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Remedial teaching technique to overcome learning difficulties in chemistry at the higher secondary level

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Abstract--This article meticulously discusses the effectiveness of remedial teaching techniques in overcoming learning difficulties in chemistry at the higher secondary level using an experimental design with a sample of 60 students. This study only used a pre-test-post-test control group design. The primary goal of this research is to evaluate the efficacy of a remedial teaching technique specialized for learning chemistry without learning difficulties at the higher secondary level. This study also demonstrated that there is a significant relationship between remedial teaching techniques and learning difficulties in chemistry. As a result, this study sheds light on a remedial teaching strategy for overcoming learning challenges in chemistry at the higher secondary level.

Keywords--Remedial teaching technique, electronic courseware, learning chemistry, learning difficulties.

Introduction

Chemistry is one of the most important subjects in schools and colleges because chemistry plays a vital role in our day-to-day life. It enables learners to realize what happened around them. The chemistry curriculum often covers numerous abstract topics that are essential for furthering one's education in both chemistry and other sciences. Chemistry is extensively perceived as difficult because of its specialized language like International Union of Pure and Applied Chemistry (IUPAC) names and chemical reaction terms, mathematical representations, and its abstract conceptual nature. Chemistry proves a difficult subject for many students and also students have chemistry learning difficulties at school and college level. For the past decade, chemistry experts and researchers have been

attempting to explain how students might be assisted in better understanding chemistry (Ben-Zvi et al. 1986 & Wu et al. 2001). Mirroring the global pattern, in Tamil Nadu higher secondary school education scenario too, learning chemistry is found to be difficult for students, as compared to other subjects. This trend is evident in class XI board exam results in recent years. So the purpose of this investigation is to overcome the learning difficulties in chemistry at higher secondary level through the remedial teaching.

Need and significance of the present study

Many of the higher secondary school students feel Chemistry is a difficult subject because of the abstract nature of many chemical concepts, teaching styles applied in classroom, lack of teaching learning materials, lack of teaching techniques and the difficulty of the language of chemistry. All of this leads to a lack of knowledge and misunderstanding of chemical ideas among students at all levels, from elementary school to university. Herron (1996) claims that pupils face the following challenges: A lack of knowledge of common words used in chemistry to communicate meaning; a lack of grasp of technical terms introduced in the study of chemistry; ascribing a familiar meaning to a common phrase used in a technical sense; erroneous conclusions about chemical occurrences based on everyday meaning; failing to achieve the level of automatization required to read chemistry smoothly by failing to acquire the conventions used to specialized chemical language (Herron, 1996, p. 165). A variety of studies on various chemistry issues have been undertaken. A review of studies on students' understanding of chemical concepts reveals that the majority of the fundamental concepts were poorly understood. More research needs to be done to identify what sort of difficulties students face in the learning of chemical concepts. For both teaching and learning, learning difficulties are important. Hence, it has been concluded that it is worthwhile to conduct a research study on how to reduce the learning difficulties and improve the chemistry learning efficiently.

Objectives

1. To study the effectiveness of remedial teaching techniques in overcoming learning difficulties in chemistry at the higher secondary level
2. To compare the effect of remedial teaching technique on learning difficulties of students in chemistry with relation learners gender.

Operational Definitions

- 1) Remedial teaching technique
Remedial teaching technique is a technique to identify slow learners and providing them with the necessary help and guidance to help them overcome their problems, after identifying their areas of difficulty. In this study e-content based learning referred as remedial teaching technique.
- 2) Learning difficulties in chemistry
A person having specific problems in processing certain forms of information and also an issue with the brains ability to process information in chemistry subject.
- 3) Higher secondary level

In this study, higher secondary school level refers to students who are studying in XI Standard.

Hypotheses

1. Remedial teaching technique approach significantly decreases the learning disability of higher secondary level learners in chemistry compared to the traditional teaching method.
2. There is no significant difference in learning difficulty of students concerning different kind of learners (among boys and girls) at the higher secondary level.

Methodology of the study

a) Method of Study

The current study is an experimental design with a randomised control group pre-test post-test” design. Following randomization, the students are divided into two equal groups, one experimental and one control. In this study, the independent variable is the 'Remedial teaching technique,' while the dependent variable is the 'Learning difficulties in Chemistry.'

b) Population and Sample

Population was drawn from higher secondary schools in the Cuddalore district of Tamil Nadu. All 60 pupils from class XI at “Government higher secondary school” in the Nallur locality are used as a sample. The school was chosen on purpose to test the study's hypothesis. The researcher separated the class XI students into two equivalent groups based on their roll numbers, 30 students with even roll numbers in one group as an experimental group, and 30 students with odd roll numbers in another control group.

Research Tools

The following tools were utilized by the investigator to conduct the study: -

Measuring Tool

For class XI standard pupils, the investigator created achievement test was established to assess students' learning difficulties on the topics "Atomic structure, solid state, and coordination compounds." The tool includes 20 multiple-choice questions, 10 fill-in-the-blank questions, 5 matching questions, and 5 true/false questions. The investigator developed and standardized it based on the blueprint.

Development of remedial teaching tool

The major goal of this research is to create a remedial teaching tool for learning chemistry at the higher secondary level. Here multimedia Courseware (e-content) is identified and created as a remedial teaching tool. The researchers chose three chapters from the Class XI Chemistry text book provided by the Tamil Nadu government under the Uniform System of School Education. Atomic structure, solid state, and coordination compounds are among the topics. These topics have

been transformed into structured lessons with rich illustrations and photographs along with videos.

Analysis and interpretation of data

Testing of the Hypotheses

Research hypothesis: Remedial teaching technique significantly reduce the learning difficulties of higher secondary level learners in chemistry compared to the traditional teaching method.

Null hypothesis: There is no significant difference between the remedial teaching technique and the traditional teaching method in reduce the learning difficulties of learners in chemistry.

Table 1
Comparison of PRT scores of CG and EG

Group	N	Mean	SD	Mean Difference	df	Calculated 't'-value	Sig.
CG	30	10.16	3.539	0.22	62	0.252	0.809
EG	30	10.38	3.415				

Table 1 shows that the difference between the control and experimental groups' pre-test averages is 0.22. The table value for the df 62 at the 0.05 level of significance and 2.66 at the 0.01 level. At the 0.05 level, the t-value is 0.252, which is not significant. As a result, there is no statistically significant difference in the pre-test scores of control and experimental group pupils. As a result, both the control and experimental groups have the same degree of intelligence.

Table 2
Comparison of POT scores of CG and EG

Group	N	Mean	SD	Mean Difference	df	Calculated 't'-value	Sig.
CG	30	12.34	3.51	5.94	62	6.830	0.000
EG	30	18.28	3.45				

Table 2 shows that the difference in post-test averages between the control and experimental groups is 5.94. At 0.05 levels, the t-value is 6.830, which is significant. As a result, at 0.05 levels, the null hypothesis "there is no significant difference between the remedial teaching technique and the traditional teaching method in reduce the learning difficulties of learners in chemistry" is rejected.

As a result, it can be concluded that the experimental group's mean value has increased significantly from M=12.34 to M=18.28. As a result, hypothesis 1 is accepted, and the initial premise that the remedial teaching strategy will improve students' thinking skills and reduce the learning difficulties in chemistry in comparison to the traditional style of teaching is determined to be valid.

Table 3
Comparison of the gain score of the CG and EG

Group	N	Mean	SD	Mean Difference	df	Calculated 't'-value	Sig.
CG	30	2.06	1.8	5.53	62	11.920	0.000
EG	30	7.59	1.92				

Table 3 shows that the 't'-value is 11.920, which is significant at 0.05 levels. As a result, the experimental group's gain scores differ significantly from the control group's gain scores. In comparison to traditional teaching methods, remedial teaching strategy appears to be more helpful in strengthening students' understanding skill and thinking abilities.

Null hypotheses: There is no significant difference in achievement of students with respect to gender at the higher secondary level.

Table 4
Comparison of PRT of the EG with respect to boys and girls

Students gender of the EG PRT	N	Mean	SD	Mean Difference	df	Calculated 't'-value	Sig.
Girls	14	9.84	2.983	0.89	30	0.829	0.464
Boys	18	10.73	3.649				

Table 4 shows that the 't'-value is 0.829, which is not statistically significant at the 0.05 level. As a result, at 0.05 levels, the null hypothesis "no significant difference in pre-test achievement scores of boys and girls in the experimental group" is accepted. As a result, it can be concluded that the experimental group's boys and girls are of equal in learning difficulties.

Table 5
Comparison of POT scores of the EG with respect to boys and girls

Students' gender of the EG POT	N	Mean	SD	Mean Difference	df	Calculated 't'-value	Sig.
Girls	14	17.46	2.757	1.38	30	1.117	0.27
Boys	18	18.84	3.819				

The 't'-value in table 5 is 1.117, which is not significant at the 0.05 level. As a result, at 0.05 levels, the null hypothesis "no significant difference achievement test scores of boys and girls in the experimental group" is accepted. As a result, it can be inferred that teaching through remedial teaching technique is equally successful in significantly reduced the learning difficulties of the experimental group.

Major Findings

After analysis of the collected data, the following objective wise findings are drawn from the study.

To study the effectiveness of remedial teaching techniques in overcoming learning difficulties in chemistry at the higher secondary level

There is no significant difference between the control and experimental group pre-test scores but a significant difference between the post-test scores of the control and experimental group. On the other hand, there is a significant difference between the pre-test and post-test scores of the control group and the experimental group.

To compare the effect of remedial teaching technique on learning difficulties of students in chemistry with relation to learners gender

There is no significant difference in pre-test and post-test scores of the experimental group of boys and girls.

Conclusion

In light of the findings, it is believed that the current study will aid in the improvement of transactional competences among Higher Secondary students. Remedial teaching techniques were found to be helpful in achieving chemistry learning skills in all areas, and this study also shows that remedial teaching techniques (e-content based learning) can effectively overcome learning challenges in chemistry at the high school level. Many educational professionals have recognized this, and as a result, there is an urgent need to focus national efforts on the implementation of novel teaching strategies such as remedial teaching.

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