THE EFFECTS OF "LIVE VIRTUAL CLASSROOM" ON STUDENTS' ACHIEVEMENT AND STUDENTS' OPINIONS ABOUT "LIVE VIRTUAL CLASSROOM" AT DISTANCE EDUCATION

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ABSTRACT
This study was performed to investigate the effects of live virtual classroom on students' achievement and to determine students' opinions about the live virtual physics classroom at distance learning. 63 second-year Distance Computer Education & Instructional Technology students enrolled in this study. At the live virtual physics classroom, the instructor presented physics lessons. Midterm, final and make-up scores were examined after the LOC instruction. Students who are LOCFF (n=32), joined over 50 % percent and they had significantly higher scores than students who are LOCFR (n=31), joined below 50 % percent to the lessons. According to t-test result, LOCFF group more successfully than LOCFR group (p=.006*). In addition, the interviews carried out with students to determine students' opinions about the live virtual physics classroom and the results were evaluated, classified and discussed several essential considerations about virtual classrooms.

Keywords: Distance education, virtual classroom, live virtual physics classroom

INTRODUCTION
Distance education is a field of education that focuses on, technology and incorporated in delivering education to students who are not physically "on site" to receive their education (Potashnik & Capper, 1998). Distance education is going to become more popular and accepted approach for education in the modern age. Several considerations have led to wide acceptance and sustained growth of distance education in all over the world. First, it is recognized that education is a key factor in economic development and social change (Rashid & Elahi, 2012). Distance education activities are designed to fit the specific context for learning, the nature of the subject matter; need and goals of the learner, the learner's environment and instructional technologies methods.

Use of the web based instruction for educational purposes is widespread and rapidly growing. Thousands of university courses have been developed for delivery entirely via the web. This approach accelerates more colleges and universities urge faculty to create online versions of their courses (Dutton et al., 2002). Online course is one of the most dynamic and enriching forms of distance learning that exist today. Online course is a subcategory of distance education, which has been defined as the formal delivery of instruction in which time and geographic location separate students and instructors (Holmberg, 1989; McIsaac & Gunawardena, 1996; Verduin & Clark, 1991).

A virtual classroom is an online learning environment (Wang & Newlin 2012). Characteristics of online courses are a type of distance education. The delivery format goes by a number of names: e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, or web-based learning (WCET, 2004). Online synchronous learning is, in many ways, similar to a physical classroom. For example, both physical and virtual classrooms allow for immediate feedback, interactions with instructor and peers, and guided exercises to motivate and increase student learning. Collis (1996) outlined four equally compelling advantages of synchronous systems in an instructional context.

• Motivation synchronous systems provide motivation for distance learners to keep up with their peers.
• Telepresence real time interaction fosters development of group cohesion and a sense of community.
• Good feedback synchronous systems provide quick feedback and support consensus and decision-making in group activities.
• Pacing synchronous events encourage discipline in learning and help students prioritize their studies.

With synchronous systems, an instructor can assess students' levels of knowledge and tailor the course material appropriately. In addition, the inclusion of a scheduled time adds the perception (or reality) that the instructor and classmates are providing external motivation and are encouraging students' participation, which can result in higher retention and completion rates (Schullo et al., 2007).

From the student perspective, synchronous systems allow for immediate feedback in the form of "just-in-time clarification and information". This feedback is particularly helpful when dealing with abstract concepts. The

ability to talk with other class participants and instructors in real time can enhance the interaction that other forms of communication cannot (Pan & Sullivan, 2005).

The online virtual classroom has another advantage as interactions which are learner-content, learner-instructor, and learner-learner in the online environment (Hillman et al., 1994; Miltiadou & Savenye, 2003; Moore, 1989; Riel & Harasim, 1994). Synchronous technologies can add value to teaching and learning models, either as a supplement or replacement for face-to-face or asynchronous learning (Schullo et al., 2007). Many researchers have indicated that interaction in the distance course and considered it as an important factor that can influence the success or failure of a course (Kearsley, 1995; Keegan, 1988; Moore, 1989; Miltiadou & Savenye, 2003; Ross, 1996; Tsui, 1996; Vrasidas & McIsaac,1999). Kearsley (1995) find out that a high level of interaction has positive effects at distance learning courses. Moore (1989) examined distance course's interaction types. Tsui and Ki (1996) indicated that students interacted more frequently over the course of the semester, as they became more comfortable using technology and more successfully.
In the light of these findings this study was aimed to investigate the effects of live virtual classroom on students' achievement at distance learning and to determine students' opinions about the live virtual physics classroom at distance education in Istanbul University.

METHODS

Purpose of the research

The purpose of this study is to investigate the effects of live virtual classroom on students' achievement at distance education. In the context of this study, "Is live virtual classroom effective in terms of student achievement at distance education?" research question was investigated and examined.

Participant and procedure

The participant of this study was 63 second-year Distance Department of Computer Education & Instructional Technology students. At the live virtual physics classroom, the instructor presented one-dimensional motion, Newton mechanic, force concept, two-dimensional motion, energy conservation and momentum subjects in each week. Students were able to ask questions to instructor at the misunderstanding points and the instructor had solved physics problems in detailed online with students. In addition, students could follow the recorded lessons whenever they want.

In this study, to investigate the effects of live virtual classroom on students' achievement at distance learning; midterm, final and make-up exam scores of students were examined after the live virtual physics classroom (LVPC) implementation.

In addition, the interviews carried out with students to determine students' opinions about the live virtual physics classroom at Istanbul University. The interviews were recorded and reported by 3 experts. Students' responses were evaluated and similar responses were classified within the scope of the study. Some examples of these responses were presented in the study.

Findings

In order to investigate the effects of live virtual classroom on students' achievement at distance learning, students' midterm exam, final exam and make-up scores were examined in detailed and the results were presented for *Live Virtual Physics Classroom Followers Rarely (LVPCFR)* and *Live Virtual Physics Classroom Followers Frequently (LVPCFF)* groups under the 3.1. and 3.2. sub-headings as follows.

Live Virtual Physics Classroom Followers Rarely (LVPCFR) Findings

In the analysis of the live virtual physics classroom data, *Live Virtual Physics Classroom Followers Rarely (LVPCFR)* group's content following numbers, live virtual physics classroom following numbers, scores and grade frequencies according to months during the semester were determined and graphs were presented.

Table 1. LVPCFR group's numbers of content following, numbers of live virtual physics classroom following, scores and grade frequencies

	Student Score and Grade								Number of Content Following						Number of Live Virtual Physics Classroom Following					
Line	Student Group (LVPCFR)	Midterm Score	Final Score	Make-Up Score	Average Score**	Letter Grade (Final)	Letter Grade (Make-Up)	Result	September	October	November	December	January	Total	September	October	November	December	January	Total
1	R1	65	25	40	48	FF	FF	FF	0	0	2	0	10	12	0	0	1	0	4	5
2	R2	70	40	50	56	FF	BB	BB	9	8	7	0	0	24	0	1	0	0	0	1
3	R3	50	45	70	64	FF	BA	BA	3	13	8	0	12	36	0	0	0	0	0	0
4	R4	60	45	NE*	50	FF	-	FF	0	1	18	1	9	29	0	0	0	0	0	0
5	R5	50	47	67	64	FF	BA	BA	0	8	15	2	10	35	0	0	0	0	1	1
6	R6	45	30	35	38	FF	FF	FF	5	19	7	2	4	37	0	2	0	0	2	4
7	R7	75	60	NE*	65	BA	-	BA	1	5	19	2	6	33	0	0	0	0	0	0
8	R8	55	50	NE*	52	CB	-	CB	0	8	25	0	12	45	0	0	4	0	0	4
9	R9	45	30	NE*	35	FF	-	FF	0	8	11	0	1	20	0	1	1	0	0	2
10	R10	20	25	40	34	FF	FF	FF	0	18	6	0	0	24	0	0	0	0	0	0
11	R11	80	45	60	66	FF	BA	BA	4	1	3	15	2	25	0	0	0	0	0	0
12	R12	35	40	45	42	FF	FF	FF	3	0	3	0	0	6	0	0	0	0	0	0
13	R13	50	75	NE*	68	BA	-	BA	0	3	16	0	19	38	0	1	0	0	0	1
14	R14	70	40	45	53	FF	FF	FF	0	10	25	0	3	38	0	0	0	0	0	0
15	R15	50	67	NE*	69	BA	-	BA	2	17	4	18	3	44	0	7	0	0	0	7
16	R16	45	45	45	45	FF	FF	FF	0	2	9	0	0	11	0	2	0	0	0	2
17	R17	90	20	55	67	FF	BA	BA	2	6	18	6	5	37	0	0	4	1	0	5
18	R18	50	55	NE*	54	CB	-	CB	0	0	2	0	0	2	0	0	0	0	0	0
19	R19	45	35	40	42	FF	FF	FF	4	14	7	2	3	30	0	3	1	2	2	8
20	R20	70	65	NE*	67	BA	-	BA	0	0	39	1	9	49	0	0	9	0	0	9
21	R21	83	20	57	65	FF	BA	BA	4	12	13	0	2	31	0	2	2	0	0	4
22	R22	35	40	50	46	FF	CC	CC	0	0	11	1	0	12	0	0	0	0	0	0
23	R23	40	45	50	47	FF	CC	CC	0	0	9	0	0	9	0	0	1	0	0	1
24	R24	95	52	NE*	64	BA	-	BA	2	14	5	4	0	25	0	0	0	0	0	0
25	R25	82	58	NE*	66	BA	-	BA	0	11	24	3	7	45	0	0	0	1	0	1
26	R26	85	55	NE*	64	BA	-	BA	4	23	15	5	1	48	0	2	2	2	0	6
27	R27	65	30	25	41	FF	FF	FF	2	9	4	0	0	15	0	1	0	0	0	1
28	R28	75	25	45	54	FF	FF	FF	3	4	6	1	5	19	0	1	0	0	0	1
29	R29	75	35	45	54	FF	FF	FF	2	12	3	11	1	29	0	1	1	0	0	2
30	R30	65	20	35	44	FF	FF	FF	0	18	16	3	6	43	0	5	3	2	1	11
31	R31	85	20	57	69	FF	BA	BA	3	5	6	1	0	15	0	1	2	0	0	3
32	R32	60	40	40	46	FF	FF	FF	0	10	9	3	9	31	0	0	0	0	4	4

NE*: Not Entered

Average Score**: 30% Midterm + 70% Final / Make-Up Score

LVPCFR: Live Virtual Physics Classroom Followers Rarely

As seen in Table 1.; when examined LVPCFR group's the lowest and the highest scores were determined. Student who was numbered as 14 followed content and Live Virtual Physics Classroom, 38 and 0 respectively. Student numbered as 30 followed content and Live Virtual Physics Classroom, 43 and 11 respectively. The both of students failed at the distance physics course.

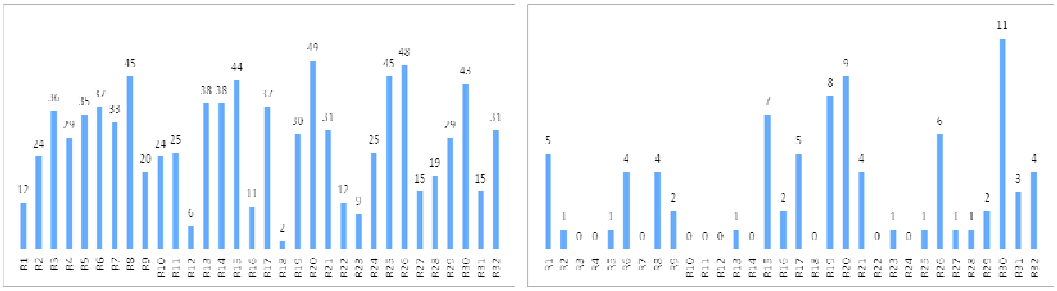

Figure 1. LVPCFR group's numbers of content following, numbers of live virtual physics classroom following, scores and grade frequencies

It was shown in Figure 1, general frequency distributions of LVPCFR Group's Content Following (Total) and Live Virtual Physics Classroom Following (Total) during the semester.

Live Virtual Physics Classroom Followers Frequently (LVPCFF) Findings

In the analysis of the live virtual physics classroom data, *Live Virtual Physics Classroom Followers Frequently (LVPCFF)* group's content following numbers, live virtual physics classroom following numbers, scores and grade frequencies according to months during the semester were determined and graphs were presented.

Table 2. LVPCFF group's numbers of content following, numbers of live virtual physics classroom following, scores and grade frequencies.

	Student Score and Grade								Number of Content Following						Number of Live Virtual Physics Classroom Following					
Line	Student Group (LVPCFF)	Midterm Score	Final Score	Make-Up Score	Average Score**	Letter Grade (Final)	Letter Grade (Make-Up)	Result	September	October	November	December	January	Total	September	October	November	December	January	Total
1	F1	65	50	NE*	55	CB	-	CB	0	17	12	18	3	50	0	4	4	20	0	28
2	F2	45	25	35	38	FF	FF	FF	0	1	27	0	24	52	0	0	0	0	1	1
3	F3	60	60	NE*	60	BB	-	BB	11	26	45	16	4	102	0	0	1	3	0	4
4	F4	55	30	50	52	FF	CB	CB	2	19	28	4	21	74	0	7	7	1	0	15
5	F5	80	75	NE*	77	AA	-	AA	2	19	19	15	9	64	0	11	5	2	0	18
6	F6	90	40	75	80	FF	AA	AA	3	19	22	23	15	82	0	3	7	5	3	18
7	F7	70	45	55	60	FF	BB	BB	1	2	47	10	34	94	0	1	5	11	4	21
8	F8	70	55	NE*	60	BB	-	BB	7	28	35	13	15	98	0	3	10	3	0	16
9	F9	91	42	74	83	FF	AA	AA	13	30	16	26	0	85	0	4	0	13	0	17
10	F10	70	40	30	49	FF	FF	FF	12	20	26	14	1	73	0	4	0	10	0	14
11	F11	60	60	NE*	60	BB	-	BB	9	28	9	9	7	62	0	0	0	2	1	3
12	F12	75	65	NE*	68	AA	-	AA	12	27	36	15	4	94	0	16	9	13	0	38
13	F13	90	30	35	52	FF	FF	FF	17	20	34	3	4	78	0	5	0	0	1	6
14	F14	89	42	73	84	FF	AA	AA	8	8	25	29	12	82	0	2	4	2	4	12
15	F15	90	40	73	79	FF	AA	AA	10	31	4	4	3	52	0	10	0	3	0	13
16	F16	90	38	75	80	AA	AA	AA	0	2	15	47	1	65	0	0	5	1	0	6

17	F17	50	40	40	43	FF	FF	FF	3	21	18	9	0	51	0	4	3	6	0	13
18	F18	45	25	30	35	FF	FF	FF	6	7	17	7	18	55	0	1	5	0	13	19
19	F19	60	25	30	39	FF	FF	FF	15	19	28	0	4	66	0	0	0	0	2	2
20	F20	60	50	NE*	53	CB	-	CB	16	8	27	2	8	61	0	0	0	5	7	12
21	F21	60	40	50	53	FF	CB	CB	0	2	24	11	27	64	0	0	2	4	1	7
22	F22	65	50	NE*	55	CB	-	CB	0	55	9	0	17	81	0	21	0	0	2	23
23	F23	60	45	NE*	50	FF	-	FF	0	33	13	12	8	66	0	6	3	6	0	15
24	F24	65	40	50	55	FF	CB	CB	19	16	28	6	6	75	0	8	12	0	2	22
25	F25	60	55	NE*	57	BB	-	BB	0	14	32	13	23	82	0	1	5	1	1	8
26	F26	50	25	50	50	FF	CB	CB	8	18	21	8	20	75	0	1	7	3	5	16
27	F27	78	80	NE*	81	AA	-	AA	6	21	19	4	2	52	0	4	8	1	0	13
28	F28	82	74	NE*	77	AA	-	AA	9	15	18	15	11	68	0	0	1	5	0	6
29	F29	30	25	30	30	FF	FF	FF	2	16	20	12	5	55	0	0	9	5	4	18
30	F30	90	72	NE*	79	AA	-	AA	14	26	24	17	16	97	0	9	4	9	6	28
31	F31	60	55	NE*	57	BB	-	BB	5	10	13	15	17	60	0	1	0	1	6	8

NE*: Not Entered

Average Score**: 30% Midterm + 70% Final / Make-Up Score

LVPCFF: Live Virtual Physics Classroom Followers Frequently

As seen in Table 2; when examined LVPCFF group's the lowest and the highest scores were determined. The student who was numbered as 2 followed content and Live Virtual Physics Classroom, 52 and 1 respectively. The student numbered as 12 followed content and Live Virtual Physics Classroom, 94 and 38 respectively. While student 2 failed at distance physics course, student 12 finished physics course with the highest score.

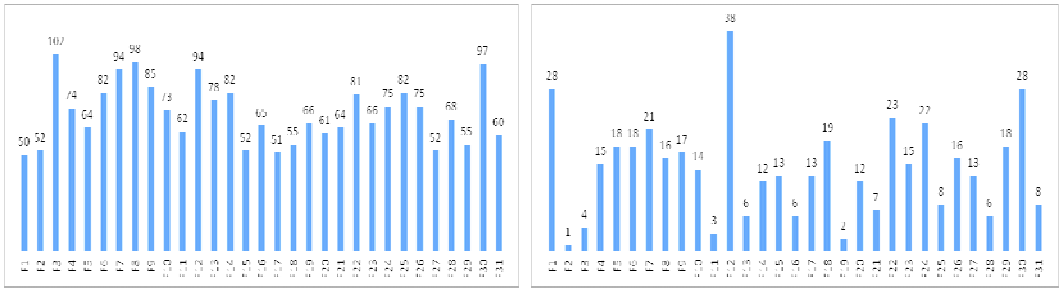

Figure 2. LVPCFF Group's content following (total) and live virtual physics classroom following (total) frequencies during the semester as scale.

It was shown in Figure 2, general frequency distributions of LVPCFF Group's Content Following (Total) and Live Virtual Physics Classroom Following (Total) during the semester.

Table 3. Comparison of LVPCFR and LVPCFF groups' scores of students' according to independent group t-test results.

Groups	Mean	N	Std. Deviation	Std. Error Mean	Independent group t test		
					t	SD	p
LVPCFR	49,12	31	17,006	3,006	-2,859	61	,006*
LVPCFF	65,74	32	27,980	5,025			

As shown in Table 3.; LVPCFF group had significantly higher mean score (65,74) than LVPCFR group's mean score (49,12) during Live Virtual Physics Course and independent group t-test results showed that there was statistically significant difference between LVPCFF and LVPCFR groups' scores (p= ,006*).

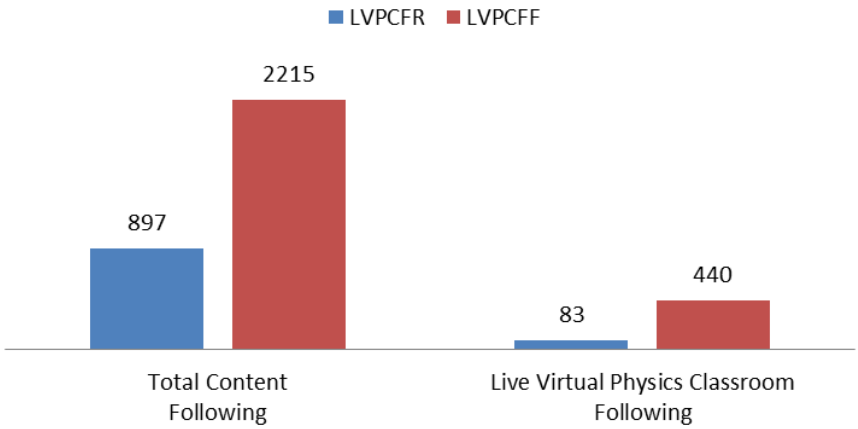

Figure 3. The comparison between the LVPCFR and LVPCFF groups were presented according to general frequency distributions of content following (total) and live virtual physics classroom following (total) during the semester.

In addition, the comparison between the LVPCFR and LVPCFF groups were presented according to general frequency distributions of Content Following (Total) and Live Virtual Physics Classroom Following (Total) during the semester in Figure 3.

Interview Findings

There are three open-ended questions in the interview form, which are as follows: (1) "What do you think about the live virtual physics classroom?", (2) "Which factors effected your success in the live virtual physics classroom? and (3) "Which points of the live virtual physics classroom did you like the most?". Some examples of data obtained in the analysis of the responses are briefly listed below:

"Although the physics lessons are boring and difficult, I enjoyed the lessons and it encouraged me to do my homeworks"

"It effected my understanding the subject to be part of solving problems during the live virtual physics classroom"

"It was the most important factor of the live virtual physics classroom on my success that I could follow lessons over and over again"

"The instructor solved problems about the subjects and I could asked my questions to him whenever I need at the live virtual physics classroom"

When the similar responses obtained in the interviews are classified, two main opinions become prominent, as follows: (1) Live virtual classroom is highly desirable and (2) To be able to access the recorded live virtual physics classroom at any time by students were the most important factors of students' success. These results indicate that the students were generally positively affected by the live virtual physics classroom at distance education.

CONCLUSION

The purpose of this study is to investigate the effects of live virtual classroom on students' achievement at distance learning. In order to investigate the effects of live virtual classroom on students' achievement at distance education, students' midterm exam, final exam and make-up scores were examined in detailed. According to data analysis, it was found that LVPCFF group had significantly higher mean score (65,74) than LVPCFR group's mean score (49,12) during The Live Virtual Physics Classroom and independent group t-test results showed that there was statistically significant difference between LVPCFF and LVPCFR groups' scores (p= ,006*). According to the findings, it was seen that LVPCFF group more successful than LVPCFR group.

According to the interviews results, it was seen that students had two main opinions as follows: (1) live virtual classroom is highly desirable and (2) To be able to access the recorded live virtual physics classroom at any time by students were the most important factors of students' achievement. These results indicate that the students

were generally positively affected by the live virtual physics classroom at distance education. As mentioned before, live virtual classroom has the advantage of being able to show an image of the speaker, three dimensional objects, motion, and preproduced video footage. The unique advantage of live virtual classroom is that they provide for two-way interaction between the instructor and the students (McIsaac & Gunawardena, 1996). According to data analysis and student's interview results support to importance of live virtual classroom on distance education.

As indicated at previous researches, an important advantage in using recorded live virtual classroom is that students can exercise "control" over the programming by using the stop, rewind, replay, and fast forward features to proceed at their own pace. Recorded live virtual classroom is also a very flexible medium allowing students to use the recorded live virtual classroom at a time that is suitable to them. Students can repeat the material until they gain mastery of it by reflecting on and analyzing it (McIsaac & Gunawardena, 1996). According to Jason (2001), students view the use of the virtual classroom as an ease of accessibility. It is much easier with the information posted on the Web because it is available 24 hours a day. Distance learning courses can be done anywhere and at any time. Students can view this information without having to contact the instructor (Posey et al., 2010). In this context, data analysis and student's interview results show that providing the recorded live virtual classroom in distance education has positively effected on students' success. As shown in this study, our findings support previous works of researchers (Miltiadou & Savenye, 2003; Potashnik & Capper, 1998; Riel & Harasim, 1994; Verduin & Clark, 1991; Vrasidas & McIsaac, 1999) about importance of live virtual classroom and it is clear that the live virtual physics classroom has played a critical role in students' achievement at distance education.

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