Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 5, Issue, 01, pp.014-016, January, 2013

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

A Retrospective Analysis of Red Alert in Physics Problem Solving through Self-Regulatory Strategies with Interactive Multimedia

***N. Johnson and Dr. E. Ramganesh**

Instructor in Educational Technology Perunthalaivar kamarajar College of Education Karaikal, U. T of Puducherry
Department of Educational Technology Bharathidasan University Tiruchirappalli

ARTICLE INFO

Article History:
Received 25th October, 2012
Received in revised form
28th November, 2012
Accepted 7th December, 2012
Published online 16th January, 2013

Key words:
Physics
Chemistry
Biology
Geology, etc.,

ABSTRACT

Physics is at the heart of the technology driving our economy (National Research council, 2001) and is present in almost every facet of modern life. Physics may also be considered the most fundamental of all the sciences because others like chemistry, Biology, Geology, etc., deal with systems that obey law of Physics. This is one of the reasons why Physics has become an essential part of being scientifically literate. Indeed Problem solving in Physics plays a key role in the conceptualization of the students at higher secondary level. This paper highlights on the objective measurement of Red Alert in Physics Problem solving through Self-regulatory strategies with interactive multimedia. A sample of 90 higher secondary students from standard XII of S.R.V.S National higher secondary school, Karaikal was taken for the study. Experimental research method with control design was adopted for the study. Researches indicate that students problem solving failures are often due not to a lack of knowledge about science but to the ineffective use of what they do know. The major outcome of research is that Self-regulatory strategies were found effective with multimedia in reducing 'Red Alerts' in Physics Problem solving among the higher secondary students.

INTRODUCTION

Physics - widely recognized to be the most fundamental of all the Sciences - has also been recognized as the foundation of our society (Pravica, 2005). Physics is not only important to a country's economic progress; it is also important to individuals to be able to cope up with the rapidly changing society as a result of advances in technology. Goodstein (1999) believes that "a solid education in Physics is the best conceivable preparation for the lifetime of rapid technological and social change that our young people must expect to face". Abdus Salam (in Ford and Wilde, 1999, p.215), a Nobel Prize winner in Physics in 1979, wrote in a book: "If a nation wants to become wealthy, it must acquire a high degree of expertise in Physics, both pure and applied". "The Physics students of today are tomorrow's scientists, engineers, medical doctors and teachers at the secondary and tertiary levels". (UNESCO, 2005). The interactive multimedia technology and self-regulation not only enable the students to review their thought processes but also to get them exposed of modern techniques and hence students may be helped regulate their thinking processes and enhance their problem solving in science. The present study attempts in the determination of Red Alert employed by a sample of higher secondary students of Physics in the school as they engaged in Physics problem solving. Self-regulatory strategies involve three actions of problem solving in Physics. They are: 1. Developing the Plan of action; 2. Monitoring the plan of action; 3. Evaluating the plan of action. When students are developing the plan of action, they are guided to ask themselves the following questions to go through their cognitive processes.

- What in my prior knowledge will help me with this particular task?
- In what direction do I want my thinking to take me?
- What should I do first?
- Why am I reading this selection?
- How much time do I have to complete the task?

When they are monitoring or maintaining the plan of actions, they are guided to ask themselves the following questions:

- How am I doing?
- Am I on the right track?
- How should I proceed?
- What information is important to remember?
- Should I move in a different direction?
- Should I adjust the pace depending on the difficulty?
- What do I need to do if I don't understand?

After the problem is completed by the students, they are directed to evaluate the plan of action by asking themselves the following questions:

- How well did I do?
- Did my particular course of thinking produce more or less than I had expected?
- What could I have done differently?
- How might I apply this line of thinking to other problems?
- Do I need to go back through the task to fill in any "blanks" in my understanding?

Such an approach exposes them to the process of thinking about the way a problem is being/could be solved ; when they reflect on or talk about the process of problem solving, the Physics Problem solving ability can be developed through Self-regulation. In that way, the present study has attempted to integrate Self-regulatory strategies in to the problem solving ability of students of physics.

Corresponding author: johnchris81@gmail.com

Interactive Multimedia was found to be more effective in teaching physics than the conventional method of teaching (Johnson *et al*., 2010). It can stimulate the students' mind and encourage learning through all sense because multimedia can combine so many media together. Psychologists acknowledge the importance of interactive process for knowledge retention. Interactive Multimedia generates a lot of excitement as a learning tool. It crosses traditional boundaries of school, work place, and home, and enabling learners to choose their learning materials, in their own time and at their own pace. Interactive multimedia was developed in physics problem in which self-regulatory strategies was integrated in the present study.

Physics Problem solving Questionnaire (PPSQ)

The Physics Problem solving Questionnaire (PPSQ) elicited students' retrospective reports on the self-regulatory strategies they had employed while working on a given Physics problem. The Questionnaire is based on an instrument used with BEd. trainees having choices Yes! No by Ramganesh (2003). To make the questionnaire more appropriate for standard XII students, the original version was modified by deleting, rewording and including some items with the consultation of experts in the field of Education and Cognitive Psychology. PPSQ was designed in order to find out the red alert of the students. There are 14 statements. Each statement has 2 options 'Yes' and 'No'. The students are given the PPSQ and their response is recorded. For each and every response they provide through PPSQ, the investigator ascertain it by the problem solving sheet provided to the students during Pre-test, Post-test1 and Post-test2. If there is a mismatch between the response in PPSQ and the Problem solving sheet, students get an error detection that is red alert.

Sample

A sample of 90 higher secondary students from standard XII of S.R.V.S National higher secondary school, Karaikal was taken for the study. Experimental research method with control design was adopted for the study.

Objectives

The objectives of the study are

1. Find the difference between Red Alert of higher secondary students between Control and experimental group.
2. Examine gender differences with respect to Red Alert of higher secondary students.
3. Examine subject group differences with respect to Red Alert of higher secondary students.

Hypothesis 1

Null hypothesis: There is no significant difference between Control and Experimental Group with respect to Red Alert (RA) of Pre-test, Post-test 1 and Post-test 2.

Table I. t test for significant difference between Control and Experimental Group with respect to RA of Pre-test, Post-test 1 and Post-test 2.

RA	Group	Mean	SD	t value	P value
Pre-test	control	7.91	2.26	1.078	0.284
	Experiment	7.47	1.60		
Post-test1	control	7.51	1.74	24.560	0.000**
	Experiment	0.69	0.67		
Post-test2	control	7.33	1.61	28.522	0.000**
	Experiment	0.24	0.44		

Note: ** Denotes significant at 1% level

Since P value is less than 0.01, null hypothesis is rejected at 1% level of significance with regard to RA of Post test 1 and post test 2. Hence there is significant difference between Control and Experimental Group with respect to RA of Post-test 1 and Post-test 2. The mean score of the post-test 1(M=0.69), Post- test2 (M=0.24) is less than that of pre-test (M= 7.47) for the experimental group. This clearly indicates that the mean score of Red alert is low for the experimental group than the control group and the self regulatory orientation with interactive multimedia on Problem solving ability minimized the red alert which is utmost essential for success in problem solving. There is no significant difference between Control and Experimental Group with respect to RA of Pre-test, since P value is greater than 0.05.

Hypothesis 2

Null hypothesis: There is no significant difference between Boys and Girls with respect to Red Alert (RA) of Pre- test, Post-test 1 and Post-test2 of experimental group.

Table II. t test for significant difference between boys and girls with respect to RA of Pre- test, Post-test 1 and Post-test2 of experimental group

RA	Sex	Mean	SD	t value	P value
Pre-test	Boys	7.59	1.76	0.504	0.617
	Girls	7.35	1.47		
Post-test1	Boys	0.64	0.66	0.511	0.612
	Girls	0.74	0.69		
Post-test2	Boys	0.23	0.43	0.256	0.799
	Girls	0.26	0.45		

Since P value is greater than 0.05, null hypothesis is accepted at 5% level of significance with regard to RA of Pre-test, Post test 1 and post test 2. Hence there is no significant difference between Boys and Girls with respect to RA of Pre- test, Post-test 1 and Post-test2 of experimental group. The mean score of Pre-test(M=7.59) for Boys is greater than for Girls pre-test mean score(M=7.35).The mean score of Post-test1 (M=0.64), Post-test2(M=0.23) for Boys is greater than for Girls Post-test1(M=0.74), Post-test2(M=0.26). This clearly indicates that the experimentation on self-regulatory strategy with interactive multimedia has reduced the red alert mean score from pre-test to post-test1 and Post-test2 which is quite evident that the experimentation is effective.

Hypothesis 3

Null hypothesis: There is no significant difference between Biology and Computer Science group with respect to Red Alert (RA) of Pre-test, Post-test 1 and Post-test2 of experimental group.

Table III . t test for significant difference between Biology and Computer Science group with respect to RA of Pre- test, Post-test 1 and Post-test2 of experimental group

RA	Group	Mean	SD	t value	P value
Pre-test	Biology	7.16	1.46	1.452	0.154
	Computer Science	7.85	1.73		
Post-test1	Biology	0.68	0.63	0.099	0.922
	Computer Science	0.70	0.73		
Post-test2	Biology	0.16	0.37	1.477	0.147
	Computer Science	0.35	0.49		

Since P value is greater than 0.05 for Pre-test, Post-test 1 and Post-test2 of Biology and Computer Science group with respect to RA of experimental group, the null hypothesis is accepted at 5% level of significance. Hence there is no significant difference between Pre-test, Post-test 1 and Post-test2 of Biology and Computer Science group with respect to RA of experimental group. The mean score of post-test1 (M=0.68) for Biology group is greater than the Post-test1 (M=0.70) for Computer Science group. The mean score of post-test2 (M=0.16) for Biology group is greater than the Post-test2 (M=0.35) for Computer Science group. On comparison of the mean score of Post-test1 and Post-test2 of experimental group, the Red alert is less for Computer science group than for the Biology group.

Findings

1. Self-regulatory strategies were found effective with multimedia in reducing 'Red Alerts' in Physics Problem solving among the higher secondary students.
2. Boys were found effective in reducing the Red Alert than the girls.
3. Computer science group students are more effective in reducing the Red Alert than the Biology group students.

Conclusion

When students come across a problem, generally they try to remember a rule to solve the problem. But this is not a good strategy, because there is no rule but a system. Most of the children are forced to learn by rote in schools and colleges. It is essential to help them become adept at analytical thinking and problem solving. Self-regulation strategies with interactive multimedia activate the students in solving Physics Problems at ease. It removes the Phobia and makes Problem solving a joyful experience.

REFERENCES

Ford, P.J. & Wilde, A.J. (1999). The decline in the study of Physics. Fizika A(Zagreb), 8(4),215-222.

Goodstein, D. (1999). "Now Boarding: The Flight from Physics" David Goodstein's acceptance speech for the 1999 Oersted Medal presented by the American Association of Physics Teachers, 11 January 1999. American Journal of Physics, 67(3), 183-186.

Johnson, N. & Ramganesh, E. (2010). Effectiveness of multimedia in teaching Physics, Studies in education, University of Kerala, Publication No.27, Thiruvananthapuram.

National Research Council(2001). Physics in a new era: An Overview. Washington, D.C.: National academy of sciences.

Pravica, M. (2005). The importance of Physics: Breakthroughs drive economy, quality of life. [online] Available: http://www.reviewjournal.com/lvrj home/2005/Mar-06-sun-2005/opinion/682710.html [2007, May 2]

Ramganesh,E.(2003). Effect of Metacognitive orientation on enhancing Problem Solving Competency in mathematics among the B.Ed trainees.Doctoral Thesis submitted to Alagappa University, Karaikudi.

UNESCO (2005). Physics without tears. A world of science, 3(1), 2-7.

****