Feedback on Using Virtual Classrooms for Teaching Blended Computer Science and Information Technology Courses at Taif University

Salha M. Alzahrani, & Abdulrahman M. Al-Zahrani

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Salha M. Alzahrani[1]**, and Abdulrahman M. Al-Zahrani**[2]

Abstract: Using technology for teaching Computer Science (CS) and Information Technology (IT) courses is an uncomplicated task because enrolled students are technically skillful and machinery familiar. This paper presents a study of using blended online teaching method for CS and IT courses conducted at the College of Computers and Information Technology (CIT) in Taif University. The courses were directed in 2013 and early of 2014. A total of 42 teaching hours in each course were blended as 31-hour traditional face-to-face classes and 11-hour online classes which were held using the virtual classrooms in the Blackboard. Supporting technology-based activities such as online quizzes, forums and discussions, online assignments submission and feedback were incorporated with the blended learning. Students' reflection and feedback have been obtained and presented in this work using qualitative and quantitative methods. Through a course hashtag on the social networks, students were able to express freely their opinion on learning via the virtual classrooms. The data shows that the students positively express their involvement and understanding during the online sessions. A questionnaire given to a number of students (N=60), using the polling tool in the Blackboard Collaborate tool, shows that above 80% benefit from the online classes.

Keywords: Blended learning, Computer science, Information technology, Online course, Virtual classroom.

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1. Introduction

Using technology for teaching is an inspiring duty for the university professors at this decade. Professional use of technology in a lesson certainly pushes the students to become more involved in learning the new concepts, organizing the course themes, and digesting the key ideas. According to Barnett et al.,

"The inclusion of learning technologies within education in all levels is becoming a reality; it is something institutions, departments, and individual members of staff cannot ignore it" (Barnett, Brunne, Maier, & Warren, 2005).

Technology forces educators to change the way they teach. Meyers & Jones (1993) discussed the strategies of promoting active learning in higher education classrooms. Different teaching strategies such as problem-solving exercises, cooperative student projects, informal group work, simulations, case studies, and role playing are compiled with a wide range of technology tools and media resources available through the World Wide Web (WWW). It is decided that the electronic media specifically can be magnificently integrated with active-learning strategies in the classroom (Meyers & Jones, 1993).

Technology integration into teaching and teacher education has started in early research (Baylor & Ritchie, 2002; Bradshaw, 2002; Vrasidas & McIsaac, 2001). The use of technology in school education was basically initiated by reforming the curriculums and inclusion of technology into teacher education. It was argued that

"for successful technology integration, there needs to be a shift in pedagogical approaches and reform of teacher education programs" (Vrasidas & McIsaac, 2001).

A number of teacher development strategies for technology use have been proposed by Bradshaw (2002). Further evaluation efforts including measures of teacher and student performance have shown that enhancing teachers' knowledge and practice of technology positively improves teaching and learning (Bradshaw, 2002). Another study investigated the factors that facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms (Baylor & Ritchie, 2002). The study concludes that technology integration was predicted by teacher openness to change and the percentage of technology use with others. Teacher morale was predicted by professional development and constructivist use of technology. Technology impact on content acquisition was predicted by the strength of leadership, teacher openness to change, and negatively influenced by teacher non-school computer use.

On the other hand, the best practices to integrate technology into teaching in higher education have been reviewed (Bates & Poole, 2003). A theoretical and pedagogical model to assist instructors in making decisions and technology choices for a learning object was planned. Such technology choice should be based on the relationship between knowledge, learning, teaching, and the nature of technology. The authors introduced a decision model that is based on key criteria for selecting appropriate technologies for teaching in higher education. They also provide guidance for developing and delivering a course using electronic

technology and discuss the organizational and technical support structures that are needed to back up instructors using technology.

The rest of the paper is organized as follows. Section 2 shows studies and concepts related to blended learning and virtual classrooms. In Section 3, we discuss the course preparation and setup which involve the sample courses, the plan of the blended courses used in this study, the introductory remarks given to the students about the virtual classrooms at glance, and finally the construction of test/trial sessions to get the students familiar with the virtual classroom environment. Section 4 investigates the students' feedback and reflection specifically on using the virtual classrooms using qualitative and quantitative methods. Finally, in Section 5 we give conclusions of this paper and remarks towards future directions.

2. Blended Learning and Virtual Classrooms

Blended learning is broadly defined as "replacing seat time in courses with online activities to achieve learning objectives" (VanDerLinden, 2014). In most of the higher educational institutions, blended learning is used as a formal educational scheme in which students learn using traditional face-to-face classes combined with online classes or at least computer-mediated activities. Both types of learning have become the core elements of educational systems in higher institutions (Chou & Chou, 2011). Blended learning models in different disciplines vary in using online activities and technology-based enhanced teaching methods to achievement outcomes (Chou & Chou, 2011; VanDerLinden, 2014). As can be seen in Figure 1, blended learning combines the best of both worlds: the important aspects of human-based learning and technology-based innovations.
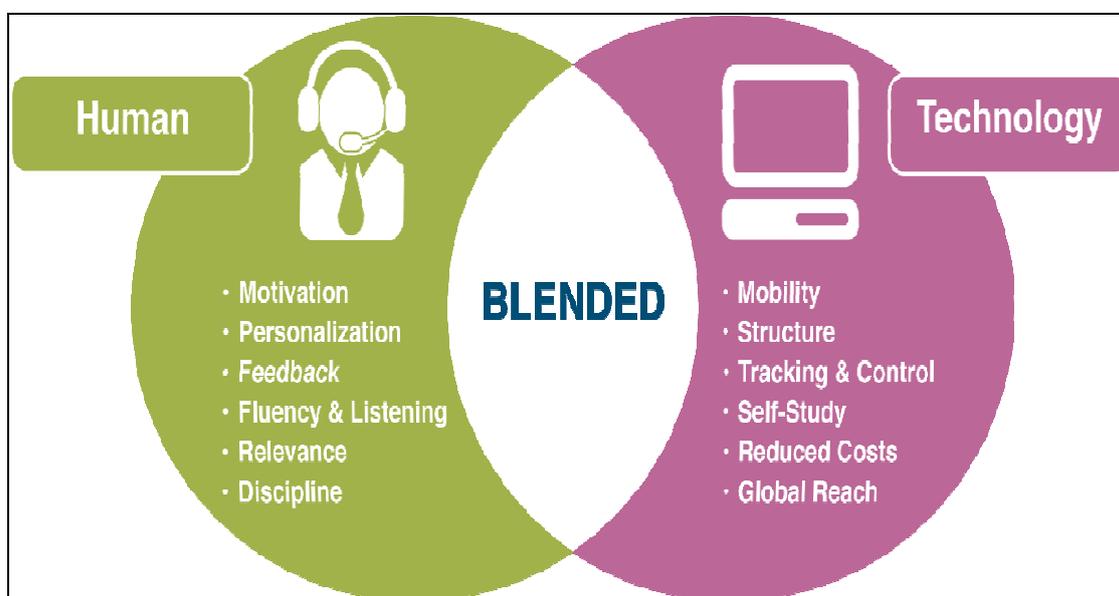

Figure 1: Blended learning as chain of best aspects from human-based learning and technology-based revolution[1]

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(1)   The figure is created by www.globalenglish.com.

The practice of blended learning includes elements like online and traditional learning environments, technology, and media for learning content delivery (Deperlioglu & Kose, 2013). Different teaching and learning methods comprised with learning activities suitable for group and individual, and both of the synchronous and asynchronous interactions are essentially engaged in blended learning, as demonstrated in Figure 2.
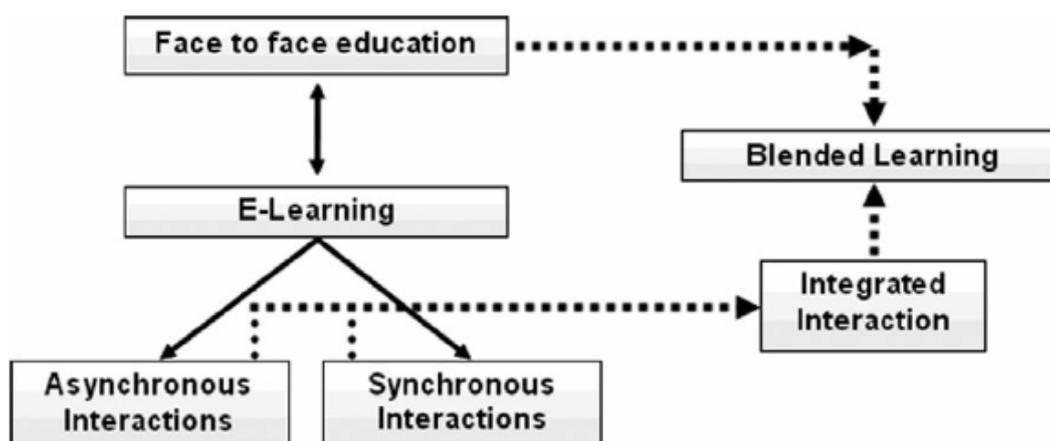

Figure 2: The Practice of Blended learning (Deperlioglu & Kose, 2013)

Using learning management system (LMS) facilitates the interaction among the learners, and the communication and feedback between the leaners and instructors. Different LMSs provide different components for instructors and students but all agreed in providing the means for content upload and organization, communication tools (such as forums, discussion boards, chats, etc.), and learning activities (such as posting assignments, quizzes, feedbacks, etc.). Thus, LMS can be considered as an ideal enabler for blended learning as it makes an important advancement to learning practice (Chou & Chou, 2011).

Amongst many Saudi universities, Taif University makes use of the Blackboard, one of the famous learning management systems (LMS) around the world. The Deanship of E-Learning in Taif University provides the Blackboard LMS service[1] with appreciative support to both of the staff and the students including automatic course openings, student enrollments, and subscription to different tools and courses. Evidences have shown that LMS can help instructors improve the efficiency of course delivery and course management. In the Saudi Arabian context, a study by Al-Qahtani & Higgins (2013) investigated the effect of the three sides: e-learning, blended learning and classroom learning on students' achievement. The study showed that amongst the three learning methods, blended learning has achieved the highest result in terms of students' achievement.

Furthermore, LMS has guided blended learning in many disciplines (Duque et al., 2013; Farley, Jain, & Thomson, 2011; Hsu & Hsieh, 2011, 2014; Kavadella, Tsiklakis, Vougiouklakis, & Lionarakis, 2012) including computer and engineering courses (Deperlioglu & Kose, 2013).

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(1)   Lms.tu.edu.sa.

LMS helps to create virtual classrooms, offices and meeting spaces that open more possibilities to more students, wherever they are. Offering exciting new approaches to learning while involving each student on an individual level.

One of the tools provided in Taif University is the availability of virtual classroom environment through using the Blackboard Collaborate tool. According to the Blackboard official website, Blackboard Collaborate "offers a more collaborative, interactive, and mobile learning experience that constantly evolves, and you'll keep everyone engaged like never before". According to the Encyclopedia of the Sciences of Learning, a virtual Classroom is a private online meeting space for synchronous (real-time) learning activities ("Virtual Classrooms," 2012). Virtual classrooms enable educators to adore the importance of communication and organization in managing virtual caseloads, and monitoring student learning remotely through the effective use of learning management system features. Figure 3 shows the basic components of a virtual classroom.
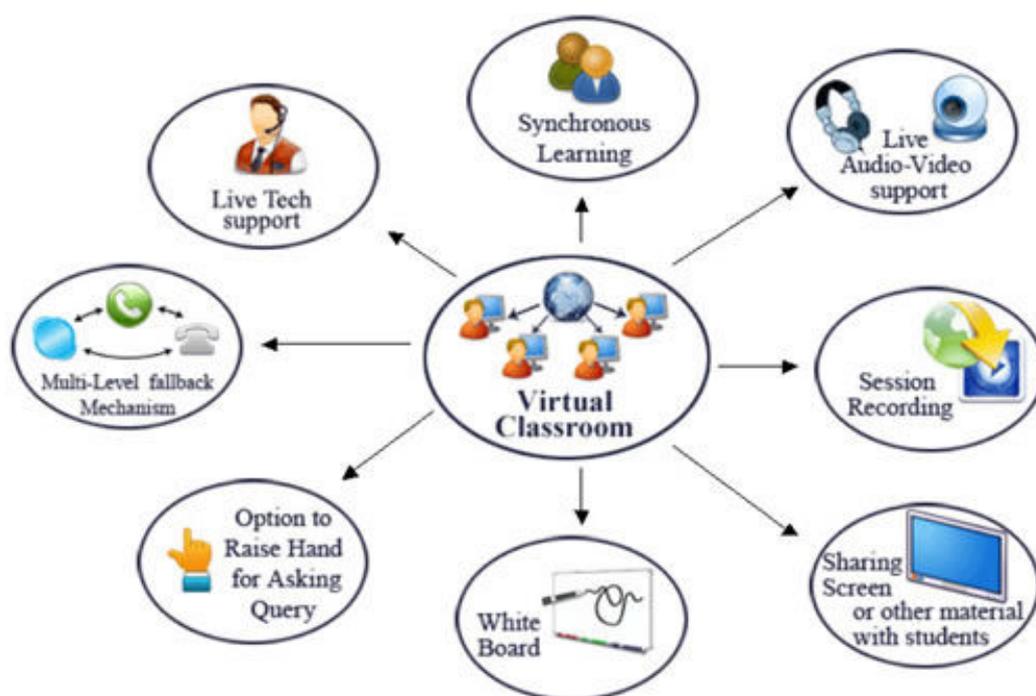

Figure 3: Basic components of a virtual classroom[1]

The protocol of virtual classrooms involves the following steps, as exemplified in Figure 4:
1. The process starts with a request of class information (via the virtual classroom software manager) by the instructor and the students.
2. The query is searched in an institutional class database.
3. The information is retrieved and sent back to the instructor and the student.
4. The content is shared between the instructor and the students, and collaboration can be made among the leaners.
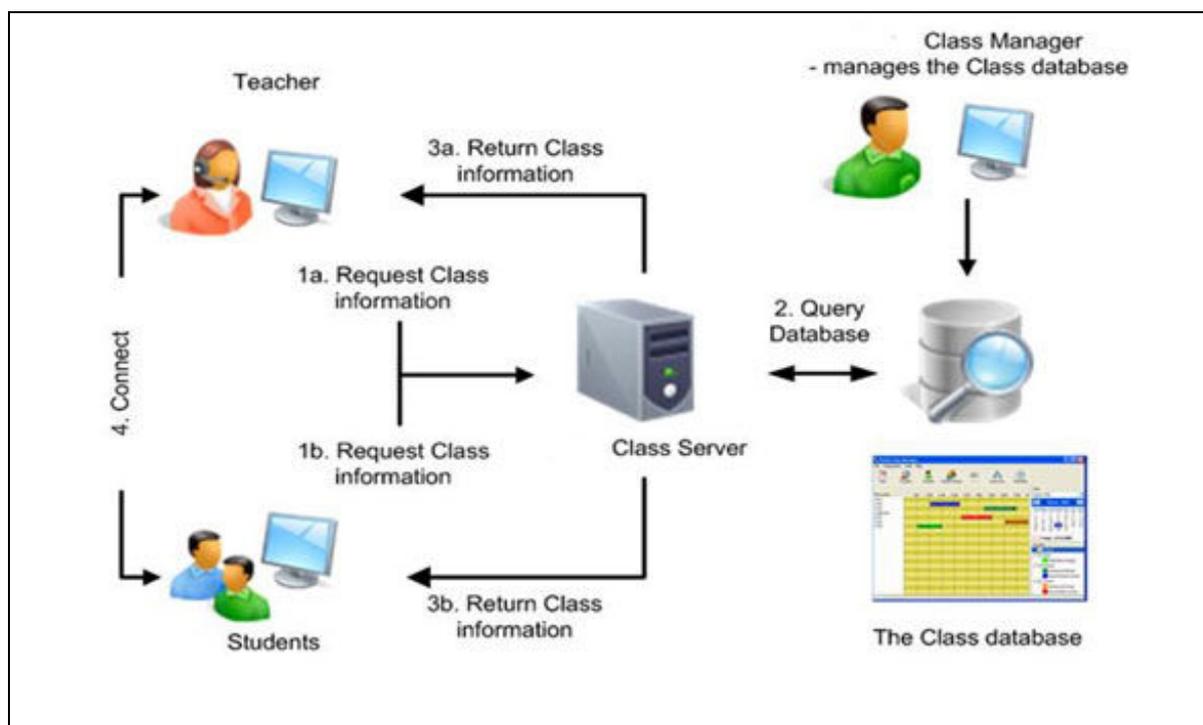
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(1)   Image retrieved from: http://www.timelesslearntech.com/virtual-classroom.php.

Figure 4: Basic components of a virtual classroom[1]

In general, virtual classrooms allow various kinds of verbal and nonverbal communication between tutors and learners (Allmendinger, Kempf, & Hamann, 2009), and in different areas (Upadhyay, Chand, & Chaudhary, 2013). Virtual classrooms help to create an open, education-focused online collaboration platform that provides a wide spectrum of online collaboration tools including web conferencing, mobile collaboration, instant Messaging, voice authoring, and Seamless Integrations.

Other features of the virtual classrooms offered via the Blackboard Collaborate include:
- Use emoticons for interactive online training.
- Instant application sharing during virtual training and classroom sessions.
- Real-time online classroom polls with instant results.
- Raise a hand to ask a question.
- Easy-to-use whiteboard and virtual markup tools for everyone in the classroom.
- Download online classroom presentations as PDF.
- Online training evaluations and tests.
- Breakout rooms for student group exercises.
- text chat where students can type what they would like others to see in real time.
- Shared information where educators and learners can write comments and draw pictures in real time.

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(1)   Image retrieved from: http://www.itiqsolutions.com/products/education/.

- Presentation capability whereby instructors have multiple options for presentation of content from audio/video/multimedia lectures, to self-guided power points.
- Audio to share information with a microphone and speakersblackboard12.jpg.
- Breakout rooms which can be used as a way of breaking the session into or more sub rooms where people can listen to a guest speaker, ask questions, or just interact in a smaller setting.

3. Course Preparation and Setup
3.1 Sample of Study

Two courses were planned to use the virtual classrooms. **The first course** is entitled Web Systems which contained two sections with 44 and 47 enrolled students, respectively. **The second course** entitled Computing Ethics was divided into four sections with the following numbers of students: 35, 38, 72, and 49, respectively. The total number of students in the sample was **285**.

3.2 Plan of Blended Course

The plan of the sample courses was designated to give each section 42 hours of theory classes. The Web Systems course included an additional two hours of lab exercises. Each course in the sample was composed of a blended teaching and learning as follows: 31-hour face-to-face classes plus 11-hour online classes. Such division makes no more than 25% of the total hours to be conducted online according to the regulations by the ministry of higher education (MOHE) in Saudi Arabia. Based on such blend, each section was taught a 2-hour face-to-face lecture via a weekly traditional classroom. Besides, each section was given a 1-hour online class via the Blackboard Collaborate in the same week. The online sessions were usually held after the face-to-face classes. Such online meetings aimed mainly to support the given theoretical concepts, to solve more problems, and/or to introduce and even touch interesting topics or discussions. The plan of the blended courses was stated clearly in the course syllabus given to each student and was described verbally to each section during the first lecture of each course.

3.3 Exploration of Virtual Classroom

Steps to enter the virtual classrooms were all described to the students using Twitter announcements through a course hashtag. Students were guided to explore the components of a virtual classroom. The participants' user interface of Blackboard Collaborate was announced to the students in Twitter as shown Figure 5. Moreover, students were assisted and guided on how to interact with the Blackboard Collaborate virtual classrooms using interaction and emotions tools. Figure 6 shows the picture that clarifies the meaning of different interaction tools which was announced to the students as well.
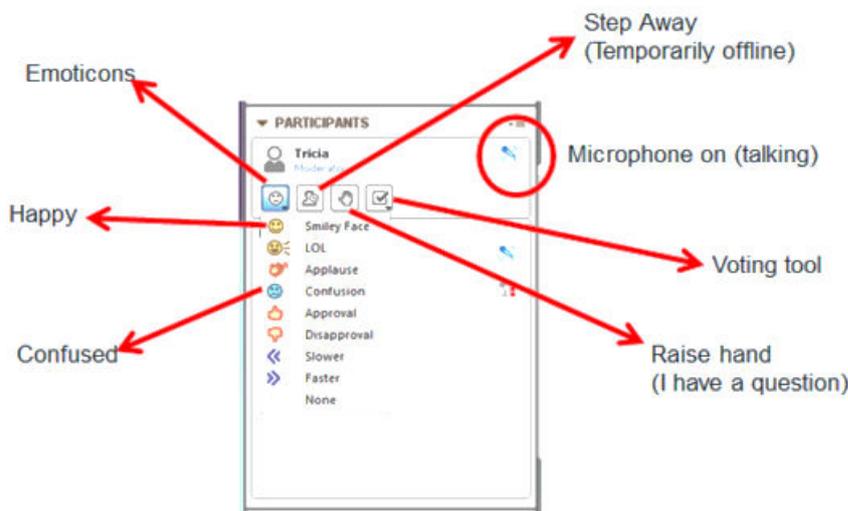
Figure 5: User Interface of Blackboard Collaborate

Figure 6: Blackboard Collaborate Interaction Tools

3.4 Test/Trial Session

After introducing the Blackboard Collaborate to the learners, a test (or trail) session was created in the first week of each course. Students were helped and assisted by the instructor during the office hours to solve problems and download Java in order to run Blackboard Collaborate via the test session. Three simple steps were given to the students in order to open the test session for the first time, as shown in Figure 7. By the beginning of the second week of each course, the learners get ready to use the virtual classrooms successfully.
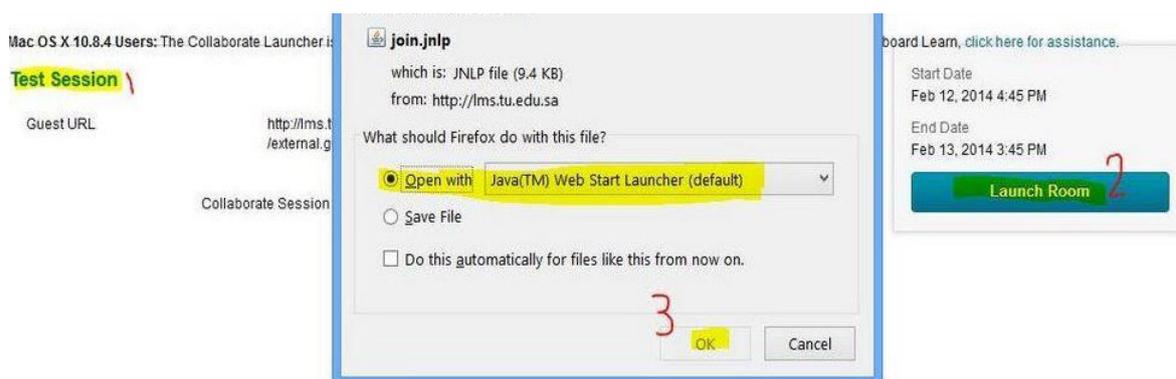
Figure 7: Steps to open Blackboard Collaborate

4. Students' Feedback and Reflection

This section discusses the findings of using virtual classrooms in teaching the abovementioned courses to CS and IT students. We obtained reflection and feedback from the students using two evaluation methods: qualitative and quantitative. The data obtained is mainly aimed at the investigation of virtual classrooms benefits to the learners to support their blended learning. The investigation focused on three factors: understanding, involvement, and weaknesses. In the following, section 4.1 shows the reflection obtained from the students using quantitative methods, whereas section 4.2 explores the qualitative data obtained to investigate the students feedback on using the virtual classrooms.

4.1 Reflection Using Quantitative Method

We used a questionnaire to evaluate the students' understanding of the topics discussed using the virtual classrooms, students' ability to involvement with the virtual class, and the difficulties faced by the students. Such factors were assessed using 7 different questions (or phrases) in the questionnaire (written in English and Arabic for the students). The questionnaire was given to the students using the polling tool available in the Blackboard Collaborate. Using this polling tool, students' responses were obtained concurrently and analyzed instantly. The poll was given after the last online lecture in the Web Systems course, using a session that joins both sections for getting reflection and evaluation. The sample contained about 60 students (52 students enrolled to the session at the beginning, then the number was increased to 62 during the poll).

In the questionnaire, students were invited to enter a choice from A to E to show how much they feel regarding their understanding and involvement in online classes. The evaluation scale was: A: Strongly Agree, B: Agree, C: Neutral, D: Disagree, E: Strongly Disagree. Students can choose one of these options using the polling icon in the interactive window (after the polling option was initiated by the instructor). They were also informed that the selection by each student is anonymous as the instructor can display the poll results only.

Table 1 shows the phrases given to the students and their evaluation in percentages. The phrases 1, 2, 5 and 6 focus on the learners' **understanding factor**. The phrase 3 and 4 focus on the learners' **involvement factor** during the virtual classrooms. Lastly, the phrase 7 investigates the difficulties and weaknesses that the students may face in using the virtual classrooms.

Table 1: Results from Students' Reflection on Using Virtual Classroom (Questionnaire and Data)

	Phrases	Student Evaluation	
1	I am able to understand the main content of during the virtual classroom. أستطيع فهم محتويات الـدرس الأساسية في محاضرة الفصول الافتراضية.	a b c d e None	32/52 (61%) 10/52 (19%) 2/52 (3%) 8/52 (15%)
2	I am able to understand the detailed explanation of each point being covered in the virtual classroom. أستطيع فهم كافة التفاصيل التي يتم شرحها لكل نقطة يـتم تغطيتهـا خـلال الـدرس في الفـصل الافتراضي.	a b c d e None	13/60 (21%) 22/60 (36%) 13/60 (21%) 1/60 (1%) 1/60 (1%) 10/60 (16%)
3	I am able to do in-class exercises/activities during online sessions. أستطيع أداء التكلفيـات والمـسائل التـي يطلـب حلها خلال المحاضرة عن بعد.	a b c d e None	14/59 (23%) 20/59 (33%) 14/59 (23%) 2/59 (3%) 9/59 (15%)
4	I am able to hear the lecturer and understand the talk. أستطيع سماع المحاضر بشكل جيد وفهم النقطة التي يدور الحديث حولها.	a b c d e None	17/58 (29%) 25/58 (43%) 5/58 (8%) 2/58 (3%) 9/58 (15%)
5	The lecture is organized and slides are easy to read and understand. المحاضرة منظمة ومادة العرض (الشرائح) سهلة القراءة والفهم	a b c d e None	44/62 (70%) 7/62 (11%) 2/62 (3%) 1/62 (1%) 8/62 (12%)
6	The lecturer uses display mode then discussion via the virtual classroom. يستخدم المحاضر أسلوب العرض ثـم المناقشة خلال الفصل الافتراضي.	a b c d e None	47/65 (72%) 7/65 (10%) 2/65 (3%) 9/65 (13%)
7	I do not face difficulties in using virtual classrooms. لا أواجـه صـعوبات في اسـتخدام الفـصول الافتراضية.	a b c d e None	52/65 (80%) 4/65 (6%) 3/65 (4%) 6/65 (9%)

4.1.1 Understanding factor

As can be seen from the table, 61% of students strongly agree and 19% agree that they can understand the main content or points being discussed during the virtual classroom. Rationally, the percentage should be the same or reasonably higher for the face-to-face classes. About 3% of the students are neutral and 8% of the students could not respond. Students who were able to understand the detailed explanation of each point being covered in the virtual classroom constitutes 57% of the total, 21% are neutral, and 2% are disagree/strongly disagree. Above 70% of students said that the lecture is organized and slides are easy to read and understand. Besides, they agreed that that lecturer used the display teaching strategy then the discussion via the virtual classroom which basically supports their understanding. Such results are highly encouraging as they show that the learners are able to understand very well through the online classes.

4.1.2 Involvement factor

While 23% are neutral and 3% disagree, 56% of the students are able to do in-class exercises/activities during the online sessions. Above 72% of the students are also able hear the lecturer and understand the talk. The results indicate that the learners can sufficiently involve into the class.

4.1.3 Weaknesses factor

Regarding the third factor, the reported difficulties were very few as above 86% of the students confirmed that they do not face difficulties in using virtual classrooms. Most of these difficulties were reported at the beginning of the online sessions such as downloading Java, or setting up the mobile apps to run the virtual classrooms smoothly.

4.2 Feedback Using Qualitative Method

For more investigation, the students were asked after conducting several virtual classrooms in each course about their impression on using them. The following questions:

" كيف تقيمين استفادتك من الفـصول الافتراضـية virtual classrooms؟ هـل واجهتـي مـشاكل؟ مـاهي انطباعاتك واقتراحاتك للجلسات المستقبلية بإذن الله؟"

were tweeted using the course hashtag and several students were able to respond freely. The students were able to express how much they could benefit from using the virtual classrooms, and describe their problems without restrictions.

Many students responded and tweeted their opinions. One student said "the class was awesome and delightful and we have perceived information quite peacefully at home". A screen shot by another student shown in Figure 8, who said that "It was so nice. I am happy for using new technology and new ways in education as there are no problems in understanding. Thank you so much doctor". Some students said using virtual classrooms is a new experience for them and it was good. They also agreed that there were no big issues/problems during the virtual classrooms, the slides were clear and the sound too.

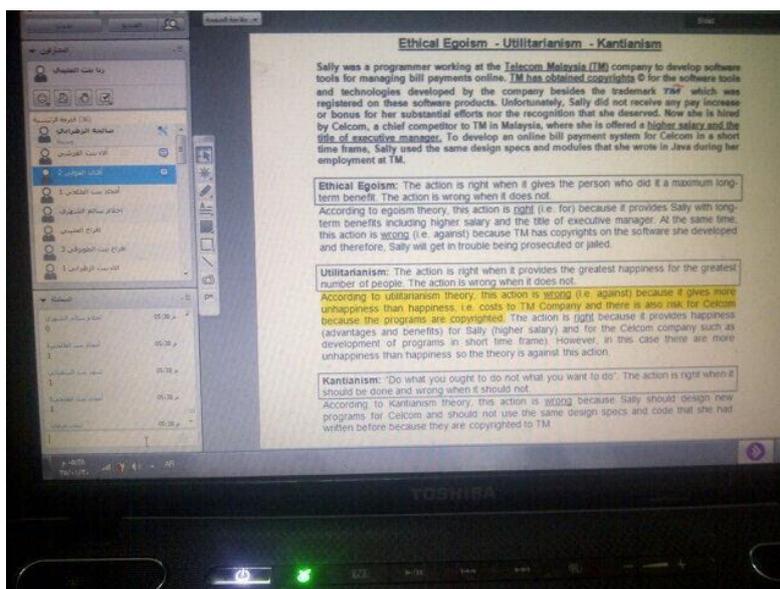Some other responses are shown in Appendix A.

Figure 8: Screen shot during an online session of "Computing Ethics" via Blackboard Collaborate

5. Conclusion and Future Remarks

This paper summarizes an experience of using virtual classrooms in two courses for CS and IT students. A blended course plan was proposed and applied. All learners were encouraged to give their feedback on using online sessions conducted weekly for each session. Students' feedback was greatly promising and reflected their ability of understanding and involvements. Few students face difficulties or express weaknesses in using the virtual classrooms.

Future remarks can be summarized in two points:
- Conducting a minimum of 15% of CS and IT courses online using virtual classroom environment is very useful in order to allow for more active and interactive roles of the learners.
- Deciding which type of instructional activities to be conducted online is critical to achieve full advantages of instructional technology tools.

* * *

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Appendix A: Sample of students responses on Twitter

1	@athbatalmabsam	@SalhaAlzahrani ممتعه ومفيدة جدا اسعدك الله
2	@Reemo0o0o0o0o	@SalhaAlzahrani الله يعطيك العافيه ماقصرتي كانت محاضره ممتعه ومفيده □
3	@Miimx_3	@SalhaAlzahrani "اسعدَكِ اللّ ، عليها تُشكري جداً هادفة جلسة
4	@EN__9	@SalhaAlzahrani. دكتوره آلعافية يعطيك _ لنا بالنسبة جديدة وتجربة حلوة
5	@ReemOufi	@SalhaAlzahrani الحمد لله جدا كانت جميلة ومتعة وتغيير لنا ،أقترح تكون أكثر من ساعة وياليت نعمل وحدة قبل اختبار الفاينل نراجع جميعنا
6	@Ghlaa2022	@SalhaAlzahrani كانت تجربة جمييلة جداً،، نفع الله بك دكتورتي الغالية لكل خير،،كانت أسهل للتواصل والفهم والمناقشة،، استفدت جداً منها..
7	@Fatoo	@SalhaAlzahrani~ يسعدكِ كثير إستفدت التغيير من نوع فيها كان رائعةَ من أكثر
8	@ghaid1993	@SalhaAlzahrani يبغى لها تعودع التركيز والجدية لأن الجو ف البيت ما يساعد انتي تناقشي الأسئلة واخواتي الصغار يناقشوني ف الفصول الافتراضية
9	@CLASSICO_A_	@SalhaAlzahrani جلسة مفيدة ، استفدت منها احس الشرح موجه لي خصوصا. شكرا لتعبك ي دكتورة
10	@o3jobh	@SalhaAlzahrani جميلة جدا يَ دكتوره.. يعطيك ألف عآفية على المجهود الاكثر من رائع
11	@Geedo2012	@SalhaAlzahrani جدا جميله ♥♥ استمتعنا بها واستفدنا كثيررر جزاك الله خيرا ي دكتوره □
12	@nada20135	@SalhaAlzahrani ممتعه ونافعه جدا فيها نوع من التغيير يعطيك العافيه دكتوره
13	@Afnan__3	@SalhaAlzahrani a new experience for me & it was gd , there is no problem the slide was clear & the sound also
14	@aljoman1_	@SalhaAlzahrani أعتذر د. صالحة عن عدم حضوري للجلسة بسبب خلل فني في الشبكة حاولت اصلاحه ولم أتمكن من ذلك إلا بعد انتهاء الجلسة ،، @aljoman1_ @SalhaAlzahrani.. أتمنى أن تقبلي عذري وإذا بالإمكان أن أحضر في جلسة أخرى @aljoman1_ It's ok. You can attend with the other sessions as will be announced later on Twitter

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