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The Impact of Virtual Classroom Template on the Development of Cognitive Skills, Infographic Production Quality and Usability

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The Impact of Virtual Classroom Template on the Development of Cognitive Skills, Infographic Production Quality and Usability

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Abstract

This study aims at pointing out the impact of "lobby mode" versus that of "analytical mode" on developing cognitive skills, quality of production and usability of the model system; all through using Adobe Connect. An achievement was developed and it consisted of 20 lexicon to measure the cognitive skills of instructional infographic design. In addition, an assessment card has been used to assess the final production in terms of quality. The card is composed of 44 texts designed to measure the quality of infographic. Besides, a measuring scale has been founded, that is composed of 55 phrases distributed among five areas; thus to measure the usability of using the virtual classroom module. The study focus groups were randomly selected of the students of Educational Technology Program, specifically, second semester of an academic year 2016/2017. Forty students have been selected and divided into two experimental groups. In terms of usability, results of the study showed up that the analytical model has been proven better than the lobby one in managing a virtual classroom using adobe connect system; whereas same results highlighted a no statistically documented difference between both models in terms of cognitive skills related to instructional infographic design together with level a d quality of production.

Keywords: Virtual Classrooms; Adobe connect; eLearning; Learning management systems; Usability; Production Quality.

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أثر اختلاف قالب الفصل الافتراضي في تنمية المهارات المعرفية وجودة إنتاج الانفوجرافيك وسهولة الاستخدام

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مستخلص البحث

تهدف هذه الدراسة إلى التعرف على أثر اختلاف قالب الفصل الافتراضي (المضغوط، التحليلي) بنظام ادوب كونكت على تنمية المهارات المعرفية، ومستوى جودة الإنتاج، وسهولة استخدام القالب، لتحقيق ذلك تم إعداد اختبار تحصيلي من 20 مفردة لقياس الجانب المعرفي لانتاج الانفوجرافيك ، كذلك تم بناء بطاقة تقييم منتج نهائي تضمنت 44 عبارة لقياس جودة الانفوجرافيك، واخيرا تم بناء مقياس اشتمل على 55 عبارة موزعة على خمسة مجالات لقياس سهولة استخدام قالب الفصل الافتراضي، تضمن مجتمع الدراسة جميع طلاب برنامج تكنولوجيا التعليم للفصل الدراسي الثاني من العام الدراسي 2017/16، في حين بلغت عينة الدراسة 40 طالب تم اختيارهم عشوائيا وتقسيمهم لمجموعتين تجريبيتين. كشفت نتائج الدراسة عن أن النمط التحليلي أفضل من النمط المضغوط لتقديم الفصل الافتراضي بنظام أدوب كونكت فيما يتعلق بسهولة الاستخدام، بينما كشفت النتائج عن عدم وجود فروق ذات دلالة إحصائية بين المجموعتين التجريبيتين فيما يتعلق بالمهارات المعرفية لتصميم الإنفوجرافيك التعليمي، و مستوى جودة إنتاجه.

الكلمات المفتاحية: الفصول الافتراضية؛ أدوبي كونيكت؛ التعلم الإلكتروني؛ نظم إدارة التعلم ؛ سهولة الاستخدام؛ جودة الإنتاج.

Introduction

The current study belongs to assessment research of e-learning environments, which aims at identifying the most appropriate means, methods and tools of e-learning systems to achieve more effective learning. "Universities and colleges are under unprecedented pressures, where the technologies and trends of educational technology represent a crowded and chaotic space and where a critical examination of distance learning is necessary to underpin its methods and its mission" (Traxler, 2018, p. 1). Virtual Classroom is regarded one of the synchronous e-learning web-based templates. It brings together the instructor, students, scientific content and learning resources at the same time and place, through a rich environment for best interaction between the student and all other educational elements. Virtual classroom template can be controlled through different templates of interaction interfaces that determine the way for lecture design, tools selection, organization as well as teaching methods to serve the educational objectives. This is often done using the adopted e-learning system. The effectiveness of virtual classrooms varies according to their ability to provide the maximum amount of interaction between the system elements through using various teaching strategies, which in turn determines the type of tools used as well as the operational requirements; so in general they are more flexible in web-based learning (Aslim-Yetis, 2010).

Recent research with multi-user virtual environments (MUVEs) in education has shown that these platforms can be effective and engaging for students (Metcalf, Kamarainen, Cooke, Turkay, & Grotzer, 2016) aimed to understand the teacher perceptions of the feasibility of implementing MUVE-based curriculum. The study showed that teachers assure the effectiveness of MUVE-based curriculum. It also included technological features contributed to increasing the value of student-directed learning and immersion in the virtual environment. many studies have examined the impact of these environments from the perspective of students concluding that students have positive attitudes and increasing enthusiasm and motivation towards the use of these environments in all educational courses (Alves, Miranda, & Morais, 2017; Mosquera, 2017; Omar & Geer, 2018). The success of e-learning environments is highly dependent on a set of elements, including: the quality of the training course design, the educational situation, the learning process organization, and the selection of the e-learning tools, methods and templates that suit the nature of the educational situation,

the scientific content and students' needs and characteristics. Thus, it is important to study the ways of designing and implementing virtual learning environments using the appropriate tools, methods and templates. Teachers should "invest course time to develop student knowledge of how to best use the multimedia tools available in classrooms, and to carefully design, prepare, and structure classroom activities to encourage deeper, more reflective learning" and "guidelines also need to be established about how and when communication tools should be used" (Falloon, 2012, p. 121). Many studies emphasized that good planning of virtual learning environments and selecting the most appropriate tools, methods, designs and templates for interfaces lead to understanding new forms of interaction and communication. In addition, it creates varied opportunities to build knowledge and achieve effective learning depending on the circumstances of each educational situation and the nature of the scientific content and the characteristics and needs of learners (Eom & Ashill, 2018; Omar & Geer, 2018; Ribeiro, Oliveira, & Mello, 2017).

Conceptual Framework for Research Virtual Classroom Systems

Virtual Classroom is an essential ingredient to all educational institutions that depend on virtual learning environment as well as online training institutions. "This is a classroom that separates the student and the teacher by time and space and it is comparably less expensive than other modes of learning in higher institutions" and "it is gradually being adopted by most developed countries and developing countries to enhance knowledge transfer and effective learning" (Elechi & Saturday, 2017, p. 1). Virtual Classrooms have been applied in Nigeria where students positively inform their support and readiness for Virtual Classrooms (Anekwe, 2017). The techniques and tools available in MUVEs enable the teacher to easily adjust and employ its elements in different educational situations. Such features can be summarized as follows:

a) Access to all possible offline or online resources of information.
b) Ready-made templates can be filled-in with any educational content in different circumstances, time and employment.
c) Direct interaction between the instructor and learner and among the learners during non-school hours.
d) Interactive content and direct participation in the applications.
e) Identifying the used tools, interaction methods and teaching strategies according to the design of e-learning situation.

f) Using the appropriate evaluation methods and electronic tools for the design of electronic educational situations.
g) Synchronous or asynchronous instant feedback. (Mikropoulos & Natsis, 2011; Thamarana, 2016).

The Virtual Classroom includes many various tools that facilitate the educational practices. These tools varied in terms of objective, method of use, design as well as its location within the interaction interface and availability. Interaction tools of a virtual classroom are in general as follows: Share Tool, share my Screen, Share White Board, and Share Document, Attendees Tool, Notes Tool, Chat Tool, Video Tool, File Tool, Poll Tool, Q &A Tool and Web Links Tool.

The usage of virtual classroom systems and its programs in the educational process is increasing significantly, more specifically in higher education. It is one of the e-learning management programs and systems and an essential component in the educational institutions. It can be used individually by Instructors or systematically by educational institutions. Synchronous virtual classrooms prevalent in higher education include: Adobe Connect, Blackboard Collaborate, WebEx and Saba Centra (Martin & Parker, 2014). In the resent study, the researchers adopted Adobe Connect, as many papers highlighted its effectiveness for the instructor and student in the educational process. Cappiccie and Desrosiers (2011), for instance, concluded that using Adobe Connect as social work curriculum in concentration year field practicum and advanced social work practice.

Falloon (2012) used Adobe Connect and Wimba Live virtual classrooms to present a series of seminars as part of Waikato University's Postgraduate Diploma in Education. The study concluded the effectiveness of the applied systems in building relationships and supporting communication and interaction. In addition, the effectiveness of these systems is influenced by task, communication tools, multimedia usability and technical/logistical factors. While most of these factors are beyond student control, they are compatible with the educational tasks and practices and essential for achieving the aspired educational goals. Several studies have compared Adobe Connect software with other web conference software in terms of cost, quality of voice, usability in education and teaching (Karabulut & Correia (2008; Schullo, Hilbelink, Venable, & Barron, 2007; and Teo, McNamara, Romeo, & Gronn, 2015). They concluded that Adobe Connect is distinguished in both audio and video. However, students' needs, learning objectives, professional experience and adopted teaching methods should be

considered when choosing the appropriate software. Teo, McNamara, Romeo, and Gronn (2015) in collaboration with faculty of an American regional state university and a Chinese regional university to find the appropriate ways to integrate synchronous education technology using Adobe Connect to enrich the students learning in the educational technology program at the American University and English language program at the Chinese University. Reports presented the results and practical recommendations for using Adobe Connect software in synchronous education.

Virtual classrooms templates

Development in MUVEs depends generally on how to present, display and organize information, in addition to the tools and methods utilized by the student and teacher to interact, use and handle information. Moreover, the availability of adding special abilities to enrich self-learning and help to gain experience better and faster while considering individual differences among learners. This is triggered by the various templates to design screens and organize content depending on which, the appropriate educational tools and strategies will be identified and selected. Several studies have confirmed that appropriate design, through various design templates, leads to efficiency in time, cost and high educational quality. (Ibrahim, Prasad, Alsadoon, & Pham, 2016; Lobo & Ansari, 2015). The ideal efficiency of adding a virtual classroom can be achieved through good designing for its components. The researchers suggest that the virtual classroom template is an integrated structure consisted of three key components which are interaction interface, interaction methods, and Teaching Strategies.

Virtual classroom template is crystallized in the design of user interfaces, which is the basis of the interaction processes between the learner and the elements of the educational process within the virtual classroom. This is in light of the used educational strategies to fit completely with the interaction tools and methods. Interfaces are the key and effective intermediate in any e-learning template in general and virtual classrooms. The classification of Ally (2004) indicated the types of interactions and identifies the learner's interaction with the interface as the first stage in the types of learner's interaction in online learning in general, as shown in figure 1.

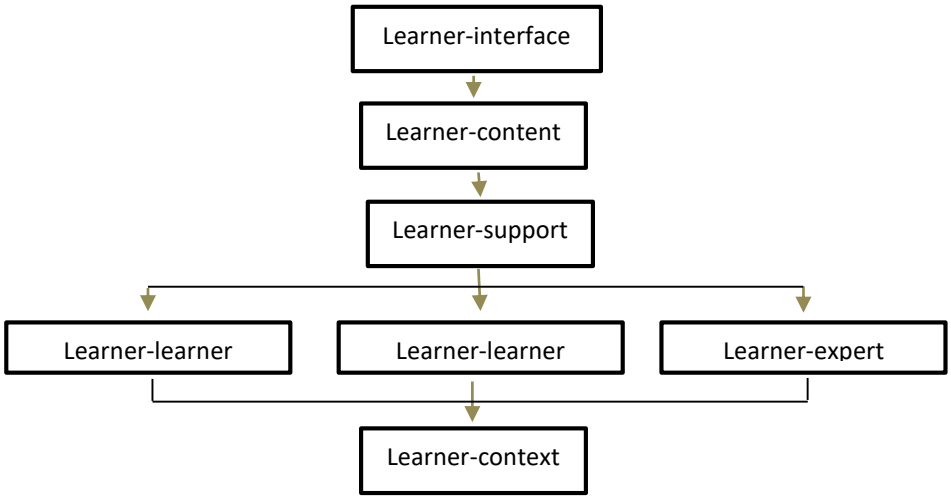
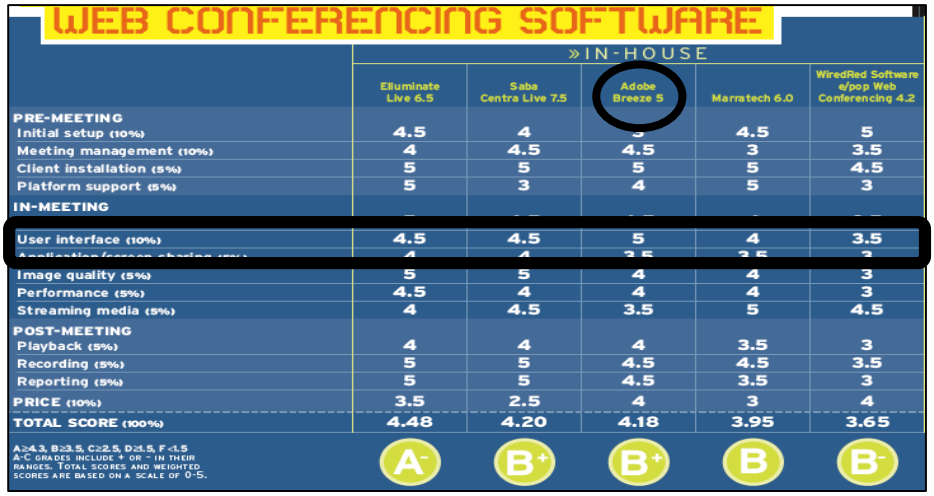


Figure 1. Levels of interaction in online learning

The user interface has a significant impact on social presence in MUVEs. Mwanza (2005) Indicated that good management of virtual classroom should be flexible, the design of interface and control panel allows usability and effectiveness including the main functions of virtual classrooms: broadcasting, coaching, monitoring (Wei, Chen, & Kinshuk, 2012). Three experiments were conducted represented in virtual computer courses to investigate the effectiveness of MUVEs interfaces and templates design, and its impact on the learner's trends to join MUVEs (Cheryan, Meltzoff, & Kim, 2011). Statistical analyses show gender differences in the degree of interest and the expectation of success appear in the very simple-designed classes. The results concluded that MUVEs design template may be a powerful mean for universities to attract a wide range of students, their enrolment in it and increasing their chances of success. Interaction has been examined in the synchronized virtual classroom of 21 post-graduates in education technology program and concluded that there is a need for good and proper design of MUVEs interfaces used in virtual classrooms due to its great impact on both the learner and the learning process (Martin, Parker, & Deale, 2012). There are three general factors that have a significant impact on the student satisfaction for receiving online learning, particularly clarity of the interface design. Thus, the degree of the learners' acceptance of interface design, usability and tools employed in the appropriate time and place are among the key factors contributing to the effectiveness of learning in such environments (Swan, 2001). Adobe connect is distinguished with an effective and usable

interface that contains different shapes of interaction ways and content show methods. A comparative study among five of video conferences programs, one of them was Adobe connect in its old version (Adobe Breeze 5). According to this study, Adobe connect program got the full score 5, regarding user interface, both of Elluminat Live and Saba Live got 4.5 score, as shown in figure 2 (Network Computing, 2006).



WEB CONFERENCING SOFTWARE

	»IN-HOUSE				
	Elluminate Live 6.5	Saba Centra Live 7.5	Adobe Breeze 5	Marratech 6.0	WiredRed Software e/pop Web Conferencing 4.2
PRE-MEETING					
Initial setup (10%)	4.5	4		4.5	5
Meeting management (10%)	4	4.5	4.5	3	3.5
Client installation (5%)	5	5	5	5	4.5
Platform support (5%)	5	3	4	5	3
IN-MEETING					
User interface (10%)	4.5	4.5	5	4	3.5
Application/screen sharing (5%)	4	4	3.5	3.5	3
Image quality (5%)	5	5	4	4	3
Performance (5%)	4.5	4	4	4	3
Streaming media (5%)	4	4.5	3.5	5	4.5
POST-MEETING					
Playback (5%)	4	4	4	3.5	3
Recording (5%)	5	5	4.5	4.5	3.5
Reporting (5%)	5	5	4.5	3.5	3
PRICE (10%)	3.5	2.5	4	3	4
TOTAL SCORE (100%)	4.48	4.20	4.18	3.95	3.65
A≥4.3, B≥3.5, C≥2.5, D≥1.5, F<1.5 A-C GRADES INCLUDE + OR - IN THEIR RANGES. TOTAL SCORES AND WEIGHTED SCORES ARE BASED ON A SCALE OF 0-5.	A-	B+	B+	B	B-

Figure 2. Comparison of Five Video Conferencing software showing superiority of Adobe Connect in terms of Interface

The interface is characterized with efficiency when considering individual differences among students, the different topics of study, teaching strategies and methods of interaction that commensurate with each learning situation. It can be achieved by providing different designs and multiple templates, as confirmed by Perey (2005) after comparing ten of video conferencing software. Adobe Connect software surpassed the other ones through providing available various templates of interaction which was one of the strong reasons for student satisfaction.

Adobe Connect

Adobe Connect is one of the strongest and excellent online video conferences and meetings. It is considered one of the virtual classroom systems that provide simple flexible environment, and quick access to virtual classrooms.

Minnesota has relied on Adobe Connect to hold official online video conferences for students, faculty members, and employees since summer, 2017. Accordingly, Students, faculty members, and employees around the state can start up an online video conference (Minnesota State, 2017). It provides an access for the system using computer in addition to a similar application for mobiles. Adobe Connect adopts various interface templates for virtual classrooms. These templates differ implicitly among each other in terms of providing some tools in different ways of organization, with access to unavailable tools when you need it, since it provides three templates for user interfaces in different design forms, namely: (Lobby- Classroom- Analysis). They differ in the design form of displaying each type of the available tools. This does not prevent its control flexibility and opening other unavailable tools on the main screen during use when necessary. Here is a detailed presentation of the three templates:

Lobby Template

This template is simple to some extent figure 3, in which the screen is divided into two sections at one third to two-thirds basis. The biggest section is allocated for sharing the teacher screen either using a projector or a specific file sharing or even the teacher allowing a student for participation of respective screen. The bottom of the screen allocated for chat tool to facilitate looking at and following it.

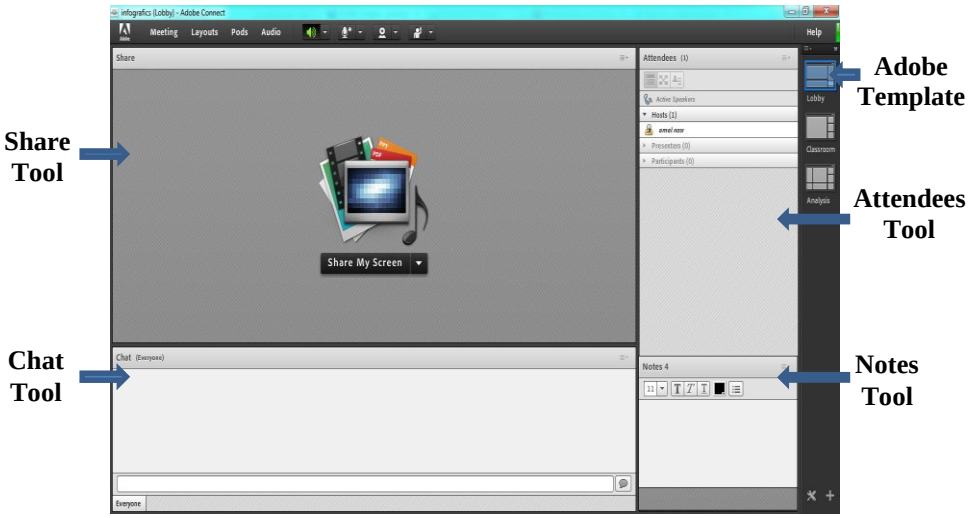


Figure 3. Interface of the Analysis Template

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This template provides four tools, which are the key tools in any virtual classroom Share Tool, Attendees Tool, Notes Tool, Chat (everyone) Tool. This template is characterized by simplicity in the design and allocating the biggest section of the screen for direct display between the teacher and learner to share the content of various resources of learning. When you add a new tool on the screen, you should carefully choose its place, so as not to affect the functions or the clarity of other tools on the screen.

Classroom Template

This template featured by simplicity figure 4, in which the screen is divided into two parts at one third and two-thirds basis. The left part of screen represented in two-thirds or more is allocated for sharing the teacher screen either using a projector or a specific file sharing or even the teacher allowing a student for sharing the respective screen. The right part of the screen allocated for three tools including video, presence and text messaging tools, respectively.

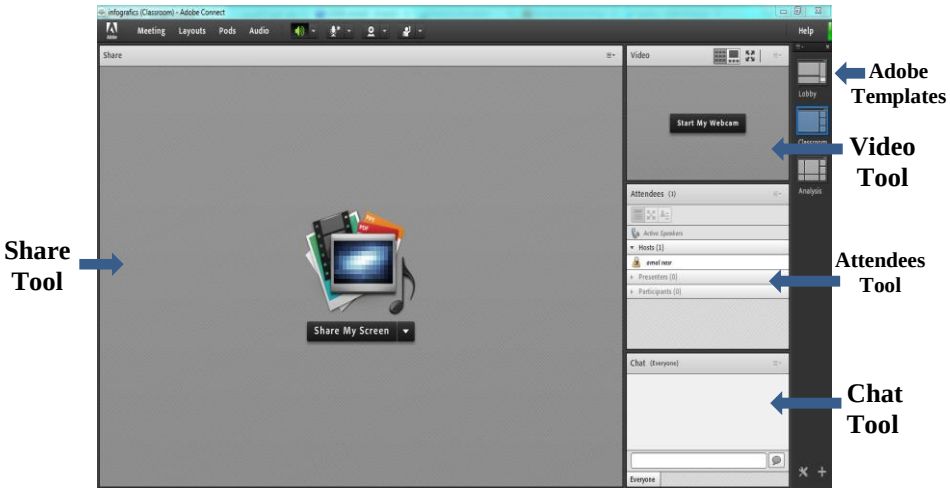

Figure 4. Interface of the Classroom Template

This template offers four tools Video Tool, Attendees Tool, Chat (everyone) Tool, and Share Tool. This template is also characterized by simple design and allocating the biggest section to share all kinds of educational resources between the teacher and the learner in a variety of different ways. The common feature between this template and the Lobby

Template, previously presented, is the design and display of few numbers of tools on the screen and thus both are similar in design simplicity.

Analysis Template

This template includes a larger number of tools that provide various educational functions and practices. The screen is divided into three longitudinal sections figure 5. The largest part is in the middle allowing a sharing window through the whiteboard for writing or drawing shapes to help explaining ideas, where the template can be changed from sharing teacher screen or sharing a document.

This template offers seven tools Video Tool, Attendees Tool, Files Tool, Share (white Board) Tool, Chat everyone Tool, Notes Tool, Poll Tool. In this template, there are multiple tools and varied learning methods and practices between the teacher and the learner through availability of different tools in multiple types of internal interaction by the user. The basic feature of this template is the availability of a large number of interaction tools in the interface and it is the most diversified one in the used ways and methods of learning.

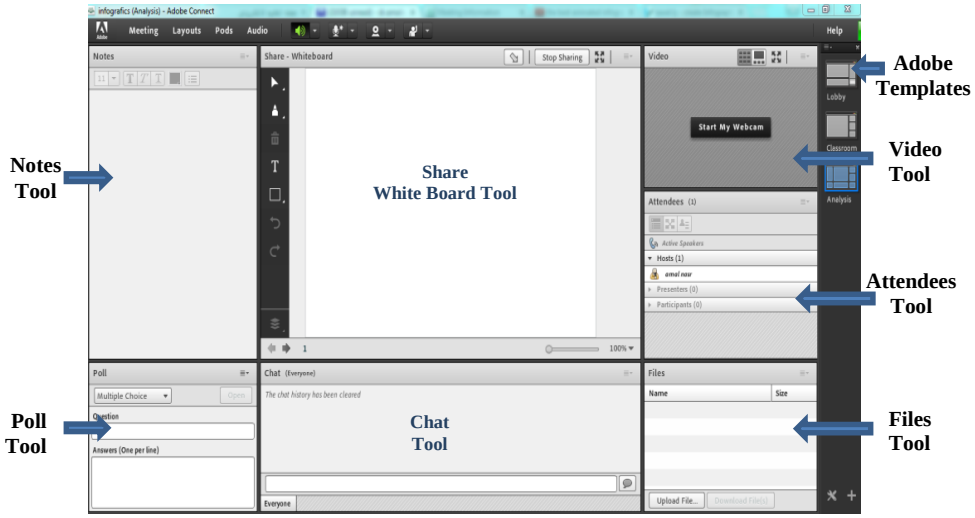

Figure 5. Analysis Template Interface

Through analysis and study of the three templates (Lobby-Classroom- Analysis) in terms of interface design and number of tools built-

in each one, the internal division of the three templates is shown in figure 6. It is noted that there is a significant similarity between Lobby and Classroom templates in terms of design simplicity and the adoption of four, different, interaction tools. Thus, the researchers of this study decided to adopt one of these two templates randomly, only two templates have been chosen from the three ones namely: lobby template as a simple-designed template with four interactive tools, and Analysis template with a composite screen design with seven interactive tools.

Figure 6. The Overall Design of Virtual Classrooms Templates in Adobe Connect.

Relation among variables

Interaction interfaces of virtual classroom templates are a key component of virtual learning environments, in general, as they constitute a means of communication and information building. They are a set of interactive media that enhance learner's participation in the e-learning environment. Thus, they play an active role in engaging the learner in learning practices and achieving its objectives. Interaction interfaces rely primarily on visual inputs and outputs in the learner's interaction with the system or the program. Accordingly, the design and construction of presenting the interaction interface have a significant impact on learning effectiveness in virtual learning environments. There is a very important relation among the independent variables, i.e. the simple template and analysis template as interfaces for the virtual learning environment, which is User Interface Design (UI) and the dependent variables, i.e. learning through the acquisition of information, developing practical skills, and virtual classroom usability by using virtual classroom template, which is User Experience Design (UX). User interface shows how things look, while User experience is how things work (Arora, 2017). Thus, User Experience is consisted of user interface

design or the used template and how the learner feels towards using it, as shown in figure 7 (Siang, 2016).

Figure 7. User Experience.

While UI designers create and design the interactive elements like clickable elements, animations, dropdown menus, and front-end development. UX designers focus on the logic and structure behind the web pages and apps with which the learner interacts. They are primary concerned with how the learner feels towards the product. Within UX, there are two distinct subfields which are research to understand the intended user's needs. After the webpage/ app/ product has launched is the validation phase. UX designers perform product testing, usability and pain point analysis to etermine if the product is reaching its intended goal. Figure 8 shows the relation between UI and UX (Cburges, 2016).

Figure 8 shows that the design scenarios and templates of the interface are key element in the design and construction of interfaces, which have an active role in the following factors:

- Forming knowledge frames for the student, which represent the informative frames of the scientific content.
- Information engineering through which the learner receives skill knowledge and construction of scenarios, which indicate how these skills are applied, implemented and practiced.
- Designing interactions in a way that suits the learner's needs to integrate in the learning environment. It helps facilitate the search processes, access to information sources, which lead to ease of use by the learner.

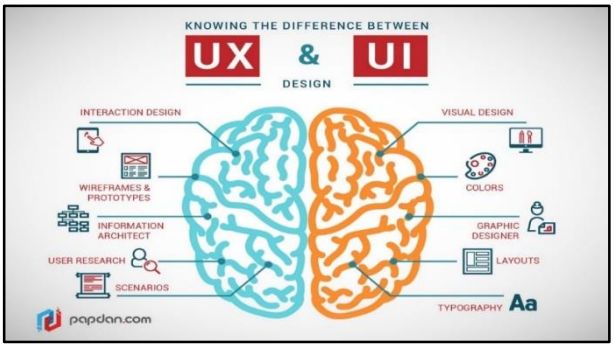

Figure 8. User the Difference between User Interface UI& User experience UX

Research problem and questions

Employing virtual classroom systems has become an urgent matter that cannot be overlooked in the educational institutions, in general, and in university education. Adobe Connect is one of the most prevalent systems in universities. Its virtual classroom templates are important variables that have not been adequately studied. Each template is characterized by several different features and plays a significant role in the success of the learning process. In other words, each template has an impact on many dependent variables related to the educational process, such as cognitive skills and usability. However, there is a limited number of studies that have tested Adobe Connect system and the impact of its templates on various dependent variables of the educational process. Accordingly, the study problem can be presented in the following main question: What is the impact of different virtual classroom templates on the development of cognitive skills of infographic design, production quality, and usability?

It can be further subdivided into the following questions:

1. Do different virtual classroom templates (lobby and analysis) using Adobe Connect affect the development of cognitive skills of infographic design?
2. Do different virtual classroom templates (lobby and analysis) using Adobe Connect affect the level of infographic production quality?
3. Do different virtual classroom template (lobby and analysis) using Adobe Connect affect the usability of instructional infographic for the participants?

Research hypotheses

These research questions have three hypotheses:

1. The simplicity of Adobe Connect virtual classroom and effective usage of its tools will support the individual learning objectives for each student. It will in turn lead to statically significant difference in the development of cognitive skills of infographic design for the interest of lobby template group.
2. The simplicity of Adobe Connect virtual classroom will lead to statically significant difference in the level of infographic quality production for the interest of lobby template group.
3. According to the previous hypotheses, the lobby template students will present a statistical level higher than the analysis template in terms of usability of Adobe Connect virtual classroom.

Research Purpose

The purpose of this research is to study the impact of virtual classroom templates (Lobby and Analysis) on the development of cognitive skills, level of infographic production quality and usability for BA students.

Methodology

The current study is an experimental research that seeks to examine and test the causal relationships. It depends on experiment, experimental variable control (virtual classroom template) and measuring its impact on the development of the cognitive skills, product quality and usability from learners' perspective.

Research Variables

Independent Variables.

The Independent variables of the current research identified in one independent variable, which is virtual classroom template at two levels as follows: Lobby template and Analysis template. Both are different in design, which relies on availability of certain number of virtual classroom tools and layouts on screen in appropriate manner fitting the use and function of each tool within the virtual classroom as follows:

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The Lobby Template

It is a simple template requiring basic teaching strategies in virtual classrooms. It contains four tools: (Share, Attendees, Notes, Chat "everyone"), its use applied on the first experimental group figure 9 the lecture lasted 1.45.

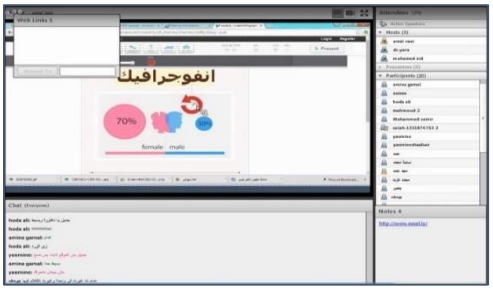

Figure 9. The Interface of the First Experimental Group of the Lobby Template

The Analysis Template

This template is rich in its tools, which are already available on the interface depending on the different ways of interaction and are used in some cases at the same time during practising learning. It requires multiple teaching strategies in the virtual classroom. It contains seven tools as follows: Video, Share-White Board, Attendees, Files, and Notes, Chat "everyone" and poll. It applied to the second experimental group figure 10, and the virtual lecture lasted for 1.57.

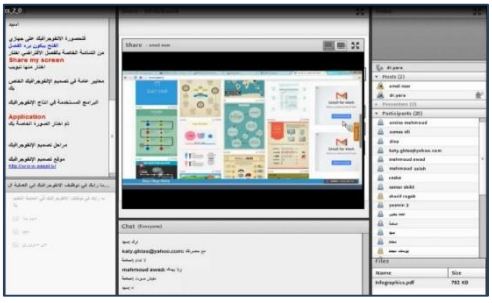

Figure 10. The Interface of the Second Experimental Group of the Analysis Template

Dependent Variables

The dependent variables of the current research identified in three independent variables are Cognitive skills, Production quality and usability.

Experimental Design

The author utilized analysis of variance (ANOVA) including the research experimental design composed of two experimental groups table 1.

Table 1
Research Experimental Design

Experimental groups	Independent variable	Dependent variables
Group (1)	Lobby Template	Cognitive Skills, production quality, and usability
Group (2)	Analysis Template	Cognitive Skills, production quality, and usability

Research Sample

The sample consisted of 40 final-year students enrolled in Multimedia course, Educational Technology program, Faculty of Specific Education, Ain Shams University in the second semester of 2016/2017. They are randomly divided into two equivalent groups, according to the experimental treatment of the research, each experimental group includes 20 students, (22 females and 18 males) has participated in this study at the average age of 21.5 years. Table 2 shows the sample distribution according to the research variables.

Table 2
Distribution of the Participants in the Experimental Groups

Experimental group	Independent variable	Participants		Average age	Number of sample
		females	males		
Group 1	Lobby	11	9	21.6	20
Group 2	Analysis	11	9	21.4	20

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Experimental processing

An electronic lecture about "Instructional infographic" is presented through two templates according Adobe Connect virtual classroom, which are lobby template and analysis template.

Instruments

The current study depends on the following instruments:

Achievement test

An achievement test on instructional infographic is prepared, according to the following steps:

1. Identifying the achievement test objective: the achievement test aimed at measuring the level of cognitive skills of instructional infographic.
2. Preparing the achievement test in its initial form: it is done according to the following steps that (a) identifying the educational objectives, (b) identifying and formulating the test items, (c) score estimation system, (d) test instructions, and (e) test form design.
3. Verifying the achievement test: After preparing the achievement test, the following procedures are taken to verify its validity and reliability: (a) test validity; the achievement test is submitted to educational technology experts to verify the ease and clarity of its items and the relevance of the test questions to the objectives. They agreed on the validity of the achievement test, after making some proposed modification to the order of questions depending on the nature of the educational subject; (b) test reliability; split-half method is utilized to check the achievement test reliability. Spearman Brown coefficients are 0.67, 0.75 and 0.89, respectively. It verifies high reliability of the achievement test.
4. Preparing the achievement test in its final form: The final form of the test is prepared after verifying its validity and reliability. It is applied to the pilot sample to determine the test time, which obtained 15 minutes.

Infographic Production Quality assessment card

An assessment card is prepared to evaluate the final product (instructional infographic), according to the following steps:

1. Identifying the assessment card objective: it aimed at evaluating the final product (instructional infographic), after delivering a lecture to the sample using virtual classroom template (Lobby and analysis).
2. Preparing the assessment card in its initial form: according to the following steps: (a) identifying the specifications list of the assessment card: a set of

the specifications lists of infographic design are utilized, as covered in some relevant studies (Antonova, 2016; Davidson, 2014, p. 37; Davis & Quinn, 2014, p. 16; Kibar & Akkoyunlu, 2014; Lamb & Johnson, 2012, p. 58; Siricharoen, 2013, p. 173 ; Siricharoen & Siricharoen, 2015, pp. 562-563); (b) identifying the domains, criteria and indicators of the assessment card: after reviewing the criteria lists of infographic design in previous studies, the assessment card is formulated in its initial form, consisting of two domains, 7 criteria and 50 indicators; (c) identifying the rating scale of assessment criteria: Rating scales are adopted for evaluating the indicators. A numerical graded scale is prepared consisting of three degrees from 0 to 2. Table 3 illustrates the scale and the significance of each estimation.

Table 3

Rating scale of evaluating infographic design indicators and its significance

The Indicators		
Yes		**No**
2	**1**	**zero**
achieved with a high degree	achieved to some extent	is not achieved at all

3. Validating the Assessment Card: After preparing the assessment card in its initial form, its validity and reliability verified through the following procedures: (a) validity, the assessment card is submitted to educational technology and e-learning experts to express their opinion about it. After making some proposed modification, the assessment card consisted of two domains, 7 criteria and 44 indicators; (b) reliability, to check the assessment card reliability, the researchers calculated: the agreement coefficient: five infographic products randomly selected were assessed by the researchers. With the help of another examiner from the Educational Technology Department, Faculty of Specific Education, agreement coefficient was calculated using Cooper equation, as shown in the following formula:

$$\text{Cooper Factor} = \frac{\text{The number of agreement times}}{\text{The number of agreement times} + \text{The number of non-agreement times}} \times 100$$

Cronbach's alpha: It was calculated using SPSS software. Its value was 0.89, which refers to the high reliability of the assessment card.

4. The final form of the assessment card: after conducting the above-mentioned steps, the assessment card became in its final form.

The scale of virtual classrooms usability

It was prepared according to the following steps:

1. Identifying the emotional-behavioral scope of the scale: the learner likes the virtual classroom template of "Adobe Connect".
2. Preparing the scale in its initial form: it was prepared through the following steps: (a) Identifying the attitude scale based on evidence: attitude scale was selected to prepare the current scale as the most used methods in preparing evidence-based attitude scale; (b) identifying the method of preparing the attitude scale: Likert scale is utilized for its appropriateness to the nature of the current scale; (c) reviewing the literature of attitude scale: a number of attitude scales related to virtual classrooms in general, and user interfaces, in particular, were reviewed (Yoon, 2010; Kiget, Wanyembi, & Peters, 2014); (d) identifying the main domains of the scale: five main domains were identified to measure the usability of virtual classrooms, which are: Learn ability, Efficiency, Memorability, Errors, and Satisfaction; (e) conducting a pilot study: through a panel discussion with faculty members and assistants in the Department of Educational Technology, Faculty of Specific Education, as well as a sample of the targeted group to obtain some items that can be included in the scale; (f) formulating the scale items: In the light of the previous step, the scale items of each domain were formulated, then the selected items were randomly arranged, finally 42 items were formulated to the scale; (g) identifying the rating scale: rating scales and five-pointed Likert scale were adopted. In front of each item, there are five choices beginning with "not applied at all" and ending with "always applied" and asking the examinee to determine his attitude towards each item; (h) setting the numerical weight: the numerical weight of the scale responses is set. High scores of the positive items refer to a high level of usability, while high scores of the negative items refer to a low level of usability; (i) designing the scale form: it is designed electronically through Google Drive service, as the form contained the scale title, the student name, the experimental group number, as well as instructions explain its aims and how to answer its items.

3. Validating the scale: After preparing the scale in its initial form, its validity and reliability verified through the following procedures: (a) validity: the scale is submitted to educational technology and e-learning experts to express their opinion about the scale items appropriateness, relevance to the main aim, and consistency. The agreement coefficient calculated where items with 80% and more agreement percentage were verified and items with lower agreement percentage were deleted. After making some linguistic modification, the scale consisted of 35 items divided into five domains: Learn ability, Efficiency, Memorability, Errors, Satisfaction; (b) scale reliability: the scale was applied to a sample like the target sample, compromising 18 students, after the experimental processing materials were applied to them. The stability scale measured using Cronbach's alpha coefficient, and the alpha value calculated was 0.84 which indicates an increase in the stability scale.
4. Preparing the scale in its final form: After verifying the scale validity and reliability and making the necessary modifications, the scale was prepared in its final form.

Statistical methods

In the current study, t-test is applied to compare the mean of the two groups, and to identify the significance of differences between them.

Procedures

The author clarified the same guidelines for the experiment and how to implement it. He introduced the students to Adobe Connect software (8th version). One week before conduction the experiment, a pre-test was conducted to determine the level of prior knowledge of the sample about the learning topic "instructional infographic". The same is applied on each group in one session, where all members in each group provided with a link to the virtual classroom dedicated to the group as to allow each member to access their respective virtual classroom. The researcher taught the study topic (instructional infographic) for both virtual classroom two groups separately. The other researcher provided the technical support for each group' members. After two days of the experiment, the learners asked to answer the post-achievement test and virtual classrooms usability scale.
The achievement of each participant calculated using the following formula:

Total Score = post-test score - pre-test score

In addition to producing an instructional infographic considering infographic design skills they acquired throughout the virtual classroom.

Data analysis & Results

SPSS V. 22 software was used to analyse the data. Data analysis was conducted to test hypotheses derived from the three research questions. The t-test utilised for independent samples to verify the primary effect of the virtual classroom templates (lobby and analysis templates) on the following dependent variables: (a) cognitive skills; (b) the level of production quality; and (c) usability. The results were presented under each variable from the dependent variables. Moreover, equivalence of variance was calculated between the two groups using t-test for independent samples through a pre-test applied to each of the two groups (T = 0.12). Table 4 shows the mean and standard deviations of lobby template (M= 5.75, SD= 2.31, N= 20), and for the analysis template (M= 6.05, SD= 1.93, N= 20).

T-Test results show that there is no significant difference between both groups before the experiment, which refers to homogeneity of variance between the two groups.

Table 4
T-test for Virtual Classroom in Adobe Connect Template Groups software in the Pre-Test

Group	*N*	*M*	*SD*	*df*	*t*	Sig.
Lobby Template	20	5.75	2.31	38	0.45	0.659
Analysis Template	20	6.05	1.93			

Cognitive skills variable

Cognitive skills for instructional infographic design measured using achievement test. To check the hypothesis of "the simplicity of virtual classroom using Adobe Connect software and the effective usage of its tools support the individual learning objectives of each student, which will in turn lead to significant difference in the development of cognitive skills of instructional infographic design for the interest of lobby template group." The T-test was utilized for independent samples to calculate the degree of achievement for each of the two groups (T = 1.51). Table 5 shows the means and standard deviations for the lobby template group (M=17.55, SD=1.27, N=20), and for the analysis template group: (M=18.02, SD=1.43, N=20).

Table 5
T-test results for Virtual Classroom Template Groups Using Adobe Connect System in Cognitive Skills (score).

Group	*N*	*M*	*SD*	*df*	*t*	Sig.
Lobby Template	20	17.55	1.27	38	1.51	0.510
Analysis Template	20	18.02	1.43			

The T-test results show that there is no statistically significant difference between both experimental groups in terms of the cognitive skills of instructional infographic design.

The level of production quality variable

The level of production quality of instructional infographic were measured using an evaluation card, and to validate our hypothesis of "the simplicity of virtual classroom interface design using Adobe Connect software will lead to statically significant difference in the level of production quality of instructional infographic for the interest of lobby template group.", T-test utilized for independent samples to calculate the degree of the level of production quality for each of the two groups (T= 0.729). Lobby template group means, and standard deviations are shown in Table 6: (M=72.75, SD=8.24, N=20), and for the analysis template group: (M=70.85, SD=8.25, N=20).

The T-test results indicate that there is no statistically significant difference between both experimental groups in terms of level of production quality of instructional infographic.

Table 6
T-*test results for Virtual Classroom Template Groups Using Adobe Connect Software in the Level of Production Quality.*

Group	*N*	*M*	*SD*	*df*	*t*	Sig.
Lobby Template	20	72.75	8.24	38	0.729	0.974
Analysis Template	20	70.85	8.25			

Usability variable

Virtual classroom usability in the two groups was measured through virtual classrooms usability scale. To validate the hypothesis "lobby template students have a statistical level higher than analysis template students in terms

of virtual classroom usability." Independent samples t-test utilized to calculate each group degree of usability (T = 3.83). Table 7 shows the means and standard deviations of lobby template group (M=1.38, SD=21.37, N=20), and for analysis template group: (M=1.58, SD=9.59, N=20).

Table 7
T-test results for Virtual Classroom Template Groups Using Adobe Connect Software in Terms of Virtual Classroom Template Usability.

Group	*N*	*M*	*SD*	*df*	*t*	Sig.
Lobby Template	20	1.38	21.37	38	3.83	0.012
Analysis Template	20	1.58	9.59			

T-Test results show that there are statistically significant differences between both experimental groups in terms of the instructional infographic usability in Adobe Connect in favour of the analysis template.

Discussion

The results of the current study can be summed up as follows:

There are no statistically significant differences between both experimental groups in terms of the first variable "cognitive skills of instructional infographic design", which leads to reject the first hypothesis "the simplicity of virtual classroom using Adobe Connect software and the effective usage of its tools support the individual learning objectives of each student, which will in turn lead to significant difference in the development of cognitive skills of instructional infographic design for the interest of lobby template group". This indicates that virtual classroom template using Adobe Connect, for lobby template with its simple design or analysis template with its compound design has no impact on the development of cognitive skills of the students.

This result indicates to the effectiveness of the virtual classroom using Adobe Connect in general regardless of its presentation template (lobby or analysis templates) in the acquisition of cognitive skills (achievement) for the participants. It has an effective impact on increasing the achievement related to cognitive skills of instructional infographic. The result of the current study is consistent with the results concluded by Cappiccie and Desrosiers, 2011, Falloon, 2012, Karabulut and Correia, 2008, Mosquera, 2017, Scharf, 2015, Teo, McNamara, Romeo, and Gronn, 2015, and Wang, Jaeger, Liu, Guo, and Xie, 2013. E-learning effectiveness depends generally on the degree of interaction between the learners and teacher, learners' adherence and self-

guidance level. The same result is confirmed by Lynch (2002) and Mwanza (2005) as to implement the learning process, in its simplest form, the interface should be designed according the learner's basic needs in the learning process. The two templates offer key interaction tools that facilitate the required interaction in the educational process and learning concepts and knowledge. It has been concluded that attractive and flexible interfaces create alternative channels to motivate the students for effective participation and development of the independent critical thinking (Arias-Masa, Alonso-Díaz, & Cubo-Delgado, 2014). It has been confirmed that there is an increase in the rates of students' performance in achievement tests and decrease in drop-outs compared with previous years prior to applying Adobe Connect on nursing students (Flaherty & Laws, 2014). The study of Yilmaz (2015) showed consistent results by examining the midterm and final tests for a sample consisted of 63 students in computer and e-learning technology. It found that students who attended more than 50% of virtual classrooms lectures (32 students) get significantly higher grades than students who attended less than 50% of the lectures (31 students). Das (2016) emphasized the effectiveness and high rate of learning through virtual classroom tools utilized to enhance teaching and learning activities. Thus, the effective usage of virtual classrooms has a general impact on the development of cognitive skills whatever the template used for the interface.

There are no statistically significant differences between both experimental groups in terms of the second variable "production quality level of instructional infographic", which leads to reject the second hypothesis "the simplicity of virtual classroom interface design using Adobe Connect software will lead to statically significant difference in the level of production quality of instructional infographic for the interest of lobby template group." This indicates that virtual classroom using Adobe Connect for both lobby and analysis templates had no impact on the level of production quality of instructional infographic for the participants.

This result indicates to the effectiveness of the virtual classroom using Adobe Connect in general regardless of its presentation template (lobby or analysis templates) in the participants' achievement of good production quality. It provides a chance to repeat viewing practical statement of the students which enables them of re-watching the educational presentation several times to implement the product in the required manner. In addition, it helped to achieve good quality of instructional infographic production. The experience of GSelling website for training through virtual classroom

confirmed that practical training in represents good opportunities for the learner to focus only on the application and secondary skills contained in practical skills which consequently enhance new knowledge and skills and thus the product quality (GSelling, 2012). Utilizing of Adobe Connect in practical training and advanced practice in work is effective (Cappiccie & Desrosiers, 2011). There is a significant increase in the performance skills of the students of Public Nursing School of the Indian state of Bihar, with respect to health practices for mothers and new-borns. Agrawal, et al. (2016) and Alves, Miranda, and Morais (2017) concluded that there is a positive remarkable relation between the e-system usability, in general, and student skill performance. According to Gedera (2014) and Das (2016), the usage of synchronized virtual classrooms using Adobe Connect allowed the use of multiple templates, generally impact the rate of student active participation in e-learning activities. It is based entirely on cognitive and practical skills for implementing the activity. This is consistent with the results of the current study regarding the lack of differences between the two groups of lobby and analysis templates in the level of product quality.

There are statistically significant differences between both experimental groups in terms of the third variable "virtual classroom usability" in favour of analysis template. It leads to reject the third hypothesis “lobby template students have a statistical level higher than analysis template students in terms of Adobe Connect virtual classroom usability”. This indicates that Analysis template has an evident positive impact on the usability virtual classroom using Adobe Connect. Such impact has a relatively large statistical difference comparing with Lobby Template. Thus, it is better to use and employ Analysis Template in virtual classrooms due to their positive impact on increasing virtual classroom usability using Adobe Connect.

This result shows that the analysis template designed for presenting virtual classrooms using Adobe Connect is characterized by many features related to user interaction standards with computers, interface design and usability by learners. Moreover, it offers many tools related to participation and interaction which are easy-to-access and simple-to-use without any obstacles. On the other hand, analysis template interface is more complex than the lobby one. The results of the current study are consistent with the results of several studies, which focused on measuring the student satisfaction about MUVEs. It necessarily affects facilitating interaction between the learner and all educational process elements through MUVEs as in (Martin, Parker & Deale, 2012). Several studies such as Ballard (2010), Hock, Omar,

Lin, Lin, and Roan (2011), Mahmud (2015), and Melton (2007) measured the degree of satisfaction of the learner about the interface and its usability. All of these studies confirmed that the learner satisfaction about the MUVEs is directly associated with an increased usability through the various offered interfaces. It necessarily has an impact on increasing the student motivation for achievement and engagement within the e-curriculum and the theme of learning. This is consistent with Keller (2005), which concluded that the more the e-system helps resolve the educational tasks through varied educational tools, the more ease of use of the e-system is afforded. In case of receiving cognitive information that require the implementation of specific skills or a set of performances, usability leads to the improvement of performing these tasks.

Yilmaz (2015), which demonstrated the effectiveness of virtual classrooms in increasing achievement motivation among students. Wilaisakoolyong (2015) Asserted that virtual classrooms have a significant impact on increasing the achievement rate and learning effectiveness. The highest three items of the scale of student satisfaction with virtual classrooms have recorded the highest degrees, as follows: (1) freedom to learn at any place and at any time (2) the availability of different tools and templates helps to better understand the content; and (3) convenience and ease of use. These results are strongly consistent with the results of the current study.

Conclusions

The previous discussion indicates that there is no impact of the template of the virtual classroom presentation by Adobe Connect (Lobby and Analysis) on the development of cognitive skills, level of infographic production quality and usability among participants. Accordingly, it asserts the effectiveness virtual classroom presentation by Adobe Connect in general, regardless to the template of its presentation (Lobby and Analysis) in the acquisition of cognitive skills (achievement) among participants. It is due to their effective impact on increasing the achievement associated with the cognitive skills of the instructional infographic, achieving a good level of products where the learner controls the repetition of the practical presentation in both templates, which leads to a good level in the production of instructional infographic.

On the other hand, the study indicated that the analysis template has a clear positive impact on the usability of the virtual classroom by Adobe Connect system among students. It has a relatively higher statistical

difference than the lobby template. Therefore, it is preferable to utilize the analysis template for the virtual classrooms because it has a positive impact on increasing the usability of the virtual classroom by Adobe Connect system, as it affords several ways of accessible and easy interaction and participation.

Implications

Most of the pieces of literature review that have dealt with learning management systems, in general, and Adobe Acrobat connect, in particular, cover the benefits of Adobe Connect to both students and faculty members and its effectiveness in academic achievement. Although there are a number of virtual classrooms templates for Adobe Connect, there is no evidence that any of these templates are easier than the other, especially from the students' point of view.

Our research contribution is to provide results that help teachers choose the Adobe Connect virtual classroom template that achieve usability and facilitate communication between teacher and students as well as among students, contributing to the successful use of synchronized learning systems.

Since attempts to have an ideal virtual classroom may never come to an end, the study may help the developers of Adobe Connect virtual classroom develop new versions that may contain other templates that combine the features available in the three existing templates. It can be so beneficial for students, teachers and the learning process through synchronized learning systems and benefit.

Recommendations and suggestions

The current study recommends using the analysis template of Adobe Connect virtual classroom because of its usability and easy interaction by students.

The results of the current study which explores the impact of different templates of virtual classroom on student learning, are restricted to one of the Egyptian universities, thus providing a limited opportunity for generalizations. Future studies may include the study of other variables that may affect the use of other templates of Adobe Connect virtual classroom in relation to the nature of the learner and the task of learning such as time of learning and beyond knowledge in online learning environments. In addition to conducting a study like the current study, considering the three templates of Adobe Connect virtual classroom.

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