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***The Effect of Constructing and Using Training
Program for Physics Teachers-Fallujah University
on Using the Virtual Labs to Their Technical
Enlightenment***

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Research summary

The current research aims to find The effect of constructing and using training program for physics teachers-Fallujah university on using the virtual labs to their technical enlightenment

by testing the following hypotheses:

1- There is no statistically significant difference at the level of 0.05 indicative between the average grades of teachers of Fallujah University before and after training on the use of virtual laboratories on the technical enlightenment scale.

2- There is no statistically significant difference at the level of 0.05 between the average grades of the Teachers of Fallujah University who have undergone the training program on the use of virtual laboratories and who have not been trained on the technical enlightenment scale.

The current community research consists of all physics teachers at the university of Fallujah who are assigned the tasks of teaching and supervising laboratory work at the university during the academic year (2016-2017), by coordinating with the university of Fallujah to nominate the sample of the study of 20 teachers.

10 teachers as the experimental group participated in the training program . the control group consisted of 10 teachers did not subject to the training program.

The training program for Al-Fallujah university teachers on using virtual laboratories was prepared according to the researchers experience, their work nature, seeing the training programs approved in the training in addition to viewing literature and previous studies.

The researchers used technical enlightenment scale prepared by (Salem 2015) which was limited by the technical enlightenment boarders which is(cognitive, skill, emotion, social, the moral, and making decision),and it's consisted of (60 items), (41 positive items) and (19 negative items). For each item (3) alternative answers (agree, I don't know, not agree), and the scores were given (0,1,2) respectively for the positive items and the scores (2,1,0)for the negative items ,So the minimum degree for the scale is between (0 and 120) degree ,with (60)average

According to research results, it was found that the level of technical enlightenment for fallujah University teachers who participated in the training program of virtual laboratories had been changed positively.

Based on the results of the current research, the researchers concluded: there is a clear and positive effect of the training program on the use of virtual laboratories by changing the level of technical enlightenment to teachers the University of Fallujah the research sample.

Key Words:Constructing training program, physics teachers, The virtual labs , Technical enlightenment

Research problem

Virtual labs are the most important virtual reality applications , the most widely used and popular for its at most importance . according to researchers and physics teachers , opinions

, the researchers concluded that there are a bunch of problems needed to be solved like the lack of equipment and laboratory tools which effected negatively on students .Depending on the researchers, experience in teaching and the results of many researches which dealt with the virtual labs and its positive effect like.(AL- Bawi,2012),(al-Mosawy,20120)and ,(AL-obaydy2025).the data was collected through an open questionnaire that was sent to a

random sample of (44)teaching staff from the university of Fallujah and discussed

The technical enlightenment level of teachers .-1

2-The effectiveness of E-learning patterns in the Educational process in general and virtual labs in particular.

3-Expreience gained by the teacher through the activation of virtual labs in laboratories during teaching.

The results of the questionnaire showed that(90%)of the sample did not interact or care and did not see the importance of virtual labs courses and does not encourage their activation (70%)of the sample agreed to participate in virtual labs courses and training programs(80%)of the sample believe that it is appropriate to integrate the four international E-learning styles in Iraqi universities.(100%)of the sample had no information universities .(100%)of the sample had no information about the technical enlightenment concept(App-1).

Through the above it becomes clear the need to stimulate the enlightenment of the teachers of science through the construction of a training program on the use of virtual labs , the problem of research in the next question :-

What is the effect of constructing and using training program for physics teachers in Fallujah University on using the virtual labs to their technical enlightenment?

Research importance

Virtual labs are an interactive electronic learning and learning environment through which real laboratory simulations are applied by applying scientific experiments by default simulating the real application of the experiment. The aim of this environment is to develop thinking skills and laboratory and collective work skills of students

facilitating communication between the teacher and the student ,creating an interactive environment among them . so students have freedom to make decisions by themselves without negative effects. It also enables the student to carry out scientific experiments and repeat them and watch the interactions and results without any risk and less effort and cost.

The relationship of virtual laboratories to E-learning – (E-learning)

– (E-learning) is considered as the umbrella under which virtual reality applications are located as . Smart classrooms, virtual classes, computer simulation and virtual labs these applications intersect and are similar in the services they provide and in their components (hardware and software) .virtual labs are software that is available individually or through a website.

E-learning has an effective role in overcoming the difficulties and solving most of the problems preparation of skilled teachers in the field of E-learning and keep pace with the times (whitehead ,etal , 2003)

Research goals

Current research aims to :

- 1-Bilding a training program for the teachers of the university of Fallujah to activate virtual labs .
- 2-To know the impact of the training program built in the technical enlightenment of the teacher of the university of Fallujah . the two objectives are verified by testing the validity of the following

Hypothesis:

- 1- There is no statistically significant difference at the level of significance (0.05) between the average

grades of teachers university of Fallujah before and after the training on the scale of technical enlightenment.

2-there is no statistically significant difference at the level of the training program of using the virtual labs and those who had not on the technical enlighten scale .

Research limits

1-the current research is determined by faculty members at Fallujah university during the academic year (2017 -2018)

2-objectivity limit: virtual experiments in the field of physics chemistry , and biology sciences in accordance with the practical experience adopted in the courses of these materials university of Fallujah.

Terminology

1-the training program is defined by many as:

-(Nasr and humady ,1995) . A number of educational activities allow the target audience to have intensive training on a number of skills

-(shahata ,2003) :A kind of program that aims at preparing individuals and training them in a particular field and developing their knowledge and attitudes in accordance with the educational experiences of the trainees and their growth and their needs to develop a skill.(shahata,2003..77).

- the researchers define it as a training program composed of a group of scientific activities which prepared by the researchers, and trained a group of Fallujah university teachers to gain a set of virtual lab activation skills in laboratories .

2-virtual labs definition ..

-(Alexiou ,c.&et al 2008) Is one of the technological innovations which is an extension of electronic simulation

systems ,it simulates real laboratories and can be obtained from results similar to the results

Of real laboratories .(alexiou,&et al p4.2008)

-(shem and others,2013):Educational environment enable students to design experiment and simulate red processes in the real laboratory in th virtual world to overcome the question of the limited time of the laboratory or lack of equipment. (shem &others -2013 -72)

-The researchers define it as: - virtual teaching and learning environment is carried out by computer simulat0rs and the learners is trained to design and conduct scientific experiments using computer programs prepared by specialists in computer simulation .

3-Technical enlightenment was defined by :

-(Miller -1986); The minimum level of understanding in which a normal individual in a society can effectively and positively employ techniques is beneficial to him and his community (miller -1986 ;195)

-the association of international technical l education and technology project for all Americans , 2006 as" the ability to use manage "

evaluate and understand technology .(I TEA & TAAP 2006 ,p.4)

Research procedures

The researchers review the procedures necessary to achieve the research objectives as follows :

1-Choosing the experimental design:

The researchers chose experimental design with two sets of pre-test and post-test ,to measure the effect of the independent variable (the training program on virtual labs) on the variable the technical enlightenment of the research

sample composed of physics teachers at the university of Fallujah

The group	Independent variable	The dependent variable
Experimental	Training on using virtual laboratory software	Technical enlightenment
Control	Do not subject to training	

Diagram (1) experimental design of teachers sample

2-Research community and its sample :

a-Determining community research:

The current community research consists of all physics teachers at the university of Fallujah who are assigned the tasks of teaching and supervising laboratory work at the university during the academic year (2016-2017)

b-Research sample : by coordinating with the university of Fallujah to nominate at least one teacher from each science (chemistry, physics, and biology) to participate the training program .

the sample of the study consisted of 20 teachers,10 teachers as the experimental group participated in the training program . the control group consisted of 10 teachers did not subject to the training program.

3-equivalence of the two groups

The equivalence of the two groups was achieved through the (number of years of service, the number of training courses they had ,the certificate, and the pre-application of technical enlightenment scale)

4- preparation of research requirements

the training program for Al-Fallujah university teachers on using virtual laboratories was prepared according to the researchers experience, their work nature, seeing the training programs approved in the training in addition to

viewing literature and previous studies. Stages of building and applying the training program.

1-analysing stage

First step : Identifying the needs of the trainees by answering the questionnaire to them .

Second step: specifying the properties of the research sample through a special form distributed to them shows the following:

- a- All the research sample holds at least a master's degree
- b- All the research sample have not previously participated in a training program similar to the current training program.
- c- All the research sample have at least three years of experience in teaching .
- d- All the research sample have experience in using computers.
- e- Students of the research sample are subject to a theoretical and practical study of the computer.
- f- Both sample groups are equivalent in technical enlightenment and that was show after analysing the results of the pre-application of technical enlightenment scale as in table (1).

Table (1): pre-application data of technical enlightenment scale on the research sample

Group	The number	Average calculation	Standard deviation	t-value calculated	t-value table
Experimental	10	67.542	3.431	18	0.417
Control	10	62.400	3.134		

Third step : selecting and arranging scientific training content for the scientific experiments of physics which exist in text books for the academic year(2016_2017) in addition to other advanced experiments not from text books

Fourth step : Identifying the training objectives (general and specific objectives of the training program): according to the training needs of participants general (5)goals were identified .

According to the general and specific goals the behavioral goals for training session were formed the number of behavioral goals in the first formulation were (118)goals including (51)cognitive, (39)skillful and (28)emotional ,and were distributed according in accordance the time and available material resources shown in appendix (2).

Table (2)behavioral goals according to (cognitive, skillful and emotional goals fields)

Subject	Cognitive goals	Skillful goals	Emotional goals	Total
Virtual laboratories	14	4	4	22
Exploring the crocodile clips program and program	12	13	6	31
Exercises for the implementation of physics experiments	13	10	8	31
Exercises for the implementation of general laboratory experiments	9	10	6	25
Feedback and evaluation	3	2	4	9
Total	51	39	28	118

The general and specific objectives of the program and the behavioral objectives were presented to group of specialized juries shown in appendix (1), in the light of agreement ratio 80% of the juries the objectives were modified and some of them reworked, but non of them were deleted..

Second stage : preparing stage

First step: organizing the academic content and practical tests of corces)

Second step :choosing the main and the a assistant software and ways to obtain them

Crocodile clips program and phet program were chosen as the main software assistant programs which work mainly on organizing the work of the above programs and they are allowed by the working system (win), like Java and Adobe flash

Third step : identifying the training material requirements

- Training assistants' : the researchers used the following assistants' : publications, illustration paintings and Data-show to show diagrams, paintings, exercises and activities, in addition to related websites in the internet which are necessary to applying the experiments.
- Human resources :as follows :

1_ Trainees: they were chosen according to their desire in training and to the conditions which were mentioned earlier. Basic approvals were obtained for (3) days at a rate of (3)hours per day to join the training program

2_Train :the researchers prepared the necessary inputs for the training process and implementation of the training themselves.

3_hall of training : the computer lab hall at Fallujah University was chosen as a training room, characterized by sufficient lighting, good ventilation, comfort in sitting and moving and containing (14) computers.

4_ Identifying training strategies and teaching patterns

The researchers used different teaching methods as the lecture method, group and individual discussion method,

questions and answers method, in addition to new training styles such as brain storming, display and reply, in addition to the method of summarizing

The training activities used collective and individual activities

5_ designing the measurement tools

The third stage : promotion stage.

First : judging the program, by presenting the initial version to experts and specialists, in curriculum and teaching methods with scientific specialist to be sure that it is suitable to achieve goals, suitability of components and its good quality with their interdependence and integration.

Second : applying the initial program on a survey sample composed of (6)teachers in order to measure the achievement of objectives and ease of application has been taken from the proposals obtained through the process of initial testing and thus the program became valid for the final application stage.

Third : making the adjustments that was recommended by judges.

Four stage : the application of the program.

First : identifying of input behavior and applying pre_enlightenment scale : the researchers depended on properties card data and requirements from data, as a base can be used to determine knowledge and skills each teacher has, to determine which tasks to start training with.

In addition to relying on the data obtained from the pre_application of the technical enlightenment scale.

Second : organizing the training sessions.

Third : conducting the training sessions.

The training program was set for three days and the number of training sessions was (6) training sessions, two sessions per day>

During which the various training events were carried out to achieve the training objectives and the feedback procedures included retrieving and assembling activities for the trainees in addition to that applying the technical enlightenment scale post _test as shown in appendix (3).

fielvth stage : Evaluation

First : determining evaluation styles : the evaluation process included three phases :

-Pre_ evaluation (before applying the program)

The training program was presented to experts with all its details including (the desired objectives, educational content, activities, schedule of sessions, formative tests and the technical enlightenment scale) as in appendix (3)

An 80% agreement between them was approved according to this rate, an adjustment was done to the program's content, and applied on survey sample.

The technical enlightenment scale was applied before starting the applying of the training program stage to determine the behavioral input of the trainees.

- Formative evaluation (evaluation during preparing and applying the program)

The researchers took notes and the trainees opinions and points of view about how to apply the program. Also theoretical tests were done after each training session with a discussion ring to evaluate duties and activities done by each trainer, with opening a score record appendix (4)

- final evaluation (evaluation after finishing the program)

- In order for the trainee to exceed this stage, he is obliged to attend the sessions and carry out the required activities, where the final score or success score was set at 70% including the following :

- 1_ attending all the training sessions (20% of the total degree), each session (2 degrees)
 - 2_ theoretical tests and applying the daily activities (25% of the total degree)
 - 3_ participating in group discussions (25% of the total degree)
 - 4_ activities and duties during the external training period (30 % of the total degree). By this evaluation it is considered as finishing the final stage of the program, which is evaluating the training appendix (5).
- The post _applying of the technical enlightenment scale

5 : preparing the research tool

Since the goals at the research is to find out the effect of the training program (contracting a training program for Al_fallujah University teachers on virtual laboratories in their technical enlightenment, the researchers used technical enlightenment scale prepared by (Salem 2015) which was limited by the technical enlightenment boarders which is(cognitive, skill, emotion, social, the moral, and making decision)

Fields adopted in the construction of the scale are :

- 1_ the nature of technology.
- 2_ technology and society
- 3_ design
- 4_ t

Abilities for technological world.

- 5_ the designed world.

The scale consisted of (60 items), (41 possative items) and (19 negative items). For each item (3) alternative answers (agree, I don't know, not agree), and the scores were given (0,1,2) respectively for the positive items and the scores (2,1,0)for the negative items

So the minimum degree for the scale is (0)and the maximum degree (120)with (60)average.

To check the virtual validity of the scale, the scale was presented to a group of experts in educational sciences, psychological sciences, and computer, and the researchers approach 80 % and more agreement ratio between them to check the validity of the scale items and how accurate is distributed between the fields that they are belong to, and its suitability to measure the adjective which was set for it according to the experts answers non of the items were deleted only some adjustments were made

6 : procedures for applying the experiment :

The researcher experiment was applied on two steps as follows :

1_ the training was carried out as was shown in the program appendix (7) according to sessions, teaching, discussion and practical applying in addition to feedback procedures, and daily tests.

2_ after finishing the training sessions, the technical enlightenment test was applied .

7 : statistical tool

The statistical bag program for social sciences (spss) was used (t -test) for two dependent samples, (t_test) for two independent samples.

Presenting and explaining the results:

a-: Presenting the results:

After processing data for the control and experimental groups before and after training ,organized in special tables and the following statistical analysis was done :

1_ to be sure of the first zero hypothesis which states (there is no statistical difference at the significance level 0.05

between the average grade of Fallujah University teachers who underwent the training program on the use of virtual labs before and after training on the technical enlightenment scale)

To find out the amount of growth in the technical enlightenment of the experimental group before training and after, we find that average scores of the technical enlightenment scale for the experimental group on the scale before training is (63.000)with (3.431) standard deviation, which is lower than the average of the scale Which is (60),while the are average grades after training was (95.300)with (2.540)standard deviation, so there was an increase about (28.572)degree which is 23%. To be sure of the significance of the differences, (t_test) equation for two dependent samples was used, the results shown in table (3).

table (3): The data for the experimental group

The application	Number	average Calculation	Standard deviation	t-value Calculated	t-value table
Before	10	63.000	3.431	9	24.218
After	10	95.300	2.540		

Since the calculated to value is higher than the table value, that means that there are significant differences between both average score of pre _application and post _applications for the experimental group in favor of the post _application.

To determine the amount of the effect of independent variable (the training program of using virtual labs) on the dependable variable (technical enlightenment), the value of the effect was calculated, it was (0.9152),and that is considered as big effect according to (cohein standards), (Lebd, 2005:40)

2_ To be sure of the truth of the second hypothesis which states there is no statistical significant deference in the level of significance 0.05 between average scores of university of Fallujah who had undergone the training program of using the virtual labs and those who had not on the technical enlightenment scale,

It is found that average scores of the technical enlightenment scale in post_application for the control group was (62.700) with (2.668)

Standard deviation, and the average scores of the technical enlightenment scale of the experimental group after training was (95.300) with (2.540) standard deviation, which means that there was an obvious increase To be sure of the significance of the differences, (T_test) equation for two independent samples was used, the results were as the following table (4)

Table (4): post-application data of scientific enlightenment scale for both groups (experimental and control)

The group	number	Calculated average	Standard deviation	t-value Calculated	t-value table
Experimental	10	95.300	2.540	18	27.977
Control	10	62.700	2.668		

Since the both calculated t_value higher than table value that means that there are significant differences between average scores of post_application of technical enlightenment in favor of the experimental group. To determine the amount of the effect of the independent variable on the dependent variable, it was calculated and was (0.9) which is a great effect value according to cohein standards

Explaining the results

According to research results, it was found that the level of technical enlightenment for fallujah University teachers

who participated in the training program of virtual Since the calculated t _value higher than table value that means that there are significant differences between average scores of post_application of technical enlightenment in favor of the experimental group.

To determine the amount of the effect of the independent variable on the dependent variable, it was calculated and was (0.9)which is a great effect value according to cohein standards

b-Explaining the results

According to research results, it was found that the level of technical enlightenment for fallujah University teachers who participated in the training program of virtual laboratories had been changed positively. The training program effected positively on their technical enlightenment level in using technical in general, and virtual labs in particular participating in the program and knowing the properties of this technical removed their fears, and using it in teaching, which pashed them to make an effective effort in using it inside classes, this is agrees with what yaconb confirmed (yacoub :89) other studies from similar field also agreed with it (Muhsen:2012),(Muhammad :2015).

The many features of the virtual labs training program provides educational environment with different resources (computers, internet and DVDs) which was used in training, had increased interaction between teachers and trainees on one side, and between trainees themselves, on the other side taking in to account individuals differences in speed and style of learning and training in addition to providing scientific accuracy and organization with diver sity in the introduction of scientific material, with all what it contained like images, flat and stereoscopic shops) fixed and moving in addition to colors and sound

The program's software (already prepared or prepared by trainees were with good and high scientific features. This agree with (Al_Ahmady, 2009 :54) exchanging experience between trainees during applying the program and after had an effect in improving their knowledge and experience which reflected positively on the training process output

Conclusion:

Based on the current research results, the researchers conclude : there is a clear and positive impact of the training program on the use of virtual labs by changing the level of technical enlightenment to teachers of Fallujah University (research sample)

Recommendations:

- 1 _ Organizing workshop on virtual laboratories and their importance and ways of activating them.
- 2_ including in the curriculum all that is new in the field of education techniques.
- 3_ importing the teacher's abilities and experience to deal with technology and necessary computer applications
- 4_ Activate and conduct other scientific researches on different age stages to activate technical learning environments

Suggestions:

The researchers suggest doing a similar study shows :

- 1_ studying the impact of the training program for teachers on virtual laboratories and its impact on their thinking skills.
- 2_ the impact of the training according to the virtual laboratory program in the virtual laboratory design skills of teachers and using computer simulation as a kind of visual reality application.

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