Efficacy of Computer Software on Trigonometry

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Abstract

Today, production of computer software have increase salient with development of technology and software spread. Visual and auditory capacity in many of software has development considerable in mathematics learning and teaching rather than traditional teaching. This research, we produced the kind of software with name of COTACSI in trigonometry subject. Then, we selected two equal groups of students in second grade of high school and teach both traditional and software method in trigonometry subject. Finally, we examine in two groups and analysis to point of tests with SPSS software and T- test for two independent samples. Result is shown that points of software teaching group in meaningful level of 0.05 have differ to group of traditional teaching. In particular statement, the mean of points of software teaching in experiment group was higher than points of traditional group; trigonometry teaching with software helping have positive effect on learning of students.

Keywords: Computer, COTACSI Software, Trigonometry, Multimedia

1. Introduction

Today, teaching and learning progress ongoing process in personal and workable life of people. Too very speed of science, change and continuum evolution in different technology fields have urgent to provide of ongoing teaching system for people and organizations. In this referral teaching system, it will inevitable in selection of proper, easy, intelligible, cheap, available, supple and finally, commensurable teaching method. In coming of technology era, theoretical nutrient base of teaching methods have changed which growth of that in teaching field have shown in electronic learning and the main of this base is disposable context in form of software to learner. The experiences of researcher in two decade of teaching in high school show that traditional teaching methods and using of blackboard and chalk are not response to learner in today era. Incoming of capacity software, in particular, mathematics fields with using of the highest graphic capacity present any of the kinds of diagrams and or

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space figures with fantastic and beautiful display and the mind directed visual and exact step to spatial and idealism step, it clear that it do not accept traditional teaching procedure either in part of teacher and student. On the other hand, in regard to implementing of about of four cycle of Third International Mathematics and Science Study (TIMSS) in 1995, 1999, 2003 and 2007 in mathematics and science lessons in elementary and middle and consequently, implementing of development TIMSS in 2008 for students in final grade in high school, yield result show that Iranian students have not been attained acceptable rank not only, but mean of their points were lower than international median scale also. More precise research of TIMSS shows that mathematical performance of students is more weak in different cognition field of "knowledge, reasoning and applying"; performance of students in knowledge field is better than reasoning and applying field and this matter is great evidence on weak in teaching method. Instance, it state that rotation teaching will not efficiency on blackboard or page when can rotate a plane or spatial shape under different angles of rotation through mathematical software. It is here that motivation of move will important and urgent to electronic teaching. In short, importance of electronic teaching consist of: a) visualization, b) possible providing it in any geographical location, c) elimination of unessential and continual traffic, d) too less expense these teaching than traditional classes, e) easing of classes, f) decreasing laden of tedious calculations and releasing of memory in direction of focus on important and considerable ideas, g) speed assessment with electronic tests and its immediate feedback and h) possible communication of people in distance. Some of researchers and thinkers believe that interplay of multimedia grow learning of students to state of more abstract concepts through providing of new methods, but others believe whereas multimedia communication can benefit to growth of conceptual perception, students and in particular, weak students can confuse through spread elements such as voice, animation and animation characters. This circumstance shows in multimedia programs and if multimedia designers lessen using of harmful traits then favorable result will not attain.

2. Literature

As literature of this research, it can allude to three cases: 1) dissertation which is wrote by Qholamreza Rezaee, entitle "efficiency of Information and communications technology (ICT) on teaching of SAMPAD school (perspicacious) in 2005 that efficiency of ICT was report in SAMPAD school in Iran-Mazandaran. 2) article which is wrote by Cumali Oksuz, Sanem Uca and Galip Gens entitle "Designing multimedia video cases to improve mathematics teaching with technology: technology integration in to mathematics education project" that is considered to technology integration in mathematics education in Turkey university in 2008. In this paper, in addition to endorsement of positive project of technology integration in to mathematics education, it allude to important result that pre-service teachers have higher potential in relation to technology integration in mathematics education than pro-service teachers and 3) other article which is wrote by Manuel Santos-Trigo and Nugo Espinosa-Perez entitle "High school teachers use of dynamic software to
generate serendipitous mathematical relations" in center of development research and studies in Mexico that is considered to teacher use of dynamic software for serendipitous mathematics relations. In this paper, efficiency of dynamic software on mathematics teaching is positive evaluated.

3. Methodology

3.1 Hypothesis
Using of computer software in trigonometry teaching has positive affect on leaning of students.

3.2 Method of Research
Since created area in this paper is not similar to present education of Iran area, therefore, method of this research can compute in quasi-experimental method.

3.3 Aim of Research
Aim of researcher in this research is that whether investment on production of mathematics software and tendency to electronic teaching can remove present problems in mathematics education.

3.4 Participants
Statistic society of this research is collection of all boy students in second grade of mathematics strand in Chalos city which were 6 classes and in general, 114 students participate in these classes. Also, statistic sample in this study, two equal classes (wholly, 32 students) among of 6 said classes that equivalence of mean of points is confirmed by studying in final points of their one mathematics grade and T-test for two independent samples (then two classes have about equal scientific level in mathematics).

3.5 Software Designing
For gain to aim in this research, COTACSI software supplied in trigonometry field and with focus on 6 subjects following as:
1) perception of trigonometric cycle, 2) negative and positive angle, 3) perception of sin(\(\cdot\)), cos(\(\cdot\)), tan and cot in trigonometric cycle, 4) perception of sin(\(\cdot\)) and cos(\(\cdot\)) diagrams (at least in first around of trigonometric cycle), 5) perception of trigonometric simple equations and 6) comparison of trigonometric proportion of \(-\theta\) and \(\pi - \theta\) in trigonometric cycle.

4 Implementation of Project
In one of the classes, teaching of trigonometry is accomplished by researcher traditionally and the other class, teaching of trigonometry is accomplished through computer and COTACSI software.

4.1 Implementation of Test
After accomplishment of teaching in both classes with traditional and software methods, final test with difficult level is designed by researcher and with opinions of
mathematics teachers in instructed subject fields. Then, with announcing prior time, test is implemented in two classes and points are attained as data of research.

5. Analysis Method of Points

First, points of two groups evaluated thereby Kolmogorov-Smirnov test for normality. Then, equivalence of variances of two samples evaluated thereby Leven test and finally, hypothesis of equivalence of mean of points of two samples evaluated through T-test for two independent samples in meaningful level of 0.05.

5.1 Analysis of Data

5.1.1 Reliability and validity study of questions of test

Surface and content reliability of test emphasized through professional people (mathematics teachers in high school). For studying of validity of test is used of internal parallelism method and with split-half technique. In this method, it produce two half test of respected test with separating of questions to odd and even numbers and then, validity rate of test calculate with \[ r_v = \frac{2 r_{tt}}{1 + r_{tt}} \]. In this formula, \( r_v \) is validity rate of whole test and \( r_{tt} \) is correlation rate of between two half test that attained \( r_{tt} = 0.57 \) and \( r_v = 0.73 \) after separating questions to odd and even number, it show that this test have acceptable validity1.

5.1.2 Descriptive statistic of test points

The posttest points of two groups (points which is taken by two groups after implementation of trigonometry teaching) is following as:

<table>
<thead>
<tr>
<th>Posttest points of traditional teaching group</th>
<th>Posttest points of computer teaching group</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 7 0 1 6 /5 2 /5 3 4/5 4 9 1 7 1 7/5 1 1 0 1</td>
<td>11 8 1 1 1 9 9 /5 11 3 4 /5 10 11 1 1 3 7</td>
</tr>
</tbody>
</table>

1. Validity rate of test will accept if its rate is more 0.7.
Also, histogram diagram of posttests of two traditional and computer groups are following as:

![Histogram of posttest points of electronic teaching group](image1)

![Histogram of posttest points of traditional teaching group](image2)

The following table is data of descriptive statistic of two posttest points:

<table>
<thead>
<tr>
<th>Table 2. Descriptive statistic of two posttest points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Descriptive Statistics</strong></td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Posttest points of traditional teaching group</td>
</tr>
<tr>
<td>Posttest points of computer teaching group</td>
</tr>
</tbody>
</table>

According to above table (Table 2), we observe that mean of points of traditional teaching group is 5.81 and computer teaching group is 9.59; about 3.87 point was difference between mean of points of two groups. In other words, mean of points of experiment group are 3.87 higher than control group and this demonstrator is better performance of computer teaching group.

**5.1.3 Normality evaluation of data**

Now, we evaluate posttest points (taken points of test in this research) for two groups with Kolmogorov-Smirnov test for normality:

H0: Taken data of posttest points in two groups have normal distribution.
H1: Taken data of posttest points in two groups have not normal distribution.
According to above table, we observe that P-value for points of two groups is higher than 0.05 in kolmogrov-smirnov test. Then, H0 hypothesis emphasize in meaningful level of 0.05; posttest points in two traditional and electronic groups have normal distribution.

5.1.4 Implementation of equivalence of variances test and T-test

First, equivalence of variances of two samples is evaluated thereby Leven test and then, we consider to accept or rejection of research hypothesis with T-test for two independent samples in following table.

HO: Mean of posttest points are equal in two groups (\( \mu_1 = \mu_2 \)).

HI: Mean of posttest points are equal in two groups (\( \mu_1 \neq \mu_2 \)).

Note: \( \mu_1 \) is mean of traditional teaching group and \( \mu_2 \) is mean of electronic teaching group.
In above table, we observe that P-value related to Leven test is higher than 0.05 (sig=0.16). Then, equivalent hypothesis of posttest points emphasize in two groups. Now, with equivalent hypothesis of variances, we see that P-value related to T-test less than 0.05 (sig=0.01); HO hypothesis reject in meaningful level of 0.05, in other words, unequal hypothesis of means emphasize in two groups. In particular, \(-6/65 < \mu_1 - \mu_2 < -0/9\) or in other words, \(\mu_1 - \mu_2 < 0\) and or \(\mu_1 < \mu_2\) and this means that mean of traditional teaching group is less than electronic teaching group in regard of Table 4. Therefore, it can that hypothesis of research is emphasized.

### 6. Conclusion and Suggestions

Study of results of this research show that hypothesis of research have emphasize through T-test for two independent samples and in meaningful level of 0.05. Therefore, mean of points of two traditional and electronic groups have meaningful difference after implementation of research project and according to T-test, mean of points of electronic teaching group higher than mean of traditional group. Therefore, it can result that using of computer software in trigonometry teaching has positive affect on leaning of students. It can analyze to reason of this that figure draw more precise and meanwhile animation of figures, diagrams and visual aspects of information receiving have increased extraordinary and corrective perception of subjects will have more affect to attitude and learning of students in computer teaching. Therefore, to result of this research, we recommits two suggestions in direction of improvement of mathematics education: 1) allocate needful cost to produce of standard software for all syllables of mathematics of education, 2) eulogy and financial supporting of mathematics teachers for production of software related to subject of their teaching of education.

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