



# The Effect of E-Learning Approach on Students' Achievement in Fraction Math Course Level 5 at Yemen's Public Primary School

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# The Effect of E-Learning Approach on Students' Achievement in Fraction Math Course Level 5 at Yemen's Public Primary School

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**Abstract-** E-learning (EL) is widely used in school and other organizations all over the world, because of difficulties in math skills (Remembering , understanding , application). There have not been any major surveys in the Yemen Public Primary School (YPPS) in that regard. This is the driving question behind this research: What is the effectiveness and usefulness of using e-learning approach in teaching the fraction math course for students of level 5 in the republic of Yemen on (Remembering , understanding , application) skills ? In this study, an experimental group of (30) students studying a course using e-learning approach. The control group (30) students they studying a course traditional learning, experimental design approach were used. The students' achievement was examined between two groups. The research results proved that there is a significant increase in gain in achievement, The EL has achieved efficiency greater than traditional learning in (Remembering, understanding, application) skills.

**Keywords:** control group, e-learning, experimental group, pre-test, post-test, students' achievement, t-test.

## I. INTRODUCTION

E-L is the use of Information and Communication Technology e.g. Internet, Computer, Mobile phone, Learning Management System (LMS), Televisions, Radios and others to enhance teaching and learning activities. E-learning is a unifying term used to describe the fields of online learning, web-based training and technology delivered instructions (Oye, Salleh, & lahad, 2010). EL has become an increasingly popular learning approach in higher educational institutions due to vast growth of internet technology. Nowadays E-learning has a competitive advantage and many universities have implemented it and this has impacts on students' performance or GPA. However, still there are other universities and academic institutions that use very low interactive E-learning which is not enough to contribute to the performance of the students. In contrary to that, other higher educational institutions use highly interactive E-learning which directly improves students' performance in general (Rodgers, 2008).

Today technology is a tool used to remove geographical barriers and facilitates everybody to learn anytime and anywhere without the presence of the lecturer. The main purpose of E-Learning is to increase accessibility of education and reducing costs and time as well as improving Students' academic performance. This approach of learning facilitates different students at different continents to attend the same classes almost at the same time. Nowadays, technology is becoming the medium for teaching and learning without being at university campuses. This technology enabled instructional method is aimed to improve quality of education and student academic performance. It has been found that students in higher educational institutions that engaged in E-Learning, generally performed better than those in face-to-face courses. (Holley, 2002) found that students who participate in online/ EL achieve better grades than students who studied traditional approach. As result of this finding EL is growing very fast and become popular and that is why many higher educational institutions are adopting to virtual learning system. E- Learning is widely used in many universities in the world today. In some universities, their EL does not add any value to the teaching and learning activities of the University and perhaps they do not investigate the impact of E-learning on student academic performance. Much research has not been done on the relationship of E-learning use and student academic performance. (EL) is the use of Information and Communication Technology e.g. Internet, Computer, Mobile phone, Learning Management System (LMS), Televisions, Radios and others to enhance teaching and learning activities. E-learning is a unifying term used to describe the fields of online learning, web-based training and technology delivered instructions (Oye, Salleh, & lahad, 2010). It is widely used in schools and other organizations all over the world, either to support classroom learning or on its own. The Yemen's public primary school (YPPS) is no exception. Usually, a special kind of Computer Aided education (CAE) content management system is used for running e- learning courses. These systems hold the fraction unit content and information of the students and also provide the interactive tools to support learning process. While using such systems makes the e- learning experience much easier, it also

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induces some problems like the heterogeneous previous knowledge of the students. In many cases, this can be an obstacle, especially in such courses, where the students are from different faculties, or in adult learning situations. This is also a problem in the regular classroom education, but even more so in e-learning, where the participants can be from all over the world. The attitude of students towards e-learning or learning content management systems is also an important factor in e-learning. There have not been any major surveys in the YPPS in that regard.

According to (Bonk and Reynolds, 1997), to encourage thinking on the e-learning, challenging activities that enable learners to link new information to old, and acquire meaningful knowledge must be created; hence, it is the instructional strategy and not the technology that influences the quality of learning. Kozma (2001) argues that the particular attributes of the computer are needed to bring real-life models and simulations to the learner; thus, the medium does influence learning. However, it is not the computer per se that makes students learn, but the design of the real-life models and simulations, and the students' interaction with those models and simulations. The computer is merely the vehicle that provides the processing capability and delivers the instruction to learners (Clark, 2001). In 1997 and after the yemen authority had been established, There is a need for e-learning with the advent of the Internet, and have seen this technology in recent years, a significant development with the evolution of the network itself, and made sure the world to benefit from the application of e-learning in the development of primary and secondary education alike, and provided different countries experiences distinct in this area deserve to be studied and analyzed to draw conclusions and then build on it in the development of an integrated system of e-learning in the Republic of Yemen, commensurate with the nature of Yemeni society and capabilities available, as there is an urgent need and rationale for the Republic of Yemen, and like other countries to introduce a system of e-learning, most notably :

- *Geographical Justifications:* Is the distances between the learners and educational institutions, and the presence of isolated areas and remote geographically, which leads to the difficulty of access to students of educational institutions of formal and informal to the rugged roads or lack thereof sometimes.
- *Social and Cultural Justifications :* Is the spread of education and increase the ability to absorb the social and cultural changes and technological developments, and the trend towards education and empowerment of women, and traditional literacy and informatics.

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- *Social And Cultural Justifications:* Is the spread of education and increase the ability to absorb the social and cultural changes and technological developments, and the trend towards education and empowerment of women, and traditional literacy and informatics.
- *Economic Rationales:* Is to provide educational services to the disadvantaged segments of the poor and others in the community, on the grounds that the e-learning system less expensive, and the possibility of teaching large numbers of students at a lower cost. Justifications for psychological and health : is that e-learning offers programs that take into account individual differences among learners, and remove the psychological barrier between the learner and the teacher, as well as met the aspirations of all individuals in the education and development of feelings of delivery capacity and contribute to the growth of self and community and continuous improvement. There is almost a consensus among educators and politicians all over the world that the gap tomorrow will be between rich and poor, but between the actors in the field of e-learning and among the recipients of this act, and like any system it relates to cultural heritage and institutional need of e-learning in our country to the time is short so settles determined constants, the application of e-learning Bmnzawmth integrated in the learning environment has become an urgent requirement dictated by the need for qualitative development required for the science content of the curriculum and the most appropriate method to be presented interactively take into account the many educational standards and technical, and perform my work to learning outcomes and educational - level scientific prepares students to enter into the realm of practical life worthily and effectively. Had turned our eyes to the experiences of countries in the field of e-learning, it can realize that there is an international trend towards e-learning due to its effectiveness in improving the educational process and flexibility of the obvious being that includes multimedia and super- enrichment activities, interactive, and provides the opportunity to achieve a partnership between the teacher and the students, parents, and society as a whole, and that this international trend vary justifications and images from country to country depending on the economic and social conditions and geographic each state,

and e-learning included all phases of basic education, secondary and university and others, and that the role and efforts in the field of e-learning is not shortened to official bodies, but also extended to community-based organizations and the private, but the field of supervision remains the official bodies, in addition to engaging in e-learning needs to infrastructure is the technical aspect associated with equipment, systems, software, networks, etc., and the human side goal of rehabilitation administrators, technicians, designers and specialists, and before that the training of teachers involved in the educational process in the the use of modern techniques, all of which must be in accordance with the successive stages of each phase is based on its predecessor, and according to the plans very carefully thought out. Yemen public primary school (YPPS) in capital sana'a, established to teach by e-learning in 20 school. This course (Normal Fractions). The course includes the following subjects: 1-Review Fraction, 2- Compare and order fractions, 3- Add fractions, 4-Sub fraction, 5- Multiply fraction, 6- Dividing fractions.

Instrumentation course in YPPS many times, and I have noticed the difficulty for students to achieve good scores and to be interactive in the classroom during the lectures. As an example, some students can't imagine how the fractions operation done, because the role of math changing for them like  $1/4+1/4$  they thinking the result is  $2/8$ , Add numerator to numerator and denominator to denominator, I tried to make imaging of fraction to them and show them how  $1/4+1/4 = 2/4$  not  $2/8$  do not Add denominator. For answering, to draw, to show animation. I am phd student in e-learning, I am programmer and teacher in Aden University, I make the program by use VB 6, and comtasia program (Video), I tried to solve the problem by used computer program to make learning is easy and fun, the computer-based learning to overcome these problems. All of them agree that e-learning using computer tools, internet and, interactive multimedia based on instructional computer will enhance the education process and increase the efficiency especially if designed under the control of the Instructional System Design theory.

## II. THE RESEARCH PROBLEM MAY BE DEFINED IN THE FOLLOWING QUESTIONADINGS

What is the effectiveness and usefulness of using e-learning approach in Fraction math course for students of level 5 in the Yemen's Public Primary school?

### a) *The Research Importance*

This study is an important contribution to the research of understanding how to use e-learning. School is using the computer more and more to deliver instruction, and instructors and courseware designers need to have valid information on what technologies are available and how to use them to improve student learning. Students of the "computer Generation" expect and demand high quality. Decisions to purchase e-learning and multimedia software by ministry of education can be justified through this research. Software companies would gain feedback about the usefulness of their products in an educational setting. The fraction course is one of the essential program requirements for fraction. Using e-learning approach to teach this course is the first attempt to engage the YPPS. The efficiency of the suggested program will be determined. The student's attitudes toward this technology will be studied. Student's feedback will be analyzed to determine future plans concerning this type of learning. YPPS technological facilities and educational development strategies may be changed according to the research results.

### b) *The Research Hypothesis*

- i. *There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement of experimental group and control in remembering skill .*
- ii. *There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement of experimental group and control in understanding skill .*
- iii. *There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement of experimental group and control in application skill .*

### c) *The Research Methodology*

The research was carried out using the experimental methodology in which the 30 student were treated as an experimental group and 30 students as control groups. This experimental group had studied the course of fraction instrumentation being programmed using e-learning, the control group had studied the course of fraction by traditional way.

## III. EXPERIMENTAL DESIGN

I have used a pretest for two group to determine if they equal in Achievement - posttest for same group to compare the Achievement. Experimental design. One experimental group and one control group with pretest-posttest. Test questions on pre- and post-tests were identical. Test answers were not revealed on the pre-test. The test questions were derived from a pool of questions bank designed by the researcher. After review of arbitrators teachers.

a) *Variables Calculations and Statistical Processing Research Importance*

After completing the experiment, I have collected the data to be analyzed used SPSS -18, program, two independent groups. The following relations were used in this research to measure the students' gain in achievement after studying fraction course using the e-learning approach and student studying by traditional way, to compare between them,

1. Effect size : How much change the independent variable will affect the students' achievement and attitudes in studying a new program. In this research I mean how much change the e- learning approach will affect the fraction students' achievement and attitudes in studying the fraction course. Statistically, t-value with degrees of freedom df.
2. Descriptive statistics .
3. t-test: The t-distribution is a bell-shaped, symmetric about the mean distribution, used when the sample size equal or less than 30 and the variance is normally or approximately normally distributed. It is actually a family of curves based on the concept of degrees of freedom, which is related to sample size (df = n-1). As the sample size increases, the t-distribution approaches the standard normal distribution .

IV. RESULTS

Use In order to apply parametric tests, the data was firstly investigated for normality distribution using Kolmogorov-Smirnov statistic. In Kolmogorov- Smirnov statistic, the data is assumed to be normal if the significance level is greater than (.05). As shown in table (1), the data was confirmed to be normally distributed. Therefore the t-test was used since the sample size is small (n=30, all the population) and the data was normally distributed.

a) *Two independent samples statistics of pretest 1: Remembering*

To check the equivalent between experimental group and control group in achievement (remembering skill) we make pretest exam, we collected the data and make processing of two independent samples t-test was run on the SPSS-18 program to determine the equivalent between experimental group and control group, the result are shown in the table (2). It is clear from this table and table (1) that the mean in the scores is (3.0667)and (3.2333). the computer t value equal (-0.504) at the degree of freedom equal (58) with statistical significant (0.616). this is greater than the claimed level of significance  $\alpha$  (0.05), therefore the two groups are equivalent in Achievement (Remembering) i.e. there is no significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (Remembering) pretest of two samples.

Table 1 : Descriptive Statistics for Achievement (Remembering) , pretest

Test	N	Mean	Std. deviation
Experimental	30	3.0667	1.38796
Control	30	3.2333	1.16511

Table 2 : Achievement (Remembering) independent two samples t-test , pretest

Achievement	T-value	df	P-value
Experimental	-0.504	58	0.616
Control			

b) *Two independent samples statistics of pretest 2: Understanding*

To check the equivalent between experimental group and control group in achievement (Understanding skill) we make pretest exam, we collected the data and make processing of two independent samples t-test was run on the SPSS-18 program to determine the equivalent between experimental group and control group, the result are shown in the table (4). It is clear from this table and table (3) that the mean in the scores is (3.2667) and (3.8000). the computer t value equal (-1.730) at the degree of freedom equal (58) with statistical significant (0.089). this is greater than the claimed level of significance  $\alpha$  (0.05), therefore the two groups are equivalent in Achievement (understanding) i.e. there is no significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (Understanding) pretest of two samples.

Table 3 : Descriptive Statistics for Achievement (Understanding), pretest

Test	N	Mean	Std. deviation
Experimental	30	3.2667	0.98027
Control	30	3.8000	1.37465

Table 4 : Achievement (Understanding) independent two samples t-test, pretest

Achievement	T-value	df	P-value
Experimental	-1.730	58	0.089
Control			

c) *Two independent samples statistics of pretest 3: Application*

To check the equivalent between experimental group and control group in achievement (application skill) we make pretest exam, we collected the data and make processing of two independent samples t-test was run on the SPSS-18 program to determine the equivalent between experimental group and control group, the result are shown in the table (6). It is clear from this table and table (5) that the mean in the scores is (3.3667) and (3.3000). The computer t value equal

(0.177) at the degree of freedom equal (58) with statistical significant (0.860). This is greater than the claimed level of significance  $\alpha$  (0.05), therefore the two groups are equivalent in Achievement (Application) i.e. there is no significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (application) pretest of two samples.

Table 5 : Descriptive Statistics for Achievement (Application), pretest

Test	N	Mean	Std. deviation
Experimental	30	3.3667	1.58623
Control	30	3.3000	1.31700

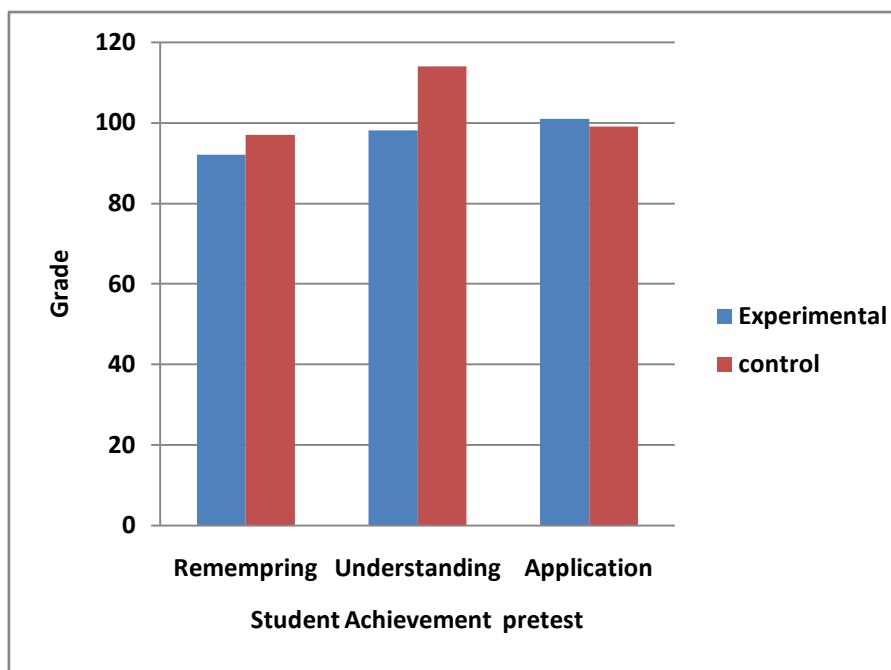


Figure 1 : Student Achievement Pretest

d) Two independent samples statistics of posttest 1: Remembering

To check the validity of the first hypothesis that stated (There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement of experimental group and control in remembering skill ), the two independent samples t-test was run on the SPSS-18 program to determine any significant differences between experimental group and control, the result are shown in the table (8). It is clear from this table and table (7) that the mean in the scores is (5.2667) and (4.2667). The computer t value equal (3.015) at the degree of freedom equal (57.899) with statistical significant (0.004). this is less than the claimed level of significance  $\alpha$  (0.05), therefore the hypothesis is Accepted and the alternative hypothesis is rejected i.e. there is significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (Remembering) posttest of two samples Favoring the experimental group.

Table 6 : Achievement (Application) independent two samples t-test, pretest

Achievement	T-value	df	P-value
Experimental	0.177	58	0.860
Control			

Table 7 : Descriptive Statistics for Achievement (Remembering), posttest.

Test	N	Mean	Std. deviation
Experimental	30	5.2667	1.58623
Control	30	4.2667	1.31700

Table 8 : Achievement (Remembering) independent two samples t-test, posttest.

Achievement	T-value	df	P-value
Experimental	3.015	57.899	0.004
Control			

e) Two independent samples statistics of posttest 2: Understanding

To check the validity of the first hypothesis that stated (There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement of experimental group and control in understanding skill ),

the two independent samples t-test was run on the SPSS-18 program to determine any significant differences between experimental group and control, the result are shown in the table (10). It is clear from this table and table (9) that the mean in the scores is (6.9000) and (5.3667). The computer t value equal (4.319) at the degree of freedom equal (55.293) with statistical significant (0.000). this is less than the claimed level of significance  $\alpha$  (0.05), therefore the hypothesis is Accepted and the alternative hypothesis is rejected i.e. there is significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (Understanding) posttest of two samples Favoring the experimental group.

*Table 9* : Descriptive Statistics for Achievement (Understanding), posttest

Test	N	Mean	Std. deviation
Experimental	30	6.9000	1.21343
Control	30	5.3667	1.51960

*Table 10* : Achievement (Understanding) independent two samples t-test, posttest

Achievement	T-value	df	P-value
Experimental	4.319	55.293	0.000
Control			

f) *Two independent samples statistics of posttest 3: Application*

To check the validity of the first hypothesis that stated (There are significant differences at level of  $\alpha$

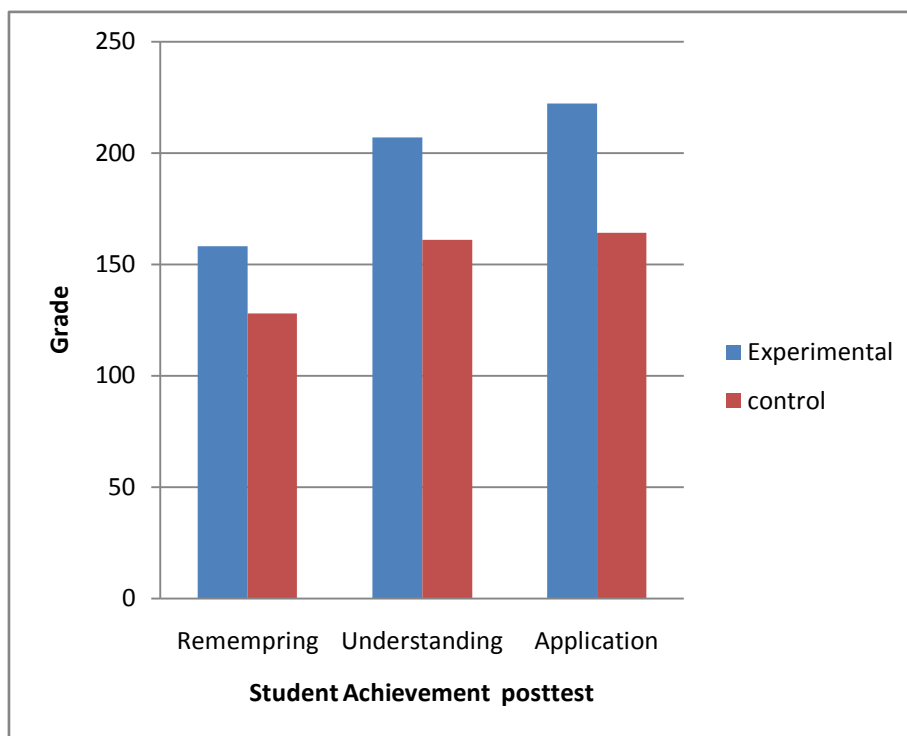
(0.05) between the mean scores of the achievement of experimental group and control in Application skill), the two independent samples t-test was run on the SPSS-18 program to determine any significant differences between experimental group and control, the result are shown in the table (12). It is clear from this table and table (11) that the mean in the scores is (7.4000) and (5.4667). The computer t value equal (4.709) at the degree of freedom equal (57.295) with statistical significant (0.000). This is less than the claimed level of significance  $\alpha$  (0.05), therefore the hypothesis is Accepted and the alternative hypothesis is rejected i.e. there is significant differences at level of  $\alpha$  (0.05) between the mean score of the Achievement (Application) posttest of two samples Favoring the experimental group.

*Table 11* : Descriptive Statistics for Achievement (Application), posttest

Test	N	Mean	Std. deviation
Experimental	30	7.4000	1.49943
Control	30	5.4667	1.67607

*Table 12* : Achievement (Application) independent two samples t-test, posttest

Achievement	T-value	df	P-value
Experimental	4.709	57.295	0.000
Control			



*Figure 2* : Student Achievement Posttest

## V. CONCLUSION

The goal of any learning activity is for learning to take place. A common way to measure the effectiveness of instruction is to measure learner achievement. When examining the descriptive data concerning the achievement pretest and posttest scores for experimental and control groups, it was found that there is an increase in the mean of experimental after the application of the EL of the course. Also, the standard deviation in the posttest of experimental group is reduced compared to the standard deviation in the posttest of control group which means less data variations and pointed out that the student's scores are around the mean. Therefore the first hypothesis stated that (There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement (Remembering) of posttest for experimental and control groups) was Accepted. The second hypothesis stated that (There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement (understanding) of posttest for experimental and control groups) was Accepted. The third hypothesis stated that (There are significant differences at level of  $\alpha$  (0.05) between the mean scores of the achievement (Application) of posttest for experimental and control groups) was accepted.

From this discussion, it is clear that EL approach has good efficiency in learning and improves the students' achievement and attitudes toward this new systematic way of learning using the new technology based on computer and multimedia tools.

## VI. ACKNOWLEDGEMENTS

After the results of the research have been lighted, the researcher would like to suggest the following points:

- Expansion in the computerization of mathematics curriculum because of its impact on student achievement.
- Work on the provision of computers in all schools with Data show.
- The need for training and rehabilitation of mathematics teachers in the use of computer.
- The need for a teacher who specializes in computer technician in addition to the computer lab in each school.
- Provide incentives and support for teachers who are doing the role of computers in the educational process.
- Hold contests on the level of the Republic of programming modules in Mathematics
- The e-learning approach should be used in our Schools,
- Execute practical sessions for students of all levels concerning use of LMS.

- Encourage instructors to practice the e-learning approach and use LMS.
- Establish an authoring unit for e-learning of different courses with different experts. acknowledgement section may be presented after the conclusion, if desired.

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