Institute Of Educational Studies
Educational Technology Department

The Effect of Using an Intelligent Virtual Instructional Environment with Variable Controls Cognitive Thinking on the Development of Innovative Thinking to Educational Technology Students

An Ph.D Thesis in Education
(Allocate Educational Technology**)**

Submitted by:

Ahmed Ragheb Mohamed Salman
Assistant Lecturer in Computer Instructor Department
Faculty of Specific Education- Mansoura University
For Obtaining PhD Degree in Educational Technology

Supervised by:

Prof. Dr.
Yosry Saber El-Gamal

Chairman of the Trustees of the
Egyptian – Japanese University
Ex- Minister of Education

Prof. Dr.
Mostafa Abdel-Samea Mohamed
Professor Emeritus Dept. of Curricula & Teaching Methods
Institute Of Educational Studies
Cairo University

Dr. Amal Abdel- Fatah Swedan
Assistant Professor Head of Educational Technology Department
Institute Of Educational Studies
Cairo University

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Summary of the Study

In this chapter, we give a brief overview of the current study, highlighting its problem and the approach adopted in addressing it, as well as the underlying procedures. We conclude with the findings of the study.

Introduction:

Students are the main object of the learning process, as well as their academic attainment and scientific performance that translates into learning outputs the achievement and enhancement of which are sought by all educational institutions at different levels. This can only be reached with an instructor who can effectively contribute towards the achievement of such goal.

Computer and Network technology provides much potential in all aspects of life, including learning in general and distant learning in particular. This potential is accompanied by major advancements in programming capabilities resulting in multi-uses of computer and networks. As for the software, especially network programs, these also witnessed major developments that resulted in enabling them to provide quality and efficient services. In communications, these programs opened the door to users providing them with different forms of visual, audio- and written communications. In addition, they contributed to enabling information exchange in the form of different file formats such as texts, sounds and films… etc.

Here comes the role of intelligent e-learning virtual environments, the impact of which on the development of creative thinking in students the current study examines.

Research questions:

The problem of the current study can be put forward in the following major question:

What is the effect of using a web-based intelligent e-learning virtual environment and its interaction with students' cognitive control, on the development of their creative thinking?

This question can be branched into the following sub-questions:

1) What effect does the cognitive control (focusing vs. scanning) have on students' attainment when presenting knowledge in an IIELVE? (This is measured by an attainment test as an initial approach to development of creative thinking?
2) What effect does the cognitive control (focusing vs. scanning) have on students' performance when presenting skills in an IIELVE? (This is measured by an observation form as another approach to development of creative thinking?
3) What effect does the cognitive control (focusing vs. scanning) have on the development of students' creative thinking in its three dimensions (fluency-flexibility-originality), when presenting skills in an IIELVE? (This is measured by tests of creative thinking?
4) What effect does the cognitive control (focusing vs. scanning) have on the development of students' creative as a whole, when presenting skills in an IIELVE?

1. There are significant differences ($p = 0.01$) between the average scores of experimental and control group, in the post-test innovative thinking abilities total score, to the favor of the experimental group.
2. There are significant differences ($p=0.01$) between post-test fluency average scores of experimental and control group, to the favor of the experimental group.
3. There are significant differences ($p=0.01$) between post-test flexibility average scores of experimental and control group, to the favor of the experimental group.
4. There are significant differences ($p=0.01$) between post-test originality average scores of experimental and control group, to the favor of the experimental group.
5. There are no significant differences in the post-test scores of innovative thinking capabilities (fluency-flexibility-originality-total score) between focusing-controlled and scanning-controlled students of the experimental group.
6. There are no significant differences between post-test overall innovative thinking capabilities average scores of the experimental group, and the 2-month-follow-up scores of the same group.

Objectives:

The current study aims at:
1. Design and production of an intelligent e-learning virtual environment to develop innovative thinking in the students of computer education department in the topic of "instructional 3d media" included in the course of "instructional media".

2. Identifying the effectiveness of intelligent virtual learning environments (IVLEs) in helping student attainment and skill performance.
3. Setting up architecture for the design of IVLEs on the web so that any proposed learning material can be incorporated into the system to be and intelligent virtual learning system.
4. Identifying the impact of the interplay between using IVLEs and Ss' cognitive control (focusing vs. scanning) on perceived cognitive behavior.
5. Identifying the potential of employing IVLEs to develop innovative thinking in Ss and its relationship with their cognitive control.

Importance:

The importance of the current study may be ascribed to the following:

- Building realistic IVLEs to learn and train Ss in performing the tasks that may impose a burden upon them.
- Providing Ss with the opportunity to experience and test natural environments inaccessible in the real world, such as exploration of the organization of museums and making trips to a number of world museums.
- Providing Ss with high skills in performing certain tasks such as doing organizational operations to minimized possibilities of error when moving to real practice.
- Virtual reality ensures learners' active participation, and provides them with interaction with others. It also enables them to access information and data, and get in touch with experts from all over the world to solve complex problems through IVLEs.

Limits:

This study is limited to certain topics related to topic of "instructional 3d media" included in the course of instructional media taught to 2nd-year students, Department of Computer Education, Faculty of Specific Education.

Procedure:

1. Method:

In view of the nature of the current study, the author will use the experimental method to identify the relationship between using IVLEs and cognitive control (focusing/scanning) and its impact on the development of innovative thinking.

The study includes the following variables:

a) Independent variables:

There are two independent variables:

- The educational program based on students' access to an intelligent virtual environment through the computer.
- Cognitive control which is a classification variable of two levels:
    - Focusing
    - Scanning

b) Dependent variables:

there are three dependent variables:

- Academic attainment attached with certain knowledge included in the topic of "instructional 3d media".
- Practical performance attached with certain skills included in the topic of "instructional 3d media".
- Innovative thinking attached with certain mental skills in which Ss are trained in the topic of "instructional 3d media".

2. Sample:

Eighty (80) 2nd-year students enrolled in the department of Computer Education, Faculty of specific education, Mansoura University participated in the current study. They were randomly selected and divided into four groups.

3. Design of the Experiment:

In view of the independent variables it is expected that such a study will have the experimental design shown in the following table:

N	Groups	Type of Treatment
1	1st experimental group	Use of IIELVE with focusing-controlled Ss
2	2nd experimental group	Use of IIELVE with scanning-controlled Ss
3	1st control group	Without any experimental treatment (conventional treatment) with focusing-controlled Ss
4	2nd control group	Without any experimental treatment (conventional treatment) with scanning-controlled Ss

4. Tools:

1. A test to measure Ss' attainment of cognitive aspects included in the topic of. This is prepared by the author.
2. An observation form to assess practical performance attached with the topic of "instructional 3d media". This is prepared by the author.
3. A test to measure Ss' innovative thinking attached with the topic of "instructional 3d media".
4. A test to measure visual perception skills. This measure has been validated to represent a standard measure of cognitive control (focusing/scanning) in an Egyptian sample.

5. Procedures:

I: Theoretical Framework:

To review the related studies on the study variables including:

- Virtual environments (concept, characteristics and relationship with education)
- Intelligent virtual environments incorporating two fields: Artificial Intelligence and Virtual Reality (concept, components and historical development)
- Preparation of an analytical study of a number of related studies on Intelligent Instructional Virtual Environments (IIVEs) and assessment of such studies.

II Experimental Framework:

1. Selection of program subject.
2. Identification of Instructional objectives to be achieved by the program.
3. Analysis of the program contents.
4. Analysis of learners' characteristics as well as Ss' activities.
5. Building a questionnaire on the topic of instructional 3d means "instructional 3d media" to identify the mistakes Ss may make while learning the subject of the program.
6. Preparing, building, designing and production of the IIVE using a number of VR building authorware programs.
7. Validation of the IIVE through presenting it to a number of judges to express their commenting of deletion form, addition to or modification of the IIVE, and executing these modifications.
8. Building and validation of an observation form on the topic of "instructional 3d media" to verify its stability and reliability.
9. Random selection of the sample of the pilot study.

10. Implementing the pilot study so as to decide on the time suitable for the implementation of the main study and identifying the difficulties the author may face and overcome when implementing the main study, assessing the internal efficiency of the program.
11. Modification of the program based upon the findings of the pilot study to achieve success, as well as modification of the study tools to perform the main study.
12. Selection of the main study sample and dividing them according to categories of cognitive control (focusing/scanning).
13. Dividing the sample into 4 groups (2 experimental groups and 2 control groups) according to the experiment design.
14. Application of measurements of innovative thinking, attainment test and observation form to the 4 groups.
15. Implementation of the IIVE on the experimental groups.
16. Application of the observation form to Ss while in the program.
17. Application of the measurement of innovative thinking and attainment test after program implementation to the 2 experimental groups.

III Statistical Treatment and Findings:

1. Processing the resultant data statistically and analyzing them to reach findings.
2. Presenting and discussion of the findings against the theoretical framework and related studies.
3. Presenting recommendations, suggestions and future work.

6) Results:

The current study came out with a number of results. These are:

a. There are significant differences (p = 0.01) between the average scores of experimental and control groups, in the post-test innovative thinking abilities total score, to the favor of the experimental group.
b. There are significant differences (p=0.01) between post-test fluency average scores of experimental and control group, to the favor of the experimental group.
c. There are significant differences (p=0.01) between post-test flexibility average scores of experimental and control group, to the favor of the experimental group.
d. There are significant differences (p=0.01) between post-test originality average scores of experimental and control group, to the favor of the experimental group.
e. There are no significant differences in the post-test scores of innovative thinking capabilities (fluency-flexibility-

originality-total score) between focusing-controlled and scanning-controlled students of the experimental group.

f. There are no significant differences between post-test overall innovative thinking capabilities average scores of the experimental group, and the 2-month-follow-up scores of the same group.

7) Recommendations:

In view of the above findings, we can give the following recommendations:

1) The IIEV outlined in the current study should be made use of by incorporating this environment in the academic courses studied by Ss.
2) The architecture of the IIEV should be made use of in the design and production of such environments. This will contribute to extending its use in the different educational institutions.
3) Because the IIEV is open-source software through which any instructional material can be introduced into any academic field, the author recommends its usage in all the courses studies by Ss in his or other faculties.
4) There should be an increased attention to overlapping sciences in the field of instructional technology (as it is the case in the current study), as it is the result of an overlapping among AI, VR, education and cognitive psychology (regarding focusing/scanning cognitive control and innovative thinking). This will produce innovations of scientific value.
5) There should be detailed interest in the provision of most of the computer-related research suggestions in the area of instructional technology on the web, due to their advantages, especially in the area of the current study.
6) There should be an attention to IIELVE as a new concept introduced by the author being an upgradation of e-learning that is more effectively student centered.
7) Production of the IIELVE outlined in this study requires much time, effort and specialization in many disciplines. So, the author recommends extraction of a model from the current study that can be used to teach researchers in the discipline how to build such environments in a way that makes its learning and building easier.
8) Educational institutions, such as the Ministry of Higher Education and the Ministry of Education, should give due attention to funding projects to build the IIELVE outlined in the current study, so that it can be modified and upgraded. This can be done, e.g., through

procurement of VR tools and equipment the funding of only large organizations can afford.

9) Through such environments, a uniform course can be taught to all Ss in the university via e-learning in different educational institutions.

8) Future Work:

1. Study of the relationship between the IIELVE outlined in the study and certain other cognitive controls such as settlement/highlighting and classification efficiency.
2. Building virtual educational institutions through such environments, to deepen the concepts of Virtual University, Virtual Library or Virtual Campus.
3. Examination of the effectiveness of using IIELVE in the development of problem-solving skills and high-order thinking styles, through different courses.
4. Studying the relationship between IIELVE and the working visual memory.
5. Examination of the psychological impact of using IIELVEs on Ss' attitudes, educational dispositions and motivation to achieve.

معهد الدراسات التربوية
قسم تكنولوجيا التعليم

أثر إستخدام بيئة تعليمية إفتراضية ذكية ذات ضوابط معرفيه متغيرة على تنمية التفكير الإبتكاري لدى دارسي تكنولوجيا التعليم

رسالة مقدمة للحصول على درجة دكتور الفلسفة في التربية
تخصص تكنولوجيا التعليم

إعداد الباحث

أحمد راغب محمد سالمان

مدرس مساعد بكلية التربية النوعية – جامعة المنصورة

إشراف

أ.د. يسرى صابر الجمـــــل
وزير التربية والتعليم الأسبق

أ.د. مصطفى عبد السميع محمد
أستاذ متفرغ بقسم المناهج وطرق التدريس
معهد الدراسات التربوية
جامعة القاهرة

د. أمل عبد الفتاح سويدان
أستاذ مساعد وقائم بأعمال رئاسة مجلس قسم تكنولوجيا التعليم
معهد الدراسات التربوية
جامعة القاهرة

١٤٣١هـ/ ٢٠١٠م

تشكيل لجنة المناقشة والحكم

على رسالة الدكتوراة في التربية

قسم تكنولوجيا التعليم

للطالب/ أحمد راغب محمد سالمان

عنوان الرسالة : " أثر إستخدام بيئه تعليمية إفتراضية ذكية ذات ضوابط معرفيه متغيره على تنمية التفكير الإبتكاري لدى دارسي تكنولوجيا التعليم ".

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أ.د. حسن حسينى جامع — عضواً

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أ.د. محمد إبراهيم الدسوقى — عضواً

أستاذ تكنولوجيا التعليم بكلية التربية – جامعة حلوان

د. أمل عبد الفتاح سويدان — مشرفاً وعضواً

أستاذ مساعد وقائم بأعمال رئاسة مجلس قسم تكنولوجيا التعليم بالمعهد

لجنة الحكم والمناقشة

أ.د. يسري صابر الجمل

استاذ هندسة الحاسبات

ورئيس مجلس أمناء الجامعة المصرية اليابانية

ووزير التربية والتعليم الأسبق

مشرفا ورئيسا

أ.د. مصطفى عبد السميع محمد

استاذ المناهج وتكنولوجيا التعلم بالمعهد

ومدير المركز القومي للبحوث التربوية والتنمية (سابقا)

مشرفا وعضوا

أ.د. حسن حسيني جامع

أستاذ متفرغ بكلية التربية النوعية – جامعة الإسكندرية

وعميد الكلية (سابقا)

عضوا

أ.د. محمد إبراهيم الدسوقي

أستاذ تكنولوجيا التعليم بكلية التربية – جامعة حلوان

ونائب رئيس الأكاديمية المهنية للمعلمين

عضوا

أ.م.د. أمل عبد الفتاح سويدان

استاذ مساعد تكنولوجيا التعليم بمعهد الدراسات التربوية – جامعة القاهرة

مشرفا وعضوا

معهد الدراسات التربوية

صورة

الاسم : أحمد راغب محمد سالمان الجنسية : مصري

تاريخ وجهة الميلاد :

الدرجة : دكتوراة

التخصص : تكنولوجيا التعليم

المشرفون : أ.د. يسرى صابر الجمل أ.د. مصطفى عبد السميع محمد

د. أمل عبد الفتاح سويدان

عنوان الرسالة : " أثر إستخدام بيئه تعليمية إفتراضية ذكية ذات ضوابط معرفيه متغيره على تنمية التفكير الإبتكاري لدى دارسي تكنولوجيا التعليم".

ملخص الرسالة :

تتناول الدراسة الحالية دراسة أثر استخدام بيئة تعليمية الكترونية افتراضية ذكية والتي هي نتيجة تزاوج ثلاثة علوم أساسية أولهما الذكاء الاصطناعي ونظم التعليم الذكية وثانيهما الواقع الافتراضي والبيئات الافتراضية وثالثهما التعليم بجميع أبعاده ، وفى هذه البيئات أحياناً ما تتبنى عملية التعليم المتضمنة فى النظام – مثلها مثل المتعلمين بالضبط – تمثيلاً افتراضياً داخل البيئة الافتراضية، بل ويمتد الى تشخيص حالة الطالب تفصيلا ومن ثم تولد البيئة ردود افعال تتناسب ومستوى الطالب بل وتتيح التغيير في طرق التدريس بما يتناسب مع االطالب وتولد له مجموعة من التلميحات وتحيله في بعض الأحيان الى دراسة جزء معين طبقا لتشخيصها وتعطي للطالب التغذية الراجعة المناسبة للموقف التدريسي الذي يمر به بل ويمكنه التعديل في البيئة بما يترانا له دون المساس بعمومية الشرح لجميع الطلاب . فتختص الدراسة بدراسة أثر تلك البيئة على تنمية التفكير الابتكاري لدى دارسي تكنولوجيا التعليم الذي تم تقسيمهم وتصنيفهم طبقا للضبط المعرفي البأورة في مقابل الفحص والذي يهتم بتصنيف الطلاب فيشير هذا الضبط إلى طريقة الفرد فى تركيز أو انتشار انتباهه عند تناوله مجال المعلومات، فالأفراد ذوى ضبط البأورة يوزعون انتباههم بطريقة منظمة عندما يفحصون مجال المعلومات التى تتضمنها البيئة المحيطة، أما الأفراد ذوو ضبط الفحص فإنهم يوزعون انتباههم بطريقة غير منظمة أى سيئة التنظيم نسبياً حتى أن المعلومات التى توجد لدى المثيرات المعروضة فى المجال الادراكى تمسح بصورة ضعيفة التنظيم. وبعد التصنيف يدخل الطلاب في تلك البيئة موضوع الدراسة ومن ثم يتم قياس قدرات التفكير الابتكاري في أبعادها الثلاث الطلاقة والمرونة والأصالة وكذلك قياس التفكير الابتكاري ككل.

الكلمات الدالة :

- أثر إستخدام بيئه تعليمية.
- إفتراضية ذكية ذات ضوابط معرفيه.
- تنمية التفكير الإبتكاري.
- لدى دارسي تكنولوجيا التعليم.

Institute Of Educational Studies

Photo

Name: Ahmed Ragheb Mohamed Salman Nationality: Egyptian

Date and Place of birth:
Degree : PhD
Specialization: Instructional Technology Department
Supervisor (s): **Prof. Dr.** Yosry Saber El-Gamal
Prof. Dr. Mostafa Abdel-Samea Mohamed
Dr. Amal Abdel Fattah Swedan

Title of thesis: The Effect of Using an Intelligent Virtual Instructional Environment with Variable Controls Cognitive Thinking on the Development of Innovative Thinking to Educational Technology Students

Summary:

Dealing with the current study examine the impact of the use of learning environment e-Smart Virtual, which is the result of mating three basic science first artificial intelligence and education systems and smart second virtual reality and virtual environments and the third education in all its dimensions, and in these environments sometimes adopt a process of education contained in the system - like educated exactly - representation of default within the virtual environment, but extends to the diagnosis of the student in detail, and then generate the environment reactions commensurate with the level of the student and even allow a change in teaching methods in line with Aatalib and generate a set of tips and allocate it in some cases, to study a particular part according to the diagnosis and give the student feedback appropriate to the position of teaching is going through and can even modification in the environment, including Itraia him without prejudice to the generality of explanation for all students. Has power in the study examining the impact of that environment on the development of innovative thinking to the students of technology education, which were divided and classified according to the set of knowledge Alboorp in return for examination and who cares about the classification of students indicates the settings to the way the individual in the concentration or spread of attention when dealing with information, individuals those with control Alboorp distribute attention in an orderly manner when examining the information contained in the surrounding environment, and the people with the control test, they distribute their attention in a non-Organization of any relatively poorly regulated so that the information that is available with stimuli presented in the cognitive area is cleared poorly organized. After the students enter the category in that environment the subject of the study are then measured the capacity of innovative thinking in three dimensions of fluency, flexibility, originality and innovative thinking as well as measure as a whole.

Keywords:

- The Effect of Using an Intelligent Virtual Instructional.
- Environment with Variable Controls Cognitive Thinking.
- The Development of Innovative Thinking.
- Educational Technology Students