

# Incorporating Screencasts in Teaching and Learning of Database Applications in an Undergraduate Course at a Turkish University

By

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## Abstract

*This study aims to report on the experiences of a faculty member and an undergraduate class (N=52) who incorporated screencasts of database applications into their teaching and learning activities in a computer course at a Turkish university. Qualitative data were obtained through participant observations in the course and in an online group in Facebook, document analysis, and written surveys (N=43). An inductive content analysis method was conducted to analyse the data. Most of the beginner students reflected that screencasts were useful mediums to rerun in order to watch the creation of the database applications. Moreover, the students said that screencasts contributed to their knowledge and skills in database applications. Although some students complained about insufficiency of screencasts in complex database applications, quality of audio and duration of the screencasts many students considered the audio-visual features and reusability of the screencasts outside the course as important advantages. The findings of this study suggest that screencasts can be considered as useful supplementary mediums to facilitate beginner students' learning in database applications. Moreover, teacher guidance and active involvements of the students are needed as well in learning and mastering the skills in the sophisticated database applications.*

**Keywords:** *Screencasts, social networking, database applications, undergraduate students*

## 1. Introduction

Screen-captured videos or screencasts have provided new opportunities to enrich teaching and learning experiences particularly in higher education. Screencasts can be defined as digital recordings of a video of screen activities (e.g., mouse movements and clicks) with real time audio commentary that explain the process (Peterson, 2007; Winterbottom, 2007). They can visually show students what the screen should look like, where to click, select and type. Moreover, they may contain sound along with the video and this helps to hold students' interest. In addition, screencasts are reasonably quick to prepare and easy to update and change (Peterson, 2007). They can be considered as podcasts of a computer monitor that can be edited and produced in various formats.

In addition, screencasts can be studied selectively at each student's individual pace (Pinder-Grover, Millunchick and Bierwert, 2008). According to the related literature (Oud, 2009; Betrancourt, 2005; Mayer, 2006; Veronikas and Maushak, 2005) multimedia instruction is more effective when the learner has control over the pace that learners prefer for multimedia tutorials. This can easily be done by including flash controls in screencasts that allow pausing, reviewing, fast forwarding, stopping and starting (Oud, 2009). Moreover, screencasts can be distributed online, thus they can be available on demand and accessible to students at any time of day (Pinder-Grover, Millunchick and Bierwert, 2008).

Additionally, screencasts can enhance and promote active study and learning instead of putting students in a passive role (Oud, 2009; Pinder-Grover, Millunchick and Bierwert, 2008). They can easily and effectively simulate a real context for learners, making it easy for example to create a database search demo that shows an actual search (Oud, 2009). Thus, multimedia or screencasts tutorials can be potentially useful in many situations, such as showing processes in action or adding opportunities for student interaction with the material in a realistic setting (Betrancourt, 2005; Oud, 2009).

Also, presenting information through worked examples in screencast format helps beginner or novice learners (Oud, 2009; Renkl, 2005). A worked example provides an example of the problem or process to be learned, then it shows how to work through the process highlighting the different steps required (Große and Renk, 2007; Renkl and Atkinson, 2002). Furthermore, screencasts can be a medium for various purposes such as demonstrating algorithms for problem solving, supporting software instructions, and providing interpretation-based conceptual understanding in an active learning format (Lloyd and Robertson, 2012).

In addition, screencasting which is a way to present digitally recorded play back of computer screen containing audio narration and visual procedural information (Sugar, Brown and Luterbach, 2010) can be applied to provide content of instruction to the students at any time any place (Winterbottom, 2007; Brown, Luterbach and Sugar, 2009; Lloyd and Robertson, 2012). Moreover, screencasting or sharing of the screencasts through a social networking environment (e.g., Facebook) may help to create an online teaching and learning community since the teacher and students may find opportunities to ask questions and make comments about the information in the screencast (Educause Learning Initiative 2006; Peterson, 2007). Thus, based on the related literature, it can be stated that screencasts can be used as a supplementary medium in teaching of basic database applications to promote undergraduate beginner students' learning experiences since the students may find opportunities to re-watch the screencasts and practice what they have learned by following the screen activities. However, little is known about the experiences of a faculty member and undergraduate beginner learners incorporating screencasts of database applications in their teaching and learning environments.

### ***Purpose of the Study***

The purpose of the study is to investigate the experiences and opinions of a faculty member and undergraduate beginner students who incorporated screencasts of database base applications in their teaching and learning environments in a Turkish university. Specifically, this study explores the following research questions:

1. What are the experiences of a faculty member about uses of screencasts of database applications in a teaching and learning environment?
2. What are the experiences and opinions of the beginner students about contributions of screencasts to their knowledge and skill acquisitions in database applications?
3. Are there any advantages, disadvantages or limitations of uses of screencasts in database applications?

## **2. Methodology**

The methodological framework of this study was formed by a qualitative case study research approach (Merriam, 1998). The case study approach combined written survey, document analysis, and participant observation as the data collection techniques.

### ***Participants***

The participants in the study were a teacher and 52 first year Turkish undergraduate students (24 females and 28 males) who used screencasts of the basic database applications in their teaching and learning environment in Computer II course.

### ***Data Collection Procedures***

The researcher applied participant observation, document analysis (Bogdan and Biklen, 1992; Denzin and Lincoln, 2005) and written survey (Driscoll & Brizee, 2010) to gather data in order to analyse experiences and opinions of the undergraduate students about screencasts in database applications. In addition, a triangulation of data from multi sources including participant observation, document analysis, and written survey with the students was performed to increase the credibility and validity of results (Stemler, 2001; Erlandson, Harris, Skipper and Allen, 1993).



database tables, queries, forms and reports in MS Access. The students were advised to watch the related screencasts before starting to work on the database applications. Also, it was suggested that they re-watch the screencast if they could not do any activity regarding the database applications. They were free to ask any question to the teacher in the computer lab as well. The researcher conducted participant observations to collect data in terms of field notes about students' uses of screencats and when the students were working on the database applications in the computer lab. Additionally, the researcher was able to monitor the online uses of screencasts in the Facebook group. The researcher took field notes regarding his important observations and experiences about online uses of screencasts in Facebook group as well.

#### ***Written Survey***

The researcher administered a written survey of four questions to ascertain views and thoughts of the students about screencasts. A total of 43 volunteer students out of 52 participated in the survey process. Thirty-four students preferred to answer the survey questions on the form anonymously, but nine students preferred to be surveyed through e-mail. The participant students were not obliged to provide their personal information on the survey form. However, they were requested to provide their e-mail addresses to ask additional questions if needed. The students answered the following questions in the survey form:

1. Do you think that screencasts regarding creating database applications in MS Access were useful to watch the creation of the database applications in a concrete way? If yes, how? If no, why?
2. Do you think that screencasts regarding creating database applications in MS Access were useful to learn applications such as creating databases, queries, forms, reports and updating databases? If yes, how? If no, why?
3. Do you think that screencasts regarding creating database applications in MS Access made contributions to your knowledge and skills in database applications? If yes, how? If no, why?
4. What are the advantages, disadvantages or limitations of screencasts in database applications in MS Access?

#### ***Document analyses***

The documents analysed in this study consisted of assignments of students regarding database applications, screencasts, , and comments and questions about database applications in screencasts shared in the social networking environment (i.e., Facebook). The related documents were electronically filed for analyses.

#### ***Analyses of Data***

Initially, the researcher assigned pseudonyms to the survey forms of the participant students. After that, an inductive content analysis method was conducted in order to discern themes, categories, and sub-categories from the varied sources of data collected (Bogdan and Biklen, 1992). All data were read and reviewed by the researcher in order to detect and identify the recurring words, phrases, and opinions. After the recurring words, phrases, and opinions were detected and identified they were marked as the initial coding categories. The unrelated data were eliminated after the initial categories were developed. Then, these initial categories were read again to generate final themes, categories and sub-categories of the research. The results were reported and dicussed based on these final themes, categories and sub-categories.

### **3. Findings and Discussion**

#### ***Experiences of the Teacher***

According to the experiences of the teacher, the screencasts are reasonably easy to prepare, edit and share with students either through flash disks and social networking environments specifically Facebook. The

students' need for teacher guidance for minor operations decreased notably after starting uses of screencasts in the computer lab. Thus, by considering the findings of this study and the related literature (e.g., Kalyuga, 2005; Oud, 2009; Renkl and Atkinson, 2002) it can be stated that screencasts are helpful tools to get the beginner students to concentrate on database applications (e.g., creating tables, queries, forms) rather than dealing with minor and simple operations (e.g., choosing the related menu option, item, etc.).

Furthermore, based on the observations of the teacher, the screencasts are quite useful to decrease number of questions related to the commonly occurring problems when teaching the straightforward or less complex database applications since many students overcome the difficulty or solve the problems by themselves after re-watching the related screencast without seeking any significant guidance from the teacher. Hence, the teacher may find sufficient time to deal with the problems of the students who lag behind their classmates when working on the sophisticated applications for them.

However, in comparison to the straightforward database applications, many students asked for more teacher guidance when working on the more complex or sophisticated database applications (e.g., conducting multiple queries with formulas, updating queries, etc.). In other words, many students preferred teacher guidance or help rather than watching the related screencast when working on the more complex database applications if they could not conduct or develop the applications. It seemed that teacher guidance or help in the computer lab was more practical for many students when they learn how to develop or conduct a sophisticated application. However, as supplementary mediums, the screencasts were also quite useful for many students to re-show how to conduct a complex application when they were practicing and working on the assignments outside or inside the computer lab. Thus, it can be stated that uses of screencasts, guidance from the teacher and active involvements of the students are all important to learn and acquire the skills in the database applications. However, active involvement of the students were quite critical in the learning processes of database applications. According to the observations of the teacher, the number of questions asked by the students about the solutions of the problems in sophisticated applications decreased notably after the students had some hands-on experiences with these applications. The students seemed to learn better when they have hands-on practices (e.g., working on the exercises, assignments) after watching the screencasts. As consistent with constructivist perspective (Jonassen, 1991), these qualitative findings support the prior studies which suggest that students seem to learn better when they are actively involved in the learning process (Anthony, 1996) and when a teacher guides their activities in productive directions (Mayer, 2004).

### ***Learning Experiences of the Students***

A big majority of the students (37 out of 43) responded positively when they were asked about usefulness of the screencasts in watching the creation of the database applications in a concrete way, usefulness of screencasts in learning the database applications, and the contributions of screencasts to their knowledge and skills in database applications. The students provided similar answers to the survey questions. Thus, their answers were reported under the common categories generated in the data analyses procedure (see Table 1).

According to the considerable number of students (N=13), the screencasts were very useful tools to rerun and watch the process of database applications, and to learn how to conduct the database applications. For instance, a participant student, Buket (names are pseudonyms) wrote that:

They [screencasts] were very useful to rerun the applications. I thought I had learned most of the applications after they were shown by the teacher in the course. However, I could not conduct some applications such as creating sub-forms when doing the homework by myself. So, I needed to rerun the screencasts a couple of times to see and learn how to conduct some applications.

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Additionally, another student, Lale, expressed that:

They [screencasts] helped a lot to watch and learn how to do the applications. I re-watched the videos several times mostly in Facebook until I would be able to do the applications

According to the experiences of 10 students, the screencasts contributed to students' knowledge and skills in database applications through their informative, illustrative, and audio-visual features. Specifically, a participant student, Nurcan, noted that:

I learned many formulas through the textbook, but I did not know very much where and how to write them when conducting queries. However, after watching and listening the screencast many things became very clear. I think the information and applications in audio-visual format are more useful and the screencasts contributed a lot to my knowledge and skills while watching them.

Another participant, Sami, stated that:

I did not have any knowledge about database applications before the course, I learned many new applications and skills in databases when watching and listening to the videos, most of them were quite informative and useful to illustrate how to do the applications.

In addition, eight students reflected that they found opportunities to improve their knowledge and skills in database applications by repeating the applications through screencasts. For instance, a participant, Efkan, mentioned that:

Some of the applications such as forms and reports required repetitions and practices several times to learn them very well. I repeated the applications by watching the screencasts, and now I can conduct them without any difficulties.

Additionally, some other students (N=6) reflected that they had a chance to master their skills in database applications through the screencasts after they had learned them in the course. Specifically, a participant student, Merve, stated that:

I tried to learn the applications in the course, then the screen-casts were quite useful for me when repeating the applications to master the skills. But, if I did not learn the applications very well in the course the screencasts would not be so useful to learn the applications.

According to the findings of this study and prior literature (Evans, 2011; Oehrli, Piacentine, Peters and Nanamaker, 2011; Pinder-Grover, Millunchick and Bierwert, 2008), it can be stated that the screencasts can be useful mediums to facilitate students' learning and to master the skills in database applications.

### *Advantages of screencasts*

Most students (N=31) mentioned about advantageous of the screencasts when they are asked about advantageous or disadvantageous these tools. As consistent with the prior literature (Peterson, 2007; Pinder-Grover, Millunchick and Bierwert, 2008), a considerable number of students (N=11) reflected that reusability of the screencasts inside and outside the course at any time or any place was an important advantage for them since they were able to rerun the screencasts until they understand and remember how to conduct the applications. For example one of the participants, Ceren, noted that:

It was very easy and handy to rerun the applications through the screencasts. They were very useful to remember how to conduct the applications since I forgot many parts of them after a certain period of the course.

Another student, Numan, responded that:

The most important advantage of the screencasts is that they can be watched at any time anywhere. I watched them in the cafeteria or at home whenever I needed them to study on the databases.

In addition, similar to the findings of prior studies (Pinder-Grover, Green and Millunchick, 2011; Pinder-Grover, Millunchick and Bierwert, 2008), the findings of this study suggest that the screencasts were pathfinder or guides for nine students when doing the homework. For example one of the students, Deniz,

When doing the homework I needed an example or guide in front of me. Most of the applications required in the homework were displayed in the screencasts and I took advantages of them. I watched and followed these applications when doing the homework and I completed them easily.

Another student, Feyyaz, noted that:

When working on the homework at home I forgot how to conduct an application sometimes. But, after watching the screencast in Facebook group I remembered how to do it like in the course.

Furthermore, the audio-visual features of the screencasts through which the applications were explained and demonstrated in a clear or concrete manner was another advantage for seven students. For example, a student, Jale, answered that:

The audio-visuality of the information and applications is an important advantage of the screencasts. They can be very useful for persons like me who prefer to learn visually.

Additionally, the screencasts were quite helpful for some students (N=4) as tutorials to catch-up the database applications in the course if they missed or could not attend a course due to some reasons. For instance, a student, Erdi, noted that:

They [screencasts] were very useful like tutorials. Especially, they were useful to watch and follow what activities were held in the course when I missed it. I could watch them in the Facebook group to follow and to do the database applications myself.

In addition, a student, Nida, mentioned that:

I could not go to the course once since I was sick. Then, I got in the Facebook group to watch the posted videos. The videos helped me a lot to learn the applications and to catch up with the class.

**Table 1. Experiences of the students using screencasts in database applications**

Themes	Categories	Sub-categories	f
Learning experiences of the students	usefulness of screencasts in learning the database applications	Learning how to conduct database applications by rerunning and watching the screencasts.	13
	Contributions of screencasts to knowledge and skills in database applications	Contributing to the students' knowledge and skills in database applications through the informative, illustrative, and audio-visual features.	10
		Improving knowledge and skills in database applications by repeating the applications.	8
		Mastering the skills in database applications through the screencasts.	6
Advantages	Reusability	Reusability of the screencasts inside or outside the course at any time or any place.	11

	Guidance	Pathfinders or guides for many students when doing the homework.	9
	Audio-visual features	Audio-visual features through which the applications were explained and demonstrated in a clear or concrete manner.	7
	Tutorial for absentee students	Usefulness as tutorials for the students who missed or could not attend a course to catch-up the database applications.	4
Disadvantages	Insufficiency	Insufficiency in complex and sophisticated applications.	5
	Audio quality	Screencasts with lower audio quality.	4
	Duration	Very long screencasts in terms of duration.	3

These findings of the current study are consistent with prior literature (Peterson, 2007; Pinder-Grover, Millunchick and Bierwert, 2008) which suggest that screencasts can be available “on demand” at any time of day, even at a distance, and they can be studied at each student’s individual pace. Additionally, sharing of the screencasts in the Facebook group had provided opportunities to have interactions with the students on the database applications and creating a teaching and learning community outside of the computer lab. For instance, a participant student, Volkan, noted that:

They [screencasts] can be considered as a useful source to be used outside the course. I replayed them in Facebook through my notebook computer when studying in my room or in the library and posted questions if did not understand something in the applications. Thus, I had opportunity to interact with the teacher and some classmates although the responses were not so immediate.

However, the interactions among the teacher and students in the Facebook group were not satisfactorily frequent. The researcher thinks that providing the screencasts through the flash disks to the students in the course can be the reason of less frequent interactions in the online group. Hence, sharing of screencasts or multimedia materials only through the online groups can be better implementation in order to increase the frequency and of the interactions and to create a more active online teaching and learning community.

### ***Limitations of Screencasts***

Although many Turkish students considered reusability of the screencasts inside and outside of the course and their audio-visual features as important advantages, some (N=5) students complained that screencasts are not very useful when working on the complex or difficult applications, as consistent with the observations of the teacher. For instance, a participant student, Sercan, answered that:

They [screencasts] were quite handy when conducting the straightforward applications such as creating a form after shown by the teacher. However, they did not help me very much when working on the other difficult applications such as relating multiple tables and using formulas in forms and queries and I had to seek help from the teacher.

Also, a student, Selma, responded that:

The screencasts were not very useful for me to learn the complex database applications such as conducting multiple queries and associating multiple tables because they were difficult to understand through screencasts. When I learned the applications from the teacher in the course the

screencasts were useful to practice later on, but when I did not understand the applications very well the screencasts were not helpful for me, and even I did not want to watch them.

Furthermore, some students (N=4) reflected that the screencasts were not very beneficial for them due to the audio quality and duration of the recordings. Specifically, a participant student, Funda, reflected that:

The audio quality of some screencasts was not so high and I had difficulties to hear and understand what the teacher said.

Moreover, three students considered the duration of some screencasts as disadvantages. For instance, one of the participants, Kezban, stated that:

Some of the screencasts were very long in terms of duration and it was not easy to find what I was looking for, I had to re-watch them from the beginning sometimes. They could have had been more useful and practical in a shorter manner I think.

These findings suggest that the audio quality can be a barrier and duration of the screencasts can cause complexity for some students when learning and mastering the skill in database applications. Thus, by considering the findings of this study and related literature (Veronikas and Maushak, 2005), the screencasts can be recorded with better audio quality to improve their usability. Moreover, the findings of the current study and prior studies (Oud, 2009; Lusk et al., 2009; Nguyen and Clark, 2005) suggest that making short segments instead of longer screencasts, videos or tutorials helps students learn better and reduces the effort it takes for them to process information.

#### **4. Conclusion**

The screencasts can be considered as useful supplementary mediums to facilitate Turkish beginner students' learning in database applications, based on the qualitative findings of this study and the related literature. Additionally, the screencasts can be supporting mediums to promote students' knowledge and skills in database applications through their *informative, illustrative, audio-visual* and *reusability* features. Moreover, the teachers may take advantages of screencasts to have sufficient time to deal with the problems of the students who lag their classmates in database applications while other students are using the screencasts to do the applications. However, based on the observations of the teacher, only uses of the screencasts can be insufficient for many Turkish students to learn the sophisticated database applications. Thus, besides screencasts as supplementary mediums, teacher support or guidance and active involvements of the students are quite important as well to learn and master the skills in the sophisticated applications for the students.

In addition, the screencasts recorded with better audio can be more useful and informative for the students to learn the database applications. Additionally the screencasts that shows only one database application at a time instead of multiple applications can be more practical for the students when studying on the database applications. Although some applications can be continuations of each other, a screencast that shows only one application can be more handy for the beginner students if the applications can be divided into multiple pieces to avoid screencats with long durations. The screencasts with long duration can be fast forwarded, but the screencasts with short duration can be more convenient for the students to find and watch a specific application. Furthermore, sharing of the screencasts through an online group may provide the teacher and students opportunities to have interactions on the database applications and to create a teaching and learning community outside of the classroom. However, sharing screencasts with the students in the classroom through the flash disks may result in infrequent or unsatisfactory interactions in the online group.

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