Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.4, No.8, 2013
www.iiste.org

The Effect of Laboratory Experiments on the Upper Basic Stage Students Achievement in physics.

Ensaf George Salameh El-Rabadi
Assistant professor
Ajlun university College, Al- Balqa Applied University
Email:dr.ensafarabdi@yahoo.com
Mail : Aljlun University College / Ajlun/ Jordan/ Postal code: 26810

Abstract

This study investigates the effect of laboratory experiments on grade ten students' achievement in physics. It answers the question: Is there any effect on the tenth grade students(male and females discretely) achievement that can be attributed to laboratory experiment? The sample of the study consisted of 130 Jordanian students. The experimental group students were taught physics in conjunction with laboratory experiments for forty five days. A thirty multiple choice item achievement test was designed to measure the students achievement .The study showed that the experimental group students achievement was higher than that of the control group students. The researcher recommends that(1) it is necessary to use the laboratory experiments in teaching science ,in general, and physics in particular, (2) the teaching schedule should include weekly classes for laboratory experiments in science, because this greatly enhances the student achievement in such topics .(3) Further similar studies involving different school stages and science branches like biology, chemistry and geology should be carried out.

Key words: lab experiments , students achievement . science , physics , science teaching

1.Introduction:

This century is witnessing rapidly changing developments in information ,science and technology in all walks of life. To cope with these developments , we have to adopt proper teaching methods for applied subjects requiring laboratory scientific experiments . This perspective should be firmly established in the minds of curriculum designers and educational decision-makers , especially when they design , develop the curricula, and consider activities and experiments related to the teaching material . Some educationists believe that science topics cannot be effectively taught without experiments .Therefore, modern educational trends in education emphasize laboratory activities and experiments , because the laboratory is physically associated to science topics that entail practical laboratory experiments ,on the one hand, and the accomplishment of the objectives of science teaching ,on the other(El-Qumeizi , 2002). Recent years have witnessed numerous discoveries and inventions through experimentation, which is a vital element of science basics. Experimentation can work effectively only through utilizing the laboratory in the teaching process(Zaytoun, 1996).

The American Chem. Study Project emphasized the laboratory work in teaching chemistry . Likewise, the British Na Field project showed great interest in using laboratory experiments in teaching physics and chemistry to develop the students manual skills.

Designing experimental activities can enhance the students' knowledge through certain processes such as analysis, synthesis , demonstration and prediction .

Science teaching has the following objectives to achieve:

1. Acquiring the proper functional information.
2. Developing the students' scientific thinking and problem-solving abilities
3. Fostering student proper functional attitudes .
4. Developing certain functional scientific skills.
5. Fostering functional scientific trends.
6. Fostering appreciation scientific attitudes and enhancing recognition of scholars efforts(Salameh, 2007).

These objectives cannot be properly attained without effective use of the science laboratory and experimentation. This attainment can be realized through the teachers readiness to effectively use the laboratory in teaching science. But , failure to achieve the objectives of science teaching in the upper basic stage is mainly due to the fact that lots of teachers evade laboratory work and science activities though they can easily use the school laboratory (Zaytoun, 1987).

Physics investigates the natural phenomena; it is both a theoretical and an empirical science that can be applied in different fields of life. Therefore ,specialists in physics believe that it is necessary to develop the teaching methods with a variety of teaching strategies to make use of the attained knowledge in the real world. This enables the coming generations to benefit from the diverse fields of knowledge enhancing thinking(Nasser , 2005).

There are other general objectives of teaching physics such as enhancing the student's ability to theorize , design scientific experiments, test hypotheses , present and explain data .It also aims to develop the student's practical skills: using the physical devices, taking measurements, installing electric circuits , monitoring results , preparing tables and charts besides enhancing right decision-making, especially the decisions pertaining to hypothesis testing and conducting physical experiments.

General strategies can be adopted in teaching physics such as presentation of the topics to demonstrate the laboratory significant role and its effect on the development of scientific knowledge . Moreover, the students should be encouraged to read relevant scientific material. It is noticed that in the tenth grade newly modified physics textbooks, the material is presented as one package accompanied by laboratory activities , observations and experiments. (Ministry of Education Guide, 2005).

Thus, the laboratory plays a major role in realizing the intellectual , the emotional and the psychomotor objectives of science teaching. Therefore, teachers ,in general , and the science teachers ,in particular, have been given more significance since 1987 when the First Educational Development Convention was held in Amman. The convention emphasized the role of the laboratory in the teaching process and investigated the causes of teachers unwillingness to use the empirical methodology in science teaching. It has become clear that the leading reason for this abstention is the teacher's unawareness of the significance of the scientific function of the laboratory and its role in knowledge development and problem solving. The convention emphasized the necessity of boosting the school laboratory role in the educational process. Therefore, the Ministry of Education in Jordan had prepared the pertaining plans and curricula for this purpose . As a result, the syllabus has been enriched with laboratory activities entailing the implementation of the empirical methodology in the educational process(Ministry of Education, 1988).

The researcher noticed , during field monitoring and school visits, that teachers try to evade the laboratory work considering it a waste of time; they don't appreciate the significance of the laboratory experiments nor do they include them the final tests. Therefore, teachers overlook the laboratory work. For this reason , the researcher highlights , in this study, the effect of the laboratory work on the tenth grade students achievement in physics , hoping that the findings would take part in an effective realization of the school laboratory role in the teaching process, The study go with the objectives of the Ministry of Education plan to develop science education ti enable the students to cope with the accelerating developments in science and information technology.

2.The Study Components:

The problem of the study is limited to the main question : What is the effect of using laboratory experiments on grade- 10 students achievement in physics?

2.1. Questions of the Study:

The following questions represent the components of the study:

1.Is there any effect on the tenth grade students' achievement in physics due to laboratory experiments ?
2.Is there a significant difference in students' achievement that can be attributed to gender interaction with the experimental method, or the traditional one?

2.2. The Study Hypotheses:

The study tests the following hypotheses:

1. There are no significant differences at α=0.05 in the means cores of grade ten students achievement in physics that can be attributed to the experiment aided method and the traditional one.
2. There are no significant differences at α=0.05 in the means scores of grade ten students' achievement in physics that can be attributed to the student gender.

2.3. Significance of the Study:

The importance of this study stems from the fact that it handles a major facet of the teaching-learning process; it investigates the practical aspect of teaching science as a method boosting the students' skills and capabilities .This method goes with the objectives of the Ministry of Education plan to develop education so that students can cope with the accelerating developments in science and information technology . Moreover , the study derives its significance from the importance of the laboratory work in teaching science , in general, and physics in particular. Recognition of the laboratory effect on teaching physics concepts is one of the factors that enhance the physics teaching methodology. It provides the educational decision-makers with a clear-cut image

of the efficacy of the laboratory work in the students' attainment of physics concepts.

2.3. Operational Definitions**:**

1. Laboratory Experiment: a set of procedures carried out by the students using the laboratory equipment and material besides data recording to obtain information under the supervision of the teacher of the subject.
2. The Traditional Teaching Method: the method adopted by the teacher in teaching physics like lecturing and theoretical instruction.
3. Achievement: the grade the student gets on the achievement test developed by the researcher.

2.4. Limitations of the Study**:**

- The study involves a sample of grade ten students in the governmental schools in Ajlun Governorate in the scholastic year 2012-2013.
- The study handles static electricity only.

2 5. Rationale of the Study:

Due to the accelerated inventions and scientific discoveries ,recent years have witnessed , numerous changes and transformations in most of the educational facets took place. The main cause of such new developments has been the focus on the empirical facets and observation as sound bases for the knowledge expansion. Therefore, the school laboratory has become a necessary venue for implementing the experimental dimension which has become an indispensable element in teaching science since the introduction of the new science curriculum abounding with tremendous experiments and practical activities that emphasize the student role as the essential element in the teaching-learning process. The students can discover facts , recognize concepts , deduce theories and recognize laws by themselves through laboratory experiments. Therefore this study attempts to highlight the significance of using experiments in the school laboratory in teaching science. Teachers should be aware of the laboratory function in school . and what this study is designed to do. The teacher with positive attitude to work laboratory is more competent in advising the students and guiding them to carry out the laboratory work successfully . He can foster self- confidence in his students so that they are able to carry out laboratory activities and handle real world problems or future challenges , too

2.6. Objectives of Laboratory Work:

The objectives of the laboratory work are:

- Familiarizing the students with the operation of laboratory equipment .
- Training the students on laboratory safety .
- Fostering the students social attitudes.
- Providing the students with skills of obtaining, classifying ,tabulating data and coming up with results.
- Training the students on the scientific method, discovery and investigation.
- Integrating the theoretical with practical knowledge.
- Enhancing the students understanding of the scientific concepts .
- Developing the mental skills like observation, interpretation , prediction etc.
- Enhancing the laboratory practical skills like tools handling, cleaning and device installing .
- Developing the students' creativity and innovations

2.7. Reasons for Using the Laboratory (Ministry of Education 1996):

- Abstract and complicated concept cannot be absorbed without laboratory treatment.
- The laboratory facilitates participation in search and investigation.
- The laboratory helps the development of certain abilities like problem-solving.
- The laboratory has a significant role in the development of the student's manual skills.
- The laboratory fosters scientific attitudes like academic integrity and objectivity.
- The laboratory enhances the student's expediency of studying science(Omari, 2001).

Howeidi, (2005) presents significant tips for conducting laboratory experiments:

- simple tools should be used .
- Students should not be told about the result in advance; they should be urged to thing of the results and discover them.
- The students should take part in the experiment plan.
- No generalization should be made, but the results should be verified.
- The students should be given the chance to originate new experiments.
- The experiment objective should be written on the chalkboard.

3.Review of Related Literature:

There are several studies about the effects of the laboratory experiments on students' achievement.

Conrad (1983) states that the laboratory work positively affects students scientific attitudes, thought and mental faculties. Students who use scientific thinking strategies and laboratory skills achieved higher than those who are taught by the traditional method.

Harty and Al- Faleh (1983) conducted a study about the effect of lecture- presentation method and the small groups experiments on the Saudi secondary school students' achievement in chemistry and their attitudes to science. The study involved a sample of seventy-four secondary students in Riyadh , the capital of Saudi Arabia. They were divided into a control group ,taught by lecture- presentation method, and an experimental group, taught by the small group experiments. The study showed that there were statistically significant differences between the achievements of both groups ; the experimental group scored higher than the control group. .

Aql (1988) proposes that the school laboratory has a significant role in accomplishing the cognitional, emotional and psychomotor objectives . To carry out laboratory experiments, the teachers must have the readiness and positive attitude toward laboratory work, and should be able guide the students and advise them so that they can carry the work successfully,

El-Safy (1988) conducted a study involving (140) students of the third intermediate grade , divided equally into control and experimental groups. The study investigated the effect of the presentation method versus the experimental method on the students' achievement in chemistry .As the experimental group scored higher than the control group , the study indicated that there were statistically significant differences between the achievements of both groups.

Kok and Brian(1993) in their study compared knowledge cognition and the learning outcomes of the preparatory stage students , who studied science through laboratory investigations , and the students who were taught by the traditional teaching method in the capital city of Singapore. The study showed that there were significant differences in the mean scores of the students who studied science through experiments and those who studied through the traditional method. The students taught by using the laboratory experimental method scored higher than the students taught by the traditional method.

Zaytoun (1996) emphasized the necessity of introducing laboratory experiments in the science curriculum to help achievement of the objectives of teaching science. According to Obeidi and al-Any (1996) , the school laboratory has become an essential component of the education process and science teaching throughout the school stages.

Hussein(2001) also investigated the effect of laboratory experiments on the send grade secondary students' achievement in chemistry in Abyan Governorate in Yemen .The sample of study consisted of 126 students divided into an experimental groups and a control group. The study showed the experimental group students scored higher than the control group students, due to the positive effect of laboratory experiments on the students achievement.

Salameh, (2002) pointed out that planning for the practical lesson is important because it stimulates the students interest . He also emphasized that the teacher should discuss with students the lesson instructions .He should move around in the laboratory to monitor the students work and answer their questions.

El-Shemaly (2006) studied the laboratory effect on the tenth grade students achievement of physics concepts. The sample of the study consisted of 96 students divided equally into an experimental group and a control one. The study showed that there were statistically significant differences in the mean scores of both groups. The students of the experimental group scored significantly higher than those of the control group, but there were no significant differences at α=0.05 that could be attributed to the student gender in both the control and the experimental groups.

The above studies show that laboratory work has a positive effect on the students achievement . They recommend utilizing the laboratory in teaching science . However ,these studies had been concerned with general science topics rather than a specific topic like physics. Therefore, this study is a complementary work to the previous studies ; it focuses on the effect of laboratory work on student achievement in physics , in particular. In addition, it investigates the relationship between the student's gender interaction with the teaching method and achievement of physics concepts.

4.The Method and Procedure:

4.1.Members of the Study:

The sample of the study consisted of 130 students in Kufrenjeh in Ajlun Governorate in Jordan. There were sixty-four male secondary school students : 32 for the control group , randomly chosen, and 32 for the experimental group. While the female students sample consisted of sixty-six students from Kufrenjeh

Secondary school for girls: 33- for the control group, randomly chosen and 33 for the experimental one. *See *(Table 1)*

The teachers were purposefully chosen for their readiness to take part in the study and their similar teaching experience , between 14 and 16 years. There were BA graduates of Yarmouk University (Jordan).

4.2.Instruments of the Study:

Two instruments were used in this study: the teaching plans and the achievement test:

1.The teaching plans : Two daily lesson teaching plans were prepared according the lesson content about the static electricity in physics . One plan represented the traditional method of teaching while the second was for the laboratory experimental method The plans were based on the theoretical literature and past studies pertaining to the laboratory experiments .

2. The Physics Achievement Test: The test measures the students achievement in static electricity . The initial structure of the test consisted of thirty-five multiple choice items , but its final form consisted of thirty multiple choice items. The test was prepared according to the following steps:

- Identifying the content of the static electricity unit in grade-ten physics text book for the year 2012-2013.
- Formulating the objectives of the content according Bloom's Taxonomy for educational objectives (recalling, understanding, application, analysis) to be measured by achievement test.
- A specification table was prepared ; it includes the components and distribution of the objectives levels as shown in table-2.
- The test validity was verified by a group of professional referees, who were members of the teaching staff at al-Balqa Applied University Colleges, educational supervisors and physics teachers. They checked the validity of the test items on the static electricity unit besides the language correctness and the suitability for the students thinking levels according to Bloom's taxonomy. In light of the referees observations and recommendations, five items were dropped and the final version of the test consisted of thirty items.
- The reliably of the test was also verified by pioneering study involving an external sample . The(K.R-20) reliability correlation coefficient of the test was(0.89), an acceptable indicator of the test reliability.
- The item difficulty discrimination index was calculated and item difficulty range was (40% - 80%) while the discrimination index was (0.41- 0.80)
- *see(Table -3
- The time of the test was one hour ,as the time the pre- test took.

4.3.The pioneering Study

Before administering the study test , the researcher ensured the equity between the members of the control group and the experimental groups by calculating the score means and the standard deviations of the pre-test which was administered to the pioneering study sample.

The mean scores of the two groups were almost identical : the experimental mean score was (3.060) where as it was (2.990) for the control group. The make certain that there was no difference , t-test was used and it turned out that t-value was (0.115) at significance level of (0.905), which is statistically insignificant at $\alpha < 0.05$.The males mean scores for the experimental group was (3.1) and(3.00) for the control group. To verify this difference the t- test was used ,and the t-value was (0.117) with a (0.907) significance level, which is statistically insignificant at $\alpha < 0.05$.This means that the three cases in post-test are equal.

*see(Table-4)

4.4 Procedure of the Study

The procedure of the study can be summarized in the following steps:

1. Preparing lesson plans (the traditional method , the experimental method).
2. Identifying the members of the study.
3. Preparing the achievement test according a table of specifications , then ensuring the validity and reliability of the test and calculating the difficulty and discrimination index of the items coefficients.
4. Conducting pioneering study involving a sample of 25 members of the population of the study to ensure the clarity of its items ,instructions and determining the time needed for answering the test.
5. Showing the teachers how carry out laboratory experiments .
6. The test was conducted in the third part of the second semester of the scholastic year 2012- 2013 after

the trial period of the test which took a month and a half.

7. Correcting the achievement test and recording the two groups answers to every item according to a key answer specially prepared for the test in order to analyze and compare their performance .

4.5. The Study Design

The semi-trial design was adopted for the study in order to identify the effect laboratory experiments on the students achievement. The variables of the study were:

The independent variable: Teaching by laboratory experiments

The dependent variable: the student's achievement

4.6. Statistical Analysis:

The mean scores , the standard deviations of the students scores in the pre-test and the post test were used .The researcher used the t-test to compare the differences between the achievement of the experimental and the control groups in pre-test and the post test.

5.Conclusion:

5.1.Results of the Study:

Following are the results of the study:

The First Question:

Is there any effect on the tenth grade students achievement in physics due to laboratory experiments ?

The achievement test was administered to both groups, to find out whether there any differences. Then mean scores and the standard deviation of the achievement test were calculated for all students (males and females).

*see(Table-5)

There was a difference between the mean scores of the students of both groups . The mean score for the experimental group was(27.25) whereas it was (22.75) for the control group. The t-test score was (5.45) at α= 0.001, i.e., a significant level at α< 0.05. This indicated that there was a significant difference in the performance of the experimental and the control group, i.e. the experimental group students scored significantly higher in the achievement test than the control group students did.

*see(Table-7)

The Second Question**:**

Is there a significant difference in students achievement that can be attributed to gender?

Statistical analysis of the students' achievement test showed that there was a difference between the mean scores of the female students of both groups . The mean score for the experimental group is (26.75) whereas it is (22.25) for the control group. The t-test was used ; the value of t-test score was 4.89) at α= 0.001, which is a significant level at α< 0.05.

*see(Table-6)

The mean scores and the standard deviation of the male students were calculated. There was difference between the mean scores of the male students of both groups . The mean score for the experimental group was (27) whereas it was(23) for the control group. The t-test score was (3.42) at α= 0.001, a significance level at α< 0.05. This indicates that there was significant difference in the performance of the experimental and the control group, i.e. the experimental group students scored higher in the achievement test than the control group students.

5.1 Discussion of the Results:

The study showed there was a statistically significant difference at α< 0.05 in the physics post -test achievement of grade ten students as a whole and for the males and the females independently. The students taught by the laboratory experiments scored significantly higher than those taught by the traditional method. This result corresponds to the results of the studies of Harty and El-Faleh (1983) , El-Safy (1988) , Kok and Brian(1993), Hussein(2001) and El_Nayyef(2006).

The higher achievement of the experimental group can be attributed the laboratory work that led to the development of the students scientific and practical skills. It also led to the students' retention of physics concepts and recalling them when needed. The laboratory method motivated the students and fostered he spirit of competition among them. This was positively reflected in their achievement scores. The laboratory work have positive effects on both male and female students, too. The work laboratory differs from other teaching strategies in that it augments achievement of the students who use this method . Moreover, this result indicates that the laboratory teaching method has an equal effect on both male and female students.

5.2. Recommendations:

In light of the results of this study, the researcher recommends the following:

1. It is necessary to use the laboratory experiments in teaching science in general and physics in particular , because this method is very effective in teaching.
2. Introducing special weekly classes for laboratory works in teaching schedule for the science topics, because they greatly enhance the student achievement in such topics.
3. Conducting similar studies involving different school stages and science branches like biology, chemistry and geology.

References:

Aql, Fakher (1988). Educational psychology . Beirut: Dar al-Ilm LL –Malyeen.

El-Qumeizi, Hamad (2001).The use of school laboratory espriements in the teaching of natural sciences for the secondary stage from the point of view of teachers and supervisors: Master thesis unpublished, King Saud University, Riyadh, Saudi Arabia.

El-Safy, Falah Mohammed Hassan (1988).The effect of using two methods and the individual experiments in the laboratory on the achievement of intermediate third-graders. Unpublished Master's Thesis: University of Baghdad, Iraq.

Harty,H. and Al- Faleh.(1983)Saudi Arabian students attitudes and achievement in chemistry and science stemming from lecture- demonstration and small group teaching methods . Journal of science teaching , 20(9). 861- 886.

Howeidi, Zaid (2005).Effective science teacher: University Book House.

Howeidi, Zaid (2005).Methods of Teaching Science in Elementary Al Ain: UAE: University Book House.

Hussein Ali Abdullah Ahmed (2001) The impact of testing laboratory oratory in the achievement of second secondary students in chemistry in Abyan province – Yemen

Kok, B. (1993). Middle school students achievement in laboratory oratory investigations explicit versus tacit knowledge . Journal of research in science teaching , 30(5) 445- 462.

Leonard , W.H.(1983) An experimental study of pscs-style laboratory approach for university biology . Journal of Research science teaching , 20(9) , 22-25.

Mahamid, Hashim (2003).The reality laboratory oratory work in science teaching eighth-grade primary students and trends towards him in Second Directorate Amman, unpublished Master, Amman Arab University for Graduate Studies: Amman N. Jordan.

Obeidi, Saleh al-Ani, Rauf (1986). The effect of using the debate followed by lab work the on the achievement of the first-year students in analytical , descriptive practical chemistry at the Faculty of breeding at Baghdad University. Arabian Gulf 7 (20), (169-78) .

Omari, Ahmed (2001).Development of a training program for my laboratory supervisors in the light of their needs for the required competencies, unpublished Master, Hashemite University Zarqa Jordan.

Salameh, Adel Abou El Ezz (2002).Methods of teaching science and its role in the development of thinking.Amman: Dar Al-Fikr

Shteiwi, Nabil (2001) role lab work on the development of scientific thinking skills and attitudes toward science among students in the seventh grade, unpublished Master thesis. Yarmouk University :Jordan.

The Ministry of Education (1988) recommendations of the Educational Development Conference, rislat al Muallem. Volume 29, Nos. alternative (3, 4).

The Ministry of Education (1988).Recommendations of the Educational Development Conference: the outlines of the science curriculum for the basic stage in Jordan.

The Ministry of Education (1996).The evaluation manual for chemistry - physics - for first secondary grade. Cairo

Zaytoun Ayesh Mahmoud (1996) Methods of Teaching Science Amman: Dar El Shorouk

Table -1: The study sample distribution:

Group	female	Male	Total
Control	33	32	65
Experimental	33	32	65
Total	66	64	130

Table -2:Distribution of the achievement test item numbers.

objective levels / Content components	Cognition and recalling	Recognition and understanding	Application	Analysis	Total
Concepts and terms	5	5	3	-	13
Facts and information	4	5	3	2	14
Generalizations and laws	2	-	1	-	3
Total	11	10	7	2	4

Table-3: The test -item difficulty and the discrimination index

Item no.	level difficulty percent	Discrimination	Item no.	level difficulty percent	Discrimination
1	79	0.72	16	53	0.72
2	81	0.41	17	64	0.55
3	80	0.61	18	79	0.42
4	71	0.56	19	71	0.64
5	40	0.80	20	60	0.55
6	64	0.73	21	74	0.65
7	75	0.65	22	62	0.45
8	62	0.45	23	76	0.73
9	80	0.63	24	62	0.64
10	42	0.75	25	79	0.45
11	79	0.72	26	71	0.64
12	53	075	27	57	0.73
13	74	0.45	28	69	0.55
14	71	0.45	29	65	0.73
15	71	0.66	30	74	0.45

Table-4: the t-test results for the pre-test:

Gender	Group	Number	mean	Standard deviation	t-value	Statistical significance
Males+ females	E**xperiment**al	65	3.06	1.06	0.115	0.905
	Control	65	2.99	1.01		
Females	experimental	33	3.02	1.02	0.123	0.903
	Control	33	2.99	1.04		
Males	experimental	32	3.1	1.05	0117	907
	Control	32	3	1.1		

Table- 5: t- test scores for the experimental and control groups in the post achievement test.

Group	Number	Mean	Standard deviation	t-value	Statistical significance
experimental	65	27.25	1.9	5.45	0.001
control	65	22.75	2.4		

Table-6 : t- test scores for the females students of the experimental and control groups in the post achievement test.

Group	Number	Mean	Standard deviation	Freedom score	t-value
experimental	33	26.75	2.41	64	4.89
control	33	22.75	2.4		

Table-7: t- test scores for the males students of the experimental and control groups in the post achievement test.

Group	Number	Mean	Standard deviation	Freedom score	t-value
experimental	32	27	2.6	62	3.42
control	32	22.75	2.4		

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE's homepage: http://www.iiste.org

CALL FOR PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There's no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** http://www.iiste.org/Journals/

The IISTE editorial team promises to the review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request of readers and authors.

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar