EFFECT OF MEMORY ENHANCING STRATEGIES ON CHEMISTRY ACHIEVEMENT BETWEEN URBAN AND RURAL ENGINEERING STUDENTS

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INDRODUCTION

Cognitive psychology deals with studying mental processes such as attention, perception, sensation, concept formation, memory, problem solving, information processing, reasoning and judgement all these related with Teaching and Learning. Effective Teaching and learning depends upon how one is perfect in all the mental process.

Memory is mind’s store house and the reservoir of accumulated learning. To the Roman statesman Cicero, memory was “the treasury and guardian of all things” To a psychologist, memory is any indication that learning has persisted over time.

Chemistry is the integrated study of the preparation, properties, structure and reactions of the chemical elements and their compounds. Chemistry is considered an important subject in school and college curriculum as many professional and applied courses, directly or indirectly use of knowledge of chemistry. More over, the present age is the era of science and more number of people are being employed in scientific pursuits which require knowledge of chemistry. Chemistry education is also necessary because of its immense value in the student’s individual life as well as in society. The science that studies the composition, properties and activity of substances and various elementary forms of matter. Scientific study of substances and how they change when they combine.

Chemistry education (or chemical education) is a comprehensive term that refers to topics related to the study or description of the teaching and learning of chemistry in schools, colleges and universities. Topics in chemistry education might include understanding how students learn chemistry, how best to teach chemistry and how to improve learning outcomes by changing teaching methods and appropriate training of chemistry instructors, within many modes, including classroom lecture, demonstrations and laboratory activities.

There is a constant need to update the skills of teachers engaged in teaching chemistry and so chemistry education speaks to this need.

SIGNIFICANCE

Chemistry & Education: Universities and colleges provide teaching and training for bright young people in the basics of chemical science and engineering, both for students specializing in chemistry and for
others who need the underpinning experience of chemistry for their own particular scientific, professional or
technical education.

Of course, provision of an educational training in chemistry does not begin at university. It starts at
primary school with an introduction to observation and embryonic interpretation of phenomena and
continues through early, middle and later schooling. There are deep worries within the chemistry community
that the educational provision in science in some countries is lacking in appropriate resourcing and basic
training, particularly in mathematical skills and in developing a familiarity with the philosophy of physical
science.

Wider scientific education and more effective programmes to increase public recognition of the
positive role of chemistry in wealth creation and improving the quality of life are needed. Such programmes
might usefully be initiated in consultation with the partners of the All Chemical Engineers. Academic
institutions and the chemical industry accept that it is necessary to demonstrate that the advanced technology
used in industry is both safe and responsibly managed.

PRESENT STUDY

In the era of examinations, present day students have to remember a number of names, facts, ideas
and concepts. In chemistry learning they have to remember names of elements, reactants and products, their
procedures, experiments, equations, structures, etc., while describing a procedure of chemical reaction more
number of chemical substance come repeatly. Here there may be chance to confuse which substance comes
where. To avoid these confusion and also be clear during exam time, memory enhancing strategies were
used. It helps to keep all these names clearly in mind and order. Different complicated chemical structures
should be remembered in chemistry. Memory enhancing strategies are used to memorise all these structure.

The main purpose of the study is to enhance the achievement in chemistry of engineering
students with the help of memory strategies. In order to enhance the chemistry achievement by improving
the memory of the students this study is undertaken.

Objective:

To find out the relationship between the chemistry achievement and memory of Memory Enhancing
Strategies with respect to Urban and Rural students.

Hypotheses:

1. Urban and Rural students do not differ in the pre test of chemistry achievement.
2. Urban and Rural students do not differ in the post test of chemistry achievement.
3. Urban and Rural students do not differ in the gain score of chemistry achievement.
4. Urban and Rural students do not differ in the pre test of memory quotient.
5. Urban and Rural students do not differ in the post test of memory quotient.
6. Urban and Rural students do not differ in the gain score of memory quotient

Population

Population is a statistical concept which means a group of larger number of units from which a
smaller group of some units is selected and used for achieving some purpose. In psychological research it is
the finite populations about which conclusions are drawn and which can be listed and counted. The
populations are defined in terms of their specific characteristics. In educational and psychological researches
they are called “target populations” more often defined as “all the members of a real or hypothetical set of
people, events, objects or other units”. (Bhatnagar R.P., 2007)
Population or universe means, the entire mass of observations, which is the parent group from which a sample is to be formed, (Saxena, 2008).

A Population is any group of individuals who has one or more characteristics in common that are of interest to the researcher. (John W.Best, 2003) In this study population refers to all engineering college students who study chemistry as one of the allied or ancillary subjects.

Sample:

In this study sample refers to 60 engineering students from EEE branch in V.M.K.V.E.C. salem.

Experimental Design

Experimental design is the blueprint of the procedures that enable the research to test hypotheses by reaching valid conclusions about relationships between independent and dependent variables, the type of variables to be manipulated, and the conditions or limiting factor under which it is conducted. [John W.Best, James V.Khan 2006]. In many experimental designs, the researcher has selected true experimental design.

VARIABLES

Variables are the conditions or characteristics that the experimenter manipulates controls, or observes [ John W.Best 2003].

Dependent Variable

The dependent variables are the conditions or characteristics that appear, disappear, or change as the experimenter introduces, removes or changes independent variables [ John W.Best 2003]. If one variable depends upon or is a consequence of the other variable, it is termed as a dependent variable. Whatever effect is noticed on dependent variable as a result of extraneous variables [C.R. Kothari, 2004].In this study Chemistry Achievement and Memory are the dependent variables.

Independent Variable

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his or her attempt to ascertain their relationship to observed phenomena [John W.Best 2003]. The variable which is manipulated by the experimenter is called independent variable. It is often called the treatment, experiment or antecedent variable [Lokesh Koul, 2008].In this study Memory Enhancing Strategies are the independent variables.

INSTRUMENTAION

Achievement Test

The Achievement Test was developed by the investigator. It consists of two parts. The first part consists of 19 questions carrying 2 marks per question. The second part consists of one question carrying 12 marks. The test is used to rate students in two different occasions like pre-assessment and post –assessment. The reliability of the tool is found by split – half method. The r-value is found to be 0.83 which shows high reliability of the tool. Experts opinion form the validity of the tool.

Wechsler Memory Scale

Wechsler memory scale was developed by Wechsler was the tool adopted by the investigator. It consists of seven parts namely personal and current information, orientation, mental control, Immediate recall, digits forward and digits backward, visual reproduction and associate learning, measuring memory. The tool is a standardised tool.
PHASES OF EXPERIMENT

Phases of Intervention Program

<table>
<thead>
<tr>
<th>Experiment phase</th>
<th>Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>Pre assessment</td>
<td>2 months</td>
</tr>
<tr>
<td>Phase II</td>
<td>Intervention</td>
<td>4 months each</td>
</tr>
<tr>
<td>Group I</td>
<td>Control Group</td>
<td>4 months</td>
</tr>
<tr>
<td>Group II</td>
<td>Memory enhancing strategies</td>
<td>4 months</td>
</tr>
<tr>
<td>Phase III</td>
<td>Post assessment</td>
<td>2 months</td>
</tr>
</tbody>
</table>

However the total duration for the interaction program taken by investigator is 8 months

Intervention

Memory enhancing strategies

Mnemoics:

Method of loci, acronym, acrostic, peg word-Rhyming method, spelling strategy, arithmetic, visualizing structure, link method, The number shape Technique, grouping, Journey method, alphabet Technique, writing repetition, verbal translation of visual information, visual translation of verbal information the number shape technique, word-letter association verbal repetition, chunking key word method, word association.

Effective study habits:

Planning study time, over learning small units correct order of text material upgrading recitation method, using SQ3R method, mind map.

Analysis and Interpretation

Null Hypotheses: Urban and Rural students of Control Group do not differ in chemistry achievement and memory quotient in pre, post and gain scores.

t- test for Significant Difference between Urban and Rural Students of Control Group in Chemistry Achievement and Memory Quotient in Pre, Post and Gain Scores.

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Urban</th>
<th>Rural</th>
<th>‘t’ Value</th>
<th>‘p’ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement in chemistry – Pre test</td>
<td>71.13</td>
<td>65.27</td>
<td>5.27</td>
<td>0.000**</td>
</tr>
<tr>
<td>Achievement in chemistry- post test</td>
<td>73.20</td>
<td>67.67</td>
<td>4.39</td>
<td>0.000**</td>
</tr>
<tr>
<td>Achievement in chemistry–gain score</td>
<td>2.07</td>
<td>2.40</td>
<td>0.29</td>
<td>0.774</td>
</tr>
<tr>
<td>Memory Quotient – Pre test</td>
<td>59.89</td>
<td>55.96</td>
<td>3.89</td>
<td>0.001**</td>
</tr>
<tr>
<td>Memory Quotient – Post test</td>
<td>63.49</td>
<td>58.46</td>
<td>3.80</td>
<td>0.001**</td>
</tr>
<tr>
<td>Memory Quotient – gain Score</td>
<td>3.60</td>
<td>2.51</td>
<td>1.33</td>
<td>0.196</td>
</tr>
</tbody>
</table>

Since ‘p’ value is less than 0.01 the null hypothesis is not accepted at 1% level with regard to pre and post test of achievement and memory quotient. In Control Group, Urban and Rural students differed
significantly (highly significant ‘p’ < 0.01) in chemistry achievement and memory quotient in pre and post test. Urban and Rural students do not differ (‘p’ > 0.05) in the chemistry achievement and memory quotient gain scores. Since ‘p’ value is greater than 0.05.

**Null Hypotheses:** Urban and Rural students of Group 2 do not differ in chemistry achievement and memory quotient in pre, post and gain scores.

**t- test for Significant Difference between Urban and Rural Students of Group 2 in Chemistry Achievement and Memory Quotient in Pre, Post and Gain Scores (MES).**

<table>
<thead>
<tr>
<th>Group 2 MES Area</th>
<th>Urban Mean</th>
<th>Urban SD</th>
<th>Rural Mean</th>
<th>Rural SD</th>
<th>‘t’ Value</th>
<th>‘p’ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement in chemistry – Pre test</td>
<td>68.73</td>
<td>4.43</td>
<td>65.80</td>
<td>4.28</td>
<td>1.84</td>
<td>0.076</td>
</tr>
<tr>
<td>Achievement in chemistry– post test</td>
<td>79.67</td>
<td>5.11</td>
<td>75.73</td>
<td>5.11</td>
<td>2.11</td>
<td>0.044*</td>
</tr>
<tr>
<td>Achievement in chemistry–gain score</td>
<td>10.93</td>
<td>2.43</td>
<td>9.93</td>
<td>1.71</td>
<td>1.30</td>
<td>0.204</td>
</tr>
<tr>
<td>Memory Quotient – Pre test</td>
<td>60.00</td>
<td>3.95</td>
<td>57.10</td>
<td>3.42</td>
<td>2.15</td>
<td>0.040*</td>
</tr>
<tr>
<td>Memory Quotient – Post test</td>
<td>76.07</td>
<td>8.32</td>
<td>69.95</td>
<td>5.85</td>
<td>2.33</td>
<td>0.027*</td>
</tr>
<tr>
<td>Memory Quotient – gain Score</td>
<td>16.07</td>
<td>5.19</td>
<td>12.84</td>
<td>3.18</td>
<td>2.05</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Since P value is less than 0.05 the null hypothesis is not accepted at 5% level with regard to post test of chemistry achievement and pre and post test of memory quotient. In Group 2 (MES) Urban and Rural students differ significantly (P < 0.05) in post test of chemistry achievement and pre and post test of memory quotient. Urban and Rural students do not differ (P > 0.05) in pre and gain scores chemistry achievement and memory quotient gain scores. Because ‘p’ value is greater than 0.05.

**Findings:**

1 Urban and Rural students do not differ in the pre test of chemistry achievement.
2 Urban and Rural students differ in the post test of chemistry achievement.
3 Urban and Rural students do not differ in the gain score of chemistry achievement.
4 Urban and Rural students differ in the pre test of chemistry quotient.
5 Urban and Rural students differ in the post test of memory quotient.
6 Urban and Rural students do not differ in the gain score of memory quotient.

In control group, the memory enhancement of achievement in chemistry is not improve due to there is no application of memory enhancing strategies. In memory enhancing strategies group, it is found that both urban and rural students improved in chemistry achievement and memory due to there is application of memory enhancing strategies. But when compared to urban and rural students; urban students improved in chemistry achievement and memory than rural students.

**EDUCATIONAL IMPLICATIONS**

The teacher’s responsibility is to encourage the learners to acquire and to retain the knowledge imported in school for future use in meeting life problems. But to our great surprise we find that students forget most of the school learning after a short lapse of time. The basic question is, why do we forget? We will examine the causes of forgetting and the various techniques which can be used by class room teachers to minimize the percentage of forgetting and to make the process of acquisition of knowledge more efficient and lasting for the students. Traditionally, we hold that we learn by practice and forget because we fail to practice. This common view has been recently challenged by experimental psychologists. Forgetting occurs only when some learning takes place. If there is no learning, then there is no forgetting. It is incorrect to say that forgetting anything which was never learned. Forgetting is an inevitable commitment of learning.
Thus failure to learn is one of the most common reasons why students are unable to recall answers to examination questions. As a matter of fact learning requires active rehearsal of what is to be learned. It means recalling relevant information, grasping fundamental principles and concepts that underlie a learning task and memorizing facts.

Memory enhancing strategies make the learning material more interesting and improve chances of recalling it. It also organizes the material and relates it to what was already known. These strategies take longer than simply reading a chapter does, but it will save time later on when studying for exams.

Memory enhancing strategies improve exam performance. It ties the new material to information already in memory and it generates a multitude of retrieval cues to help recall the material when reed it. Mennonites, people skilled at using memory teaching use frequently have compelling reasons for developing their memories.

These techniques are used to remember more information more accurately. These techniques increase information entry in to long term memory and also increase retention.

REFERENCES