

Effectiveness of Multimedia Learning on Achievement in Biology

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Abstract

The traditional teaching strategies have failed to enhance problem-solving skills, curiosity, and critical and logical thinking among students. There for there is a need to move from traditional approaches to more innovative information and communications technologies (ICTs) enriched approaches for meaningful learning. In this study an attempt is made to explore the effectiveness of using multimedia tools in the teaching and learning process. The present study is experimental in nature having pre test post test parallel group design. The statistical technique like Mean, S.D. and the "t" test were used in the study. After analysis of the data it was found that student who learned biology concept through Digital games made significant achievement compared to the student who learned through conventional method.

Key words

Multimedia, Achievement.

Introduction

Man always strives for perfection because he is aware of his incompleteness. His desires for comfort and excellence gave birth to new inventions and innovations. Technology is one of the most prominent innovations that man has invented, which has permeated in every walk of life.

Over the last two decades with the advent of technology, tremendous changes and transformation has been witnessed in the world wide education sector. Use of technology in education sector began in 1967 with the establishment of National council for educational technology in Great Britain. In India it started in 1973 with the effort of NCERT. Since then steady growth in the field of educational technology can be seen. The recent campaign of digital India launched by prime minister Narendra Modis Government has also made significal impact on the education scenario of the country. As a result drastic rise in application of technology and multimedia learning tools in school across the nation can be seen. The variety of media such as text, graphics, audio, and video for delivering content has attracted many instructors and students to use the Internet for distance education (Ali, 2003)

The traditional teaching strategies have failed to enhance problem-solving skills, curiosity, and critical and logical thinking among students. There for there is a need to move from traditional approaches to more innovative information and communications technologies (ICTs) enriched approaches for meaningful learning. The multimedia aided teaching is more effective than the traditional one. Mojtaba Rezaei Rad (2013),Cubriolo,et.al.(2014). Multimedia method of learning is effective in terms of achievement and retention in comparing with conventional method of learning. Pratibha Sharma (2013) The present study an attempt is made to explore the effectiveness of using multimedia tools in the teaching and learning process.

STATEMENT OF AIM: "To study the Effectiveness of Multimedia Based learning on students Achievement in Biology".

Objectives of The Study

- 1) To study the significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology through multimedia based learning instruction.
- 2) To study the significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology through conventional method.
- 3) To study the significance difference between pretest, posttest and delayed test achievement of VIII standard boy students studying biology through multimedia based learning instruction.
- 4) To study the significance difference between pretest, posttest and delayed test achievement of VIII standard girl students studying biology through multimedia based learning instruction.
- 5) To study the significant difference between boy and girl students of VIII standard studying biology with respect to pretest, posttest and delayed test achievement in multimedia based learning instruction.

Hypothesis of The Study

- There is no significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology in multimedia based learning group.
- There is no significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology in control group.
- There is no significance difference between pretest, posttest and delayed test achievement of VIII standard boy students studying biology in multimedia based learning group.
- There is no significance difference between pretest, posttest and delayed test achievement of VIII standard girl students studying biology in multimedia based learning group.
- There is no significant difference between boy and girl students of VIII standard studying Biology with respect to pretest, posttest and delayed test achievement in multimedia based learning group.

Variables of The Study

Dependent Variable: Achievement in Biology.
Independent variable: Multimedia based learning approach.
Moderate variable: Gender

The Sample

VIII standard students of secondary level were considered as the population of the study. As it is an experimental study. It was difficult to collect data from a large sample. Therefore only one private unaided English medium school of Karnataka following the state curriculum was selected for the conduct of experiment. The two division of VIII Std containing 30 students in each division were taken as sample of the study. After identification of the sample R.P.M Test of intelligence was administered on the selected sample. Based on the scores two identical groups has been identified namely experimental group and the control group containing 30 students in each.

Collection of Data

The investigator collected data's through administering pre achievement test before the treatment and post achievement test immediate after the teaching. To know the acquired retention delayed test was administered after a gap of 15 days to both groups respectively.

TOOL USED:

- a) Achievement test constructed by the investigator.
- b) R.P.M. test of intelligence

Statistical Technique Used

The data was quantified according to the variables involved in the study. The analysis was carried out on the basis of formulated objectives and hypothesis by using suitable statistical techniques like, Mean, SD and "t" test.

Analysis of The Data

Hypothesis 1: There is no significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology in multimedia based learning group. To achieve this hypothesis, the paired t test was applied and the results are presented in the following table.

Table 1: Results of t test between pretest, posttest and delayed test achievement of VIII standard students studying biology in multimedia based learning group

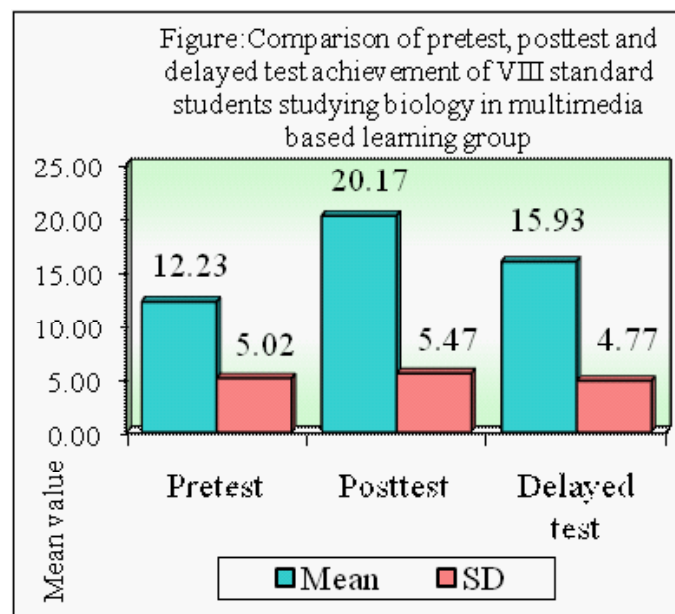
Achievement	Mean	SD	Mean Diff.	SD Diff.	Paired t	p-value	Signi.
Pretest	12.23	5.02	-7.93	3.53	-12.3010	0.0001	<0.05, S
Posttest	20.17	5.47					
Pretest	12.23	5.02	-3.70	1.99	-10.2079	0.0001	<0.05, S
Delayed test	15.93	4.77					
Posttest	20.17	5.47	4.23	2.71	8.5483	0.0001	<0.05, S
Delayed test	15.93	4.77					

From the results of the above table, it can be seen that, A significant difference was observed between pretest and posttest achievement of VIII standard students studying biology in multimedia based learning group ($t=-12.3010$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of students are significantly higher as compared to pretest scores of achievement

of VIII standard students studying biology in multimedia based learning group.

A significant difference was observed between pretest and delayed test achievement of VIII standard students studying biology in multimedia based learning group ($t=-10.2079$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the delayed test scores of achievement of students are significantly higher as compared to pretest scores of achievement of VIII standard students studying biology in multimedia based learning group.

A significant difference was observed between posttest and delayed test achievement of VIII standard students studying biology in multimedia based learning group ($t=8.5483$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of students are significantly higher as compared to delayed test scores of achievement of VIII standard students studying biology in multimedia based learning group. The mean and SD scores of pretest, posttest and delayed achievement of VIII standard students studying biology in multimedia based learning group are also presented in the following figure.



Hypothesis 2: There is no significance difference between pretest, posttest and delayed test achievement of VIII standard students studying biology in control group. To achieve this hypothesis, the paired t test was applied and the results are presented in the following table.

Table 2: Results of t test between pretest, posttest and delayed test achievement of VIII standard students studying biology in control group.

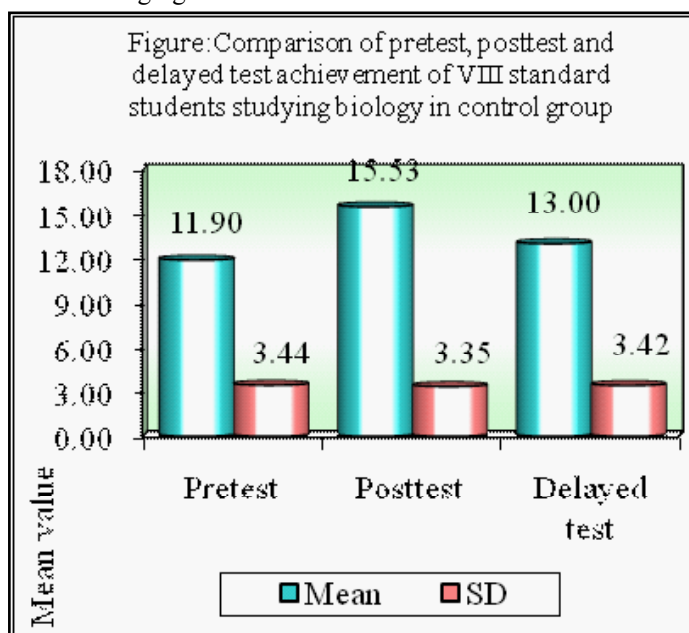
Achievement	Mean	SD	Mean Diff.	SD Diff.	Paired t	p-value	Signi.
Pretest	11.90	3.44	-3.63	2.06	-9.6643	0.0001	<0.05, S
Posttest	15.53	3.35					
Pretest	11.90	3.44	-1.10	0.96	-6.2791	0.0001	<0.05, S
Delayed test	13.00	3.42					
Posttest	15.53	3.35	2.53	1.61	8.6015	0.0001	<0.05, S
Delayed test	13.00	3.42					

From the results of the above table, it can be seen that, A significant difference was observed between pretest and posttest

achievement of VIII standard students studying biology in control group ($t=-9.6643, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of students are significantly higher as compared to pretest scores of achievement of VIII standard students studying biology in control group.

A significant difference was observed between pretest and delayed test achievement of VIII standard students studying biology in control group ($t=-6.2791, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the delayed test scores of achievement of students are significantly higher as compared to pretest scores of achievement of VIII standard students studying biology in control group.

A significant difference was observed between posttest and delayed test achievement of VIII standard students studying biology in control group ($t=8.6015, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of students are significantly higher as compared to delayed test scores of achievement of VIII standard students studying biology in control group. The mean and SD scores of pretest, posttest and delayed achievement of VIII standard students studying biology in control group are also presented in the following figure.



Hypothesis 3: There is no significance difference between pretest, posttest and delayed test achievement of VIII standard boy students studying biology in multimedia based learning group.

To achieve this hypothesis, the paired t test was applied and the results are presented in the following table.

Table 3: Results of t test between pretest, posttest and delayed test achievement of VIII standard boy students studying biology in multimedia based learning group

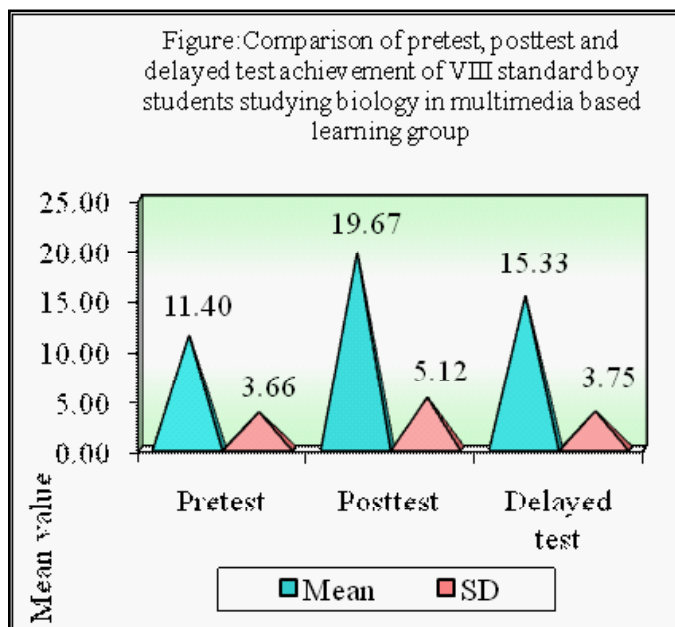
Achievement	Mean	SD	Mean Diff.	SD Diff.	Paired t	p-value	Signi.
Pretest	11.40	3.66	-8.27	3.92	-8.1712	0.0001	<0.05, S
Posttest	19.67	5.12					
Pretest	11.40	3.66	-3.93	2.34	-6.4985	0.0001	<0.05, S
Delayed test	15.33	3.75					

Posttest	19.67	5.12	4.33	3.18	5.2821	0.0001	<0.05, S
Delayed test	15.33	3.75					

From the results of the above table, it can be seen that, A significant difference was observed between pretest and posttest achievement of VIII standard boy students studying biology in multimedia based learning group ($t=-8.1712, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of boy students are significantly higher as compared to pretest scores of achievement of VIII standard boy students studying biology in multimedia based learning group.

A significant difference was observed between pretest and delayed test achievement of VIII standard boy students studying biology in multimedia based learning group ($t=-6.4985, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the delayed test scores of achievement of boy students are significantly higher as compared to pretest scores of achievement of VIII standard boy students studying biology in multimedia based learning group.

A significant difference was observed between posttest and delayed test achievement of VIII standard boy students studying biology in multimedia based learning group ($t=5.2821, p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of boy students are significantly higher as compared to delayed test scores of achievement of VIII standard boy students studying biology in multimedia based learning group. The mean and SD scores of pretest, posttest and delayed achievement of VIII standard boy students studying biology in multimedia based learning group are also presented in the following figure



Hypothesis 4: There is no significance difference between pretest, posttest and delayed test achievement of VIII standard girl students studying biology in multimedia based learning group.

To achieve this hypothesis, the paired t test was applied and the results are presented in the following table.

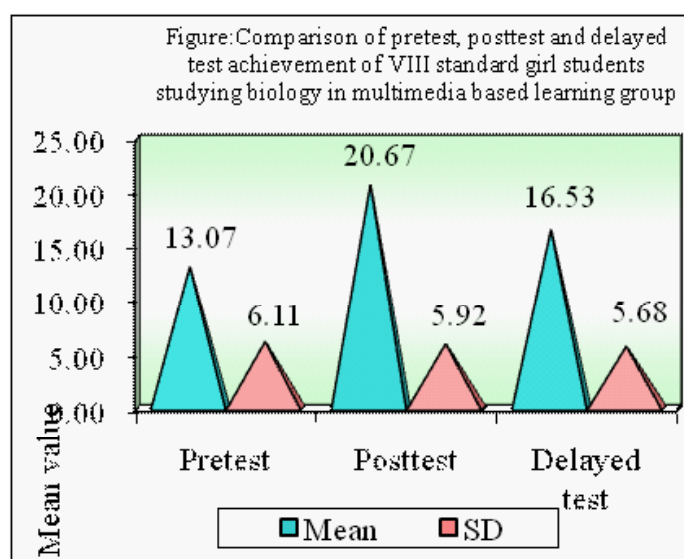
Table 4 : Results of t test between pretest, posttest and delayed test achievement of VIII standard girl students studying biology in multimedia based learning group

Achievement	Mean	SD	Mean Diff.	SD Diff.	Paired t	p-value	Signi.
Pretest	13.07	6.11	-7.60	3.20	-9.1906	0.0001	<0.05, S
Posttest	20.67	5.92					
Pretest	13.07	6.11	-3.47	1.60	-8.4040	0.0001	<0.05, S
Delayed test	16.53	5.68					
Posttest	20.67	5.92	4.13	2.26	7.0721	0.0001	<0.05, S
Delayed test	16.53	5.68					

From the results of the above table, it can be seen that, A significant difference was observed between pretest and posttest achievement of VIII standard girl students studying biology in multimedia based learning group ($t=-9.1906$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of girl students are significantly higher as compared to pretest scores of achievement of VIII standard girl students studying biology in multimedia based learning group.

A significant difference was observed between pretest and delayed test achievement of VIII standard girl students studying biology in multimedia based learning group ($t=-8.4040$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the delayed test scores of achievement of girl students are significantly higher as compared to pretest scores of achievement of VIII standard girl students studying biology in multimedia based learning group.

A significant difference was observed between posttest and delayed test achievement of VIII standard girl students studying biology in multimedia based learning group ($t=7.0721$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected. It means that, the posttest scores of achievement of girl students are significantly higher as compared to delayed test scores of achievement of VIII standard girl students studying biology in multimedia based learning group. The mean and SD scores of pretest, posttest and delayed achievement of VIII standard girl students studying biology in multimedia based learning group are also presented in the following figure



Hypothesis 5: There is no significant difference between boy and girl students of VIII standard studying biology with respect to pretest, posttest and delayed test achievement in multimedia

based learning group

To achieve this hypothesis, the unpaired t test was applied and the results are presented in the following table.

Table 5: Results of t test between boy and girl students of VIII standard studying biology with respect to pretest, posttest and delayed test achievement in multimedia based learning group

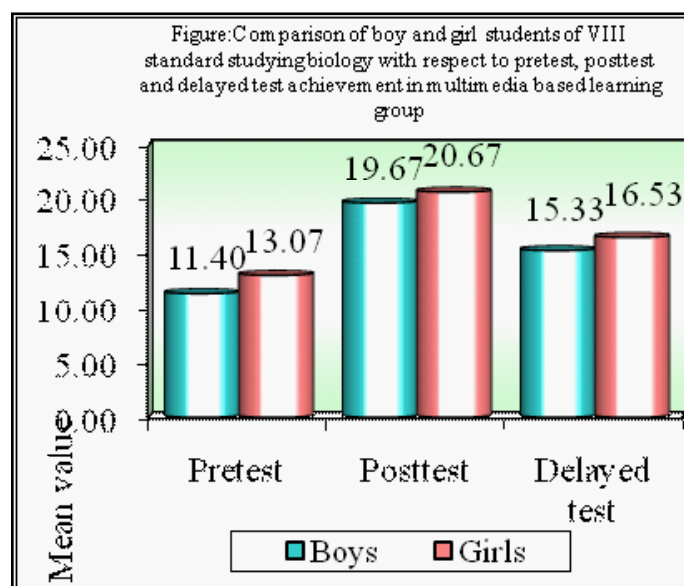
Achievement	Sex	n	Mean	SD	t-value	P-value	Signi.
Pretest	Boys	15	11.40	3.66	-0.9061	0.3726	>0.05, NS
	Girls	15	13.07	6.11			
Posttest	Boys	15	19.67	5.12	-0.4945	0.6248	>0.05, NS
	Girls	15	20.67	5.92			
Delayed test	Boys	15	15.33	3.75	-0.6826	0.5005	>0.05, NS
	Girls	15	16.53	5.68			

From the results of the above table, it can be seen that,

A non-significant difference was observed between boy and girl students of VIII standard studying biology with respect to pretest achievement in multimedia based learning group ($t=-0.9061$, $p>0.05$) at 5% level of significance. Hence, the null hypothesis is not rejected. It means that, the boy and girl students of VIII standard studying biology have similar pretest achievement in multimedia based learning group.

A non-significant difference was observed between boy and girl students of VIII standard studying biology with respect to posttest achievement in multimedia based learning group ($t=-0.4945$, $p>0.05$) at 5% level of significance. Hence, the null hypothesis is not rejected. It means that, the boy and girl students of VIII standard studying biology have similar posttest achievement in multimedia based learning group.

A non-significant difference was observed between boy and girl students of VIII standard studying biology with respect to delayed test achievement in multimedia based learning group ($t=-0.6826$, $p>0.05$) at 5% level of significance. Hence, the null hypothesis is not rejected. It means that, the boy and girl students of VIII standard studying biology have similar delayed test achievement in multimedia based learning group. The mean and SD scores of pretest posttest and delayed tests achievement of VIII standard boy and girl students studying biology in multimedia based learning group are also presented in the following figure.



MAJOR FINDINGS OF THE STUDY: The following are the major findings of the study

- There is significant difference (“t”value-12.3010) between the pre and post test achievement of VIII standard student studying biology in Multimedia based learning which means that students could achieve more in biology after teaching through Multimedia method.
- There is significant difference (“t”value-9.6643) between mean achievement in post and pre test score of VIII standard students studying biology through conventional method. Which means that student of control group could achieve more even after conventional method of teaching.
- There is significant difference between post test and delayed test achievement of experimental group (“t”value 8.5483) and control group (“t”value8.6015) which means that gain retention is more among the student who have learned concept through Multimedia method then the students who learned through conventional method.
- There is significant difference (“t”value-8.1712) between the pre and post test achievement of VIII standard boys studying biology through Multimedia method. This means that boys could achieve more in biology after teaching through multimedia method.
- There is significant difference (“t”value-9.1906) between the pre and post test achievement of VIII standard girl students studying biology through Multimedia method. This means that girls could achieve more in biology after teaching through multimedia method of learning.
- It was found that there is no significant difference (“t”value-0.4945) between boy and girl student of VIII standard studying biology with respect to post test achievement. This means that boy and girl students are equally competent to learn biological concept through Multimedia method of learning.
- There was no significant difference (“t”value-0.6826) between boy and girl students of VIII standard studying biology with respect to delayed test achievement. This means that, the boy and girl students of VIII standard studying biology have similar delayed test achievement in multimedia based learning group.

Educational Implication of The Study

- From the study it was found that Multimedia approach of teaching is more effective than the traditional method. Hence such method of teaching learning process to enhance the learning.
- The study revealed that multimedia method of instruction promotes good learning and allows student to involve in the learning process rather than the passive listener.
- The multimedia learning materials like interactive video, animations and graphics strengthen the learned concept by which creative expression and confidence of the students can be encouraged.
- Multimedia method of instruction helps in developing 21st century skills.
- It was observed from the study that, the gain retention in multimedia method of instruction is more compared to traditional method. Hence concept learned through multimedia can be retain for longer time.
- The present study helps to assess and compare the achievement among boys and girls students of VIII standard Biology

learning through Multimedia and traditional method.

Conclusion

The present study is experimental in design with pre test post test parallel group design. The researcher undertook the study to determine the effect of Multimedia based learning on student’s achievement. The result of the study reveals that Multimedia mediated learning Method is more effective than the conventional Method of teaching. It has also been seen from the study that boys and girls equally competent in terms of achievement and retention if they are made to learn through the use of Multimedia. This method of teaching helps individual to learn in keeping with one’s own pace.

References

- [1]. Patel (2013) “Use of Multimedia Technology in Teaching and Learning communication skill”: An Analysis” *International Journal of Advancements in Research & Technology, Volume 2, Issue 7, 116* ISSN 2278-7763.
- [2]. Rad (2013) “The effect of educational software on achievement motivation, self concept and educational achievement of girl students in Arabic course.” *Universal Journal of Education and General Studies (ISSN: 2277-0984) Vol. 2(5) pp. 180-183*
- [3]. Sara Aloraini (2012) “The impact of using multimedia on students academic achievement in the College of Education at King Saud University”. *Journal of King Saud University – Languages and Translation (2012) 24, 75–82*
- [4]. Ogochukwu (2010) “Enhancing students interest in mathematics via multimedia presentation” *African Journal of Mathematics and Computer Science Research Vol. 3(7), pp. 107-113, July 2010*
- [5]. Sedimo (2006) *Bringing Teaching To Life: Using Multimedia To Engage And Empower Students*” *Proceedings of the EDU-COM 2006 International Conference. Engagement and Empowerment: New Opportunities for Growth in Higher Education, Edith Cowan University, Perth Western Australia, 22-24 November 2006*
- [6]. Ali, A. (2003). *Instructional design and online instruction: Practices and perception. Tech Trends, 47 (5), 42-45.*