ISSN 0975-9735

Ambikeya

Journal of Education

Biannual, Volume 2 No. 1 February,2011

Noida College of Physical Education

(Approved by NCTE & Under Section 2(f) of the UGC Act. Affiliated to Ch. Charan Singh University, Meerut, U.P.

Website : www.ncpenoida.com

EVALUATION OF THE IMPACT OF PROBLEM-BASED LEARNING APPROACH ON INTELLIGENCE AND ACADEMIC ACHIEVEMENT

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ABSTRACT

The present study is an attempt towards the evaluation on the impact of problem-based learning approach on intelligence and academic achievement of high school students. The sample for the purpose of experimentation was taken from two schools of Mandi district of Himachal Pradesh. Two parallel form of achievement test in subject science i.e. Achievement test (Form-A) and Achievement test (Form-B) and General Intelligence test developed by Dr. (Mrs) Pramila Ahuja were used to assess the academic achievement and intelligence ability of the learners respectively. Analysis of the results revealed that there exists significant impact of problem-based learning approach on academic achievement and intelligence ability of the learners. Results further revealed that the traditional method of teaching has significant impact on academic achievement but not on the intelligence ability of the learners.

Introduction: With the advancement in socio-economic and technological fields, the life of the individual is becoming more and more complex fraught with a number of problems which the individual and the society have to face in near future complex society. The task of teaching- learning in science at the school level is now more complex than ever before, since its excitement and diverse possibilities must now be infused into young minds in an appropriate and dynamically evolving ways. This demands that the entire gamut of teaching-learning of science has to change from its conventionality.

Problem-based learning is the type of classroom organization needed to support a constructivist approach to teaching and learning. It is any environment in which problem drives the learning. Problem-based learning is diametrically different from the conventional didactic and teacher-centered approach to teaching. The approach is primarily '*student-centered*' and the student assumes the major responsibility to his or her

learning. Rather than the tutor dispensing the syllabic content, students decide and discover for themselves what they will learn. Problems are first given as the starting point of their inquiry and students are required to solve the problem by providing relevant knowledge and skills. The students work in groups to allow for collaborative learning in order to harness the

collective synergy of teamwork. This is central to problem-based learning as it mirrors real world situations where employees work in project teams to collaborate within and without.

Rationale of the Study : Traditional educational practices from kindergarten through high school produce students who are disenchanted and bored with their education. They are given a vast amount of amount of information to memorize much of which seems irrelevant to their future when they go outside of the school. They forget much of what they learned. And what they remember may always not be applied to the problems and tasks they later face. In Problem-based learning, students are confronted with a real problem that has meaning for them. This problem launches their inquiry as they collaborate to find solutions. In true problem- based learning, the problem is real and the student's actions matter.

Problem-based learning provides a focus- a reason for setting goals, planning and using tools to solve problem. The intended outcome is to develop knowledge that is useful and flexible, not inert. Inert

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knowledge is information that is memorized but seldom applied. Hence, activity and problem based learning approach must be used in classroom to strengthen the cognitive potential of the learners.

In India, problem- based learning is relatively new and different form of education. Its group-based learning process suggests strong collaborative features, and therefore allows students to reap the full extent of the benefits of collaborative learning. There is greater apprehension of the development of their academic excellence. In view of the above considerations the present study was an attempt to apply the problem-based learning approach in the high school of H.P. and to study its impact on academic achievement of eighth class learners.

Objectives of the Study: The following were the main objectives of the study:

1. To study the impact of problem-based learning on development of the intelligence of eighth class learners in the subject science.
2. To study the impact of problem-based learning on academic achievement of eighth class learners in the subject science.
3. To study the impact traditional method of teaching on development of the intelligence of eighth class learners in the subject science.
4. To study the impact of traditional method of teaching on academic achievement of eighth class learners in the subject science.

Hypotheses of the Study: Keeping in mind, the objectives listed above the following hypotheses were formulated for the study:

1. The problem-based learning has no significant impact on the intelligence ability of the learners.
2. The problem-based learning has no significant impact on the academic achievement of the learners.
3. The traditional method of teaching has no significant impact on the intelligence ability of the learners.
4. The traditional method of teaching has no significant impact on the academic achievement of the learners.

Design of the Study : The design of the present study is mainly of non-equivalent control group design of the quasi-experimental type.

Paradigm for Design : Pretest-Posttest Non-equivalent control group design

Group	*Pretest*	*Independent Variable*	*Posttest*
Experimental	*T1*	Teaching through problem-based learning	*T2*
Control	*T1*	Teaching through conventional teaching methods	*T2*

Sample: In the present study, the sample was drawn from the two high schools of district Mandi of Himachal Pradesh. The eighth grade students of Arunodya High School, Mandi were taken as the subjects of the experimental group and eighth grade students of St. Stephens School, Mandi were taken as subjects of control group. The number of subjects of the experimental and control group were 34 and 35 respectively.

Instrumentation: In the present study, the investigator used two instruments for obtaining the scores on two dependent variables i.e. intelligence and academic achievement. To assess the intelligence ability of the learners, the General Intelligence test as developed by Dr. (Mrs.) Pramila Ahuja was used by the investigator and to assess the academic achievement of the learners, the investigator developed two parallel form of achievement test in subject science i.e. Achievement test (Form-A) and Achievement test (Form-B).

Statistical Techniques Used: To test the normality of distribution of the data at pre-test level, the description measures of statistics like mean, median, mode, skewness, kurtosis, was applied and to test the impact of independent variable the inferential statistical measure 't' test was used.

Analysis and Interpretation of Data: The data thus obtained was analyzed by using t-test and the results obtained are given below in three sections. Section I shows study of score distribution on Intelligence and Academic Achievement. Section II deals with the impact of Problem-based learning approach on Intelligence and Academic Achievement and Section III deals with the impact of traditional approach of teaching on Intelligence and Academic Achievement.

Section I Study of score distribution on Intelligence and Academic Achievement.

't' test is applied to test the significance of difference between the Mean intelligence and academic achievement scores of the experimental and control group at the pre-test.

1.1 Study of pre-test scores on intelligence of both experimental and control

TABLE-1: Mean Intelligence Scores of the Experimental Group compared with that of the Control Group at the Pre-test

Group	N	Mean	S.D.	't' value	Level of significance at 0.05 level
Experimental	34	80.42	23.61	0.015	Not significant
Control	35	80.51	23.46		

The Table No. 1 indicates that the't' value (0.015) is not significant at 0.05 level. Hence, it can be inferred that there is no significant difference between the experimental group and control group in their intelligence at the pre-test.

1.2 Study of pre-test scores on academic achievement of both experimental and control groups

TABLE-2: Mean Academic Achievement Scores of the Experimental Group compared with that of the Control Group at the Pre-test

Group	N	Mean	S.D.	't' value	Level of significance at 0.05 level
Experimental	34	45.00	6.01	0.007	Not significant
Control	35	45.01	5.09		

The Table No. 2 indicates that the't' value (0.007) is not significant at 0.05 level. Hence, it can be inferred that there is no significant difference between the experimental group and control group in their academic achievement at the pre-test.

Section-II Impact of Problem-based learning approach on Intelligence and Academic Achievement

2.1 Impact of Problem-based learning on intelligence of experimental group

TABLE-3: Significance of difference between mean scores on intelligence of experimental group at pre-test and post-test level

Test	N	Mean	S.D.	't' value	Remarks
Pre-test	34	80.42	23.61	3.29	Significant at 0.01level
Post-test	34	83.63	24.36		

The Table No. 3 reveals that the't' value for the pre-test and post-test of the experimental group was found to be 3.29 which is significant at 0.01 level of confidence. Thus, it shows that teaching with the help of problem-based learning approach has a positive impact upon intelligence. Hence, the null hypothesis was rejected.

2.2 Impact of Problem-based learning on academic achievement of experimental group

TABLE-4: Significance of difference between mean scores on academic achievement of experimental group at pre-test and post-test level

Test	N	Mean	S.D.	't' value	Remarks
Pre-test	34	45.00	6.01	3.02	Significant at 0.01 level
Post-test	34	50.00	5.00		

The Table No. 4 reveals that the't' value for the pre-test and post-test of the experimental group was found to be 3.02 which is significant at 0.01 level of confidence. Thus, it shows that teaching with the help of problem-based learning approach has a positive impact upon academic achievement. Hence, the null hypothesis was rejected.

Section III Impact of traditional approach of teaching on Intelligence and Academic Achievement

3.1 Impact of traditional approach of learning on intelligence of control group

TABLE-5: Significance of difference between mean scores on intelligence of control group at pre-test and post-test level

Test	N	Mean	S.D.	't' value	Remarks
Pre-test	35	80.51	23.46	1.331	Not Significant
Post-test	35	80.24	21.61		

The Table No. 5 reveals that the't' value for the pre-test and post-test of the control group was found to be 1.331 which is not significant at 0.05 level of confidence. Thus, it shows that teaching through traditional approach does not put any significant impact on intelligence of the control group. Hence, the null hypothesis was accepted.

3.2 *Impact of traditional approach of learning on academic achievement of control group*

TABLE-6: Significance of difference between mean scores on academic achievement of control group at pre-test and post-test level

Test	N	Mean	S.D.	't' value	Remarks
Pre-test	35	45.01	5.09	4.97	Significant at 0.01 level
Post-test	35	45.00	2.00		

The Table No. 6 reveals that the 't' value for the pre-test and post-test of the control group was found to be 4.97 which is significant at 0.01 level of confidence. Thus, it shows that teaching through traditional approach has significant impact on academic achievement of the control group. Hence, the null hypothesis was rejected.

Main Findings:

- The problem-based learning has significant impact on the intelligence ability of the learners.
- The problem-based learning has significant impact on the academic achievement of the learners.
- The traditional method of teaching has no significant impact on the intelligence ability of the learners.
- The traditional method of teaching has significant impact on the academic achievement of the learners.

Conclusion: From the analysis of the obtained data, it can be concluded that problem-based learning has significance importance in enhancing intelligence and achievement among eighth class learners. Problem-based learning is more effective for the development of intelligence and achievement than the traditional teaching method. It also shows that problem-based learning is one of the potent and effective ways of imparting science education and communicating science and technological advancements in the integrated and holistic manner. Hence, special emphasis should be given for problem-based learning in science education in schools and colleges.

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