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Comparing the Effectiveness of Using Tablet or Desktop PC in Video-Supported Education

By

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Abstract

Software courses include a variety of mathematical, technical or graphical skills. Therefore, students need to accomplish different educational practices to be successful. They should struggle with the fast paces of the lectures during the active course times. It is always hard to both understand the theoretical content of coding and use it to create practical solutions. Video records of the lectures can be used as supportive instructional technologies to improve the software skills of the students. In this concept, the main purpose of the study was defined as comparing the effectiveness of Using Tablet or Desktop PC in Video-Supported Education. This is a part of scientific Project (Project Number: 2012-09-03-KAP1) financially supported by Scientific Research Project Office of Yildiz Technical University. It was conducted in two different video-supported software courses at undergraduate level. The effect of students' access to video lectures via tablet or desktop computer is investigated in 15 weeks in total. The application was used in Programming Languages Course at undergraduate 2. Grade and in Multimedia Design Course at undergraduate 3. Grade. 15 videos for each course, 30 video lecture records in total, were published on http://www.ytuavitab.com website which was prepared and developed by researchers. The obtained findings demonstrated that the academic success of the students who accessed video lectures via Tablet PC were significantly higher than the other students for both Multimedia Design and Programming Languages Courses. The obtained finding can be explained as Tablet PC usage can be performed independently of the current environment.

Keywords: *Video records, tablet PCs in education, software education, mobile learning*

1. Introduction

Following practical steps in software education is always a major problem for university students. Complexity of technical content forces them to take down notes instead of listening to their lecturers during course hours (Yoon & Sneddon, 2011). Additionally, due to overcrowded classrooms, many schools and universities face difficulties in creating educational environments based on healthy communications between lecturers and students (Koile et al., 2007). Preparing and using video recordings of the lectures might be a remarkable solution to these problems. In this regard, important scientific studies about video lectures (Sharman, Hogan, & Cooke, 2010; Copley, 2007; Chandra, 2007) were conducted in recent years.

In their study, Sharman, Hogan, and Coooke (2010) used lecture records in law education and investigated the relationship between course content and video lecture activity. Data from the study were collected using qualitative methods, including observations and interviews. The most remarkable result from the study was that participants preferred to be in class rather than following a course through interactive videos. In their study conducted at the University of Houston, Subhlok, Johnson, Subramaniam, Vilalta, and Yun (2007) tried to create a blended learning environment. In graphic design and software engineering courses, they recorded the screens of tablet PCs of the lecturers. These screen recordings were enriched with audio recordings of the presentations. At the end of the semester, all the recordings were shared with the students through an online content management system named VNET, and the thoughts of the students about the recordings were reviewed. It was found that many students showed positive responses to this implementation. At this point, it can be mentioned that using video lectures for technical course contents might be more effective than using the same technology for

different theoretical contents. Similar results can be found from the studies of Hoganson and Lebron (2007) and Hoganson (2009). In these studies, the technical and pedagogical effects of using videos in computer science were investigated and suggested the use of recordings as support tools for in-class presentations.

Academically, different students with various individual needs exist in today's classrooms. The increasing number of students needing different and personalized attention increases the pressure on teachers to meet students' expectations. Students are disappointed when teachers use one-size-fits-all methods in the classroom. As discussed above, two main effective approaches for meeting different learners' needs include video lecturing and mobile devices. Video lecturing provides personalized learning environments, while mobile devices give students the opportunity to access videos at any time and from anywhere.

Personalized learning is a pedagogical approach that aims to meet the needs of diverse learners (Looi et al., 2009). Rudd (2008) stated that personalization should "increase learner choice and voice" where learners have greater control. Nowadays, students are active in designing their education. Students are "subjects," as opposed to "objects" (Looi et al., 2009). This means that personalized learning provides greater diversity, participation, and responsibility for students who have different learning styles (Rudd, 2008).

According to Rudd (2008), a successful personalized learning environment will offer students individual learning routes and develop them into active and responsible learners. For this reason, students will have more platforms to "demonstrate and access wide-ranging skills and knowledge that may fall outside the current 'core' content of the course and/or exist in sites outside schools" (Green, Facer, Rudd, Dillon, & Humphries, 2005, p. 15). Video lecturing provides personalized learning environments to students. When students use video records of courses after the lesson to review, teachers can provide different lessons, and students are able to personalize their learning experiences in many ways by using independent devices. The pace of lectures, especially the fast pace of software training courses, is always seen as a major problem by undergraduate students. Students in overcrowded classrooms often feel that the fast pace of the lecture and the difficulty of the content require them to split their concentration between trying to understand the content of the lecture and writing down detailed notes to make sense later (Yoon & Sneddon, 2011). Subhlok et al. (2007) presented a hybrid model to teach computer science courses. Based on this model, lectures were recorded as video using tablet PCs in a live class and made available to students through Internet streaming since there were limited classroom interactions among students and teachers. According to the results, the students considered video lectures a critical resource, giving them a status equal to that of a live class. Also, video lectures naturally become an important component of learning and preparation for exams.

The number of students who own mobile devices, including tablet PCs and mobile phones, increases every day, indicating a desire to use those personal learning tools in courses to increase collaboration and access to resources. Traxler (2007) relates that "mobile learning offers a perspective that differs dramatically from personalized conventional e-Learning in that it supports learning that recognizes the context and history of each individual learner and delivers learning to the learner when and where they want it" (p. 7). Mobile technologies make available learning contexts and environments to meet the needs of individual learners.

Mobile technologies have the potential to improve personalized learning because of their unique characteristics in two aspects (Song et al., 2012): first, learning occurs in environments that move with the learners, and second, learning is more personalized in continually reconstructed contexts (Looi et al., 2013). With respect to the first aspect, learners can physically move their own learning environments as they move (Barbosa & Geyer, 2005). Regarding the second aspect, learning becomes more personalized in learner-generated contexts because learners have increasing control over their learning goals achieved

through the support of personalized mobile technologies (Jones & Issroff, 2007; Sharples et al., 2007; Wong et al., 2011 as cited in Song et al., 2012).

Out-of-school access to learning resources through the Internet has increased the chances of personalized learning and continuity of learning between home and school has and enhanced learner independence and motivation (Kerawalla et al., 2007; Livingstone, 2007). For example, Song and Fox (2008) performed a one-year multiple case study investigating how undergraduate students used smartphones to support their English vocabulary learning anytime, anywhere. In the study, three individual students from different disciplinary studies participated. The research results indicated that the students had a variety of smartphone uses based on their own learning goals, developed personalized ways of vocabulary learning, and increased their efficiency in their academic studies. Tablet PCs, like mobile devices, have been increasingly used in undergraduate courses to create recorded lectures that are close copies of live lectures. Yoon and Sneddon (2011) observed students using recorded lectures in two undergraduate mathematics courses. They investigated patterns in their use of recorded lectures and live lecture attendance, how and why they used recorded lectures, and how this use was associated with their final grade. The results suggest that the practice of missing live lectures was intentional because the recordings were available and was not associated with the final grade.

Mock (2004) used a tablet PC to teach a computer science (CS1) course and a software engineering (SWE) course. The SWE course primarily consisted of PowerPoint lectures, while the CS1 course consisted primarily of handwritten material. For both courses, the tablet PC was used in the classroom as a digital whiteboard by connecting it to a data projector. The researcher described how the tablet PC could be used as an effective tool for grading, preparing lectures, and delivering classroom presentations. It provides a simple way to integrate live, handwritten material with slides and figures prepared in advance. Lectures can be easily captured for viewing at a later time. Students gave positive feedback about the approach. Faculty members at the University of Washington have used the Classroom Presenter system based on tablet PCs. The system allows an instructor to lecture from a tablet PC that communicates wirelessly through a server connected to a data projector. This allows the instructor to move freely in the room and allows students to write comments that are visible to everyone in the class. Surveys indicated that students paid more attention, understood material better, and encouraged other faculty to also use tablet PCs (Anderson et al., 2004). Hoganson (2009) studied the use, effectiveness, and acceptance of graduate computer science course lectures recorded and formatted for mobile devices, including video iPods, PDAs, and ultra-mobile PCs (UMPC). Technological devices allow students to participate live in class discussions from anywhere that they have connectivity using Wi-Fi, mobile broadband, or wired LAN. Students found a conventional laptop to be most effective for both synchronous and asynchronous distance learning. Also, the increase of students' use of asynchronous lecture viewing from 2002 to 2008 confirms the effectiveness of recorded lectures. Koile et al. (2007) discussed the latest developments for a wireless pen-based classroom interaction system, Classroom Learning Partner (CLP). CLP consists of a network of tablet PCs and software for posing questions to students, interpreting their handwritten answers, and aggregating the answers into equivalent classes. Researchers stated that the use of CLP improves student learning, especially among students who might otherwise be left behind. Simon et al. (2004) developed a further system as an extension to the Classroom Presenter, a tablet PC–based presentation system. In this system, students are equipped with tablet computers and, at various points during the lecture, are asked to solve a problem or respond to a question. Students respond by writing their solution on the tablet and submitting it wirelessly to the instructor. Researchers described their experiences using the system in two classes (CS1 and Computer Ethics) at the University of San Diego in fall 2003. Simon et al. (2004) found that the system supports active and collaborative learning activities in the computer science classroom. With this system, students learn common mistakes and a wide variety of solutions to the same or different problems. Subhlok et al. (2007) presented a hybrid model to teach three different computer science courses. Lectures are recorded using tablet PCs in a live class and made available to students in hybrid sections with Internet streaming. The classroom is used for review of lecture material, examinations, and demonstrations. The hybrid

framework is particularly suitable for students with logistical difficulties, that is, conflicting work schedules. Based on the results, tablet PCs offer a good way to record and deliver classroom experience for computer science courses. Additionally, it is important to support video streaming to make video lectures available to students. Unlike this study, the purpose of our study is not to create a hybrid learning environment. Rather, the aim of this study is to provide a learning environment for students who have different paces of learning and different levels of prior knowledge. Also, this environment gives students an opportunity to access video records and review lectures regardless of the device at any time and from anywhere. In the current paper, considering the important results of studies conducted in recent years, we investigated the academic effectiveness of video recorded lectures offered in various ways. Hence, the academic successes of students using (a)Their PCs for accessing video lectures and (b) Their Tablet PCs for accessing video lectures, were compared, and the results were presented in this study. Additionally, the thoughts of the students about the implementation process were collected and added as qualitative part of the investigation.

2. Methodology

This study was conducted in two different software courses which were given as video supported, at the same period at undergraduate level. The effect of students' access to video lectures via tablet or desktop computer is investigated in 15 weeks in total. The application was used in Programming Languages Course at undergraduate 2. Grade and in Multimedia Design Course at undergraduate 3. Grade. 15 videos for each course, 30 video lecture records in total, were published on http://www.ytuavitab.com website which was prepared and developed by researchers. Out of face to face lesson hours, video lecture records were open to access for all students continuously. Website records of the devices used by the students in order to access the videos were kept. At the end of the lesson process, academic success difference between the students who accessed the videos of the two different courses via only tablet computers and only desktop computers was examined. The process can be summarized as in Figure 1 graphically.

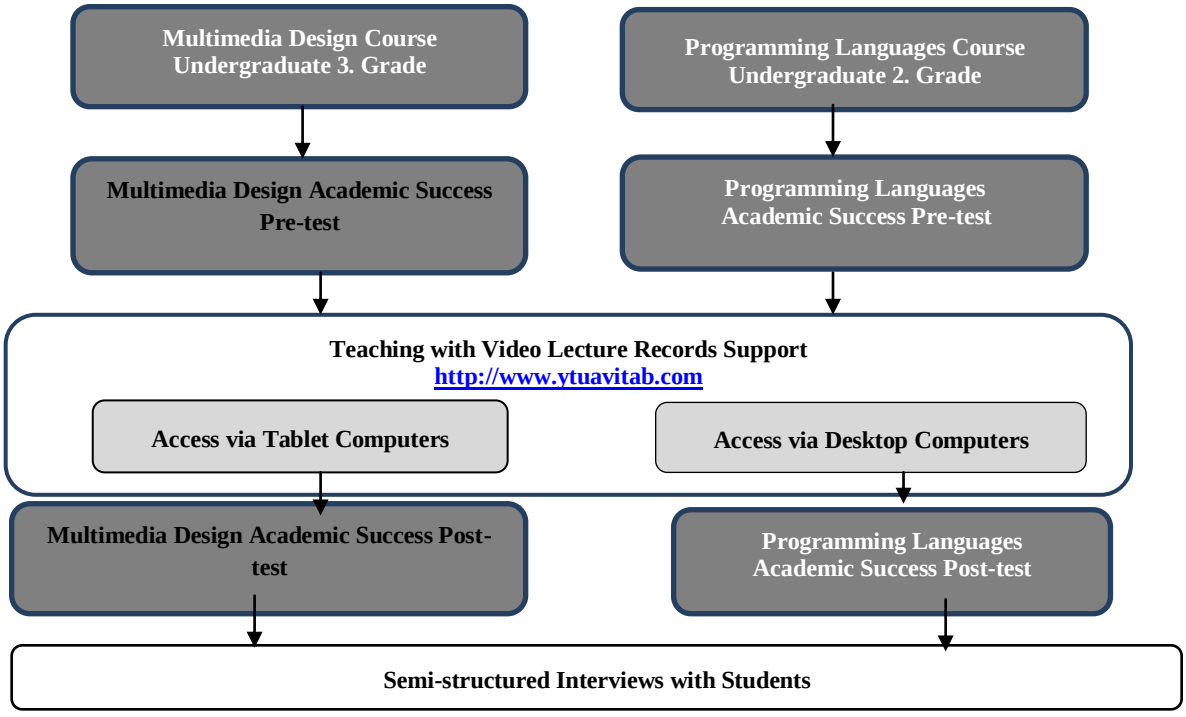
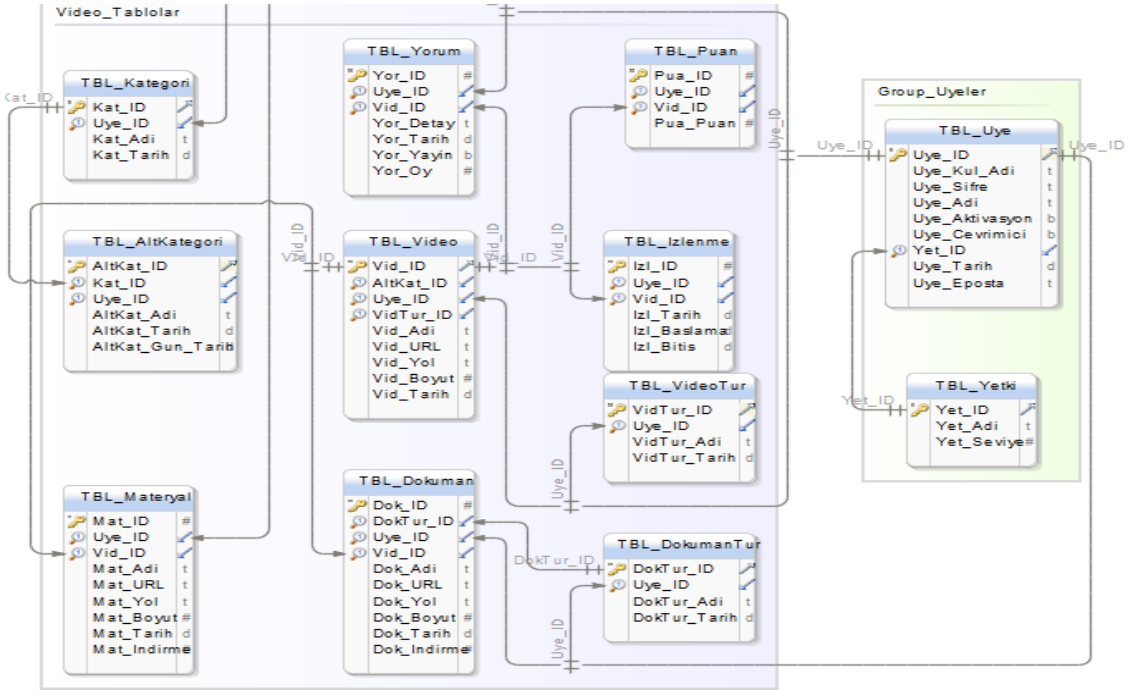


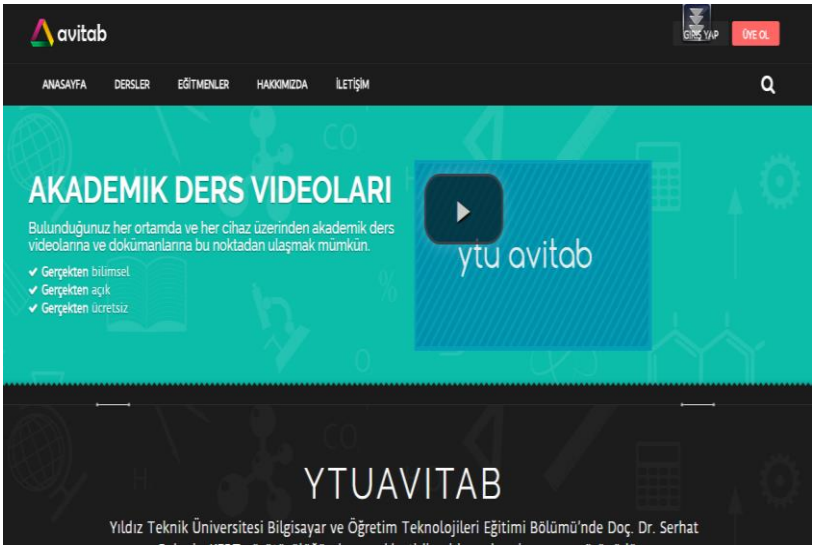
Figure 1: Graphical display of work structure

Video Publishing System

The system (http://www.ytuavitab.com) where video lectures are published was developed before the courses started. On the system which was prepared mobile compatible, data tables were created in order to keep the user access records. In the period of 15 weeks, the records of Multimedia Design and Programming Languages Courses were compiled and published each week via the system. System data table chart (Figure 2-a) and interface image (Figure 2-b) are demonstrated in Figure 2.



(a)



(b)

Figure 2: YTUVITAB (a) data table chart and (b) interface image

At the end of the application process, students were split into groups on the basis of access records obtained via the system. A detailed administration panel was developed for this aim. Screenshot of YTUVITAB administration panel is presented in Figure 3.

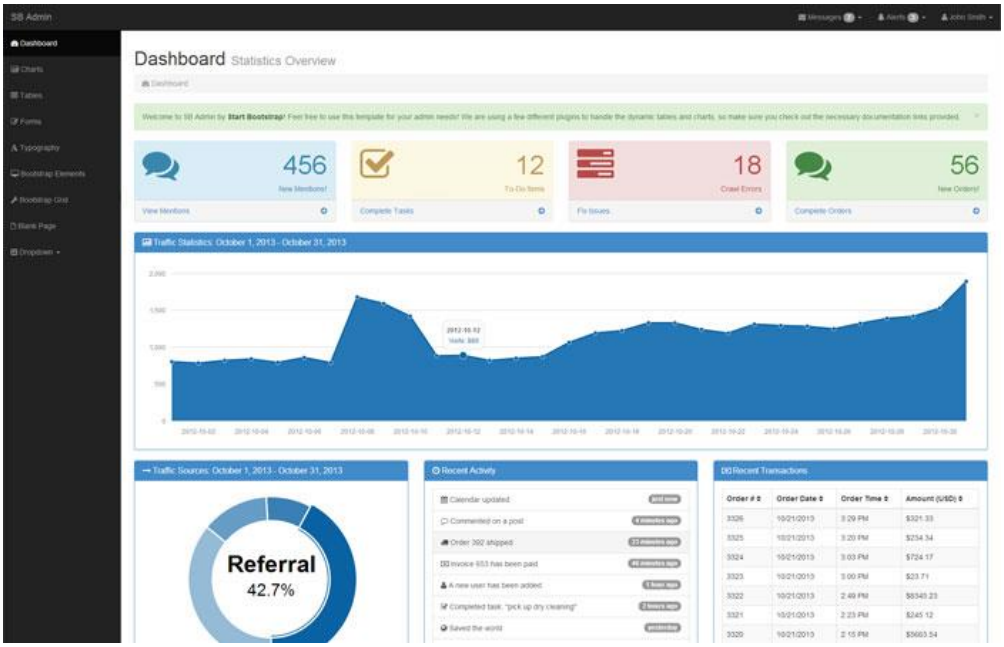


Figure 3. Screenshot of YTUVITAB administrator panel

Participants

In the study, two different participant groups were worked with in parallel. The study group was constituted of students who enrolled to the Programming Languages course at undergraduate 2nd grade and to the Multimedia Design Course at 3rd grade for the first time. While determining the participants, first, students who could access to the videos of the two different courses regularly during the 15 weeks of period were determined. Then, via which devices these students accessed to the system was recorded. Academic success difference between the students who accessed the videos via tablet computers and those who accessed via desktop computers during the period was examined. The number of participants to Programming Languages Course was 33 and the number of participants to Multimedia Design Course was 38. Website records about via which devices the students accessed to the video lectures are presented in Table 1 and Table 2.

Table 1: Records of student access to Programming Languages video lectures

		Video Lectures														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Students	1	P	P	P	P	P	P			P		P	P	P	P	P
	2	T	T	T		T	T	T	T	T	T	T		T	T	T
	3	T	T	T	T		T	T	T	T	T	T	T		T	
	4	P	P		P		P	P	P	P	P	P	P	P		P
	5	P		P	P	P		P	P	P	P	P		P	P	P

		Video Lectures														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Students	18	P		P	P	P	P	P		P	P		P		P	
	19	P	P	P	P	P	P		P		P		P	P	P	P
	20	T	T	T	T	T	T	T	T		T	T			T	T
	21	T			T	T	T		T		T		T	T	T	T
	22	T	T	T	T	T	T	T	T	T	T	T		T	T	

6	T	T	T	T		T		T	T	T	T	T	T		T
7	P		P	P	P	P	P	P		P	P	P		P	
8			P	P		P	P		P	P	P		P	P	P
9	T	T	T		T	T	T	T	T		T		T	T	T
10	T	T	T	T	T		T	T	T		T		T	T	
11	P	P	P	P	P	P	P		P	P	P	P		P	P
12	P	P	P		P	P	P	P	P	P	P			P	
13	T	T	T		T	T	T		T		T	T	T		T
14	P	P		P	P		P	P	P	P	P	P	P	P	P
15	T	T	T	T		T		T	T	T		T	T	T	
16	P		P	P	P	P				P	P	P			P
17	P		P	P	P	P		P	P		P	P	P	P	P

23	P	P	P		P	P	P	P	P	P	P	P		P	P
24	P			P	P		P	P		P	P		P	P	P
25	P	P	P	P	P	P	P	P		P	P	P		P	P
26	P	P		P	P	P		P	P	P	P	P	P	P	P
27	T	T	T	T	T	T	T	T	T	T	T	T		T	T
28	T		T	T	T	T	T	T	T		T	T	T	T	T
29	P	P	P		P	P	P	P	P	P	P	P	P	P	P
30	T	T		T	T		T			T	T	T	T		T
31	P	P	P	P	P	P	P		P	P		P			P
32	P	P	P		P		P	P		P	P	P	P		P
33	P	P	P	P	P	P	P	P	P		P			P	P

P: Accessing video lectures via PC **T:**Accessing video lectures via Tablet PC

As it is clear in Table 1, it was seen that totally 13 students accessed to Programming Languages video lectures via Tablet computers (T) regularly. On the other hand, it was determined that 20 students watched videos via desktop computers. Records of access to Multimedia Design video lectures are presented in Table 2.

Table 2: Records of student access to Multimedia Design video lectures

Students	Video Lectures														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	T	T	T		T	T		T	T	T		T	T		T
2	P	P	P	P	P	P	P			P	P	P		P	P
3	P	P	P	P	P	P		P	P	P	P	P		P	
4	P	P		P	P	P	P	P	P	P			P	P	
5	T	T	T	T	T		T	T	T	T	T	T		T	T
6	P	P	P	P	P	P		P	P		P	P			P
7	T	T		T	T	T	T	T	T		T	T	T	T	
8	T	T		T	T	T			T	T	T	T		T	T
9	P	P	P		P	P	P	P	P	P	P	P	P	P	P

Students	Video Lectures														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
20	P	P	P		P	P	P	P	P		P	P	P	P	
21	P	P		P	P	P		P	P	P	P		P		P
22	T	T	T	T		T	T		T		T	T	T	T	
23	T	T	T		T	T	T	T	T	T	T	T		T	T
24	P	P	P	P	P	P		P		P	P	P	P		P
25	P	P	P	P	P		P	P	P	P		P	P	P	P
26		P		P	P	P	P		P		P		P		P
27	P	P	P	P	P	P	P			P	P	P	P	P	
28	T	T	T	T		T	T	T		T		T	T	T	T

	10	P	P	P	P		P	P	P	P	P	P	P	P		P	
	11	P	P	P	P		P	P	P		P	P	P	P	P	P	
	12	P	P	P		P	P	P	P	P	P	P		P	P	P	
	13	P	P		P	P	P	P	P	P	P		P	P	P		
	14	T	T	T	T		T	T	T	T		T		T	T	T	
	15	T	T	T	T	T	T	T	T		T	T	T	T		T	
	16	T	T	T		T				T	T	T	T	T	T	T	
	17	P	P	P		P	P			P		P	P	P	P		
	18	P	P		P	P	P	P	P	P		P	P	P	P	P	
	19	P	P	P	P	P		P			P		P	P		P	

P:Accessing video lectures via PC

	29	P	P		P	P	P	P		P	P	P	P		P	P	
	30		P	P	P	P	P			P	P		P		P		
	31	T	T	T		T		T	T	T		T	T	T	T	T	
	32	P	P	P	P		P	P	P	P	P	P			P	P	
	33			P	P	P		P	P	P	P		P		P		
	34	P	P	P	P		P		P	P		P	P	P	P	P	
	35	T	T	T	T	T	T		T	T		T	T	T	T	T	
	36	P	P		P	P	P	P	P	P	P	P	P		P		
	37	P	P	P	P		P	P	P	P	P		P			P	
	38	P		P	P	P	P	P	P	P	P	P		P		P	

T:Accessing video lectures via Tablet PC

As it is clear in Table 2, it was seen that totally 12 students accessed to Multimedia Design video lectures via Tablet computers (T) regularly. On the other hand, it was determined that 26 students watched videos via desktop computers.

Data Collection Tools

In the study, academic success tests which were prepared for Programming Languages and Multimedia Design Courses by the researchers were used as quantitative data collection tools. After the validity and reliability analyses of multiple choice test which was prepared for Programming Languages Course were made, a form containing totally 28 questions was created. For Multimedia Design Course, after the validity and reliability analyses of the created form, a multiple choice test containing 25 questions was obtained. Academic success lesson contents for both courses are given in Table 3.

Table 3: Weekly subjects of Programming Languages and Multimedia Design Courses

Programming Languages Course		**Multimedia Design Course**	
Week	Subject	Week	Subject
1	Basic Components of C# programming language	**1**	Adobe Flash Architecture
2	Introducing to C#,compiling and running processes	**2**	Symbols
3	Variables, data types	**3**	Introduction to Animation
4	Form architecture	**4**	Filters and Blending Applications
5	Operators	**5**	Action Script 3.0 Features
6	Flow chart structures	**6**	Variables and Operators
7	Arrays	**7**	Midterm exam
8	Midterm Exam	**8**	Loops and Arrays
9	Methods	**9**	Events in ActionScript3.0
10	Classes and Object Oriented Programming	**10**	Timer Events
11	Checking out the projects	**11**	Sounds and Videos
12	Name spaces	**12**	Inverse Kinematics
13	Heredity	**13**	3D Object Controls
14	Heredity and related subjects	**14**	Data Source Relations
15	Database	**15**	XML Document Relations

Academic success tests were applied to the study groups as pre-test and post-test with 15 weeks intervals. Moreover, semi-structured interviews were made in order to get voluntary students' opinions about the process.

3. Findings

In the study, the data of the two groups whose lesson periods were parallel were examined independent of each other. SPSS packaged software was utilized in all analyses. Primarily, descriptive analyses of the groups are presented collectively in Table 4.

Table 4: Descriptive analyses of the application process

Course	Video Access Tool	Measurement	N	Minimum	Maximum	Mean	Sd
Multimedia Design	Desktop PC	Pre-test	26	12,00	68,00	41,54	14,93
		Post-test		36,00	84,00	65,08	11,79
	Tablet PC	Pre-test	12	28,00	60,00	47,000	10,25
		Post-test		48,00	88,00	73,67	10,30
Programming Languages	Desktop PC	Pre-test	20	36,00	86,00	59,75	14,65
		Post-test		36,00	93,00	68,50	14,39
	Tablet PC	Pre-test	13	39,00	82,00	59,15	11,61
		Post-test		57,00	93,00	80,00	10,55

Test results were all evaluated out of 100 points. When Table 4 was examined, an increase in the post-tests was seen comparing with pre-tests for all groups. Before passing to the analyses of the relevance of the increase, whether data showed normal distribution was examined with Shapiro-Wilk statistics. The results are demonstrated in Table 5.

Table 5: The obtained normal distribution controls

Course	Measurement	Shapiro-Wilk		
		Statistic	df	Sig.
Multimedia Design	Pre-test	,975	38	,540
	Post-test	,947	38	,074
Programming Languages	Pre-test	,968	33	,418
	Post-test	,940	33	,068

When Table 5 was examined, it was seen that pre-test and post-test data of both courses showed normal distribution (p>.05). Thus, the obtained findings were compared with parametric analysis methods. First, the balance of the groups at the beginning of the application was examined by making independent groups t-test between pre-tests. The results are demonstrated in Table 6.

Table 6: Independent groups t-test analysis for the pre-test results of the groups.

Course	**Video Access Tool**	**N**	**Mean**	**sd**	**df**	**t**	**p**
Multimedia Design	Desktop PC	26	41,54	14,93	36	-1,145	,260
	Tablet PC	12	47,00	10,25			
Programming Languages	Desktop PC	20	59,75	14,65	31	,123	,903
	Tablet PC	13	59,15	11,61			

A significant difference could not be find among pre-test results of students who accessed video lectures via Tablet PC and Desktop PC, in Multimedia Design Course (t=-1,145;p>,05). Furthermore, it was seen that there was not a significant difference among pre-test results of the group who took Programming Languages Course (t=,123;p>,05). Before passing to post-test comparisons, paired groups t-test analyses

were made among the measurements in order to examine whether there was a significant difference between pre-tests and post-tests of the groups. The results of the analyses are presented in Table 7.

Table 7: The results of paired groups t-test for the comparison of the pre-test and post-test results of the groups

Course	Video Access Tool	Measurement	N	Mean	sd	df	t	p
Multimedia Design	Desktop PC	Pre-test Post-test	26	41,54 65,08	15,19	25	-7,90	,000
	Tablet PC	Pre-test Post-test	12	47,00 73,67	15,76	11	-5,86	,000
Programming Languages	Desktop PC	Pre-test Post-test	20	59,75 68,50	12,68	19	-3,09	,006
	Tablet PC	Pre-test Post-test	13	59,15 80,00	6,38	12	-11,79	,000

When Table 7 was examined, the obtained results can be summarized as follows:

- There was a significant difference between pre-test and post-test results of 26 students who accessed Multimedia Design video lectures via Desktop PC in behalf of post-test (t=-7,90;p<,05),
- A significant difference between pre-test and post-test results of 12 students who accessed Multimedia Design video lectures via Tablet PC in behalf of post-test was seen (t=-5,86;p<,05),
- There was a significant difference between pre-test and post-test results of 20 students who accessed Programming Languages video lectures via Desktop PC in behalf of post-test (t=-3,09;p<,05) and
- A significant difference between pre-test and post-test results of 13 students who accessed Programming Languages video lectures via Tablet PC in behalf of post-test was seen (t=-11,79;p<,05).

Starting from these findings, it can be expressed that academic success increased in the courses taught with the support of lecture records for both groups. Lastly, whether the choice of access tool made a significant difference in academic success was checked with the comparisons between the post-tests of the groups. The difference analysis between the post-tests was made with independent groups t-test and the results are presented in Table 8.

Table 8: Independent groups t-test analysis of the post-test results of the groups

Course	Video Access Tool	N	Mean	sd	df	t	p
Multimedia Design	Desktop PC Tablet PC	26 12	65,08 73,67	11,79 10,30	36	-2,17	,037
Programming Languages	Desktop PC Tablet PC	20 13	68,50 80,00	14,39 10,55	31	-2,48	,019

When post-test findings were compared, a significant academic success difference was observed in behalf of the students who accessed video lectures via Tablet PC in Multimedia Design(t=-2,17; p<,05) and Programming Languages (t=-2,48; p<,05) Courses. In other words, Tablet PC usage affects video supported lecture processes in a more positive direction than Desktop PC usage. This finding is interpreted in Conclusion and Discussion part with comparisons.

Interview results

A theme analysis was done to code students' answers. Themes and subthemes were created in accordance with the answers of the students. After the theme analysis, a coding table was created as below:

Table 9: Coding of interviews

Themes	Sub-Themes	Concepts
Software lectures	• Expectations from software lectures	• Learning different langauges; practical implementations; basic concepts; developing own software; practical exams; individual effort
	• Negative effect in software lectures	• Overcrowded groups; negative motivation; focusing on content; following the course
Video recordings of courses	• Benefits of using video records	• After course (or out of course?) course repetitions; self control; watching everywhere.
	• Using tablet PCs for watching videos	• Light weight; size advantage; coding problem.
	• Sharing platform of videos	• Online watching; downloaded files
	• Using video records in different courses	• Theoretical courses; technical courses; for all content

As seen in Table 9, all the codes emerged from two themes: (a) software lectures and (b) video recordings of the courses. All the questions were determined as subthemes of the interview. First of all, general expectations of the students from the software courses were questioned. Answers intensified during the discussion of learning different languages and practical implementations. As an example, student B said the following:

> *When I was at high school, I learned some basic concepts about programming languages. Therefore, I believe that we have to learn popular language at the university. Each student wants to study a different kind of programming language. It must be possible for students to learn their favorable coding platform at our department.*

On the other hand, student C talked about a different problem:

> *We have practical programming lectures, but some of our exams are only on paper. It is very hard for me to keep all theoretical codes in my mind. I think that all programming language exams must be practice-based. In this way, we can improve our skills in actual coding by using keyboards.*

Generally, other students mentioned similar thoughts related to their expectations from the software course. As a second question, we asked the participants whether they faced any negative effect in the programming language courses. Student D gave this answer:

> *When I missed a lecture, I couldn't have a chance to get it again. This is a big problem for me because all of the topics are connected to each other in a programming language course. If you don't know anything about a basic part of that language, it would be very hard for you to learn the following content.*

Student M complained about the "noise" in the class. Student F pointed out her individual learning process:

> *During the course hour, the lecturer is writing codes and I am trying to understand the structure of the code blocks. While I am thinking about the codes, the lecturer is moving on to another topic. That's why generally it is not possible for me to understand the whole contents of the courses.*

As seen in the comments, following the course content and impossible repetitions were generally mentioned by the students as the main problems. After this question, the students' thoughts about video recordings were solicited. As in the first question, the benefits of the video recordings were asked of them. Some of their answers are listed below:

> *When I missed the course, I watched the videos instead of movies. It was very useful for me. (Student C)*

> *Sometimes, I really understood the working of a code block after I watched the video recording of the course. (Student A)*

> *When I hesitated to ask the lecturer about one part of the content, I watched the videos again and again. It was very good to be able to stop and replay at some points of the recording. (Student E)*

After this positive feedback from the students, the differences in using tablet PCs were investigated. Answers were primarily focused on the weight and size advantages of the tablet PCs. The answers of two students are presented below:

> *It was a big advantage to be able to use it everywhere. For instance, it takes almost two hours to arrive home from school for me. I watched all of the videos on the bus, on my way home. (Student H)*

> *It is light and portable, I watched videos even lying down on my bed with the tablet PC. (Student C)*

> *I am staying in the same room with my roommate. When I used a laptop, the sound of the machine was disturbing him. There was no such problem with the tablet. (Student B)*

On the other hand, student G pointed out an interesting negative feature of using tablet PCs:

> *I can't study programming language content by only watching the lecture. At some points, I need to stop and try the codes on my computer. But, when I used the tablet PC, it wasn't possible to try codes because of the keyboard problem. I think this is an important issue about watching technical content on tablets.*

The thoughts of the group were separated into two parts about the sharing platform of the videos. Some of them wanted downloadable videos because of Internet connection problems. However, other students

mentioned that it would be easier to watch videos online instead of downloading them. As with the last question, the preferences of the students in recordable courses were asked. Different courses were mentioned by them, and the common point of the answers was that using video recordings would be useful for all kinds of courses.

4. Conclusion and Discussion

In the conducted study, the effect of differentiation of access tools in two different software courses which were lectured as video record supported on the academic success of the participants was examined. The obtained findings demonstrated that the academic success of the students who accessed video lectures via Tablet PC were significantly higher than the other students for both Multimedia Design and Programming Languages Courses. The obtained finding can be explained as Tablet PC usage can be performed independently of the current environment. When literature is examined, supporting and opposite studies can be encountered. Findings support the Traxler (2007)'s statement as "*mobile learning offers a perspective that differs dramatically from personalized conventional e-Learning in that it supports learning that recognizes the context and history of each individual learner and delivers learning to the learner when and where they want it*" (p. 7). I can be thought that the flexibility of watching video records via Tablet Pc as one of the reasons of significant success of the students in the group. The potential of Tablet Pcs in personalized learning was stressed by Song et al. (2012) at Looi et al. (2013). In another study Mock (2004), used Tablet Pc in a software education process and reached positive outcomes. The results of the study show some similar indicators with the studies of Anderson et al. (2004), Hoganson (2009) and Subhlok et al. (2007) with regard to positive effects of using Tablet Pcs in education. Additionally, in the interview, many participants used positive statements about the mobility and easy use of video lectures. These positive approaches are parallel to the studies of Rudd (2008); Looi et al. (2009); Green, Facer, Rudd, Dillon, & Humphries (2005); and Yoon & Sneddon (2011). On the other hand, there can be seen opposite research findings in the literature. Pegrum, Howitt, and Striepe (2013) found in their study that there were three important obstacles to using iPads as learning tools: device limitations, time limitations, and attitudinal limitations. Similarly, One of our participants mentioned the same statement during the interview. He said, *"I can't study a programming language content by only watching the lecture. At some point, I need to stop and try the codes on my computer. But when I used tablet PC, it wasn't possible to try codes because of the keyboard problem. I think this is an important issue about watching technical content on tablets."* This can be explained in the device limitations of tablet PCs.

In this study, different kinds of educational technologies were compared instead of proposing a new technological tool. Both quantitative and qualitative data showed that video-based technologies can be used effectively in software education. The growing educational needs of individuals require effective solutions in educational environments. Especially, making repetitions to support in-class theoretical presentations is an important part of any software education process. Sometimes, these repetitions are impossible for the students because of the formal content and timetables of the course hours. In this respect, video recordings of technological courses can be put forward as a solution to this problem.

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