the order of which was randomized for each participant.Post test was conducted and scores were collected.

STATISTICAL TECHNIQUE USED

Descriptive and deferential statistic techniques were used in the interpretation of the data, to draw out a meaningful picture of results from the collected data.

DESCRIPTIVE AND DIFFERENTIAL ANALYSIS

- **HYPOTHESIS -1**

There are significant differences between pre-test and post-test score of Problem solving and working memory

GROUP	PROBLEM SOLVING		WORKING MEMORY	
	MEAN	SD	MEAN	SD
PRE TEST	52.5	4.02	60.25	20.49
POST-TEST	68.13	12.85	78.80	5.41

The mean score of the pre-test for Problem solving is low(52.5) and the same is high in post test score (68.13). For working memory the mean score is 60.25 in pre-test and 78.80 for post- test. So the hypothesis is accepted.

HYPOTHESIS -2

- There are significant differences between working memory and Academic Achieve before and after giving problem solving training

Table 2

PROBLEM SOLVING ABILITY	ACADEMIC ACHIEVE		WORKING MEMORY	
	MEAN	SD	MEAN	SD
Before	62.57	5.25	60.25	3.8
After	86.73	4.81	89.47	3.93

The mean score of the achievement is low(62.57) before giving training and the same is high(86.73) after traing. For working memory the mean score is 60.25 before training and 89.47 after training . So the hypothesis is accepted.

HYPOTHESIS -3

There is a significant difference between the pre-test achievement score and post-test achievement score.

CONCLUSION

- plays a role in helping people to decide what elements of a problem to focus on or in helping them to direct the search for relevant information internally and externally. Successful insight problem-solvers are more likely to switch strategies when they realize their current strategy is not working. This study suggested that directing people. n to a particular element of a problem can improve performance and people who pay more attention to peripherally presented information make better use of that information in a subsequent task. The results show that growth in the component of problem-solving was significantly related to growth in working memory.The results support the notion that growth in the system of working memory is an important predictor of growth in children's problem solving beyond the contribution of cognitive restructuring. Achievement measures related to problem solving ability helps pupils in increasing attention and working memory.

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