

Teaching Method Survey Based on Constructivist Approach in Permanent Learning Geometry

F. Hosseinzadeh Lotfi*, S. Sakenian Dehkordi and M. Vaez-Ghasemi

Department of Mathematics, Science and Research Branch
Islamic Azad University, Tehran, Iran

Abstract

In this paper we compare teaching methods based on constructivist and traditional approach in permanent learning Geometry by motivating and interesting creation. In this survey we choose two Geometry class for pilot and instance group in one term of educational year. Pilot group which has been teach based on constructivist and instance group based on traditional approach. The differences and scores of these groups are compared by statistical t-student test. Although the result shows that motivation, interest and solving problem skills of pilot group are better than instance group, a significant different was not considered between pilot and instance group.

Keywords: constructivist; traditional teaching; Permanent Learning; Solving Problem Skills

1. Introduction

Improving increment is depends on educational development in every society and teachers have great roles and special position for changing society.

* Corresponding Author. Farhad Hosseinzadeh Lotfi, E-mail address: farhad@hosseinzadeh.ir
Department of Mathematics, Science and Research Branch, Islamic Azad University, Tehran, Iran

One of the important things in identifying effective elements for improving performance of educational system is finding weakness and suitable changes in education, specially mathematics training.

Due to the reason that geometric has an effective role in strengthening student's mind it is necessary to consider teaching it with various ways. Almost everything that has been done in classes is about the teacher's experiments and interests. Moreover, students are not so familiar with investigation for the geometric lessons and think that its concepts are so far from the mind. They do not enjoy solving geometric problems. The mentioned issues have guided the mind, with regard to the teaching and methods of teachers in classes ([1,2]).

The methods which have taken the students up from the static state were viewpoints of constructive learning in constructivist theories which makes students eager to explore. Emphasize upon the teaching should be accompanied with the creation of meaning and perception, while encountering with new information in different fields. Active learners need participation, cooperation and construction. In order that knowledge to be possessed by learners, active learning should be taken place([4,5]).

Thus one of the best teaching methods is that at first to produce knowledge and skill much more rationale and in the second place make a situation for students to use their knowledge and skills in real situations.

Constructivist is one of the new ideas of teaching and learning. If theories of education are being put on a spectrum, on which from one side there exists behaviorism and from the other side recognition, constructivist would be located at the beginning of this spectrum near recognition.

This method has rejected the static accept and instead of that recommend constructing, in an active manner. Moreover it is the basis of some types of recognition perception, which has paid attention, in order to contribute for the ease of acquisitions of education with internal benchmark in addition of external ones. Some researchers believed that: education, thoughts, viewpoints and individual worth, have been participate via compromising with others. Recognition, at first, is inter-individual and then it will become individual. By learning, some other researchers mean learning activity, specially, has emphasized on a specific types of exploiting learning in which learner, by figuring out the problems, will come to the concept. Biehler R. F. , J. Snowman [2] believed that constructivist viewpoint means that meaningful learning is an active creation of knowledge structure which is of personal experiments and each of learners, on basis of their experiments have made an personal interpretation of the world. Moreover, it is based upon this belief that the essence of one's knowledge cannot be carried out to someone else totally. Since knowledge is instance interpretation of each person from his/her personal experiments and it is under the influence of different factors such as age, sex and race and base of knowledge. The origin of the psychological constructivism is the theory of recognition change from Piaje. Followers of psychological constructivist theory, in accordance to the taut of Piaje, believed that the aim of teaching and training is to protect needs and interests of children. Because they believed that learning, mostly, is an individual action thus their way of teaching is upon learning.

Haneli have notified the following characteristics for constructivist teachers:

The teacher becomes a source from which students can learn something, not the source of all knowledge.

Teachers have involved students in experiments which put them in a challenge with their current level of their knowledge.

They let student to think, after proposing the question, and give their answers.

When designing the assignments, they have used some recognition corrections such as classifying, analyzing and creative.

They have strengthened the essence of questioning open problems, those which are provoking thoughts and reasons.

They have accepted the free will and authority of students and encourage them.

They have used raw data and main resources.

They have not separated apprehending from the apprehending process.

They have emphasized on clear explanation of students, whenever the students can convey their perceptions that's when they have fully leaned.

Moreover, Lakros in comparison of creativeness and behaviorism believed that the role of student in behaviorism is totally of absorbing knowledge, and that when the student have been provoked, in the learning atmosphere he/she gives the expected answer. Also, he, Lakros, have revealed that the role of students in creativeness viewpoint are as follows:

1-In an active and aim full manner have imposed structure and meaning to the experiment in order to better perceive it and use it.

2- It is the center of the pilot in learning process.

3-The student is so active in solving problems, in learning process, have discussed about the produced knowledge until she/he get convinced.

4- Have taken possessions about his/her learning and have scheduled for It .

2. Background

The root of the Constructivist thinking is in ancient Greece and it returns to the discussions between Socrates and his fellows. Conversations in which he has bring up guided questions in order to guide his students to feel their weaknesses in their thoughts. Socratic conversations have been used as one of the important tools which uses in methods that Constructivist teachers utilized for evaluating students learning and designing new educational experiments.

Kant (1780) has said that rational analysis of actions and goals, will cause an increase in knowledge and with this viewpoint personal experiment creates correspondence knowledge. From the time that Van Gerasezefland have presented the theory of radical creativeness in 11th international teaching mathematics psychology in Montreal, it has been recognized as an important theory in international level ([5,6]).

John Kinds in an investigation named “ Constructivist in learning science of schools, a powerful and influenced model or harmful faculty tendency”, have analyzed some of the theories and common claims related to Constructivist methods in teaching science in schools and with sufficient reasons shows that for continuous and progressive leaning, students attending in applied activities and utilizing Constructivist ideas in elementary

education, is so useful. Some researchers, has investigated a research about the conventional teaching method on basis of Constructivist viewpoint in Iran and in some parts of this research the methods of teaching based on this viewpoint has been mooted. He has come to conclusion, according to a opinion polling, that slogans of individuals who believes in constructivist is better than principles related to the conventional viewpoints in education .In another subject which have performed by Alsop, the effect of the constructivists method in comparison to that of conventional one which are performed on two classes of mathematics concepts, has been investigated. Esmali and Mach, have shown that those teachers have felt that using methods of demagogical for constructing learning of students itself need much more time. Some others, have investigate the comparison and influences of teaching in a researching manner and conventional methods in Physics, and he revealed that those students which have been taught with researching method have a better condition, in having a positive opinion to the lessons, to those taught by conventional methods. Forotan (2000), with the aim of comparison has investigate the influence of three methods of Constructivist, explanatory and combinatory in the subject of Limit and Integral ([7,8]).

3. Methodology

Those axis used in this research which are based on methods, those that are upon the Constructivist methods are such as:

Learning axis educations

2- Education with the help of group and contributing discussion.

3- Education with the help of investigation learning

4-Educating via solving problems.

In this research pilot and instance groups have been chosen from two class of geometric 1. Statistical community have been chosen from the students of guidance schools related to national association of training talented students in Shahrekord in 2010-2011. The methods of sampling are of clustering types and the sample of this research are boy students of second grade of guidance school. 27 have been included in instance group and 21 are in pilot group.

In this research the information are gained trough initial and final tests (fore-test and post-test) for two groups of pilot and experiment. The collected data are:

Tests related to the stable learning of concepts of geometric lessons, each of which contains 8 questions prepared from the basic concepts and what has been taught.

Tests related to the examining the skills and the ability of solving problems of geometric, each of which included 6 innovative questions Related to the concepts of lessons that have been taught.

Tests of educational development, which are the final exams of the first semester and those for the second semester.

After performing these tests, which are accomplished at the beginning of the plan, the data obtained from the scores and the extent to which they have answered the questions have been gathered and recorded, then methods of teaching based on constructivist theories for the instance group and conventional methods for the pilot group, which are

performed for one semester, have been carried out. Teaching in the instance group are performed under the conditions of working in groups (two-persons or more) and doing various activities in fields of learning concepts, solving problems, making theories and etc in different groups under the supervision of teacher who, while performing the issue, carried out discussions with the groups and students and paid attention to the opinions, beliefs and findings of them and moreover reviewed their comments and discoveries. It should be noted that teachers by confirming the correct findings guide groups in accessing to the mentioned concepts in teaching or solving problems. In order to pilot some factors such as attention, concentration and contribution of students in educational activities all, of the verified observations while performing the plan, have been recorded, and then by reviewing the acquired findings it has been tried for optimizing teaching and paying attention to continue the procedure. For piloting other variables for which there may be possibility of affecting the results, after teaching some lessons at the end of the test with the mentioned methods, Constructivist and conventional, the extent of learning of students has been evaluated. Moreover in a class which is considered for Constructivist method, for each group a working-file has been considered in which in addition of their results and scores in each exams and tests their special works and positive innovative ideas, initiative solutions are also recorded which shows their accomplishments. All of these records are for ensuring aims of the plan and by considering them it is possible to evaluate, more accurately, performance of each group and students.

In order to perform this project, classifying students, according to the non homogeneous methods, has been carried out in a way that students of each group, in accordance with the others who are in the same group and those in other groups, have been selected with different abilities. It should be noted that criteria for selecting groups are their scores and average score of previous year. Moreover some applied advices such as some rules for establishing disciplines and avoiding opportune quarrels, to honor opinions of others, not inopportune interfere and utilizing devices of each other, for virtue of performing this duty, have been proposed and finally accepted by all the students. In order to score each student, a collection of criteria have been considered in a way that for each part of the activity a separate score has been considered and at the final from among the acquired scores, an average score will be calculated which will be the final result.

On the other hand it is possible to visually evaluate while supervising on how the project has been carried out and performing the activities and guiding groups, and assessing performance of them. In this project for analyzing the findings descriptive statistics has been carried out. In descriptive statistics with the contribution of frequency, average percentage and standard deviations, evaluation have been performed, by t-test, K.S. test, proportional to the level of examining the data and statistics assumptions and according to the fact that the data are normal.

4. Results

At first it is examined that weather data are normalized or not, and after that these data are accepted at the level of 0.05. Also, pilot and instance groups have been trained about 20 sections in one semester and with two methods of constructivist for the group of

constructivist and conventional method for the pilot group. After that those groups with final exams have been assessed and the results obtained from their scores. The acquired results are obtained from SPSS software which are listed in Tables 1 through 8.

Table 1: Comparison of scores of stable learning in geometric lesson for pilot and instance groups in fore-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
0.5	0/824	0/698	46	0/391	0/313	1/629	17	instance
					0/378	1/735	16/8	pilot

Table 2: Comparison of scores of stable learning in geometric lesson for pilot and instance groups in post-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
/688 5	0/021	0/00	46	4/381	0/224	1/166	18/42	instance
					0/377	1/732	16/5	pilot

Table 3: Comparison of scores of motivation for pilot and instance groups in fore-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
0.477	0.493	0.010	46	2.689	2.443	12.695	86.37	instance
					2.525	11.574	76.80	pilot

Table 4: Comparison of scores of motivation for pilot and instance groups in post-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
3.923	0.054	0.000	46	9.74	1.409	7.322	98.33	instance
					2.384	10.929	72.61	pilot

Table 5: Comparison of scores of skills for pilot and instance groups in fore-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
486	0.489	0.0254	46	1.15	0.502	2.609	13.18	instance
					0.636	2.918	12.26	pilot

Table 6: Comparison of scores of motivation for pilot and instance groups in post-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
437	0.512	0.013	46	2.58	0.468	2.431	14.45	instance
					0.611	2.801	12.5	pilot

Table 7: Comparison of scores of educational developments for pilot and instance groups in fore-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
0.603	0.448	0.588	46	0.546	0.330	1.716	17.16	instance
					0.339	1.554	16.90	pilot

Table 8: Comparison of scores of of educational developments for pilot and instance groups in post-exam

F	Sig.	Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	groups
0.065	0.80	0.142	46	1.492	0.279	1.454	17.42	instance
					0.327	4.500	16.78	pilot

5. Conclusion

The acquired results from comparing the average scores of pre-exam of these two groups, pilot and instance, have revealed this fact that the difference is not meaningful. Thus, there exists a same condition before performing the plan and after performing the independent variable it has been showed that the difference between these groups are meaningful. Moreover comparing the average scores of fore-exam and pre-exam have indicated that increasing in average score of post-exam to that of fore-exam is meaningful. But this comparison in the other group, pilot, is not meaningful, that means methods of examination on basis of constructivist have not increase the average scores of stable learning exam. Thus the first assumption has been accepted, at the meaningful level of 0.5. Therefore it can concluded that those students who leaned geometric by conventional methods on basis of constructivist method, in comparison to others, will have more stable learning in the concepts of this lesson.

The acquired results have revealed that there exists a meaningful difference between the average scores of pilot and instance groups. That means eagerness for geometric in instance group, before the performing the plan, was much more. The results, of fore-exam and post-exam for the instance group have indicated an increase in the average scores of post-exam in this group in comparison to those of pilot group. And this comparison does not have a meaningful difference. Therefore, it can be said that the method of educating based on the constructivist will cause an increase in motivation of students for the geometric lessons.

The average scores of the instance group in ability of solving problems, in post-exam, is more than those of pilot group. This difference is meaningful from the viewpoint of statistics and the assumption at the meaningful level of 0.5 has been accepted. Therefore it can be concluded that those student who have been taught with Constructivist method in comparison to those who are trained with the conventional methods, have much more ability in solving problems.

The obtained results between average of fore-exam scores for groups of pilot and instance reveal that there exists no meaningful difference. Also, there exists no meaningful

difference in post-exam scores. Moreover, in instance group, comparing the fore-exam and post-exam score, also, indicated no meaningful difference. Furthermore, in pilot group, comparing the fore-exam and post-exam score also showed no meaningful difference.

That means, the instance group, in geometric lessons, has not gain any developments. Thus the fourth hypothesis has not been accepted, at the meaningful level of 0.5. Therefore, those students who have been taught by the Constructivist method, in comparison to those educated by conventional methods, have not showed any developments. But, it should be noted that the difference of averages in comparison of fore-exam and post-exam scores in instance group is much more to those of acquired by comparing the fore-exam and post-exam scores in pilot group. That means there exist developments in instance group but it is not so significant.

In accordance with the acquired results, discussed above, consider the following suggestions.

- 1- IT seems to be much ideal to carry out this plan in the optimal length of time, as an instance in an educational year, since under such situation there will be no bad effects on students.
- 2- Although it is necessary for compilation and executing the methods based on constructivist in education, setting aside the conventional methods should be done with care.
- 3- It is suggested to investigate the effects of teaching base on constructivist method for other mathematics lessons, in secondary schools.
- 4- Investigation of the effects of teaching according to the Constructivist methods for increasing the self pilot, verbal skills and spiritual joy in students.

References

- [1] Bahadir H., Y., Alfinio Flores, "Understanding rigid geometric transformations: Jeff's learning path for translation", *The Journal of Mathematical Behavior*, 28 (2009) 41–57.
- [2] Biehler R. F. , J. Snowman, psychology applied to teaching (7thed.), USA: Houghton Mifflin. 1993.
- [3] Erdoan T., S. Durmu, "The effect of the instruction based on Van Hiele model on the geometrical thinking levels of preservice elementary school teachers", *World Conference on Educational Sciences 2009*.
- [4] karagiorgi Y. , L. symeo u, "Translating constructivism into Instructional design", potential and limitations. *Educational Technology society*, 8 (1), 2005, 16-22.
- [5] Richardson V. , "Constructivist teaching and teacher education: Theory and practice", in V. Richardson (Ed.), "Constructivist teachers education", *Building New UNDERSTANDINGS*, Washington, DC: Falmer Press, 1997, 3-14.

[6] Silva Figueira-Sampaio A., Elias Ferreira dos Santos E., Arantes Carrijo G., "Computers & Education A constructivist computational tool to assist in learning primary school mathematical equations", *Computers & Education* 53 (2009) 484–492.

[7] Yiitcan Nayir O., B. Yildirim, H. Iker Kotur, "Pre-service teachers' opinions about constructivism", *World Conference on Educational Sciences 2009*.

[8] Yıldız C., M. Aydın, D. Köce, " Comparing the old and new 6th - 8th grade mathematics curricula in terms of Van Hiele understanding levels for geometry", *World Conference on Educational Sciences 2009*.

Received: August, 2011