

The Comparison of Geometry Skills Learning in Dynamic Geometry Educational Places Based on Algebraic and Traditional (Static) Educational Places in Iran Educational System

Mohammad Hassan Shakki, Ezzatallah Baloui Jamkhaneh

Islamic Azad University, Ghaemshahr Branch, Ghaemshahr, Iran
mh_shakki@yahoo.com, e_baloui2008@yahoo.com

Seyyed Mousa Hosseini

Sama Organization (affiliated with Islamic Azad University), Ghaemshahr Branch
Ghaemshahr, Iran
mousa60@gmail.com

Abstract

With development in communication and information technology and fast distribution of personal computers, the use of technology in training has improved. The foundation of mathematics educational fields which is a combination of math science and educational science improved some programming researches of math training in certain direction. The development of new fields in training is provided by the combination of these researches. There are many researches about the use of technology in mathematics teaching and it leads to new educational branches such as Dynamic Geometry software. The university and school students have opportunities to survey the geometric concepts in a non aesthetic space and can find deep understanding in Dynamic Geometry Environments. Recent developments in math education field based on ICT have positive conclusions. The survey of them can remove some educational difficulties in our country. The attention to educational concept experience by students is the result of western countries researches. Of course it provides the depth concepts for the students. Although Dynamic Geometry doesn't consider as a new science or branch of Geometry science, it's an educational modern process. So in this article we're going to precede survey the role and effect software educational dynamic geometry in Iran educational system.

Mathematics Subject Classification: 97U50

Keywords: geometry, dynamic, educational, traditional

1 Introduction

During the third millennium, information technology development and the usage of it in different science moved with high speed on the other hand the foundation of math educational sciences cause to advance the planning educational researches and math education in certain way. The combination of these two researches direction can provide the development of new courses of education. In teaching mathematic has done a lot of researches in based on technology usage in education and it has created new education branches. Dynamic geometry software environment, provide opportunity so that students have studied geometric concept in a static environment and find deeper understanding of it.

Question expression

The results of international examination of mathematics & science indicate serious weakness of our country's students in global ranking. Shallow understanding and sometimes mistake in maths indicate the inefficiency of instruction methods in schools which itself arising from use of traditional & inefficient methods of instruction by the teachers. Existence of such situation, made any researcher to find a cure. Recently gained progress in the domain of mathematic instruction on a base of ICT, have positive results which studding & attempting to naturalize them could notably remove some of instructional problems in our country. Furthermore, the process of research in western country indicates the necessity of attention to the experience of instructional concepts by students, which itself provides the possibility of prefunding concepts for students. Dynamic geometry does not consider a new science or a branch of geometry science, but it's a new instructional method which has been also used before, to design industrial dynamic instruments. In this new instructional method, students together with traditional instructional based on chalk & blackboard in a special instructional environment, will be able to observe searching drawing of their question and with that, undertake personal experiments, for better understanding of geometry concepts in dynamic geometry, the opportunity given to student to leave drawing limitations in paper & pencil area, and study the questions ioith more attention and in a intelligent and free space. In this environment, with lessening the unwanted assumptions possibility of seeing features of geometry shapes became more, and we can see the questions, more real than the past on the other hand, the possibility of developing geometry skills in dynamic geometry is more. Dynamic geometry promise well a different word in understanding geometry for wham that hope geometry has been more interesting than they knew up to now.

Problem necessity

Research above dynamic geometry start in developed country since 1982. Producing specialty software is in this field. It's number added and so that 10s of PHD thesis have done up to now about it. More than 40 countries in this field seriously, having activity and exchanging views. Obtained results from research and useful instructional results of dynamic geometry's software on teaching-learning process, also find its place on schools teaching plan. Significant increase in students learning rate made researchers to have more study & research about the function manner & effectiveness of this subject. Famous research & instructional institutes such as u.s maths teachers association (NCTM) & U.K Royal institute, focused many of their plan to dynamic geometry. Now, in Iran a few

numbers of scholars are engaged in university researchers in this field. Considering numerous and update sources that are available in English in this field & emphasis which developed country.

Research background

It's more than 2 centuries that dynamic geometry software are the most useful instructional software in schools & universities all over the world. The main researches which have done, is about 3 following main subjects.

Sympathy with software by students

Most of performed researches were about students sympathy with software for example Arzarlo and et al. found that in the first in counter with taking and changing the points and shapes, students became confused because they don't get the habit to move the shapes on the paper. After sometimes when they are experience this environment. They discover the power of drawing mode. Understanding what does remain constant with parts changing, is not always distinctive and clear.

How is learning of proving in this environment?

Such domain of researches are concentrate on this vital question that do opportunities which suggest by dynamic geometry software area to see maths features which may decrease in a very simple form or totally replace for any need to proving or such equipments may find new meaningful ways to promote the perception of need to prove its regulations. Some of the researches indicate the streng thinning of proving ability. (such as Moriti and Jones researches).

Designing teacher activities different from past

Researches indicate that teacher's activities should design carefully otherwise, as Holze suggests, students avoid, analysing maths searching in finding solution in experimental form and do not take it's theory and meaning aspects. Hily & Hoilz get involved with these issues, with arranged plan. Hedas and entail indicate design method of proper activities for students in contradictory situations that lead students to seek maths justification with surprised and doubtful situations.

Labord's experience in drawing plan in dynamic geometry software and combining it with common teaching content show that they need a lot of time to reach the point that the activities be useful in a correct form. Totally the studies show that dynamic geometry's software can nat provide an educational area, but there are other actives that is necessary for students to promote in mathematics. It's original message respectively are: A) Unsuitable use from dynamic geometry's software may have no certain changes on learner's learning. And even may worse the statues. B) Intelligent incorporation of dynamic geometry's software with study program and education establish the portion of measurable learning. (Although it is difficult to measure that is obtained portions resulted from technology or related to amendment of study schedule we can refer to Gavlic) How they use dynamic geometry software? Using dynamic geometry software for conceptual research can lead in concept portions. Using dynamic geometry software can facilitate some of learning activities, for example in research, drawings and probably some of proven.

Research questions

Does educational area of dynamic geometry have effect on increasing the skills of student's geometry.

Does educational area of dynamic geometry have more effect on increasing skill and logic?

Does educational area of dynamic geometry have more influence on increasing "map"

skill?

Theory

- 1) Educational area of dynamic geometry influence on increasing the geometry skills of students.
- 2) Educational area of dynamic geometry influence on increasing the geometry skills of students.
- 3) Educational area of dynamic geometry influence on increasing the logic skills.
- 3) Educational area of dynamic geometry influence on increasing the map skills.

Goals

- 1- Familiarity with the effect of dynamic educational areas on student`s geometry skills.
- 2- Recognition with running dynamic educational areas on increasing geometry skills.

Methodology

This research considers as an applied research. It can be tested as a plan of final and initiative test by group. At first the students took a pre_exam and after teaching they should be tested again:

Table 1. Methodology

Group	Exam	Independent variable	Final exam
Experimental	T1	X	T2

Research extent

Forty four students are introduced software environment with basic training in teaching workshop.

Several parts of text book are determined as an example. Before teaching, the students should be tested. After teaching, the student should be tested again.

The method of information collecting

This method is based on observation and investigation of test results and it depends on two training environments. First is based on aesthetic geometry and second Dynamic geometry. The performance of students is evaluated from a qualitative and quantitative point of view.

Research variable

In this research the variables can be stated according its quiddity. Independent variables include two training environments that they present geometry software. Dependent variables include geometry skills. Control variables are like: the kind of schools (government and nonprofits-making schools), the period of education and gender. The skills of geometry: Hooper (1991) divided the skills of geometry into five parts. 1-Visualization 2-description 3- drawing 4- logical 5- application

2 Dynamic geometry software

Dynamic geometry software is figurative environment based on computer. It gives a possibility to user to draw an exact geometric figure and with moving can research his guess. Geometer's sketch, Geo Gebra and Cabri Geometer software consider as examples of Dynamic Geometry software. Right now, more than fifty software are designed in this

field. In this software, drawing figures are kept their main structure with geometric relations. The students can use of Dynamic G.S for tracing of Geometric point, to move the figures, to reverse, to turn round the shapes. Preparing text for check of drawing and doing some affairs through charts and equations, in addition drawing and moving of figure elements.

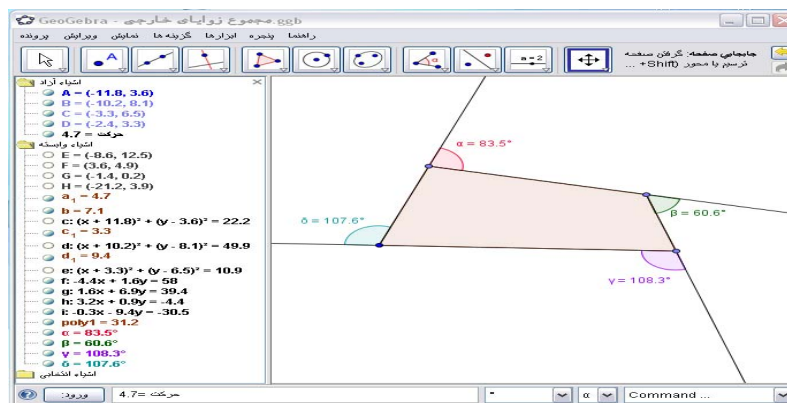


Fig1. Dynamic geometry software

GeoGebra workshops

Workshop1: introduction Time: 10minutes Presentation topic: GeoGebra public usage

Activity 1: drawing of perpendicular bisector on paper

Time: 10 minutes Tools: paper, pencil, ruler and compass

After presenting tools to students, they are gotten a chance to draw, and then I wrote the steps of racing on the board: Drawing AB short line Drawing a circle with A center passing of B

Drawing a circle with B center passing of A

The line tracing be passing from intersection of two circles. The steps of drawing are determined in this activity and it prepares the students to use GeoGebra for the first time.

Activity 2: tracing of perpendicular bisector through GeoGebra.

Time: 10 minutes, Introducing tools: the short line between two dots, a circle with a determined center and a point on environment, intersection of two objects, passing line from two points, to move magnification and make small pictures. The students could do the drawing stages of perpendicular bisector through GeoGebra in second activity:

a=AB short line between two points of A and B, a circle with A center and passing of B

a circle with B center and passing of A. The intersection of two circles c and d for getting intersection C and D (the use of magnification tools on line b , passing of intersection of points C and D is the perpendicular bisector of AB short line).

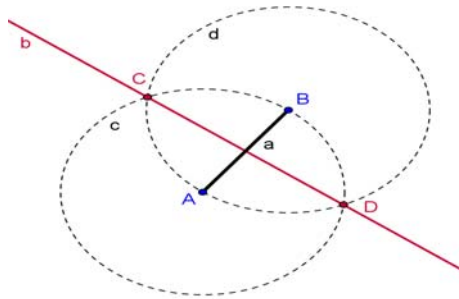


Fig 2. Tracing of perpendicular bisector through GeoGebra

Activity 3: square

Time: 15 minutes, introduced tools: poly hadrons, vertical line, to hide and appear objects. Other used tools: short line, circle, intersection of two objects as following stages.

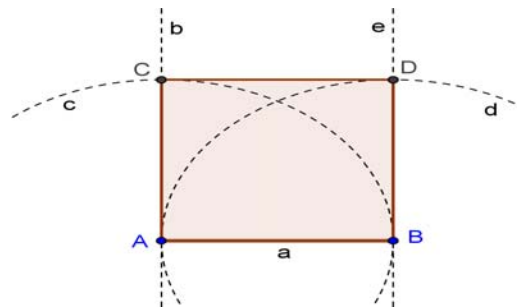


Fig 3. Square

Activity4: turning of polyhedron

Time: 20 minutes, Introduced tools: turn the shape around the point of angle.

Other in used tools : polyhedron , new point , draw a circle and put the point in its center , angle , the part between two section , to move. The last workshop activist is turning of polyhedron around a point of a certain angle as following stages.

- 1- ABC..... polyhedron with A, B, C, ... apexes. (Shape 4.A)
- 2- New point
- 3- Cycle of d with p center through one of the polyhedron apexes "it means c" draw a circle.
- 4- $g=cp$ part between points "c and p"
- 5- Move c' new point as it really is location a circle .
- 6- $h= pc'$ part between p and c' points
- 7- A angle between c, p and c' points
- 8- Turn polyhedron with an angle around "p" point as obtain the first – picture of polyhedron
- 9- Activity: c' point should be moved angle the circle for polyhedron turning.

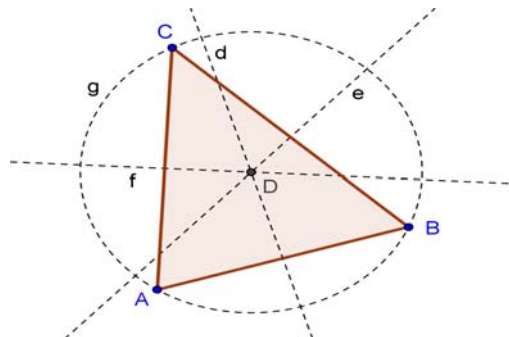


Fig 4. Turning of polyhedron

3 Results

Since the view points of frequency in Table 4 is symbol of persons and can't be decimal therefore we should change them into integer number for averaging and addition. As total addition of rounded frequencies should be equal to the number of samples. We can consider two categories: first, to add frequency and choices percent of very easy, easy, half of average frequency and second, the addition of other chart half that first category is confirmed and the other is refused.

Table 2.

	Very easy	Easy	Average	hard	Very hard
frequency	14	14	8	5	3
Percent	31.82	31.82	18.18	11.36	6.82

Description Table 2: as above chart, 31.82 % of answers to first theory is very easy 31.82 % is easy, 8 % is average, 5% is hard and 3% is very hard.

Description Table 3: in this chart, 27% of participators refuse and 73% confirm the theory 1.

Table 3

category	refutation	Confirmation	total
Percent	27	73	100

Theory 1: The educational activities of GeoGebra introduced workshop are suitable for guidance students.

Table 4 (Theory 1)

The number of question naive	topics	Very easy	Easy	Average	hard	Very hard
1	Perpendicular bisector drawing on paper	12	9	9	8	7
2	Perpendicular bisector with GeoGebra	8	18	11	5	3
3	Square drawing	15	6	6	10	7
4	Circle circum ferential triangle drawing	11	6	11	13	7
5	Parallelogram with angle	11	14	12	5	6
6	Painting tools for symmetrical shapes	11	25	9	4	0
7	Inserting of picture background	24	13	6	6	2
8	Turning of polyhedron	20	11	8	5	6
9	Linear equation	17	13	12	4	1
average		14.33	12.77	9.33	6.66	4.33

Theory 2: Students have positive tendency to GeoGebra`s software for its easiness application and efficiency.

Table 5. (Second theory)

Number	Topics	Very easy	Easy	Average	Difficult	Very difficult
1	How you measure GeoGebra`s instruments in work shop 1	18	18	6	2	0
2	How you measure GeoGebra`s instruments in work shop 2	11	15	14	4	0
3	How you measure GeoGebra`s instruments in work shop 3	20	12	10	2	0
Mean		16.23	15	10	2.67	0
percentage		37.11	34.09	22.73	6.07	0

Table 6

	Very easy	Easy	Average	Difficult	Very difficult
Fre.	16	15	10	3	0
Per.	36.36	34.09	22.37	6.82	0

Since the frequency of views is person`s representative and cannot be decimal number, so all decimal number should be rounded into integer numbers. Such the addition of total rounded frequencies is equal to the number of samples.

Description Table 6: As you see in above charts. 36.36 percent answer to theory 1 very easy, 34.09 percent easy, 22.73 percent average, 6.82 percent difficult and 0 percent very difficult.

Description Table 7: 18 percent reject the theory 2 and 82 percent confirm it.

Table 7.

Categories	Reject	Confirm	Add up
percentage	18	82	100

References

- [1] A., Arshaqi, Existence and evolution of geometry, Amir Kabir press, Tehran, (1986).
- [2] A.A., Alam Zade, Geometry basis, Science and Technical Press, Tehran, (1999).
- [3] F., Baqeri, H.K., Mehdi, Electronic learning standards, (The institution of intelligent schools of educational information development, press), Tehran, (2006).
- [4] M.A., Rezvani, , Geometry, Fatemi press, Tehran, (1998).
- [5] E., Zamin, A., Azimi, Electronic learning from theory to perform, Tehran, (2006).

Received: November, 2009