



# The Effect of Multimedia Tool (Corel Draw) on the Academic Achievement and Retention of Contents in Mathematics of Sixth Grade in Tehran Region 3 in 2017-2018 Academic Year

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**Abstract:** This research aimed to investigate the effect of teaching with Corel Draw on the academic achievement and retention of contents in the male students of sixth grade in Tehran (Region 3). To carry out this quasi-experimental research, the multistage cluster method was used to select two classes, each holding 20 students (totally 40 male students). Accordingly, one class was considered as the control group (taught by traditional and conventional method) and another class as an experimental group (taught by Corel Draw). To accomplish the results of the research, the quasi-experimental method with the pretest-posttest design was used between two groups of control and experimental. The obtained data were analyzed with the independent-samples *t*-test and SPSS-18. The results of this study indicated that the academic achievement of students, taught by the multimedia method (Corel Draw), was more than those, taught by the conventional (traditional) method. Moreover, the academic achievements of students, taught by the multimedia method (Corel Draw) was more than those, taught by the conventional (traditional) method based on the learning problem-solving components, learning the concept of polygons, and learning the concept of fractions. Additionally, the results showed that the retention of math's contents of students, taught by the multimedia method (Corel Draw), was better than those taught by the conventional (traditional) method.

**Keywords:** Multimedia Method, Corel Draw Software, Academic Achievement, Contents Retention, Math, Sixth Grade

## INTRODUCTION

Currently, teaching and its methods are less taken into consideration and the monotony and overuse of one teaching method slow down the learning process. Teaching is both science and art and the teacher should hold its science and art. In the teaching process, the important point is that the teacher identifies what should be learned and what kind of audience there is in order to provide the educational content and appropriate activities associated with the subject and students' understanding. Primary school's teachers have declared more than high school's teachers, using a computer during their teaching regularly. Teaching is the interaction or the mutual behavior between teacher and student based on the ordered and meaningful plan of the teacher to make a change on his/her students' behavior. Today, the education world has been drawn its

attention from teaching to learning. This approach considers learning as a basis and foundation of all programs, policies, and guidelines. To accomplish the purpose of such an approach, the efficiency of all rich facilities and technologies must be accessed with regard to the vast knowledge of information technology (Shabani, 2014, p.45).

Regarding all the efforts that the Ministry of Education has made for improving the teaching condition of subjects, the teaching condition of math and students' grades have not been desirable yet. On the other hand, the educational goals of teaching math, which are creative and logical thinking, are not fulfilled. Indeed, math is one of the subjects which all students, from the basic level of education to the higher level of secondary education, have difficulty to cope with it. Furthermore, the statistics show that most of students' failure in the final exams is involved with math. The most important goal of math is thinking (Georg Polia, 1999; translation: Shahriari, 2001), and the teachers are recommended to enhance the thinking ability level in their students. Therefore, the duty and responsibility of today's teacher are heavier and more complex than in past times. Its community people cannot be led to the complex and advanced evolution by traditional methods (Ibid, p.59).

The use of educational technology in schools has been caused that students become more motivated and interested in learning and engage themselves in learning, encompassing fast and better learning (Richey, 2008). Using a computer in teaching and learning is the factor, leading to a great evolution in teaching and learning. Electronic learning is mostly associated with learning, occurring on the internet context and facilitating by using network technologies (Farajollahi & Dehbashi Sharif, 2009, p.17).

During an agenda, UNESCO of the International Commission on Education for the twenty-first century proposed a framework for educational evolution in the future. This framework is an appropriate context to discuss establishing the relationship between information communication technology (ICT) and learning. Regarding computers, it can be generally declared that this device can contain many affairs at the minimum time and absolute precision without feeling tired or great expenses. One of the usages of a computer on teaching individuals is its teaching role. According to its absolute precision, the computer acts as a professor, playing a highly significant role without neglect, tiredness, forgetfulness, and other reasons, resulting in the weakness in teaching.

### **Statement of the Problem**

The students' academic achievement is affected by different factors. If these factors and how they affect the students' academic achievement is identified, the objectives of the education system can be accomplished very well. One of these factors is the teaching method of teachers, manifesting more in subjects such as math. Previously, it was believed that only quiet and inactive classes are the real classrooms. In the traditional teaching methods, particularly in math, the process of teaching and learning significantly prevents the students' engagement in learning. The teacher is a speaker and regularly transfers the book's contents to students as speaking without considering his/her students' abilities, talent, and interests. Teaching is the main pillar of the sustainable development of every country. More to the point, currently, electronic teaching is the newest, most effective and reliable method for developing individual and organizational teachings. The modern system of electronic teaching has unique benefits and advantages for individuals, organizations, and educational centers. In the past, all school teachings were held as the in-class manner in which the class was teacher-centered. By emerging internet, e-teaching led to developing education scope and sharing knowledge and information. Additionally, it seems that meeting the virtual world compels people to meet each other in the real world (Farajollahi et al, 2014, p.38).

Students play the instructor and learner role at the intelligent school. At this school, the curriculum is not restrictive and students are allowed to step beyond it. Furthermore, the teaching method is student-centered. Emphasizing the thinking skills and providing the teaching-learning environment falls under the strategies and policies of intelligent schools. Specifically, the characteristics and advantages of e-learning by

emphasizing the learning through the web can be shown by referring to the theories of Gillian and Cherchil (2012) at the centers of Australia, USA, England, and Hong Kong:

1. Accessing the information resources and education everywhere and at any time;
2. Creating equal learning opportunities (educational justice);
3. Enhancing the quality of the teaching-learning process;
4. Developing a rich environment for creativity;
5. Increasing the motivation for self-learning and autonomy in learning;
6. Paying attention to different learning styles of learners;
7. Flexibility in accessing the extremely high volume of information
8. Enhancing learning by using senses
9. The possibility of creating deeper and more meaningful learning
10. The possibility of supporting learners like all technical and educational supports in the web-based programs (As cited in Zarabian, Farajollahi, and Sarmadi, 2012)
11. The findings show that approximately 75% of human learning is carried out by using the sense of sight, 13% by hearing, 6% by feeling, 3% by the sense of smell, and 3% by the sense of taste. Therefore, using computer software can be considered as one of the useful methods for learning.

Today, one of the problems of the education scope is the lack of students' interest in learning, especially in subjects like math. Despite the importance of all educational courses, since primary school is the foundation and basis of developing students' scientific personality and provides the basis for creating positive and negative attitude towards the subjects, particularly math, in them, modern and new method should be used to create the interest in this subject and education, especially in the sixth grade and this special subject, which its importance is apparent for everyone. One of the modern methods of education is the use of information and communication technology. The use of this method causes that students will be interested in math; because teaching is always carried out with beautiful pictures in this method. On the other hand, since students play a role in learning, this method causes their interest and learning deepening. Different types of the mathematics training software can be used to help students learn math skills and create a conceptual understanding of problem-solving skills; because students acquire significant improvement in mathematics reasoning by interacting with the software. Currently, the various software such as PowerPoint, Geo Gebra, Modekals, Microsoft Mathematics, and Corel have been designed for teaching, and they can be used to teach mathematics. Given that using the new technologies have a lot of capacities for teaching and learning and owe positive characteristics such as new technologies like mathematic training software, they can make abstract concepts of math tangible and objective for students. However, teachers hesitate to use this software, and their effects cannot be certainly discussed. Therefore, the present research is carried out to investigate the effect of teaching with Corel Draw on the academic achievement and retention of contents in sixth grade mathematics in Tehran (Region 3) to examine the existing hypotheses and more closely address choosing the more useful teaching method. An acquaintance of necessary skills and autonomy of students can be provided by using innovative approaches and creating a context for active learning and representing the new methods (Nielsen, 2012). According to Shabani (2014), the characteristics of teaching machines are as following: 1. it enhances the answer, 2. The student follows the program based on her/his talent and ability. 3. The concepts are logically arranged in it. 4. The questions are segmentally interconnected with each other. 5. Students can follow the program when he/she has learned the previous phases. 6. The information associated with the students' answer is kept in it. 7. Information is also represented to students nonverbally (figure, diagram). 8. Unlike a human, the machine does not have effects of tiredness, anger, and discomfort. According to what was mentioned, due to the advancement of science, information mass, their growth speed, the attractive facilities of materials made for teaching, the importance of mathematics, particularly in the sixth grade, which is the basis of education, and lack of research with this goal about using Corel software in Tehran (Region 3), it is

necessary to conduct a research to investigate the multimedia effect and especially the Corel software on the academic achievement and retention of contents in the mathematics of the sixth grade students in Tehran (Region 3).

### **Research Objectives**

#### **Primary Objective**

The effect of multimedia tool (Corel) on academic achievement and retention of contents in the mathematics of the sixth grade of primary school in Tehran (Region 3)

#### **Secondary Objective**

The effect of teaching with multimedia (Corel) on the achievement of problem-solving in the mathematics of sixth grade

The effect of teaching with multimedia (Corel) on the achievement of learning polygons (the fifth chapter of math book of sixth grade)

The effect of teaching with multimedia (Corel) on the achievement of learning fractions (the second chapter of math book of sixth grade)

The effect of teaching with multimedia (Corel) on the retention of contents in the mathematics of sixth grade

### **Research Hypotheses**

#### **Primary Hypothesis**

There is a difference between the results of the student's mathematics test, taught by the traditional conventional and multimedia teaching methods.

#### **Secondary Hypotheses**

There is a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of problem-solving in the mathematics of primary sixth grade.

There is a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of polygons in the mathematics of primary sixth grade.

There is a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of fractions in the mathematics of primary sixth grade.

There is a difference between the effect of multimedia (Corel) method and traditional teaching method on the retention of contents in the mathematics of primary sixth grade.

### **Research Question**

Is there a difference between the results of students' mathematic test with traditional method and multimedia method?

#### **Secondary Questions**

Is there a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of problem-solving in the mathematics of primary sixth grade?

Is there a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of polygons in the mathematics of primary sixth grade?

Is there a difference between the effect of multimedia (Corel) method and traditional teaching method on learning the concept of polygons in the mathematics of primary sixth grade?

Is there a difference between the results of the mathematics test of students with traditional method and multimedia method?

### **Theoretical Basis and Review of the Literature**

#### **Cognitive Theory of Multimedia Learning**

Mayer (2001) maintains that the use of the whole cognitive capacity of human for processing information is the logical explanation of multimedia presentations, namely presenting materials in terms of words and pictures. Accordingly, the decision-making regarding how to design the multimedia messages shows the inference and basic understanding of how a human learns. Three assumptions have been proposed considering the cognitive theory of multimedia learning which are as following:

1. A dual-channel assumption: According to this assumption, humans have separate and distinct channels for processing information representing as visual/pictorial and auditory/verbal materials.
2. Limited capacity assumption: This indicates that humans have a limitation in terms of the amount of information that they can process in each channel and at a particular time.
3. Active processing assumption: This shows that humans are actively engaged to create a coherent and intelligible mental representation of their experiences in the cognitive process. This active cognitive process includes attention, organizing the information entered, and integrating information based upon prior knowledge of learners. Soler (As cited in Mayer, 1993) emphasizes the relationship between short term and long term memories in human's brain when the educational materials are designed (As cited in Zarei Zavaraki & Jafarkhani, 2011).

### **Seven Principles of Designing the Multimedia Educational Applications**

As one of the prominent scholars of education field on designing multimedia educational applications, Mayer (2004) considers seven principles as the key points:

1. Multimedia principle: learners learn more from words and pictures than only words;
2. Temporal contiguity principle: The simultaneous presentations of words and pictures;
3. Spatial contiguity principle: The contiguous presentations of related words and pictures;
4. Coherence principle: Minimizing unnecessary words and pictures;
5. Modality principle: Presenting words and pictures in terms of verbal animation instead of writing animation;
6. Redundancy principle: Presenting words and pictures only as a verbal animation instead of verbal animation and writing text;
7. Personalization principle: The greater effect of multimedia on learners with low information rather than learners with high information (Mayer, 2005).

### **The Advantages of Multimedia in Learning**

The development of creativity, saving time, eliminating useless activities, adding time for communicating with the student and discussion, presenting materials in different forms, recognizing different styles of learning, active learning with feedback, repetition possibility, learning in accordance with the special speed of learner while controlling the learning process, facilitating participation in activities, establishing dual interaction and relationship with user, and combining the linguistic skills such as reading, writing, listening, and speaking can be considered as the advantages of multimedia.

### **Multimedia and Enhancement of Memory Efficiency and Retention of Contents**

Extraneous cognitive load is created due to the pressure on working memory through the way of presenting subject matters and is associated with the quality of design method, organizing and presenting educational material and contents. In other words, extraneous cognitive load is only developed because of the information presentation method to learners. Although the multimedia eliminates the extraneous and unnecessary cognitive load, it enhances the efficiency of active memory by physical integration of learning content and material which is mainly done as two forms, namely text (written and verbal) and picture (photo, figure, diagram). Moreover, learning is provided by connecting new knowledge and prior information.

### **The History of Considering the Concept of Academic Achievement**

Professional and psychological groups always emphasize to investigate different educational aspects. Focusing on academic achievement has begun since Binet. He found out that his test scores could separate the children specified as "intelligent" and "less intelligent" according to the classroom observations, and the results of students' exam were extrapolated later (Saif, 2008). Currently, the investigation of these concepts has also been drawn to all countries attention, and a lot of communities' budget is annually allocated to the education of children and teenagers. Moreover, many studies have been conducted the different factors such as family, living environment, school, and educational programs which can impact on the academic achievement.

### **Definition of Academic Achievement**

According to Reber (1985), academic achievement is the accomplishment of standards and educational goals. In 1994, Paulson claims that academic achievement refers to a feature of the educational position of students, representing a score for a course, the mean scores in a course associated with a subject or mean scores of different courses.

### **The Important Effective Factors on the Academic Achievement**

The study of effective factors on academic achievement is a complex issue; because achievement is a multidimensional element and is slightly involved with the physical, social, cognitive, and emotional growth of students. Previously, many scholars emphasized the effect of mental and cognitive abilities on academic achievement.

### **Mental and Cognitive Factors**

By explaining the mind transformation under the assumption that the thinking process is qualitatively different in adolescence and adulthood from the thinking process in childhood and also by emphasizing the thinking structure and not its content, Piaget recognizes the cognitive growth process during four phases (sensory, mobility, pre-operational, concrete operations, and formal operations), which the order of passing through these phases is equal for everyone. Studies demonstrate that there is a relationship between cognitive growth and school achievement. Particularly, students with high mental growth have better school achievement. However, the students who are in the concrete operations regarding cognitive growth only understand 30% of the concrete operations level and are able to recognize none of the abstract concepts requiring formal reasoning.

### **Personality Factors**

In recent research, it has been emphasized that personality factors play a significant role in predicting academic performance and achievement, particularly in higher education. Additionally, in some studies, it has been indicated that the association between psychometric intelligence and academic achievement is far less than expected, especially at the university environments. Accordingly, it seems that if the predictive ability of scales contributed to the cognitive abilities are low in higher education, the number of personality variables will increase. During the investigation of the relationship between the personality traits and academic performance, Chamord-permozice and Farenhime found out that personality factors explain 10-17% performance variance. For instance, the results of a study by Defroite and Mervildy indicated that on one hand, there is a negative and significant relationship between neuroticism and academic achievement, and on the other hand, loyalty and acceptance have a positive relationship with academic achievement.

### **Context Factor and External Factor**

Some psychologists have considered the academic performance associated with the context. For instance, the context model emphasizes the important role of variables such as interpersonal, educational methods, curriculum, and assessment methods. Accordingly, in order to explain the academic performance, some researchers emphasize the role of socioeconomic variables of learners as another interpersonal variable. The surveys such as that conducted by other researchers have been demonstrated that academic achievement is affected by the interaction between the context variables like educational methods program, emotional condition, academic environment, the attitude towards educational issues, and the achievement motivation of learners. The combination of two classes of achievement motivations (internal and external) manage the behavior and academic activities of the students.

### **Emotional Intelligence, Self-concept, and Positive Attitude Factors**

Research by Ako boiro and Joshvoa showed that the academic achievement of high school students can be predicted based on the self-concept and students' attitude towards the academic activities. Research by Bass indicates that t students' positive attitude towards the school subjects has a positive effect on their academic achievement in these subjects. In addition, student attitude towards the school, the attitude that he/ she has towards his/her ability or competency in doing homework, is often accompanied by better motivation,

achievement, and academic performance. In particular, Bendora points out some evidence in this regard, showing that only motivation ability stimulates students to attempt for academic achievement.

### **Family Environment and Parenting Styles**

The effect of family environment processes on academic achievement is maintained in an important event. Most studies conducted on this approach demonstrates that there is a relationship between parenting style and academic achievement. The children who raise in strict families obtain higher academic achievement score than the children with other family styles (Strenberg et al, 1989 as cited in Saheb, 2010).

### **The Factor of Self-Regulation Skill of Individual**

Some research is carried out based on an approach, indicating the relationship between self-regulation skill of students and their academic achievement. Students who have more self-regulation skill show higher academic achievement (Loun et al., 1993 as cited in Saheb, 2010).

### **The Theoretical Basis of Retention**

#### **Retention Definition**

Retention is the ability to maintain, retain and recall prior experiences (Saif, 2011). Some of the information entered into the short-term memory, which communicates with previously learned information, transfer to the long-term memory and turns into as organized materials which remain there for a long time, even for a lifetime. Eventually, they are returned to the long-term memory and the person answers according to them (as cited in Zare et al., 2014).

### **The Importance of Teaching Mathematics in the Primary School**

Mathematics is one of the important subjects which should be taken into consideration. Mathematics is important because it is used for life and occupation skills and studying more on the key subjects such as basic sciences and engineering (NAO, 2008). The most important point in learning math is that learning is not easy and learners should learn it in practice, and learners themselves are responsible for understanding math. Nevertheless, despite the importance of this subject, it is often observed that some students are less interested in learning math and sometimes they hate it.

### **The Objective of Mathematics Teaching According to George Polya and Plato**

According to George Polya, the most important goal of math teaching is “thinking”, and the teachers are recommended to enhance the ability and thinking level of their students (George Polya, 1999; translator: Shahriari, 2001).

According to Plato, the goals of math teaching are 1) common culture, 2) Thought standardization, 3) Thinking of habit, 4) Mental and emotional growth, 5) Obtaining a balanced character.

### **Review of the literature**

#### **Abroad Literature**

Harrison et al. (2012) have carried out and identified the effect of the use of communication and information technology on education. According to this research, communication and information technology makes the education deeper and more effective and causes emerging creativity.

In their research, Flana and Alfanso found out that computers have the capacity of creating motivation, personalization, and the practice of concentration towards traditional teaching.

Ynag ji (2010) conducted research associated with the effect of communication and information technology on how to learn. It was detected that this teaching method increased learning due to concentration.

#### **The literature in Iran**

Moradi and Maleki (2015) carried out a research to examine the effect of educational computer games on the educational motivation of male students of primary third students with a disability of learning math. The results of the study showed that the use of educational computer games leads to the increase in the educational motivation of students with a disability of learning math in the concepts of addition and subtraction, multiple, and division.

Emadi, Famil, and Shokrian (2014) demonstrated the use of electronic teaching software of English alphabet based on the constructivist approach statistically impact the internal motivation and academic achievement of the first grade students of secondary school. Rasekh (2014) carried out a research on designing and producing educational multimedia to investigate the concept of number, addition, and subtraction and its effect on the academic achievement of primary fourth grade students with a learning disorder in Shiraz (Region 3). The results showed that teaching the concepts of number and polygons by the multimedia method has a significant effect on the achievement and growth of students with a learning disorder.

## **Methodology**

The population being studied is all male students of primary sixth grade studying in Tehran (Region 3) in the academic year of 2017-2018 which 300 students have enrolled at state school and 100 students at the private school. There are approximately 400 sixth grade students.

In this study, the sample size contains 40 sixth grade male students of one of the primary schools of Tehran (Region 3), studying in two classes, each holding 20 students. The multistage cluster sampling was used to select the sample. According to the equal arrangement of students in terms of first or second level parental education and the results of educational assessment, it can be assumed that the effect of physiological growth, the level of parental education, and intelligent has reached the possible minimum level.

### **Instrument and Measurement Method**

In this research, the researcher has carried out the pretest due to the newness of the Corel software, Furthermore, the researcher will conduct the posttest after teaching the electronic content with Corel software. The tests will design as pencil-paper form and consists of 10 questions with the total 20-scores scale with subcomponents. The questions types and their numbers were approved by educational trainers and teachers. Therefore, they can be used to examine the academic achievement of sixth grade students in math and the retention of contents.

### **Procedure**

The current research is the quasi-experimental type with distinct two-group design, namely pretest and posttest of experimental and control groups. Moreover, this research is a semi-empirical type in terms of functional goal and method.

In this research, the pre-learning of both groups will be evaluated by using pretest. Then, two third of sixth grade mathematics will be taught by traditional method for the control group and by Corel software for the experimental group.

According to research objectives, the concepts of addition and subtraction of fractions, multiplying fractions, and problem-solving have been taught, and then, post-test have been given to both groups. Particularly, the mean difference in the academic achievement level has obtained for both groups of math. Meanwhile, the retention test has been given to the statistical sample after two months.

In this research, descriptive statistical methods (including mean, standard deviation) and the inferential method (t-independence) in SPSS-18 was used to investigate and analyze the data.

### **Delimitations (Temporal, Spatial, and Thematic)**

#### **Temporal Delimitation**

The temporal delimitation will be in the academic year of 2017-2018.

#### **Spatial Delimitation**

The spatial delimitation of this research will be Tehran (Region 3).

#### **Thematic Delimitation**

The thematic delimitation of the research includes the multimedia education area, math, and primary school.

#### **Significant of the Study**

Regarding the investigation that the researcher carried out about examined variables, it was detected that there was no research relating to this topic. Therefore, the present research is not repetitive. In addition, few



studies have been found that surveyed the use of educational software of mathematics in the primary sixth grade. Accordingly, it would be useful and precious to research in this regard.

**The Applications of the Research**

The Applications used in the research will be mathematics teachers, instructors, and trainers at the primary school. Moreover, teachers and trainers of the education system can attempt to promoting and using the educational multimedia software at schools at the regional level in order to plan and support the programs and this software.

**Data Analysis**

Table 1 represents the descriptive characteristics of the pre-test scores of control and experimental groups.

**Table 1.** Descriptive Characteristics of the Pre-test Scores of Control and Experimental groups in the Academic Achievements of Math grades

Group	Number	Mean	Standard Deviation	Average Standard Error
Experimental	20	13.80	2.60	0.58
Control	20	14.00	2.75	0.61

As it is shown in Table 1, the mean of pre-test scores of both groups is almost at the same level in the academic achievement of mathematics.

Before selecting the test type being used, particularly in the comparative tests, it is required to ensure that the variable is normal. If the variable is normal, the use of parametric tests will be recommended; otherwise, the use of a nonparametric equivalence test will be taken into account. The results show that the significant level of the variable is more than 0.05. Therefore, the variable is normal.

**Table 2.** Kolmogorov–Smirnov Test of Research Variables

Variable	Mean	Standard Deviation	Z Statistics	Sig.	Result
Academic Achievement	13.90	2.64	0.87	0.42	Normal

Accordingly, the t-test was used to examine the difference in pre-test scores of two groups (Table 3). The independent t-test was used to compare the mean of two populations. The t-test is assumed independent for both samples, and the variance of two populations is equal.

**Table 3.** The T-test in Order To Investigate the Pre-test Scores of Both Experimental and Control groups

Statistical Indicator	Mean Difference	Standard Deviation Differences	Degree of Freedom	t	Significance Level
Pre-test	- 0.20	0.84	38	-0.236	0.81

According to Table 3, the results of t-test have indicated that there is no difference between the mean of pre-test scores of academic achievement of both groups.

According to the results, after the representation of mathematics concepts to the experimental group by multimedia method (by using Corel software), the post-test was given to the experimental and control groups taught by the traditional and conventional methods. Moreover, the primary hypothesis of the research was investigated.

The investigation primary hypothesis: there is a difference between the math results of the students taught by traditional and conventional and multimedia methods.

**Table 4.** Descriptive Characteristics of the Pre-test Scores of Academic Achievements of Two Control and Experimental groups

Group	Number	Mean	Standard Deviation	Average Standard Error
Experimental	20	17.70	1.83	0.41
Control	20	15.40	1.69	0.37

**Table 5.** The T-test in Order To Investigate the Pre-test Scores of Both Experimental and Control groups

Statistical Indicator	Mean Difference	Standard Deviation Differences	Degree of Freedom	t	Significance Level
Post-test	2.30	0.559	38	4.110	P<0.01

According to Tables 4 and 5, it can be observed that there is a difference between the mean scores of the two groups. The posttest scores of mathematics academic achievement of the experimental group are more than the mean score of the control group, and this difference is statistically different. Therefore, the primary hypothesis is approved at 0.01 significant level. That is to say, the experimental group (exposed to the multimedia teaching method by using Corel software) has shown better performance than the control group. Particularly, it can be declared that the academic achievement of students taught by multimedia method (by using Corel software) is more than those taught by the conventional (traditional) method.

Table 6 illustrates the descriptive method of the pre-test scores of the control and experimental group under the academic achievements components.

**Table 6.** Descriptive Characteristics of the Pre-test Scores of Control and Experimental groups in the Academic Achievements Components of Math grades

Components	Group	Number	Mean	Standard Deviation	Average Standard Error
Learning Problem-solving	Experimental	20	5.65	1.30	0.292
	Control	20	5.50	1.46	0.328
Learning the Concept of Polygons	Experimental	20	3.60	1.04	0.233
	Control	20	4.15	1.18	0.264
Learning the Concept of Fractions	Experimental	20	3.60	1.04	0.233
	Control	20	4.15	1.18	0.264

The above table shows that the mean of the pre-test scores of control and experimental groups in the academic achievements components (learning problem-solving, learning the concepts of polygons, and learning the concepts of fractions) is approximately at the same level.

Accordingly, t-test was used to examine the difference between pre-test scores of two groups (Table 7).

**Table 7.** The T-test in Order To Investigate the Pre-test Scores of the Components of Both Experimental and Control Groups

Statistical Indicator	Mean Difference	Standard Deviation Differences	Degree of Freedom	t	Significance Level
Pre-test of Learning Problem-solving	0.150	0.439	38	0.341	0.735
Pre-test of Learning the Concept of Polygons	0.200	0.549	38	0.605	0.549
Pre-test of Learning the Concept of Fractions	-0.550	0.352	38	-1.558	0.128

As it is observed in Table 7, the results of the t-test show that there is no difference between the mean of pretest scores of both groups in the academic achievements components (learning problem-solving, learning the concepts of polygons, and learning the concepts of fractions). The secondary hypotheses are examined based on the obtained results.

**The Investigation of Secondary Hypotheses of the Research**

1. There is a difference between the effect of the multimedia method (Corel) and the traditional teaching method on learning the concept of problem-solving in the mathematics of primary sixth grade.
2. There is a difference between the effect of the multimedia method (Corel) and the traditional teaching method on learning the concepts of polygons in the mathematics of primary sixth grade.
3. There is a difference between the effect of the multimedia method (Corel) and the traditional teaching method on learning the concepts of fractions in the mathematics of primary sixth grade.

**Table 8.** Descriptive Characteristics of the Post-test Scores of Control and Experimental groups in the Academic Achievements Components of Math grades

Components	Group	Number	Mean	Standard Deviation	Average Standard Error
Learning Problem-solving	Experimental	20	7.20	0.83	0.186
	Control	20	6.50	1.10	0.246
Learning the Concept of Polygons	Experimental	20	5.20	0.83	0.186
	Control	20	4.60	0.99	0.222
Learning the Concept of Fractions	Experimental	20	5.30	0.80	0.179
	Control	20	4.30	0.65	0.146

**Table 9.** The T-test in Order To Investigate the Post-test Scores of the Components of Both Experimental and Control Groups

Statistical Indicator	Mean Difference	Standard Deviation Differences	Degree of Freedom	t	Significance Level
Pre-test of Learning Problem-solving	0.700	0.308	38	1.278	0.046
Pre-test of Learning the Concept of Polygons	0.600	0.290	38	0.464	0.01<p<0.05
Pre-test of Learning the Concept of Fractions	1.00	0.231	38	4.316	P<0.01

As it is presented in Tables 8 and 9, there is a difference between the mean scores of two groups. The post-test scores of academic achievement components of mathematics (learning problem-solving, learning the concepts of polygons, and learning the concepts of fractions) of experimental group are more than the control group, and this difference is statistically different. Therefore, the secondary hypotheses of the research were approved at the significant level (learning problem-solving sig=0.046, learning the concepts of polygons sig=0.029, and learning fractions concepts sig=0.01) based on the fact that there is a difference between the effect of multimedia (Corel) and traditional teaching method on the learning problem-solving, learning the concepts of polygons, and learning the concepts of fractions in the basic math of primary sixth grade. Indeed, the experimental group (exposed to the multimedia teaching method by using Corel software) has shown better performance than the control group (exposed to the traditional method). Therefore, it can be stated that academic achievement of students taught by the multimedia method (by using Corel software) is more than those taught by the conventional (traditional) method under the components of learning problem-solving, learning the concepts of polygons, learning the concept of fraction.

The investigation of the fifth hypothesis of the research: there is a difference between the effect of multimedia (Corel) method and traditional teaching method on the retention of contents in the mathematics of primary sixth grade. After two months of teaching and academic achievement test of students' math, a test was given again to trace the effect of multimedia by using Corel software and investigate the effect amount of this method on the retention of contents.

**Table 10.** The Descriptive Characteristics of Post-test Scores of Retention of Contents of Experimental and Control Groups

Group	Number	Mean	Standard Deviation	Average Standard Error
Experimental	20	18.850	1.42	0.318
Control	20	16.700	1.62	0.363

**Table 11.** The T-test Analysis in Order To Evaluate the Amount of Retention of Contents of Both Experimental and Control Groups

Statistical Indicator	Mean Difference	Standard Deviation Differences	Degree of Freedom	t	Significance Level
Retention of Contents	2.150	0.483	38	4.449	0.01

According to Tables 10 and 11, it can be observed that there is a difference between the mean scores of the two groups. The contents retention scores of the experimental group are more than the mean scores of the control group in math, and this difference is significantly different. Accordingly, the fifth hypothesis of the research was approved at 0.01 significant level. Notably, the experimental group (exposed to the multimedia teaching method by using Corel software) has indicated better performance than the control group (exposed to the traditional teaching method). Therefore, it can be claimed that the retention of the content of the math of students taught by the multimedia method (Corel) is better than those taught by the conventional (traditional) method.

### Conclusion and Recommendation

**Research Hypothesis:** there is a difference between the math test results of students taught by conventional (traditional) and multimedia teaching methods.

As Table 4 and 5 show, there is a difference between the mean score of both groups. Moreover, the post-test scores of mathematics academic achievement of the experimental group are more than the mean of the control group, and this difference is significantly different. Particularly, the primary hypothesis of the research was approved at 0.01 significant level. In other words, the experimental group (exposed to the multimedia teaching method by using Corel) has indicated better performance than the control group (exposed to the traditional teaching method). Thus, it can be stated that the academic achievement of students taught by multimedia method (by using Corel) is more than those taught by traditional method. Furthermore, according to the secondary hypothesis of the research and Table 8 and 9, it can be observed that there is a difference between the mean scores of two groups. The post-test scores of mathematics academic achievement components (learning problem-solving, learning the concept of polygons, learning the concept of fractions) of the experimental group is more than the mean score of the control group; this difference is significantly different. Therefore, the secondary hypotheses of the research were approved based on the fact that there is a difference between the effect of multimedia (Corel) and traditional teaching method on learning problem-solving, learning the concepts of polygons, and learning the concepts of fractions in the basic math of primary sixth grade. Likewise, Tables 10 and 11 illustrate a difference between the mean scores of both groups. The scores of contents retention of the experimental group in math are more than the mean score of the control

group, and this difference is statistically different. Accordingly, the fifth hypothesis of the research is approved at 0.01 significant level.

According to this research, it can be declared that:

1. The multimedia method enhances the educational outcome qualitatively and quantitatively.
2. Education through Corel software can make teaching and learning collaborative.
3. It can actualize education based on more scientific methods and criteria.
4. It can strongly actualize education.
5. It can accelerate and facilitate learning.
6. It provides the clarification, coordination, and effectiveness of educational expectations.

### **Research Recommendation**

1. This research should be repeated for other regions and educational courses.
2. This research has investigated teaching by using one of the multimedia tools (Corel software). The evidence from this research suggests that a study similar to this one should be carried out by considering other tools or the combination of them and comparing them with the traditional method and other variables being examined.
3. This research was quasi-experimental and semi-empirical with respect to the method and implementation. Future research should concentrate on other methods and implementations.
4. Further research is needed to repeat and account for female students; since this research was conducted on male students.
5. This research should be implemented and repeated on other grades of primary school and higher grades.

### **Practical Recommendations**

1. It is recommended that school administrators should open up opportunities for teachers to provide students with the contemporary teaching methods and pleasant and motivated environment.
2. It is suggested that some courses should be offered for teachers to become familiar with the various tools of multimedia teaching.
3. Teachers and trainers should spend hours to teach electronic subjects at schools to enhance students' skill in learning and teaching.

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### **References**

1. Farajollahi M., & Zarif Sanaye'ei, N. (2009). Education based on Information and communication technology in higher education. *Education Strategies in Medical Sciences*. 2 (4): 167-171
2. Farajollahi, M., (2015) (B). *Online collaborative learning under learning models*. Tehran: Maroon Publication.
3. Farajollahi, M., Khatib Zanjani, N., & Moeinikia, M. (2014). *Global central university*. Tehran: Elmeostadan Publication.
4. Flana ·D. Alfonso ·P. (2011). Computer assisted instruction in reading for student with learning disabilities: aresearch synthesis. *Education & Treatment of children*. 23 ·173-193.

5. Nielsen D. L. (2012). Effect of active learning theory on the motivation of school blindness and low vision in Texas. LID Academy - 2012 Texas Active Learning Conference, TX, June (19-20). Retrieved from <http://www.tsbvi.edu/>
6. Polya, G. (1990). *Mathematical creativity*. Translator: Shahriari, Parviz. (2001). (Sixth Ed.). Tehran: Fatemi Publishing.
7. Rasekh, M. (2014). The investigation of design and production of teaching multimedia, the concept of number, addition and subtraction, and their impact on the mathematical achievement of the first grade of students with a learning disorder in the third region of Shiraz.
8. Richey, R. C. (2008). Reflections on the 2008 AECT Definitions of the Field. *Tech Trends*, 52(1), 24-25.
9. Saif, A. (2007). *Modern Educational psychology*. Tehran: Agah Publication
10. Saif, A. (2011). *Modern Educational psychology*. Tehran: Douran Publication
11. Shabani, H. (2014). *Education and training skills (Teaching methods and techniques)*. Tehran: Samt.
12. UNESCO institute of statistics (2009). *Guide to measuring information and communication technologies (ICT) in education*. Montreal: UNESCO institute of Statistics. Available at: <http://www.uis.unesco.org>.
13. Zarabian, F., Sarmadi, M., & Farajollahi, M. (2011). Instruction planning of E-learning program for grade primary school dictation and its validation from the viewpoint of experts. *Journal of Curriculum Studies*.
14. Zare, M., Sarikhani, R., Sarikhani, E., & Babazade, M. (2015). The Effects of Multimedia Education on learning and Retention in Physiology Course. *Journal of Virtual Learning*, 6 (1).
15. Zarei Zavaraki, E., & Gharibi, F. (2012). The impact of multimedia teaching on learning and retention of the math of female disability students of fourth grade in Arak. *Quarterly of Psychology of Exceptional Individuals*, 2 (5).
16. Zarei Zavaraki, E., & Jafarkhani, F. (2014). Multimedia teaching and its role in special education. *Journal of Exceptional Education*, 2 (98-99).