

STUDENT-CENTERED APPROACH FOR BEFITTINGLY TEACHING SCIENCE CONCEPTS AT ELEMENTARY LEVEL

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Abstract

Purpose of the study: The main purpose of the study is to find out the “use of student-centred approach of teaching science on the performance of students performance at elementary level”.

Methodology: Quasi-experimental research was used in this study. Pre-test and post-test were used to collect the data and analyses were done through SPSS. Three classes; grades 6th, 7th, and 8th were chosen as a sample of the study.

Main Findings: Findings of the research study revealed that the students belonging to lower grade levels responded more positively to the student-centred methods as compared to the students belonging to higher grade levels.

Applications of this study: This study is applicable in the elementary level of education in Khyber Pakhtunkhwa. Policymakers and government officials can take guidance to improve the situations of elementary schools.

Novelty/Originality of this study: This study was originated to determine the effectiveness of a Student-centered learning slant, especially for teaching science at the elementary level. It was also attempted to know whether or not the effectiveness of the Student-centered approach alters at different grade levels of students.

Keywords: Student-centered Approach, Effective Teaching, Science Concepts, Elementary Level.

INTRODUCTION

Preamble

The student-centred approach has a key factor in improving Student's academic performance, based on which a teacher can achieve short- or long-term scholastic goals. In our educational institutions' students' academic performance is the main and vital thing to achieve. For improving the academic performance of students besides all factors i.e. subject interest, engaging students in co-curricular activities, motivation, etc. The student-centred approach is the main and key element in teaching and learning situations. ([Narad and Abdullah,2016](#))

Student-centred methods in teaching divert the attention of activities from teacher to student. [Kulieva \(2018\)](#) in the teaching-learning process Learner-centered approach involves all students in hard, tough disordered, and rough work of learning. Regarding this method, educators educate students about thinking, problem-solving, and assessing the things around them. The student-centred method comprises Cooperative learning, Active learning, and an Inductive method of teaching. The student-centred method prepares students for the future in many perspectives like adjustment in society, problem-solving, better understanding, and preparing their own learning style (Wikipedia 14/02/2018). Experts' observation says that this method is decent for students, although this is not a well-structured and disciplined method (Wikipedia 17/12/2019).

[Ozfidan \(2017\)](#) Many time it has observed that Student-centered method of teaching has enhanced the thinking skill of students, so we can say that it is the best method of teaching the teachers must use this method in his/her teaching and learning process, but unfortunately, so many teaches avoid this approach of teaching pedagogy. This method is seen by teachers as a threat as it could reduce the significant role they play in class. The student-centred method of teaching looked important for speculative attainment in science education. Results showed that science teachers' views about rehabilitated education are very high, so we can say that science teachers have a prompt role in this regard.

Research Objectives

The main objective of the study was, to find out that student-centred method of teaching is appropriate teaching for science concepts at elementary level”.

Research hypothesis

H₀: There is no significant impact of the student-centred method of teaching on the performance of science students at the elementary level.

Theoretical Framework

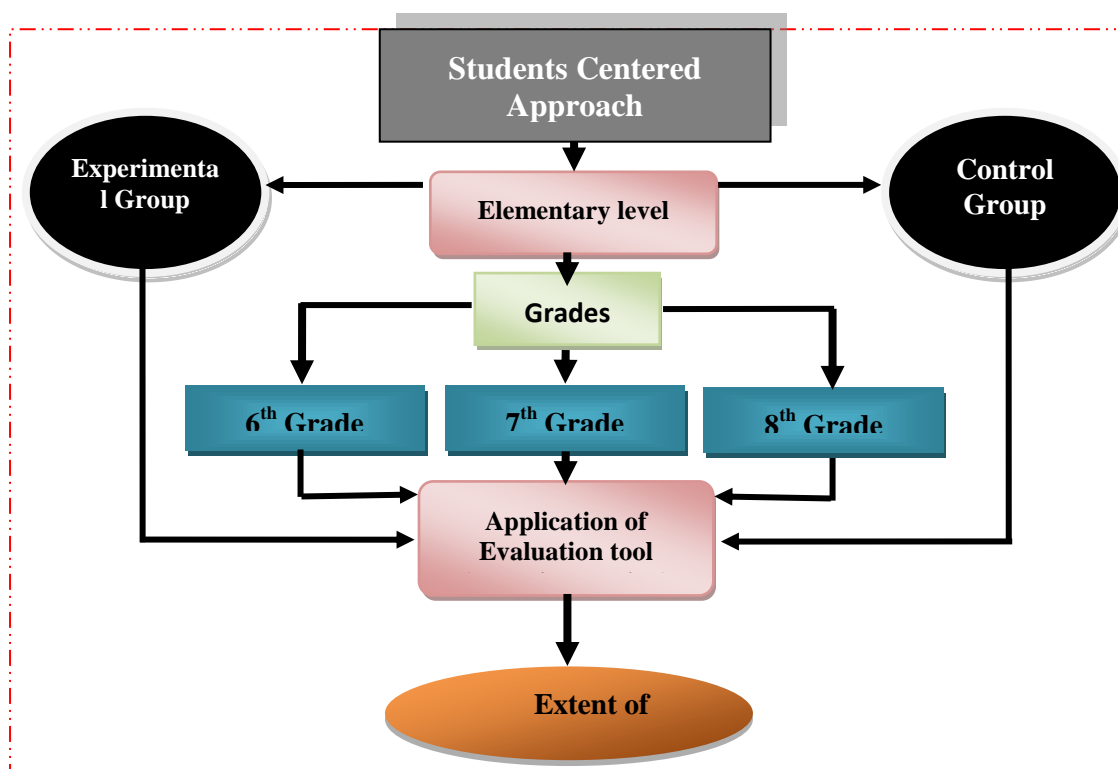


Figure 1: Theoretical Framework

Source: Authors conceptualization

LITERATURE REVIEW

[Taylor \(2018\)](#) exposed that the use of Student-centered methods of teaching in science has shown early success in refining science attainment. [Johnson, Bolshakova, and Waldron \(2016\)](#) specified that the Student-centered method of teaching enabled momentous evolution in the quality of teachers and also in the achievement of science students. [Sukardiyono, Rosana, and Dwandaru \(2019\)](#) initiate that the Student-centered method of teaching affects the students' science achievement skills e.g. prediction, experimentation, observation, and measurement. [Idin and Dönmez \(2017\)](#) explained that many science teachers supposed that besides the Student-centered method of teaching for students' science achievement the gender equity issues are important.

[Howe and Berv \(2000\)](#) constructivism 'Student-centered method of teaching' comprises a vigorous form of thoughts and ideas. In other words, Student-centered methods of teaching play an important role in the active participation of students in the teaching-learning process. The student-centred method of teaching treats individuals as actively involved in the process of thinking and learning. In this method, students participate in generating thinking and understanding ([Brooks & Brooks 1993](#)).

[Alwahaibi \(2019\)](#) indicated that the Student-centered method of teaching engages students in different activities of the institution, like curricular and co-curricular activities. Student-centred teaching has been defined as a process in which the requirements of the students are conceived and their active participation in the process of learning is always encouraged in a real sense. The students in a learner-centred classroom should be taught to; listen and respect each other's ideas and take responsibility for their actions. The teachers should know how to develop self-assessment abilities within the students. If all of these conditions are operating, no matter what activities are being used, the environment will now be ready for the students to take their rightful position at the centre of their own learning experience.

[Mulyeni, Jamaris, and Supriyati \(2019\)](#) showed that basic science process skills are enhanced through an inquiry-based approach such as communications with both students and teachers. The role of a teacher in a student-centred method of teaching is not only to encourage but to grant autonomy to the students by creating a conducive environment for allowing free expressions by the students. The Teacher should assume the role of a guide for fruitful implementation of the approach. The learner-centred tactic of teaching helps the student get motivated, initiate academic skills. Notwithstanding there are a few challenges that certain teachers are supposed to face while implementing student-centred teaching methodologies e.g. required time for successful completion of course work within the stipulated period. So we can say that there is a positive association between the student-centred teaching method in science subjects and the speculative attainment of students in science teaching.

[Montrezor \(2016\)](#) initiated that with active methodologies engaging students in different fruitful activities enhanced student performance as compared to non-performing activities. With a little bit of variation, different methods relating to the student-centred approach of teaching are used by the teachers for clarification of theoretical concepts. Prominent among these are problem, inquiry, and challenge-based learning. In the classroom most of the activities are an old style of instruction where students are passive listeners, sitting quietly, teacher-centred learning activity is suitably described as erudition.

[Poggi, Miceli, and Testa \(2017\)](#) found that Student-centered methods of teaching predict a better understanding of the learning needs of the students. They need to comprehend teen development, incentive, and management for amicably playing their role and to plan their instructional responsibilities in accordance with the needs of the students. The focal point of a student-centered learning approach is the students, and to make them creative, confident, and independent in making decisions.

RESEARCH METHODOLOGY

The quantitative approach was used in this research. The quasi-experimental study design was used to measure the effect of student centered activities on the understanding of science concepts. Pre-test and post-test were used to gather statistics from both control and E-group.

The population of the study consisted of all the students belonging to elementary classes within Government Girls Higher Secondary School, Paharpur, D.I.Khan. Three classes; grade 6th, 7th and 8th were chosen as a sample of the study. The strength of the students in each class was 30. The learners were equally divided into two groups. The C-group was used for the control group and the E-group was used for the experimental group, Thus the control and E-groups contained 15 students each. Students of both low and high achievement levels were mixed up in both experimental and C-group in order to make it as homogenous as possible.

A test for each grade level was developed and validated through a triangulation process, by the researchers. It was used as the evaluation tool to check the achievement levels of the students belonging to both groups. The test was developed from three lessons each of science textbooks of 6th, 7th, and 8th grade. The pre-test was taken from both groups. After that, the C-groups were taught selected lessons through traditional methods and the E-groups were taught through learner centered techniques. In this process, activities were prepared according to the lesson. At the end of lessons, a post-test was administered to both the control and E-group and then the results were analyzed. Gathered data was analyzed through a statistical package for social sciences.

The study was based upon the following presumptions:

1. There is no modification between the performance of students belonging to control and E-group due to dissimilarities in the methods of teaching.
2. The students belonging to the E-group show better results in tests as compared to the C-group students.
3. The learner centered teaching techniques prove more effective as the grade level increases.
4. The learners-centered teaching techniques are considered more effective in terms of better performance by the students in the post-tests.

RESULTS AND DISCUSSIONS

Table 1: t-test application for C-group and E-group of 6th grade

Group	No of students	Mean	Standard Deviation	t-cal:	t-tab:	P-value
C-group						
Pre-test	15	17.86	2.16	0.3474	2.048	.7309
Post-test	15	18	2.57			
E-group						
Pre-test	15	17.7	2.14	2.8527	2.048	.0081
Post-test	15	19.714	1.702			

Independent samples *t*-test was applied to compare the levels of achievement of the students belonging to C-group and E-group at 0.05 level of significance.

Table 1 shows that for the C-group, The P-value equals 0.7309 by conservative standards, this dissimilarity is considered to be not statistically substantial. For the E-group, The P-value equals 0.0081, this dissimilarity is considered to be statistically substantial. For the C-group, the calculated t-value 0.3474 is less than the tabulated t-value 2.048. For the E-group, the calculated t-value 2.8527 is more than the tabulated t-value 2.048; hence statistical analysis of data affirmed the presumed stance of the researchers.

Table 2: t-test application for C-group and E-group of 7th class

	No of students	Mean	Standard Deviation	t-cal:	t-tab:	P-value
C-group						
Pre-test	15	11.78	1.66	.3970	2.048	.6943
Post-test	15	12	1.36			
E-group						
Pre-test	15	11.78	1.66	3.1554	2.048	.0038
Post-test	15	13.757	1.77			

The above table shows that for the C-group, The P-value equals 0.6943 by conventional criteria; this dissimilarity is considered to be not statistically substantial. For the E-group, the P-value equals 0.0038, this dissimilarity is considered to be statistically substantial. For the C-group, the calculated t-value .3970 is less than the tabulated t-value 2.048. For the E-group, the calculated t-value 3.1554 is more than the tabulated t-value 2.048. Hence statistical analysis of data affirmed the presumed stance of the researcher at 0.05 level of significance.

Table 3: t-test application for C-group and E-group of 8th class

	No of students	Mean	Standard Deviation	t-cal:	t-tab:	P value
C-group						
Pre-test	15	12.35	1.74	.9523	2.048	.3491
Post-test	15	13	1.99			
E-group						
Pre-test	15	12.35	1.74	2.5618	2.048	.0161
Post-test	15	14.57	2.87			

The above table shows that for the C-group, The P-value equals 0.3491 by conventional criteria; this dissimilarity is considered to be not statistically substantial. For the E-group, The P-value equals 0.0161, this dissimilarity is considered to be statistically substantial. For the C-group, the calculated t-value 0.9523 is less than the tabulated t-value 2.048. For the E-group, the calculated t-value 2.5618 is more than the tabulated t-value 2.048. Hence statistical analysis of data affirmed the presumed stance of the researcher at 0.05 level of significance.

Table 4: Showing post-test results of E-groups of 6th, 7th, and 8th grade

Group	No of students	Mean	Standard Deviation	t-cal:	t-tab:	P value
E-group class 6 th						
Pre-test	15	17.7	2.14	2.8527	2.048	.0081
Post-test	15	19.714	1.702			
E-group class 7 th						
Pre-test	15	11.78	1.66	3.1554	2.048	.0038
Post-test	15	13.757	1.77			
E-group class 8 th						
Pre-test	15	12.35	1.74	2.5618	2.048	.0161
Post-test	15	14.57	2.87			

The above table No.4 shows an improvement in student performance after using activity-based methods. Total mean scores of pre-tests for 6th, 7th, and 8th grade were 17.7, 11.78, and 12.35 respectively. After applying the activity-based method post-test was taken, Average scores of students in the post-test were 19.714, 13.757, and 14.57 respectively. This shows that the mean scores of the students in the E-group considerably increased at 0.05 level of significance. Thus showing that the activity-based teaching method resulted in increasing the average scores of the students belonging to all three grade levels.

DISCUSSION

It is indicated that for science students' student centered teaching method (teaching with dioramas, concept mapping, Jigsaw method, method of cooperative learning, drama-based science teaching) is better, so the schools and institutions must try to use this method in teaching and learning. (Aslan, 2017), (Ogonnaya et al., 2016), (Karacop, 2017), and (Abed, 2016).

Ohle, Boone, and Fischer (2015) revealed that a student centered teaching method was found to be a better method for student achievement. In this method, students' learning can be improved. After using this method the students can easily teach to others and can improve the performance of others as well as their own. Moreover, we can say that students' social skills, communication, speaking, interaction, listening, logic, and solving the problem are improved by this.

Gurganious (2017) in teaching-learning situations many teachers trust that they could never apply modern teaching methods with their students. In this regard, the confidence of the teachers may be built in various situations, an

environment may be provided to teachers for the development of interest in this regard. Two points need to be remembered in this regard;

- Change doesn't happen overnight. It may take time for a teacher and a group of students to learn how to work in this student-centered way.
- Strategies and techniques which give structure and bring control to the group can be learned. The teacher can experiment by trying out student-centered activities and patiently exercising within the classroom until both the teacher and the students feel comfortable about it.

CONCLUSION OF THE STUDY

- The analysis of data reveals that the performance of the students who were exposed to Student centered activities improved considerably as compared to the C-group. This seems to be true for all the three grade levels upon which the study was done.
- A notable improvement in the performance of the E-groups, exposed to Student centered Techniques were observed by the researcher. The P-value for all the E-groups was found to be very low.
- Looking closely at the performance of the E-groups of all the three grade levels; 6th, 7th and 8th, it was found that although the achievement levels of these students increased considerably, the researcher was unable to find any evidence that the performance levels of the students increase with the grade level. On the other hand, it was found that the students belonging to the lowest grade; grade 5 showed the highest levels of improvements when exposed to the student centered activities.
- Findings of the research study revealed that there was a substantial improvement in the performance of the students exposed to the Student-centered approach of teaching science concepts at the elementary level. It was also found that the students belonging to lower grade levels responded more positively to the student-centered methods as compared to the students belonging to higher grade levels.

RECOMMENDATIONS

- For student centered teaching methods Skills may be provided to teachers in order to improve themselves and also to students.
- Workshops, seminars, and conferences may be conducted to improve the teaching skills of teachers.
- In order to improve the skills of students' Individual attention may be given to students in schools.

SUGGESTIONS FOR FUTURE RESEARCHERS

- The current study was conducted in three classes; grade 6th, 7th and 8th; the future researchers may expand it to other classes.
- The present study was conducted at the elementary level, the future studies can be done in higher education as well.
- The current study was experimental; the future researcher may be done with a descriptive method.

LIMITATIONS

Like all other research, this research also has a few limitations. First, this study was conducted only in the elementary schools, this study may be implemented in other secondary and higher institutions. Experimental research design has been used in this research, Descriptive research design may be used for further research.

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AUTHORS CONTRIBUTION

Dr. Malik Amer Atta and Prof. Dr. Asif Jamil initiated the idea of this article, preparing the introduction, objective, research hypothesis, methodology, statistical analysis, and preparation of tables. Dr. Abdul Hafeez helped in the validity and reliability of research instruments and also helped in research methodology, Sadia Bibi, Ph.D. Scholar, worked on plagiarism. Bushra Salah-Ud-Din worked on the proofreading, references, citation, and editing of this article. All the team was involved in the correction of the research article.

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