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Study of the attitude of secondary school science students studying in English Medium schools affiliated to ICSE Board in Mumbai region towards 7E model of Constructivist teaching methods

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ABSTRACT

The constructivist approach in science training involves students in the active construction of knowledge. Students examine the new scenario (student-centered approach) and evaluate new ideas and conceptions in terms of their prior conceptions. Constructivist teaching approaches aid students in acquiring scientific knowledge and developing a varied type of skills like communication, critical thinking, problem-solving, collaboration, data analysis, and scientific reasoning. These skills are vital not only for science but also for other areas of life and future careers. It is the need of the day today. The researcher used a training package designed by the researcher based on the 7E steps of Constructivist teaching. The experimental group was taught with 7 E constructivist learning approach-based lesson plans whereas the control group was taught with traditional approach-based lesson plans. The researchers developed a tool themselves to examine the post-attitudes of secondary school science students studying in English Medium schools affiliated with the ICSE Board in the Mumbai region towards the 7E model of Constructivist teaching approach with respect to gender. A Sample of 153 secondary school science students was selected using random sampling techniques from 2 ICSE schools in the Mumbai region of which 77 belonged to the experimental group taught by the 7E model of the Constructivist teaching approach and 76 belonged to the control group taught by the traditional method. The methodology includes a t-test. The study by the researcher is a true experimental method. The research undertaken attempted to compare if there is any significant difference between the attitudes of the post-test scores of boys and girls of standard IX science students towards studying Physics taught by the training module based on the 7E model of the Constructivist approach (Experimental group) studying in English Medium school affiliated to ICSE Board in Mumbai region.

Keywords: Attitude, Secondary School Students, 7E-Model of constructivism, Traditional method, Gender.

INTRODUCTION

The field of education has witnessed numerous advancements and transformations over the years. One such approach that has gained considerable attention is the constructivist teaching approach. Constructivism emphasizes active learning, where students are encouraged to construct their own knowledge through hands-on experiences and interactions with their environment. Constructivist theory serves as the foundation for Eisenkraft's (2003) inquiry-based 7E model of instruction.

The 7 steps of (Elicit-Engage-Explore-Explain-Elaborate-Evaluate and Extend) (7E) learning model supports upgrading current teaching techniques and incorporating cutting-edge pedagogical approaches into the science curriculum thus strengthening the science education provided in schools.

National Education Policy (NEP 2020) in line with the National Curriculum Framework (NCF 2005) propagates a constructivist type of learning including the renewed emphasis on constructivism rather than rote learning. It helps in encouraging the youth of today to not just investigate what they have been asked to do, but prepare them to research their own areas of interest and utilize that knowledge and apply it to real-world contexts of their country.

There are many factors affecting secondary school science students such as their gender, age, scientific aptitude, classroom environment, student engagement, prior learning experience, etc. The aim of the current study is to examine the attitude of secondary school science students studying in English Medium schools affiliated with the ICSE Board in the Mumbai region towards the 7E model of the Constructivist teaching approach with respect to gender.

LITERATURE REVIEW

The inclusion of inquiry-based 7E strategy instruction in education to make it an integral part of pedagogy at the secondary school level irrespective of the cognitive styles of students should be encouraged among educators. This will aid in getting 21st-century learners.

Among the studies that have been reviewed, attitudes toward science can be characterized as the display of positive or negative emotional characteristics associated with science.

Positive attitude towards science course; has a positive impact on science achievement Chandrasekaran S., (2014)(Ahuja, 2017; Alkan, 2006, p.25; Çibir & Özden, 2017; Dede & Yaman, 2008; Fidan-Dişikitli, 2011, p.57; Kenar & Balcı, 2012; Kesamang & Taiwo, 2002; Şişman, Acat, Aypay & Karadağ, 2011, p.281). In addition to these variables, it was found that there was a negative correlation between the grade level of the students and their attitudes toward science (Çokadar & Külçe, 2008; George, 2000; Yıldırım & Kansız, 2017)

The finding also revealed that there was a significant difference between the attitude of boys and girls students towards science. This is in agreement with the findings of Sekar and Mani (2016); Amit (2017) and Gbanga and Effiong (2015) who in their separate studies found that there are differences in the attitude of secondary school students based on gender towards science. However, the finding of this study is not in agreement with the findings of Abdulaziz (2018); Sakaryau, (2016), and Sofiani et al (2017) who's their findings showed that there was no significant difference between girls and boys in attitude toward science. Male students performed better than female students exposed to 7E's instructional approach in urban and rural areas(Adolphus, T., M.D. Omeodu, Naade, N., Ubaka, D. O., Echenu, F.2022).

Findings describe that the experimental group shows a higher Attitude towards Chemistry than the control group in the pretest. t-value suggests that both experimental and control groups were equal in terms of Attitude toward Chemistry before intervention (Verma, Rati 2017)

The results also showed that the attitudes of boys and girls students towards science differed significantly. This is consistent with research by Sekar and Mani (2016), Amit (2017), and Gbanga and Effiong (2015), who discovered in independent investigations that there are gender-based disparities in secondary school students' attitudes towards science. The results of this study, however, do not support the findings of Sakaryau (2016), Abdulaziz (2018), or Sofiani et al (2017), who found no discernible difference in the attitudes of boys and girls towards science. In both urban and rural settings, boys outperformed girls when exposed to the 7E method of instruction (Adolphus, T., M.D. Omeodu, Naade, N., Ubaka, D. O., Echenu, F. 2022).

Objective:
To compare the attitude of boys and girls of secondary English standard IX science students towards studying Physics taught by the training module based on the 7E model of Constructivist approach (Experimental group) studying in an English Medium school affiliated to ICSE Board in Mumbai region.

Hypothesis:
There is no significant difference between the attitudes of the post-test scores of boys and girls of standard IX science students towards studying Physics taught by the training module based on the 7E model of Constructivist approach (Experimental group) studying in English Medium school affiliated to ICSE Board in Mumbai region.

TOOL / MATERIALS

The following tool was used for data collection in the present study: the 'Attitude Scale' developed by the investigator. In this study, the tool used was designed by the researchers.

The questionnaire is divided into 2 parts:

Part 1: Demographics.
Part 2: Attitude Aspects.

The tool included 25 questions for which a Likert scale was used from a scale of 5(Strongly Agree) to 1 (Strongly Disagree). The reliability of the attitude tool is indicated by a Cronbach's Alpha value of 0.860.

METHOD

The study undertaken by the researcher is a true Experimental method. The Investigator shall be using statistical techniques like standard deviation (SD), mean, t-test, etc. for interpreting and further analyzing the data collected for the study. The population includes all the school students, studying in English Medium schools affiliated to ICSE Board in the Mumbai region.

Random sampling method has been used to collect the sample of 153 school students from 2 schools. A Sample of 153 secondary school science students was selected using random sampling techniques from 2 ICSE schools in the Mumbai region of which 77 belonged to the experimental group taught by the 7E Constructivist model and 76 belonged to the control group taught by the traditional method.

ANALYSIS

Reliability and Validity

The tool's Reliability and Validity are as follows:
Reliability-Total Variables, Scale: ALL VARIABLES

Figures and Tables

Table 1: Reliability and Validity of Tool

Case Processing Summary			
		N	%
Cases	Valid	147	96.1
	Excluded	6	3.9
	Total	153	100.0
a. Listwise deletion based on all variables in the procedure.			

Table 2: Reliability statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.860	105

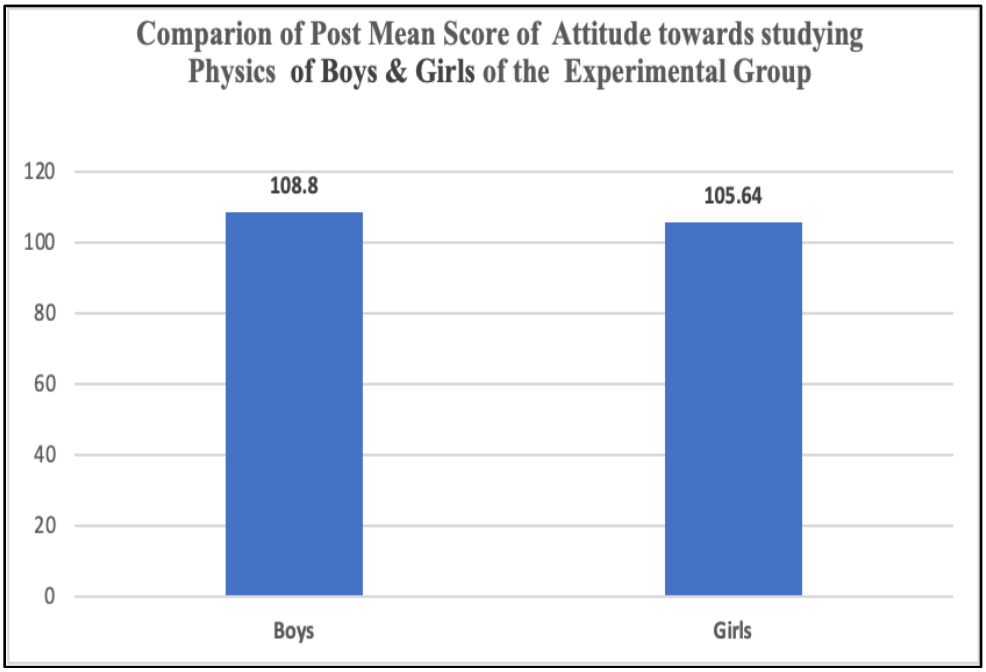
The reliability coefficient of the tool, Cronbach's Alpha,α = .860 (> 0.60), which indicates a high level of internal consistency for our scale.

Table 3: T-test for the attitudes of the post-test scores of boys and girls of standard IX science students of the Experimental group.

T Test Group Statistics -a. GR = 1 Experimental					
	Sex	N	Mean	Std. Deviation	Std. Error Mean
ATT_SCR ATTITUDE SCORE	1 Boys	49	108.88	10.037	1.434
	2 Girls	28	105.64	12.239	2.313

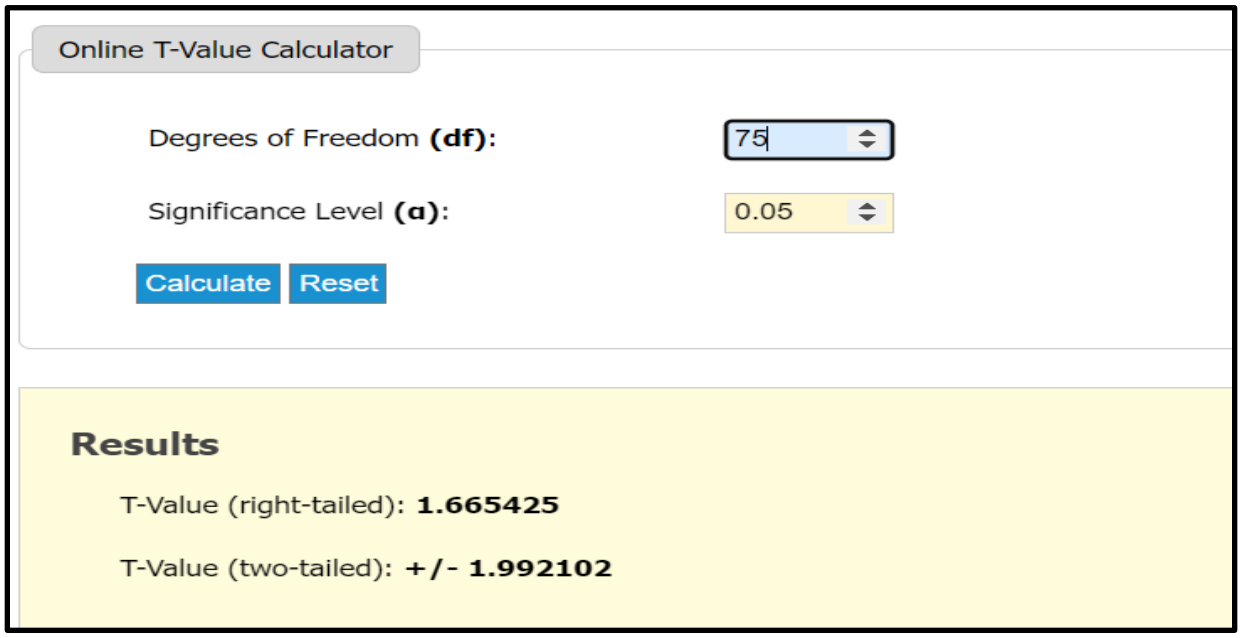
Table 4: T-test for the attitudes of the post-test scores of boys and girls of standard IX science students of the Experimental group

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ATT_SCR ATTITUDE SCORE	Equal variances assumed	.494	.484	1.255	75	.213	3.235	2.578	-1.900	8.370
	Equal variances not assumed			1.189	47.770	.240	3.235	2.721	-2.238	8.707



Graph 1: Comparison of Post-Mean Score of Attitude towards Studying Physics of Boys & Girls of the Experimental Group

Table No. 5: Student's t-value based on the significance level and the degrees of freedom in the standard deviation



From the table 5:

- The critical value of **t** for **df = 75** at 0.05 significance level is 1.67.
- The calculated value of **t** is = 1.255 which is less than the tabulated value at a 0.05 level of significance. Therefore, **the null hypothesis is accepted** at a 0.05 level of significance.

CONCLUSION

The researcher accepts the null hypothesis. The overall results indicate that there is no significant difference between the attitudes of the post-test scores of boys and girls of standard IX science students towards studying Physics taught by the training module based on the 7E model of the Constructivist approach (Experimental group) studying in an English Medium school affiliated with the ICSE Board in the Mumbai region.

RECOMMENDATIONS FOR FURTHER RESEARCH

The following are the recommendations for further research:

- Studies can be conducted to find the effectiveness of social constructivist strategies in different school subjects namely languages, social sciences, and mathematics.
- Similar studies can be conducted by adopting social constructivist strategies to the ICSE syllabus.
- Studies could be taken to develop teacher training packages related to social constructivist strategies.

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