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Developing Curiosity: An Innovative Constructive Framework

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Abstract

Schools as formal agencies of education provide opportunities to realize the full potential of an individual to promote social, national individual development. We witnessed significant shifts in the traditional and foundational aspects of schooling throughout many decades. It follows an organized structure of learning that includes many academic disciplines. Each academic discipline has specific goals that can be achieved through different teaching modes and approaches. Social science is a discipline that requires deep concern and attention to develop interest and curiosity among learners. Innovative pedagogical practices and approaches help to promote self-paced and self-directed learning for the successful attainment of desired academic goals of social sciences. The constructive approach to teaching is one of the innovative and productive approach that could let someone build their knowledge at their own pace. Thus, the study intends to clarify and investigate the potential of a constructive approach to social science education. It also considers how a constructive approach affects students' academic achievement. The study helps to realize the value of a constructive approach and enlightens the path to enhance the creativity and interactivity of teaching social science at the school level.

Keywords

Constructive approach, Academic Achievement, Social science.

Introduction:

"Education is fundamental for achieving full human potential, developing an equitable and just society promoting national development" (NEP, 2020). Scientific and technological advancements transform the fundamental nature of education. Innovative and creative educational approaches that maximize opportunities to consider learners as active participants in the teaching-learning process have supplanted traditional classroom practices. NEP, 2020 mentioned that "Learning should be holistic, integrated, enjoyable and engaging." It restructured the school curriculum to 5+3+3+4 design and also advocated reforms in curriculum and pedagogy across all stages of learning. The school curriculum consists of a diverse range of disciplines. An essential part of the school curriculum, social science aids in meeting social needs, improving social adjustment and enhancing an individual's quality of life. It helps to develop social skills, address a wide range of societal issues and enable learners to think and question social realities. It also supports upholding democracy and strengthens democratic and constitutional values. It helps to prepare vigilant citizens and develop analytical and critical minds. Unfortunately, "social sciences tend to be considered non-utility subject and are given less importance then the natural sciences. It is believed that the social science merely transmits information and are text centered" (NCF, 2005). Thus, open-ended and interactive teaching approaches need to be deployed to foster interest and curiosity among learners toward social science education. "The teaching of the social sciences must adopt methods that promote creativity, aesthetics critical perspectives and enable children to draw relationships between past and present to understand changes taking place in society" (NCF, 2005). Teaching through constructive approach may help to foster a critical understanding of socio-political realities. Young minds that are taught constructively are better able to think critically and logically. By assimilating experiences, learners can build their knowledge. It enables learners to better adjust themselves following their preferred mode of learning to fulfill the needs and demands of the contemporary world. Here, Teachers must look into maximum possibilities to engage learners in worthwhile activities learners need to consider as active participants in the process of knowledge construction. Active participation, curiosity, engagement, creativity, exploration problem-solving attitude are prerequisites to creating a constructive environment of learning. The foundation of constructivism is the idea that learning is not objective but rather subjective. The process of creating knowledge is greatly influenced by the beliefs, learning preferences social reality of the learners. Constructivist theories proposed by Piaget, Novak Lev S. Vygotsky. According to Vygotsky, social interaction is essential to the process of knowledge construction. Novak also elucidates how social connection is necessary for knowledge construction. The fundamental notion of the constructive approach is that learning is not a passive process. It offers opportunities to create new knowledge based on accepted concepts, methods

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experiences. To understand the phenomenon from their point of view, students should be encouraged to think, examine, explore, reflect evaluate. It is a pedagogical practice that support learners' autonomy in the teaching-learning process. Therefore, by adhering to its guiding principles-engage, explore, explain, elaborate evaluate the constructive approach aids in achieving the desired goals of social science at the school level. Learners need to be engaged in meaningful activities to conceptualize the phenomenon from a broader perspective. To maximize opportunities to explore learners' autonomy needs to be encouraged. Through the explanation and elaboration of facts and formal concepts, this teaching technique facilitates the assimilation and accommodation of new knowledge with pre-existing knowledge. It also encourages self-directed learning and suggests innovative, distinctive wide-ranging evaluation techniques mainly focused on peer and self-assessment.

Review of Related Literature:

Fardanesh (2006) studied "A classification of constructivist instructional design models based on learning and teaching approaches". The prime objective was to categorize constructivist instructional design models according to teaching and learning approaches. Ten of the twenty-five constructivist instructional design models in the population made up the sample. The results showed that majority of the models fall into the individual category, while very few fall into the group category. The most important finding was that model under the personalised teaching method works best for instructions. Effandi (2003) examined the effects of cooperative learning on students' academic achievement and problem-solving skills. Cooperative learning techniques were used to teach the experimental group, whereas the control group was taught by the conventional method. Findings revealed that cooperative group education improves students' performance in math. Additionally, the findings also reflect that students in the cooperative learning group responded well to group projects. Karaduman and Gultekin (2007) studied "The Effect of constructivist learning principles based learning materials to students' attitudes, success retention in social studies". The primary objective was to determine the efficacy of learning materials prepared on the key principles of the constructivist approach. The sample comprises seventy-two students of grade five split into two groups control and experimental. The findings of the study reflect that instructional materials based on principles of constructivism helpful to improve students' performance and retention rates. Kim, J.S (2005) conducted a study on "the effects of a constructivist teaching approach on student academic achievement, self-concept and learning strategies". The objective was to investigate how a constructivist approach affected learning strategies, self-concept academic achievement. Seventy-six sixth-grade children made up the sample. Two groups were formed. The control group was instructed through the conventional method the experimental group was instructed through the constructivist method. The finding revealed that the constructivist mode of teaching is more effective in comparison to the conventional mode concerning the academic achievement of learners. However, it had a limited effect on students' self-concept and learning strategies. Neo and Neo (2010) conducted a study on "students' perceptions in developing a multimedia project within a constructivist learning environment: A Malaysian experience". The prime goal was to infuse students with multimedia project development skills. Fifty-three second-year students enrolled in degree programs made up the sample. Findings revealed that students became extremely motivated and involved in their education when given a task through a multimedia project in a constructivist learning environment. This also inspired and encouraged Malaysian teachers to integrate multimedia technology and constructivist teaching methods in their classrooms. Kaur, A. & Kaur, P. (2016) studied the role of a constructive approach in the teaching of science. The prime aim of the study was to compare the impact of constructive versus traditional teaching methods on students' academic confidence. The total sample of the study was 200 secondary school students in the district of Jalandhar. The findings indicate that a constructive approach is better in comparison to the traditional approach of teaching to increase the academic interest and confidence of the students. Pandey, L. (2017) determines how a constructive approach affects teachers' attitudes and students' academic achievement. The sample consists of eighty students and thirty teachers. A quasi-experimental design pre-test and post-test was adopted to conduct the study. The findings of the study revealed constructive approach to teaching had a considerable impact on students' academic achievement and teachers' attitude. Aspasia, P. (2020) conducted a study on constructive teaching and learning in physical education. The prime aim of the study was to explore the correlation between constructive teaching and learning. The total sample of the study comprises of 909 students from the elementary level and 25 PETs. Findings revealed a negative correlation between constructive teaching and learning in physical education.

Significance of the Study:

The contemporary period of education moving towards a learner-centric approach. Teaching through a constructive approach aids in determining the satisfactory level of engagement and achievement. It creates a self-paced learning environment and encourages learners to serious exploration of facts from diverse perspectives. The scope of social science is wide and requires the active participation of

learners to assimilate their learning experiences and reflect upon social realities. It enables learners to establish the relationship between human culture in the light of facts and theories of social science. Rote learning and memorizing instead of understanding the facts encourages an isolated and irrational form of teaching social science. Interactive pedagogical strategies may contribute to developing curiosity, interest and motivation among learners toward social science. The constructive approach is considered one of the interactive approach to teaching for conceptual clarity and understanding the phenomenon of social science. A demonstrated desired skills and knowledge largely depend on a logical and purposeful selection of meaningful activities. Thus, the study helps to comprehend the effect of a constructive approach on the student's academic achievement in social science. It will be beneficial to comprehend the empirical findings of the study focusing on the integration of constructive approach as an interactive tool to make learning more enjoyable and meaningful for learners.

Objectives and Hypotheses:

- To compare mean pre-test scores within control and experimental groups.
- To compare mean post-test scores within control and experimental groups.
- To compare mean pre and post-test scores of the experimental group.
- Ho_1: No significant difference exists between experimental and control groups' pre-test means.
- Ho_2: No significant improvement occurs in the control group from pre-test to post-test.
- Ho_3: No significant improvement occurs in the experimental group from pre-test to post-test.
- Ho_4: No significant difference exists between the groups' post-test means.

Methodology:

Research Design: A quasi-experimental, pre-test–post-test design was employed. Sixty seventh-grade students, selected via simple random sampling, were split equally into control (traditional teaching) and experimental (constructivist teaching) groups. Both groups completed an identical pre-test; mean scores were calculated. Following a six-week instructional intervention, a post-test was administered. Descriptive statistics, paired and independent t-tests, effect sizes (Cohen's d) 95% confidence intervals (CIs) were computed.

Population:

The population consists of all students between the age group of 11-14 from middle stage of schooling.

Sample:

The study's sample consists of sixty (60) students from class seven selected through a simple random sampling method and split equally between the groups i.e. control and experimental.

Tool:

In order to gather pre-test and post-test scores and examine the effect of a constructive approach to teaching on students' academic achievement, two parallel achievement tests were developed and administered to both groups.

Analysis:

The collected data was organized and analysed quantitatively using basic descriptive statistics measures i.e. mean, median, mode t-test.

Research Findings:

Table 1: Descriptive Statistics for Pre-test and Post-test

Table 1 presents means, standard deviations score ranges for both groups before and after intervention.

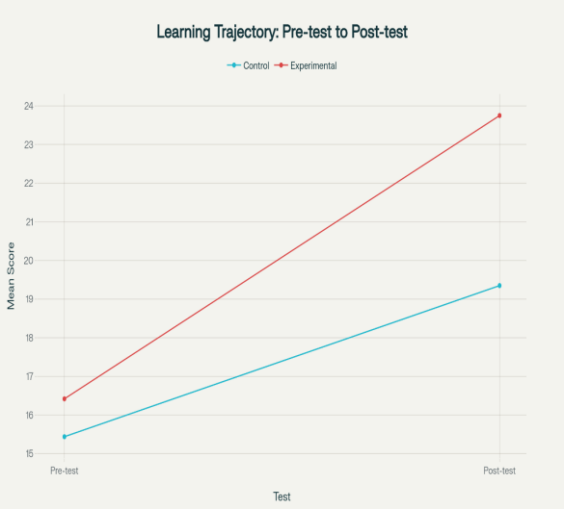
Group	N	Mean	SD	Min	Max	Range
Control Pre-test	30	15.44	3.04	12	22	10
Control Post-test	30	19.35	3.66	13	24	11
Experimental Pre-test	30	16.42	2.85	15	24	9
Experimental Post-test	30	23.75	3.82	18	30	12

Both groups exhibited score increases after instruction. The experimental group's mean rose by 7.33 points (44.6% improvement), whereas the control group improved by 3.91 points (25.3% improvement), indicating a larger gain under the constructivist approach.

Figure 1: Pre-test vs Post-test Mean Scores by Group

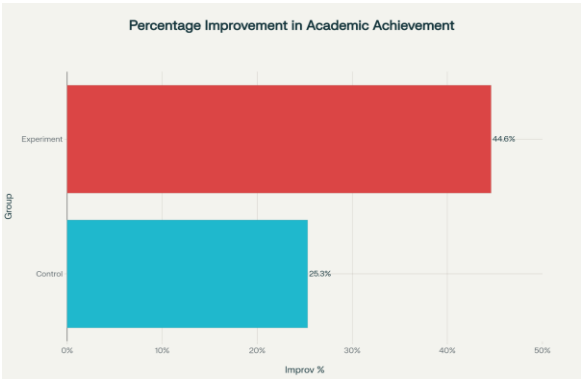
Comparison of pre-test and post-test mean scores between control and experimental groups with error bars showing standard deviation. The experimental group's post-test bar notably exceeds that of the control group, illustrating greater achievement gains. Error bars show that variability remains comparable between groups.

Figure 2: Learning Trajectory-Pre-test to Post-test Improvement



Learning trajectory showing improvement from pre-test to post-test for both control and experimental groups. The Line chart depicts mean score trajectories from pre-test to post-test for both groups. It shows that both lines ascend, but the experimental group's trajectory is steeper, highlighting accelerated learning under the constructivist method.

Figure 3: Percentage Improvement in Academic Achievement



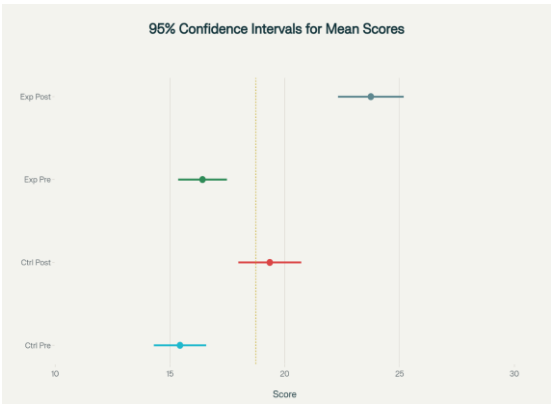
Percentage improvement in academic achievement comparing the control and experimental groups. The Horizontal bar chart shows the percentage improvement in test scores for each group. It reveals that the experimental group achieved a 44.6% increase versus 25.3% for the control group, underscoring the constructivist approach's practical impact.

Table 2: Inferential Statistics and Effect Sizes

Comparison	t-value	df	p-value	Result	Cohen's *d*
Control vs Experimental (Pre-test)	1.25	58	> 0.05	Not significant (Ho_1 accepted)	0.333
Control Pre- vs Post-test	5.22	58	< 0.01	Significant (Ho_2 rejected)	—
Experimental Pre- vs Post-test	8.25	58	< 0.01	Significant (Ho_3 rejected)	—
Control vs Experimental (Post-test)	4.54	58	< 0.01	Significant (Ho_4 rejected)	1.176

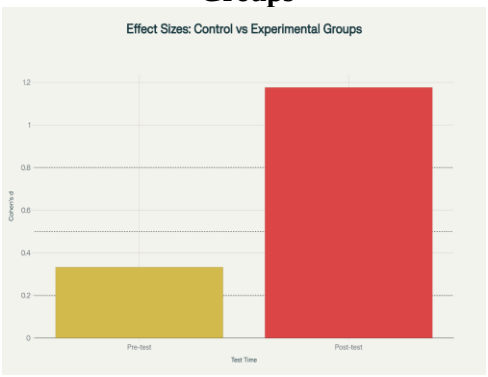
Baseline equivalence (Ho_1) is confirmed. Both within-group comparisons show significant gains (Ho_2, Ho_3 rejected). The post-test comparison (Ho_4) yields a large effect size (d = 1.176), demonstrating the constructivist approach's superiority.

Figure 4: 95% Confidence Intervals for Mean Scores



Forest plot showing 95% confidence intervals for all mean scores across groups and time points. The plot displays that Narrow CIs indicate precise estimates. Overlap between pre-test CIs confirms baseline comparability; non-overlap between post-test CIs underscores the significant group difference.

Figure 5: Effect Sizes-Control vs Experimental Groups



Effect sizes (Cohen's d) comparing control and experimental groups at pre-test and post-test. Column chart of Cohen's d for pre-test and post-test comparisons, with reference lines at small (0.2), medium (0.5) large (0.8) thresholds. It displays that the pre-test effect size is small (d = 0.333), while the post-test effect size is large (d = 1.176), indicating strong practical significance of the constructivist intervention.

Discussion:

The study investigated the effectiveness of a constructive framework in developing curiosity and enhancing academic achievement. Based on the analysis of pre-test and post-test scores, several important findings emerged. The experimental group demonstrated a substantially higher gain compared to the control group. It highlights the positive impact and significant improvement in academic achievement and curiosity among learners that confirm the constructivist approach's efficacy. The accelerated improvement can be interpreted as a direct outcome of engaging learners cognitively and effectively in the process of knowledge construction.

A large effect size suggests shifting from traditional to constructivist methods can significantly enhance learning effectiveness, stimulate curiosity and develop conceptual understanding. Thus, it is recommended that the teachers must provide a conducive environment to explore, engage, reflect, question and discuss to promote active learning and curiosity among learners. School administrators must integrate constructive frameworks into curriculum planning and design across subject and grade levels. Policy makers should suggest some educational reforms to construct a creative learning environment in educational settings. Overall, the findings indicate that a carefully designed constructive framework is highly effective in developing curiosity and achieving desirable learning outcomes.

Conclusion:

This study provides robust evidence that a constructivist teaching approach significantly enhances seventh-grade students' academic achievement in social science compared to traditional methods. While both the control and experimental groups demonstrated learning gains following instruction, the experimental group exhibited substantially larger improvements both in absolute score increases (7.33 vs. 3.91 points) and percentage gains (44.6% vs. 25.3%). The independent t-test on post-test scores yielded a highly significant difference ($t = 4.54$, $p < 0.01$) with a large effect size (Cohen's $d = 1.176$), underscoring the practical importance of constructivist pedagogy. However, the effective implementation of a constructive approach largely depends on the selection of meaningful activities to ensure maximum participation of learners and to realize the aims of social science. The present research has yielded valuable insights into its potential to enhance student learning and engagement. Through a comprehensive examination of various aspects of this pedagogical approach, including its impact on critical and logical thinking, problem-solving attitude long-term retention of knowledge, it becomes evident that the constructive approach has the potential to revolutionize social science education. Its emphasis on active participation, collaborative learning the construction of knowledge within a meaningful context resonates with contemporary educational goals. While challenges and nuances exist in its implementation, the overall findings indicate that the Constructive Approach holds promise for educators seeking innovative and effective ways to foster a deeper understanding of social sciences among their students. Further research and exploration are needed to refine instructional strategies and maximize their potential in the ever-evolving landscape of education.

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