

COGNITIVE DISCOURSES

INTERNATIONAL MULTIDISCIPLINARY JOURNAL

ISSN 2321-1075 ISSN 2347-5692

VOLUME 11

ISSUE 1

JULY 2023

cdimj.naspublishers.com

Published Since 2013

Improving Seventh-Grade Students' Academic Self-Efficacy Through Constructivist 7E Model

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Abstract

Confidence in own ability to accomplish goals influences the overall development of the students. The goal of the current study was to determine the usefulness of the constructivist 7E model in enhancing the Academic Self-efficacy of seventh-grade students. The pre-test and post-test design for non-equivalent groups (the quasi-experimental research design) was employed. The sample was selected using the incidental sampling technique. The sample consisted of 88 students (the experimental group comprised 88 students whereas the control group incorporated 46 students). For data collection researcher prepared an Academic Self-Efficacy Scale consisting of 25 items. The t-test and Wolf's formula were used for testing the null hypothesis & effect size respectively. The students in the experimental group displayed higher academic self-efficacy than those in the control group. Wolf's criterion for the effect size showed that teaching through the Constructivist 7E model has the maximum effect in raising seventh-grade students' academic self-efficacy.

Keywords: constructivist learning, 7 e model, academic self-efficacy; seventh grade students

Introduction

This statement suggests that there is a vital role of self-belief and confidence in one's academic abilities to set challenging goals, overcome obstacles, and persist through difficult tasks which not only leads to a proactive approach to learning to achieve academic goals but also foster holistic development of the learners that encompasses confidence, decision making, motivation for learning, problem-solving skills, resilience & positive interactions with teachers, peers & the environment.

Albert Bandura, a psychologist, first put up the notion of self-efficacy. The conviction or belief in one's ability to carry out a specific task or a particular goal is called self-efficacy. Academic self-efficacy is an individual's confidence in their capability to carry out academic tasks successfully to achieve their educational goals by organizing their knowledge and expertise and putting that into action to solve the problem. It is one of the very crucial elements that determine the academic performance of the learners. It refers to an individual conviction that they can successfully carry off academic tasks or achieve particular goals. Individuals with high self-efficacy when taking on challenging activities or difficult tasks feel calm and restful whereas low self-efficacy or lack of confidence in one's ability to accomplish the task may cause someone to perceive a task as more challenging than it is in reality.

Constructivism is an educational paradigm that suggests that people build their knowledge and comprehension of the world, through active engagement in the learning process, through experiencing things, social interactions, and reflecting on their learning experiences. "It is based on the belief that knowledge isn't a thing that can be simply given by the teacher at the front of the classroom to students at their desks. Rather, knowledge is constructed by learners through an active, mental process of development. A constructivist student-centered approach places more

focus on students learning than on teachers teaching (Gray, 1997).” The study under consideration employs the Constructivist 7E learning cycle model given by Eisenkraft (2003). Eisenkraft outlined the seven phases of the 7E teaching-learning process as Elicit (first phase), Engage (second phase), Explore (third phase), Explain (fourth phase), Elaborate (fifth phase), Evaluate (sixth phase), and Extend (seventh phase).

Need and Significance of the Study

The holistic pedagogy aims to nurture the overall development of students in such a way that they are not only intellectually proficient but also socially, emotionally aware, and self-confident individuals, having the resilience to cope with life’s challenges & contributing towards the development of society. A global study to assess the educational performance of students in **reading, mathematics, and science** revealed that India participated in PISA in 2009 & ranked towards the bottom among the participating countries. The 2021 National Achievement Survey (NAS) also reported a nationwide decline in students’ learning levels across all grades and subjects tested. Academic self-efficacy plays a crucial in an individual’s educational journey as well as their overall development. Students displaying confidence in their capabilities tend to achieve higher grades & demonstrate outstanding performance in assessments. Academic self-efficacy is positively correlated with the educational performance of the students. Students with higher degrees of self-efficacy persevere with given tasks and show greater levels of effort and self-guided interest, as it relates to academic learning and achievement (Schunk, 1984b, 1990), the exceptional academic accomplishment was discovered in the students with high academic self-efficacy. The crucial importance of academic self-efficacy in improving academic performance, coping with challenges, enhancing motivation & engagement in learning, boosting confidence, fostering resilience, developing a positive mindset & contributing to overall well-being and mental

health was also found. Thus, there is a need to foster & nurture the students' confidence in their academic abilities.

Objectives

1. To examine the academic self-efficacy pre-test scores of students in experimental and control groups.
2. To examine the academic self-efficacy post-test scores of students in experimental and control groups.
3. To investigate the relationship between gender and treatment on the students' academic self-efficacy in the experimental and control groups.
4. To investigate how treatment and gender interact to affect the students' academic self-efficacy in the experimental and control groups.
5. To determine the effect size of treatment on the students' Academic Self-efficacy.

Methodology

Research Design & Sample

A quasi-experimental study was carried out by the investigator. The study included eighty-eight students in all. The technique of incidental sampling was employed. The students of class VII-A from C.E.S. Michael High School, Kurla(W) were randomly assigned as the experimental group, and of class VII-A from St. Joseph High School, Kurla(W) was assigned as the control group.

Tool

For the collection of data, the academic Self-Efficacy Scale was prepared by the investigator. The scale consisted of 25 items. Based on the experts' opinion the validity of the scale

was confirmed. Reliability was assessed using the Cronbach's alpha method. The tool's reliability coefficient as determined by Cronbach's alpha method was 0.87.

Data Collection Procedure

The current study was carried out during the academic year 2022-23 for teaching science to 7th-grade students using the Constructivist 7E model. The lesson plans were prepared from the Science textbook of Maharashtra State Board by the researcher according to the Constructivist 7E Learning Cycle model. Different activities were developed based on the seven phases of the constructivist 7E model & implemented by the researcher. The program was implemented on forty-eight 7th-grade students of Michael High School, Kurla, Mumbai. Before the implementation of the program, both groups received an academic self-efficacy scale as a pre-test. Following the treatment both groups were given the same test again as a post-test.

Data Analysis and Results

Data was analyzed using a t-test and Wolf's formula.

Comparison of the Students' Pre-test Scores of Academic Self-efficacy

The appropriate statistics of the scores of pre-test academic self-efficacy for experimental and control groups are displayed in Table 1.

Table 1

Statistics for Pre-test Academic Self-Efficacy of EG and CG

Variable	Group	N	Mean	SD	Obtained t-value	L.O. S
Academic Self-Efficacy	EG	42	67.43	10.38	0.66	NS
	CG	46	63.85	9.12		

From table C, for N=88, df=86, tabulated t=1.99 at 0.05 level and t= 2.63 at 0.01 level

Interpretation & Conclusion

For the pre-test scores of Academic Self-Efficacy, the obtained value of 't' is 0.66 is lesser than the tabulated 't' value which shows that experimental and control group pre-test results do not significantly differ from one another. Therefore, it can be claimed that both groups were comparable in their level of Academic Self-Efficacy before the implementation of the intervention program.

Comparison of the Students' Post-test Scores of Academic Self-efficacy

The appropriate statistics of the scores of post-test academic self-efficacy for experimental and control groups are displayed in Table 2.

Table 2

Pertinent Statistics for Post-test Academic Self-Efficacy of EG and CG

Variables	Group	N	Mean	SD	Obtained t-value	L.O. S
Academic Self-Efficacy	EG	42	80.74	10.88	6.64	0.01
	CG	46	66.93	8.27		

From table C, for N=88, df=86, tabulated t=1.99 at 0.05 level and t= 2.63 at 0.01 level

Interpretation & Conclusion

For the students in the experimental and control group the obtained value of 't' is 6.64 for post-test Academic Self-Efficacy which exceeds the tabulated 't' value. Hence, it can be said that the experimental group differed in their level of Academic Self-Efficacy after the treatment. The experimental group's post-test mean score is greater than that of the control group suggesting that the experimental group's Academic Self-Efficacy has increased as a result of their learning through the constructivist 7E model.

Influence of Interaction between Gender and Treatment on the students' Academic Self

Efficacy

Table 3 shows the appropriate statistics of academic self-efficacy by treatment and gender.

Table 3

Pertinent Statistics of Academic Self-Efficacy scores by Treatment and Gender

Treatment	Gender	N	Total N	Mean	SD
Experimental	Boys	18	42	79.39	12.77
	Girls	24		81.75	9.38
Control	Boys	23	46	65.04	8.15
	Girls	23		68.83	8.12

Table 4 presents the results of a two-way analysis of the variance for Academic Self-Efficacy scores according to treatment and gender.

Table 4

Analysis of Variance of Academic Self-Efficacy scores by Treatment and Gender

Source of Variance	SS	df	MSS	F	L.O.S
Gender	365.25	1	365.25	3.98	0.05
Treatment	4183.03	1	4183.03	45.58	0.01
Interaction	143.36	1	143.36	1.56	NS
Within Group	7709.03	84	91.77		
Total	12113.95	87			

From table D, for $N=88$, $df= (1, 84)$, tabulated $F=3.95$ at 0.05 level and $F= 6.92$ at 0.01 level

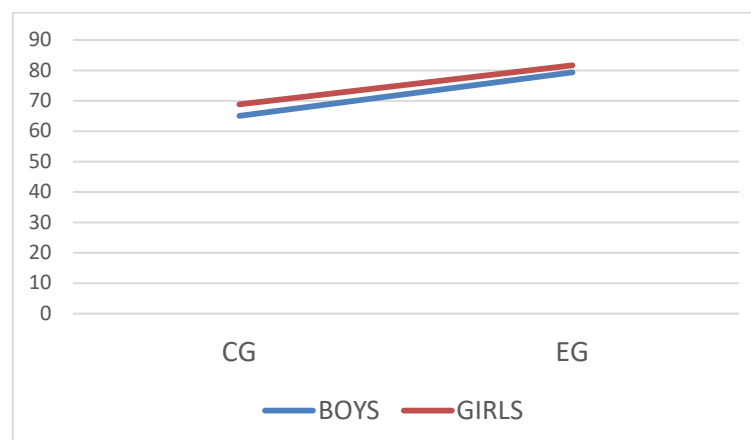
Interpretation and Conclusion

- For the gender, the obtained $F =3.98$ which at the significance level of 0.05 is higher than 3.95. Thus, it may be concluded that there is a substantial difference in Academic Self-Efficacy by gender.
- For the treatment, the obtained $F =45.58$ which at the significance level of 0.01 is greater than 6.92. Therefore, Academic Self-Efficacy varies significantly depending upon the treatment.
- For the interaction, the obtained $F= 1.56$ is smaller than 3.95 at a 0.05 level of significance. Hence it can be concluded that there is no substantial impact of interaction between gender and treatment on the student's academic self-efficacy.

Figure 1 illustrates the pattern of interaction between gender and treatment on the Academic Self-Efficacy scores.

Figure 1

The Trend of Influence of Interaction Between Gender and Treatment on the Students' Academic Self-Efficacy



From the graph, it can be seen that as the treatment changes from CG to EG there is a sharp increase in the students' academic self-efficacy(both boys & girls). But compared to boys, girls' academic self-efficacy was found slightly higher. It may be inferred that the treatment has an equal impact on both girls' and boys' academic self-efficacy since the lines are essentially parallel to one another and do not cross.

Effect Size of Treatment on The Students' Academic Self-Efficacy

Wolf's formula was employed to calculate the treatment's effect size on the students' Academic Self-Efficacy.

Table 5

Effect Size of Treatment on Students' Academic Self-Efficacy

Group	N	Mean	SD	The magnitude of the effect	Effect size
Experimental	42	80.74	10.88	1.67	maximum
Control	46	66.93	8.27		

Interpretation & Conclusion

From Table 5, it is evident that the treatment's impact on Academic Self-Efficacy is 1.67. Therefore, the treatment has the greatest effect on improving students' academic self-efficacy, according to Wolf's criterion.

Discussion and Recommendations

The study showed that the students in the experimental group were more confident in their academic abilities than those in the control group. This shows that the student's academic

self-efficacy has increased as a result of the intervention program. Furthermore, the students' academic self-efficacy was not shown to be significantly impacted by the relationship between treatment and gender. It indicates that gender does not considerably mitigate the impact of the treatment on the levels of academic self-efficacy of the students i.e. the treatment has a consistent effect on the students' academic self-efficacy for both boys & girls. Besides, it is also evident from Wolf's criterion of effect size that after undergoing the treatment the students' academic self-efficacy is significantly raised and it has shown maximum impact in improving the student's academic self-efficacy.

The concept of Academic self-efficacy is vital in the realm of education and the personal development of an individual. The present study has a limited sample size so the generalization of the results is not possible but it can serve as a beginning of venture for further research on the application of the constructivist 7E model. The study put forward a need to develop and implement intervention programs to boost academic self-efficacy. The investigation recommends that there is a necessity to encourage and train teachers to create and develop constructivist teaching-learning environments in the classrooms. It also suggests that it is important to perform both qualitative and quantitative research on the challenges that the teachers face in implementing learner-centered and activity-based teaching methods such as constructivist learning models, and students' perception towards it to improve educational outcomes & to improve their academic self-efficacy as well as overall well-being. Similar research using a sizable sample can be conducted for various populations considering other factors like age, socio-economic status, etc. Comparable studies can be conducted for teaching different subjects & for various levels of education to yield a confident and learned society. Investing in education and fostering confidence in individuals will result in a multitude of positive outcomes and benefits and create a foundation for a brighter, more prosperous future for all which will lead to the overall progress of the nation.

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