AN INVESTIGATION OF USING DIFFERENT TYPES OF FEEDBACK STRATEGIES IN INTERACTIVE VIDEO LECTURES

EZGİ RABİA DİRİ

BOĞAZİÇİ UNIVERSITY

2022

AN INVESTIGATION OF USING DIFFERENT TYPES OF FEEDBACK STRATEGIES IN INTERACTIVE VIDEO LECTURES

Thesis submitted to the

Institute for Graduate Studies in Social Sciences

in partial fulfillment of the requirements for the degree of

Master of Arts

in

Educational Technology

by

Ezgi Rabia Diri

Boğaziçi University

2022

DECLARATION OF ORIGINALITY

I, Ezgi Rabia Diri, certify that

- I am the sole author of this thesis and that I have fully acknowledged and documented in my thesis all sources of ideas and words, including digital resources, which have been produced or published by another person or institution;
- this thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution;
- this is a true copy of the thesis approved by my advisor and thesis committee at Boğaziçi University, including final revisions required by them.

Signature……..

Date……..

ABSTRACT

An Investigation of Using Different Types Of

Feedback Strategies in Interactive Video Lectures

The purpose of this study is to compare the use of elaborated and metacognitive feedback strategies in interactive video lectures in terms of undergraduate students' engagement and metacognitive awareness levels. This study also aims to investigate undergraduate students' evaluations of elaborated and metacognitive feedback in interactive video lectures based on qualitative data. This study used a basic randomized post-test-only experimental design comparing two treatments supported with qualitative data. The participants were 52 preservice teachers who registered in an undergraduate course offered at the Faculty of Education. They were randomly assigned to the two feedback groups, the metacognitive and the elaborated feedback groups. For both groups, measurements were made after the implementation with the Short Form of the User Engagement Scale and the Metacognitive Awareness Inventory. In addition, qualitative data were collected through interviews and used to examine students' evaluations of the elaborated and metacognitive feedback used in the interactive video lectures. The results showed that there was no statistically significant difference between the two feedback types in terms of students' engagement and metacognitive awareness levels. The qualitative findings, also consistent with the quantitative findings, suggested that while two types of feedback did not provide a significant superiority over each other, students viewed the two types of feedback as serving different purposes.

ÖZET

Etkileşimli Video Derslerinde Farklı Tür

Geri Bildirim Stratejilerinin Kullanımının İncelenmesi

Bu çalışmanın amacı, etkileşimli video derslerde kullanılan ayrıntılı ve üstbilişsel geri bildirim stratejilerini, öğrencilerin katılımı ve üstbilişsel farkındalık düzeyleri açısından karşılaştırmaktır. Aynı zamanda bu çalışma nitel veriler de toplayarak, öğrencilerin bu iki tip geri bildirime yönelik değerlendirmelerini incelemeyi amaçlamıştır. Bu çalışma, nitel verilerle desteklenen, iki uygulamayı karşılaştıran basit rastgele yalnızca son test deney desenini kullanmıştır. Katılımcılar, eğitim fakültesinde verilen bir derse kayıt yaptıran 52 lisans öğrencisinden oluşmaktadır (45 kız ve 7 erkek). Katılımcılar bir grup olarak ele alınmış ve rastgele iki geri bildirim grubuna atanmışlardır. Her iki grup için de uygulama sonrası “The Short Form of the User Engagement Scale” ve “The Metacognitive Awareness Inventory” ölçekleri ile ölçümler yapılmıştır. Ayrıca öğrencilerin geri her iki bilidirim çeşidine dair değerlendirmelerini incelemek için bire bir görüşmeler yoluyla nitel veri toplanmıştır. Sonuçlar, katılım ve üstbilişsel farkındalık düzeyleri açısından iki geri bildirim türü arasında istatiksel olarak anlamlı bir fark olmadığını göstermiştir. Nitel bulgular, nicel bulgularla uyumlu olarak, iki geri bildirim türünün birbirine tutarlı bir üstünlük sağlamadığını desteklemektedir. Buna ek olarak öğrenciler iki geribilidirim türünün farklı amaçlara hizmet ettiğini düşünmektedir.

ACKNOWLEDGEMENTS

First, I would like to present my sincere gratitude to my advisor Prof. Dr. Diler Öner who has been the most substantial supporter of my MA research, for her tolerance, motivation, enthusiasm, and immense knowledge. Her guidance helped me in writing my thesis and it was a great pleasure for me to study with her. Besides, I would like to thank Assist. Prof. Duygu Umutlu and Assist. Prof. Mutlu Şen-Akbulut for allowing me to use their lectures for this research. I would also like to appreciate the research assistant of the course Beste Ulus for her support in preparing the necessary implementations, such as videos, or quiz questions, for this study. In addition, I would like to acknowledge each of my thesis committee members, Assoc. Prof. Dr. Engin Ader and Assoc. Prof. Dr. Elif Buğra Kuzu Demir, for their valuable suggestions and feedback.

Finally, I am grateful to my family Hakan Diri, Bedriye Diri, and my fiance Mustafa Koç for their endless support. Also, I thank myself, for all my hard work even so of my workload.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The interest in educational research on video-based learning has increased with different forms of distance education such as massive open online courses (MOOCs) (Kolas, 2015). Especially in the COVID-19 pandemic period worldwide, a new era of video-based learning has emerged because of the physical closure of educational organizations (Pal & Patra, 2020). An interactive video uses in-video quizzes and is a part of video-based learning. This in-video quiz concept can be simply defined as questions shown to users at certain points in a lecture video (Kovacs, 2016). Through these platforms, learners can test themselves on the material and receive feedback (Kovacs, 2016). When learning technologies are utilized appropriately to give feedback, better engagement can be achieved (Hepplestone, Holden, Irwin, Parkin, & Thorpe, 2011). Engagement is one of the essential factors in education because student learning is related to engagement, and learning is affected by participation in learning activities (Coates, 2005). It is commonly known that engaged students are more successful than unengaged students (Lee, Sanders, Antczak, Parker, Noetel, Parker, & Lonsdale, 2021)

Also, forced educational changes brought by the COVID-19 pandemic more clearly revealed that students need to monitor their own learning and progress. In computer-based distance education environments, achieving self-regulation has been a challenge for students. Self-regulation refers to a self-directive learning process in which students can control their own learning (Şen, Yılmaz, & Geban, 2018). The lack of self-

regulation can lead to disengagement and dropout (Cho & Shen, 2013) and students do not always regulate their own learning (Lee, Lim, & Grabowski, 2010). Therefore, new online educational approaches are needed for developing students' self-regulation skills (Cho & Shen, 2013). Interactive video-based learning can be one of these approaches (Sebille, Joksimovic, Kovanovic, & Mirriahi, 2018). These interactive videos, with questions, and feedback added, can be used for developing students' self-regulation (Hulsman & Vloodt, 2015).

Particularly in online education, self-directed learning has become very important (Kohan, Arabshahi, Mojtahedzadeh, Abbaszadeh, Rakshani & Emami, 2017). To support self-directed learners, metacognitive skills are essential (Ghomi, Moslemi, & Mohammadi, 2016) and there is a significant relationship between them (Shih & Huang, 2018). Metacognition is also an important factor in the learning process in terms of awareness and controlling learning (Khodaei, Hasanvand, Gholami, Mokhayeri, & Amini, 2022). It has been shown that metacognitive awareness positively affects students' performance (Khan & Seemab, 2019), and it is a key factor to reach achievement in learning processes (Abdelrahman, 2020). Researchers suggest providing immediate feedback in the learning process to support students' metacognitive awareness and engagement, to achieve the larger goal of self-regulation (Sebille et al., 2018).

There exist different types of feedback that could be used in video-based lectures. The types of feedback commonly used in distance education are knowledge of correct response (KCR), knowledge of response (KR), answer until correct (AUC), and elaborated feedback (Narciss, 2014). While KR provides learners information on the

correctness of their actual responses (e.g., correct/incorrect), KCR provides the correct answer to the given task (Narciss, 2014). And, AUC feedback provides KR and offers the opportunity to further tries with the same exercise until the exercise is answered correctly (Narciss, 2014). KCR, KR, AUC are considered as simple outcome feedback types because any other information except the response is not given in these feedback types. Therefore, students who receive these feedback types cannot have many opportunities to develop their self-regulation (Butler & Winne, 1995). However, good feedback should provide opportunities to develop students' self-regulation (Nicol & Macfarlane-Dick, 2006).

Elaborated feedback can support students' self-regulation by providing information about essential cues and conditions (Chung & Yuen, 2011). Also, when students participate in self-regulation activities, their metacognitive skills such as planning, monitoring, or evaluating are developed (Lee, Muthoosamy, Chiang, & Ooi, 2016). Thus, self-regulated students utilize metacognitive strategies to gain learning outcomes (Zimmerman, 2008). Because self-regulated students are aware of how to use metacognitive strategies (Delen, Liew, & Willson, 2014), metacognitive feedback strategies can also support self-regulation. Therefore, one can conclude that elaborated and metacognitive feedback are the two specific types of feedback that could support students' self-regulation.

To the best of our knowledge, no studies to date have investigated and compared these two types of feedback embedded into in-video quizzes. However, learning about the types of feedback that could affect student engagement and metacognitive awareness levels has important implications to design better video resources for students.

Especially, instructional designers, teachers, and other educational practitioners can benefit from the findings of such research. They could make more informed decisions regarding the effectiveness of feedback strategies used in interactive videos. Also, because there is a gap in the literature regarding the comparison of these feedback types in interactive videos, researchers could benefit from this study deriving new research questions for further work.

1.1 Purpose of the study

The purpose of this study is to compare the use of elaborated and metacognitive feedback strategies in interactive video lectures in terms of undergraduate students' engagement and metacognitive awareness levels. This study also aims to investigate undergraduate students' evaluations of elaborated and metacognitive feedback in interactive video lectures based on qualitative data.

1.2 Research questions

The following research questions are asked:

i. Is there any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?
ii. Is there any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?

iii. How do the students evaluate elaborated and metacognitive feedback in interactive video lectures?

1.3 Research hypotheses

1.3.1 H0 of research question 1

There is no statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

1.3.2 H1 of research question 1

There is a statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

1.3.3 H0 of research question 2

There is no statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

1.3.4 H1 of research question 2

There is a statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

CHAPTER 2

REVIEW OF LITERATURE

In the literature review part, first, interactive videos, which are the main topic of this research, are examined and discussed. Then, attention will be drawn to the feedback types and their relationship to self-regulation. After that, metacognition and metacognitive feedback strategies, and engagement are explained. Finally, a general summary is presented.

2.1 Interactive videos

In the 2010s, the use of video-based learning (VBL) has significantly increased in distance education (Kolas, 2015). Today, the COVID-19 pandemic shows the need to rely more on VBL (Eidenberger & Nowotny, 2022). In VBL, students can be passive learners. To deal with the negative effects of passive learning, interactive videos that support user engagement and learning are used (Sebille et al., 2018). The interactive video concept, one of the e-learning tools used in distance education, has been developed based on constructivist theories (Zhang, Zhou, Briggs & Nunamaker Jr., 2006). An interactive video is a type of video that supports interaction with some clickable areas such as quizzes (Zhang et al., 2006). These in-video quizzes are defined as questions shown to users in certain points in a video lecture (Kovacs,2016).

According to Wagner (1994), interaction can be defined as influence and change between groups and individuals that affect each other. As stated by Pahl (2004),

interaction is necessary for learning and adequate interaction has positive effects on learning. Moore (1989) mentions three different types of interaction that need to be supported for effective learning. These interactions are learner-teacher interaction, learner-learner interaction, and learner-content interaction. Considering video-based learning, quizzes and feedback have been added to the videos to provide better learner-content interaction (Uğur & Okur, 2016).

In practice, the most common use of interactive videos can be seen in MOOCs. One of the main purposes of MOOC-based learning is to support learning by helping learners build new knowledge with interactions (Nawrot & Doucet, 2014). However, one of biggest problems of MOOCs and other online courses has been the high drop-out rates (Nawrot & Doucet, 2014). Nevertheless, it has been seen in studies that the drop-out rate of the courses with in-video quizzes is lower, compared to courses that lack in-video quizzes (Kovacs, 2016). For this reason, it is believed that in-video quizzes positively affect engagement (Nawrot & Doucet, 2014; Sebille et al., 2018; Vural, 2013).

Additionally, with interavtive videos, students have the opportunity to receive immediate feedback after the quiz questions (Cummins, Beresford & Rice, 2016). According to Çuhadar and Kıyıcı (2007), in distance education applications, students should be provided with immediate feedback for interaction purposes. For learners, receiving feedback and controlling their understanding is a critical point in interactive videos (Cummins et al., 2016). In the literature, it is seen that the feedback types given by different technology tools affect the engagement and the correct use of feedback has positive effects on the student engagement (Hepplestone et al., 2011). Besides, Lee,

Irving, Pape and Owens (2015) stated that feedback giving with help of technology is an important strategy to increase the metacognitive opportunities of students. Eventually, offering immediate feedback to students can lead to more metacognitive awareness (Molin, Haelermans, Cabus, & Groot, 2020).

2.2 Widely used feedback types in computer based instruction

Feedback can be defined as any response information about students' state of performance or learning (Narciss,2014). Feedback is an important strategy to support learning because empirical evidence demonstrates that when students receive feedback that gives the correct answer and additional information more effective learning can occur (Guo, Chen, Lei, & Wen, 2014). In the literature, researchers have identified several feedback types used in computer-based learning environments.

Among these, widely used feedback types are knowledge of performance (KP), knowledge of response (KR), knowledge of correct response (KCR), answer-until-correct (AUC), multiple-try feedback (MTF) and elaborated feedback (EF) (Narciss,2014). Narciss (2014), provided explanations for these feedback types (see Table 1).

Table 1. Commonly Used Feedback Types and Explanations

Feedback Type	Explanation
Knowledge of performance (KP)	KP offers students summative feedback after they have answered the tasks. This feedback includes information on the successful performance level for these tasks (e.g., ratio of correctly answered questions).
Knowledge of result/response (KR)	KR offers students information on the truth of their answer (e.g., true/false).
Knowledge of the correct response (KCR)	KCR includes the true answer
Answer-until-correct (AUC)	AUC includes KR and provides the chance for more tries on the same task until the task is answered correctly.
Multiple-try feedback (MTF)	MTF consists of KR and the chance for limited tries on the same task.
Elaborated feedback (EF)	EF includes further information in addition to KR or KCR.

Source: [Narciss, 2014]

In the literature, some of these types of feedback are compared and analyzed in different computer-based education environments. For example, in a study conducted by Clariana (1990), AUC and KCR were compared. Thirty-two students were randomly assigned to groups and received these two types of feedback by microcomputers in instructional lessons (Clariana, 1990). The lessons consisted of four text portions printed on standard papers. After students read the papers, eight multiple-choice questions were displayed on a computer. The students encountered these two types of feedback in these questions. When students answer the question wrong, KCR feedback provided the correct answer, while AUC feedback stated “wrong, try again.”. At the end of the study,

the post-test scores of students who received KCR feedback were higher than those who received AUC feedback.

A similar study was conducted by Clariana, Ross, Morrison (1991). In this study, researchers looked at the effects of feedback types on learning science in computer-based instructions. The feedback conditions they used were KCR, AUC, and no feedback. Instruction consisted of text and quiz questions. A total of 100 students were randomly assigned to the groups and received instruction for five weeks. Students in the no-feedback group did not receive feedback on their answers to the quiz questions. When the students in the KCR group answered the question wrong, they learned the right answer. Those in the AUC group could not pass the question until they answered it correctly. According to the results, the post-test scores of the students in the no-feedback group were lower than the other two groups. Also, there was no significant difference between scores of students in the KCR and AUC groups.

In another research, a comparison of KR, KCR, and elaborated feedback was conducted by Jaehnig and Miller (2007). In this research, programmed instruction was used as a teaching method. Again, different feedback types were given to the multiple-choice questions as part of the instruction. When the students in the KR group answered the question incorrectly, they only got the “your answer is wrong” feedback. Students in the KCR group learned the correct answer. Students in the elaborated group learned the correct answer and received more detailed additional information about the topic. According to the results of the study, the least effective feedback type in terms of learning was identified as the knowledge of response. Elaborated feedback was the most

effective of them. However, a discussion topic of the research is that preparing elaborated feedback for each question can be time-consuming.

2.2.2 Elaborated feedback

As mentioned by Narciss (2012), elaborated feedback should include tutoring to state mistakes, deal with obstacles, and apply effective strategies for solving the problem. To provide an elaborated feedback design, the following components can be analyzed: task rules, and task requirements, conceptual knowledge, errors or mistakes, and procedural knowledge (Narciss, 2012). In many feedback studies, different elaborated feedback components are combined such as knowledge of the correct result, knowledge of the result, and explanations of errors (Narciss, 2012).

Shute (2008) has also identified some forms that elaborated feedback may have. These feedback types can include discussing errors, providing examples, giving general guidance, offering needed strategy uses, and giving the right answer. Similarly, elaborated feedback can be given in such forms as explaining why a specific response is correct, giving cognitive or metacognitive hints, and providing additional background or related information (Golke, Dörfler, & Artelt, 2015). The most important feature in this type of feedback is that, with all these components and forms, students are thought to exhibit a deeper cognitive engagement with effective elaborated feedback (Wanga, Gonga, Xua, & Hua, 2019).

Widely used types of feedback, except elaborated feedback, are considered simple outcome feedback. These feedback types do not have extra information about the task or strategy other than the state of achievement. Thus, even if they are less time-

consuming to prepare, they offer minimal guidance and opportunities to self-regulate (Butler & Winne, 1995). However, it is a well-known fact that self-regulation is positively correlated with achievement and motivation (Dignath & Veenman, 2020). Also, according to Nicol and Macfarlane-Dick (2006), a good feedback practice should be able to provide opportunities for students to develop self-regulation. Considering these inferences, it can be said that the types of feedback that provide opportunities for self-regulation are more effective for learning than other simple outcome feedback types.

2.3 Self-regulation and feedback

Self-regulation can be defined as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p.14). According to theorists, most effective students are self-regulating (Butler & Winne, 1995). Similarly, as reported by Chung and Yuen (2011), self-regulated students are more motivated, confident, and persistent in learning.

Self-regulation has also brought with it the concept of self-regulated learning. According to Pintrich and Zusho (2002), the definition of self-regulated learning as follows "Self-regulated learning is an active constructive process whereby learners set goals for their learning and monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features of the environment." (p.64).

Self-regulated learning can be divided into three main components (Boekarts, 1999). The first one is cognition which is about the mental process involved in knowing, and understanding. The second one is metacognition which is about learning how to learn. Finally, the third one is motivation, which is about willingness to engage the metacognitive and cognitive processes.

Also, Pintrich and Zusho (2002) state that self-regulated learning will occur as a constructive process, when the learners monitor, regulate, and control their cognition. As reported by Dignath and Büttner (2008), to control and regulate the cognition, metacognitive strategies should be used. Because self-regulation is releated with the regulation of cognition component of metacognition (Hughes, 2017). According to Weinstein and Mayer (1986), while cognitive strategies are related to processing information, metacognitive strategies are related to regulating and modifying their cognitive strategies. Furthermore, self-regulated learners play a metacognitively active role in their learning processes (Lee et al., 2010; Zimmerman, 1986).

Students can not accomplish this regulatory process at all times. That's why, sometimes, scaffolds that guide students about their self-regulation are needed (Lee et al., 2010). In self-regulated learning, according to Butler and Winne (1995), feedback can be used as a scaffold. Giving immediate feedback as a scaffold for self-regulation increases students' motivation, engagement, and metacognitive skills (Sebille et al., 2018).

As reported by Chung and Yuen (2011), effective elaborated feedback can provide students more details on their learning process and thus supports their monitoring, and adapting their efforts. They stated that to support self-regulation,

elaborated feedback should include essential cues and conditions to assist students. Also, when feedback about the strategy used to solve the problem is given to the students, their self-regulation was higher (Dignath & Büttner, 2008). As mentioned above, elaborated feedback, which is prepared about essential cues and strategy uses, can support self-regulation. Besides, because self-regulated learning focuses on metacognitive strategies (Paris & Paris, 2001), metacognitive feedback strategies can also support self-regulation. When students participate in self-regulation activities, their metacognitive skills such as planning, monitoring, or evaluating are developed (Lee et al., 2016). Thus, self-regulated students utilize metacognitive strategies to gain learning outcomes (Zimmerman, 2008).

2.4 Metacognition and metacognitive feedback strategies

Metacognition refers to the comprehension of learning processes and this allows persons to control and regulate these learning processes (Sato & Loewen, 2018). Flavell (1976) states that metacognition is about the monitoring and regulation of person's own cognitive processes. Garner (1987) differentiates cognition and metacognition as follows: while cognition is about performing an exercise, metacognition is about understanding how the exercise performed. In other words, the slogan "thinking about thinking" can be used for metacognition (Gassner, 2009).

Researchers divide metacognition into two components as knowledge of cognition and regulation of cognition (Schraw, 1998). Knowledge of cognition is about knowing one's own cognition or general cognition concept. There are three various knowledge types as declarative, procedural, and conditional (Brown, 1987; Jacobs,

Paris, 1987; Schraw, Moshman, 1995). Declarative knowledge points knowing "about" while procedural knowledge points knowing "how" to do. Finally, conditional knowledge refers to knowing the "why" and "when" aspects of cognition. Regulation of cognition is about any activity that controls and regulates their learning (Sato & Loewen, 2018). As stated in many studies, metacognitive regulation develops students' performance by supporting awareness and the use of learning strategies (Schraw, 1998). In addition, for learning, metacognition is a critical factor because it provides the ability to manage and regulate cognitive skills (Schraw, 1998). If students are not aware of their metacognition, it gets harder to control their learning (Gassner, 2009). Metacognitive awareness is defined as the ability of regulation of individual's own cognition or thinking processes (Schraw & Dennison, 1994). It is a well-known fact that metacognitive awareness is positively correlated with good course outcomes (Ostafichuk, Nesbit, Ellis, & Tembrevilla, 2020). Since metacognitive awareness helps students to plan, monitor, and evaluate their own learning processes, metacognitively aware students perform better than unaware students (Schraw & Dennison, 1994).

Three essential metacognitive strategies have been widely used in the literature: planning, monitoring, and evaluation (Schraw, 1998). These metacognitive skills help students to be aware of their learning process (Altıok, Başer, & Yükseltürk, 2019). Schraw (1998) describes these skills as follows: Planning refers to strategy selection and allocation. Monitoring is controlling self-comprehension, awareness, and performance. Evaluating is about assessment on goals or products.

A regulatory checklist is used by King (1991) to provide an overlook of the regulation of cognition and controlling their performance. Figure 1 offers this checklist with three essential categories.

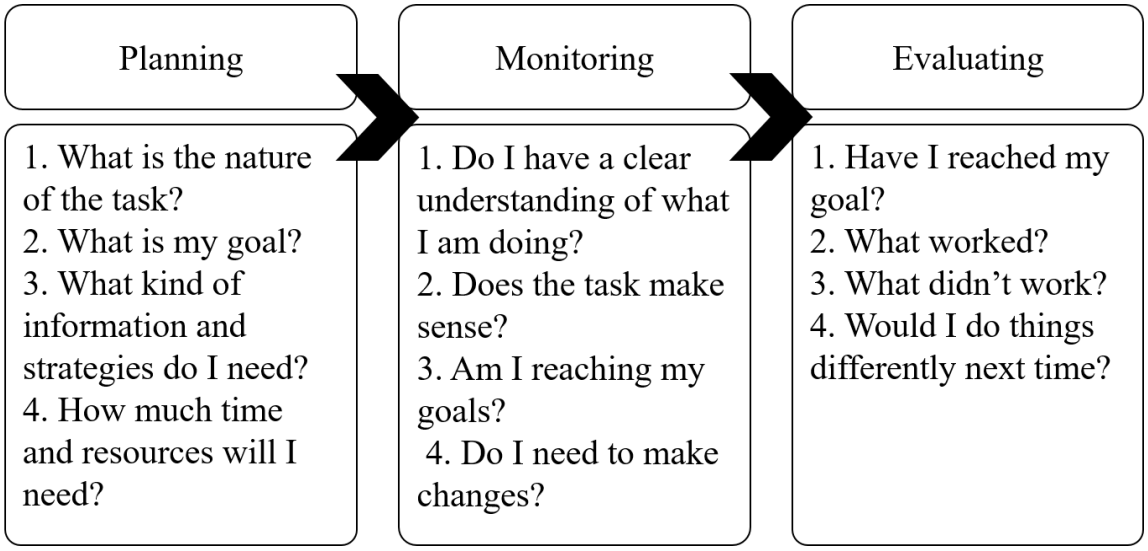

Figure 1. A regulatory checklist

Source: [King, 1991]

As stated by King (1991), students who used a checklist similar to Figure 1 outperformed those who did not on problem-solving and asking strategic questions. Therefore, it can be said that these types of a checklist can allow students to be more systematic and strategic on problem-solving (King,1991).

Likewise, Tanner (2012), prepared an example table of self-question for planning, monitoring, and evaluating steps in the context of one class session, an assignment, a test, or a whole course. These example questions are shown in Table 2. While these questions might be shared directly with learners, they can be also embedded in different activities such as exams, quizzes, assignments, or feedback. This type of questioning of the thinking process is one of the strategies to develop metacognitive awareness (Altıok et al., 2019).

Table 2. Example Self-Questions for Planning, Monitoring, and Evaluating

Activity	Planning	Monitoring	Evaluating
Class session	What are the goals of the class session going to be? What do I already know about this topic? What questions do I already have about this topic that I want to find out more about?	Do I find this interesting? Why or why not? How could I make this material personally relevant? Can I distinguish important information from details?	What did I hear today that is in conflict with my prior understanding? How did the ideas of today's class session relate to previous class sessions? What did I find most interesting about class today?
Active-learning task and/or homework assignment	What are all the things I need to do to successfully accomplish this task? What resources do I need to complete the task?	What strategies am I using that are working well or not working well to help me learn? What action should I take to get these?	When I do an assignment or task like this again, what do I want to remember to do differently? What worked well for me that I should use next time?
Quiz or exam	What strategies will I use to study? Which aspects of the course material should I spend more or less time on, based on my current understanding?	Which of my confusions have I clarified? How was I able to get them clarified? Which confusions remain and how am I going to get them clarified?	What did not work so well that I should not do next time or that I should change? How did my answer compare with the suggested correct answer?
Overall course	What do I most want to learn in this course? What do I want to be able to do by the end of this course?	In what ways is the teaching in this course supportive of my learning? How could I maximize this?	What advice would I give a friend about how to learn the most in this course? If I were to teach this course, how would I change it?

Source: [Tanner, 2012, p. 115]

According to Lee et al. (2010), in computer-based learning platforms, students should control their learning process. In this control process, metacognitive feedback can be used to guide what cognitive strategies should be used and how to use them. In connection with this, in the study of Mevarech and Fridkin (2006), the impact of metacognitive feedback that used self-questioning on students' math achievement and metacognition in an online math course is examined. There were four types of self-questions given after math problems. These are comprehension (e.g., "What is the problem all about?"), connection (e.g., "What are the similarities and differences between the given problem and problems you have solved in the past, and why?"), strategic (e.g., "What strategies are appropriate for solving the problem, and why?"), and reflection questions (e.g., "What am I doing here?"). According to the results, students receiving these self-questions were more significantly successful on mathematical knowledge and they used more metacognitive strategies than students who didn't receive these questions (Mevarech & Fridkin, 2006). Consistent with this research, Ader (2013) also emphasized the link between mathematical problem solving and metacognition. Therefore, these questions can be scaffolds for metacognitive feedback that helps and guide students' self-regulatory process (Lee et al., 2010). A guiding function is one of the metacognitive functions that feedback should have (Butler & Winne, 1995). This function can be used to encourage students (e.g., with leading questions) to plan, monitor, or evaluate their learning process (Butler & Winne, 1995).

In a similar study by Karaoğlan Yılmaz and Yılmaz (2021), the effect of metacognitive feedback on students' engagement within the scope of a computing course based on online learning is examined. While the experimental group received

metacognitive feedback (self-questioning e.g., “How could I relate what I have learned with real life?”), the control group didn’t receive any feedback. The results show that the engagement of students, who received metacognitive feedback, was higher than the engagement of students, who didn’t receive it (Karaoğlan Yılmaz & Yılmaz, 2021).

2.5 Engagement

Engagement is an important construct that is related to student learning, and learning is affected by participation in learning activities (Coates, 2005). Engagement can be in the form of attending to a task, or activity (Rice & Kipp, 2020). When it comes to learning, learner engagement is associated with participation in learning, and understanding (Bote-Lorenzo & Gomez-Sanchez, 2018). Learner engagement is defined as the student’s cognitive, behavioral, and emotional effort to achieve a learning outcome (Halverson & Graham, 2019).

According to Fredricks, Blumenfeld, and Paris (2004), student engagement also has three dimensions: behavioral engagement, emotional engagement, and cognitive engagement. As reported in their article, behaviorally engaged learners attend the process and do not demonstrate disruptive or negative behaviors in their learning process; emotionally engaged learners demonstrate affective reactions like enjoyment or sense of acceptance; and learners who are cognitively engaged invest in their understanding and learning requirements.

The literature demonstrates that these dimensions are related to different concepts (Nayır, 2017). In Table 3, these dimensions and the concepts associated with

them are shown (Gibbs & Poskitt, 2010). As seen in the table, the use of self-regulation and metacognitive strategies can be directly associated with cognitive engagement.

Table 3. Dimensions of Student Engagement

Dimensions	Exemplified in the following elements
Behavioral	-Participation -Presence -On task -Behavior -Compliance with rules -Effort, persistence, concentration, attention, rates of/quality of contribution -Involvement in school-related activities
Emotional	-Positive and negative reactions to teachers, classmates, -Academic activity and school -Student attitude (thoughts, feelings, outlook) -Perception of the value of learning -Interest and enjoyment -Happiness -Identification with school -Sense of belonging within a school
Cognitive	-Volition learning (learning by choice) -Investment and willingness to exert effort -Thoughtfulness (applying the processes of deep thinking) -Self-regulation -Goal setting -Use of meta-cognitive strategies -Preference for challenge -Resiliency and persistence -Mastery orientation -A sense of agency

Source: [Gibbs & Poskitt, 2010, p. 12]

Engagement can be measured with self-report scales or it can be also determined with some indicators (Mandernach, 2012). For example, in an online learning environment, behavioral engagement is related to the actions in the online learning platform such as the amount of time spent, emotional engagement is about students' feelings about their experiences such as satisfaction, motivation, or frustration, and finally, cognitive engagement is related to students' effort and investment in learning experiences such as reflection (Lee, et al., 2021). Similarly, video watching time, the number of correct answers in quizzes, the rate of submitting quizzes, the number of videos watched, etc. can be examples of these indicators (Cummins et al., 2016 & Bote-Lorenzo, Gomez-Sanchez, 2018). These indicators can be selected depending on the design of the course. For example, in research on MOOCs, video-watching time, or quiz submitting rates are frequently used as engagement indicators (Nawrot & Doucet, 2014). In this type of research, these selected indicators are recorded by the platform for each user and interpreted after treatment.

An example of such research was conducted by (Cummins et al., 2016). In that research, he designed a course to lower the high dropout rates of online courses. He used the Interactive Lecture Video Platform for the in-video quiz concept. In the study, the question types in the quiz are determined as independent variables. These question types are organized according to the Bloom's Taxonomy. These questions were used at the level of remembering, understanding, applying, and analyzing. Some indicators have been determined as the dependent variables. These are answering questions and answering questions correctly. Users were given quizzes with different question types in

the video and the indicators were recorded. According to these two indicators, the average engagement of the users was higher in the questions of the remembering level.

Attfield, Kazai, Lalmas, and Piwowarski (2011) state the definition of user engagement as follows; “User engagement is the emotional, cognitive and behavioural connection that exists, at any point in time and possibly over time, between a user and a resource.” (p.2).

Following suggestions have been developed to increase user engagement in interactive videos: supporting the understanding with simple explanations of procedures or concepts, emphasizing active learning and interaction, providing immediate feedback to users, and using quizzes (Hew, 2016). For the interactive videos used in this study, these suggestions are utilized.

2.6 Summary of the literature review section

Based on the literature review, the following inferences can be made.

With the expansion of e-learning in education, the use of video-based learning resources has significantly increased. Especially video-based lectures or tutorials have become a new area of interest for researchers given that they need to be engaging and helpful for student learning. In-video quizzes can be defined as questions shown to users on certain points in a video-based lecture and make the videos interactive (Kovacs,2016). With interactive videos, students can be both asked comprehension questions and have the opportunity to receive feedback after these questions (Cummins et al., 2016). In such videos, receiving immediate feedback to control their own

understanding is important for students (Cummins et al., 2016). Also, it is known that the correct use of feedback can positively affect students' engagement and metacognitive awareness (Hepplestone et al., 2011; Lee, Irving, Pape, & Owens, 2015; Molin et al., 2020).

There are different feedback types that can be used in interactive video lectures. In general, simple outcome feedback is often used in video-based lectures as these are the eaisest to prepare (Narciss, 2014). But, these simple outcome feedback types have no extra information about the task or strategy, therefore cannot sufficiently foster self-regulation skills, which are essential for controling learning processes (Butler & Winne, 1995). However, good feedback practice should provide opportunities to improve students' self-regulation (Nicol & Macfarlane-Dick, 2006).

According to the literature, elaborated feedback, providing essential cues, conditions, and strategy use, can support self-regulation (Chung & Yuen, 2011; Diagnath & Büttner, 2008). Also, since self-regulation is related to the metacognitive strategies (Paris & Paris, 2001), metacognitive feedback strategies can support self-regulation, too.

Unfortunately, despite these promising indications, there is not enough research in the literature that compares the use of different types of feedback in in-video quizzes in terms of student engagement and metacognitive awareness. Thus, the purpose of this study is to compare the use of elaborated and metacognitive feedback strategies in interactive video lectures in terms of undergraduate students' engagement and metacognitive awareness levels. This study also aims to investigate undergraduate

students' evaluations of elaborated and metacognitive feedback in interactive video lectures based on qualitative data.

Research questions and hypotheses of this study are as follows;

i. RQ1: Is there any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?
ii. H0: There is no statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.
iii. H1: There is a statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.
iv. RQ2: Is there any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?
v. H0: There is no statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

vi. H1: There is a statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

vii. RQ3: How do the students evaluate elaborated and metacognitive feedback in interactive video lectures?

CHAPTER 3

METHOD

In this chapter, the following sections are covered: (1) research design, (2) sampling and participants, (3) data collection instruments, (4) data collection procedures, and (5) data analysis.

3.1 Research design

This study used a basic randomized post-test only experimental design comparing two treatments (Shadish, Cook, & Campbell, 2002) supported with qualitative data. Participants were randomly assigned to the comparison groups, which are the elaborated feedback group and the metacognitive feedback group. For both groups, measurements were made after the implementation. In addition, qualitative data were collected through interviews and used to examine students' evaluations of the elaborated and metacognitive feedback used in the interactive video lectures.

In this study a control group or pre-test were not used for the following reasons. According to Clariana et al. (1991), even simple outcome feedback types that provided minimal self-regulation opportunities had more positive effects on students' learning compared to the no feedback condition. Thus, any control group without feedback was not used in this study. Also, if one treatment is innovative and the other one is a standard treatment, there is no need to use a control group (Shadish et al., 2002). In the literature, while the use of elaborated feedback is common in technology-based learning

environments, the use of metacognitive feedback is much less common. Therefore, while metacognitive feedback in interactive videos can be considered as an innovative treatment, elaborated feedback in interactive videos can be accepted as a standard best possible (or gold) treatment. The reason for not using a pre-test is as follows. This study focused on users' engagement in relation to specific types of video-based resources. Measuring engagement without using a particular interactive video would not have made sense and the scale used was not suitable for this situation. If some interactive videos had been used before a pre-test, the same video resources could not have been used for the post-test. And the changed video topics could have been an extraneous factor. However, the study used random assignment to groups, thus no systematic difference between the two groups' initial engagement or metacognitive awareness can be assumed.

The independent variable of the study is the two types of feedback embedded into a set of interactive videos. The dependent variables of the study are students' engagement and metacognitive awareness levels, measured with quantitative scales, that can change according to feedback types. The dependent and independent variables of the study are shown in Table 4. Furthermore, this study also looked into undergraduate students' evaluation of feedback types based on qualitative data collected through the one-on-one interviews.

Table 4. The Variables of the Study

Independent Variable	Dependent Variables
Feedback types embedded into interactive videos	Students' engagement Students' metacognitive awareness

3.2 Sampling and participants

The target population of the study is undergraduate students in Turkey. The participants were selected using a purposeful sampling strategy (Creswell, 2012) based on the following criteria: (a) being an undergraduate student, (b) having basic computer skills, especially in using Moodle, and Panopto.

Because the researcher was a student and research assistant in a public research university, the participants were selected among the undergraduate students who took the "Instructional Technologies and Materials Design" course. Therefore, the accessible population of the study was the pre-service teachers who took this course.

The participants were 52 undergraduate students who registered for the four different sections of this course in Spring 2021. The course was offered totally online due to the COVID-19 pandemic. There were 45 female students and seven male students. The age range of the students was 20-25. Participants satisfied the necessary criteria for purposeful sampling. Before the application, students used Moodle and Panopto in the lecture part of the course. Therefore, it is known that the students could use both Panopto and Moodle.

A total of 52 students, who participated in the study, were randomly assigned to the two feedback groups (see Table 5).

Table 5. Number of Group Participants

	Elaborated Feedback Group	Metacognitive Feedback Group
Total	26	26
Female	23	22
Male	3	4

Three one-on-one interviews were conducted with three volunteering students, who participated in the study, to collect more in-depth data about the effectiveness of the two feedback strategies. One of the students was in the elaborated feedback group and two of them were in the metacognitive feedback group. There is no particular reason for these selections since the participants were chosen on a voluntary basis. However, the participants were asked to examine both types of feedback for the interviews. Therefore, the group they belong to does not matter.

3.3 Data collection instruments

In this study, (1) the short form of the User Engagement Scale and (2) planning, comprehension monitoring, and evaluation subcomponent items of the Metacognitive Awareness Inventory were used as the quantitative data collection scales. To collect qualitative data, an interview protocol prepared by the researcher was used.

3.3.1 The Short Form of the User Engagement Scale

The User Engagement Scale (UES) is used to measure user engagement and it has been used in a variety of digital domains (O'Brien & Toms, 2013). The UES consists of 31-

items and was prepared to measure six dimensions of engagement: aesthetic appeal, focused attention, novelty, perceived usability, felt involvement, and endurability. O'Brien, Cairns, and Hall (2018) suggested a shorter version of the scale and produced a new UES short form. The Short Form of the User Engagement Scale (UES-SF) (APPENDIX A) consists of 12-items including six negative and six positive items and has a four-factor structure. It aims to evaluate user engagement in a particular application. The factors are focused attention, perceived usability, aesthetic appeal, reward factor. Cronbach's alpha values for these factors are calculated as 0.92, 0.92, 0.90, and 0.87 respectively and 0.88 for overall (O'Brien, Cairns, & Hall, 2018). This 5-point Likert scale consist of 5 answer options: strongly disagree; disagree; neither agree nor disagree; agree; strongly agree. Considering that this research aimed to evaluate student engagement in video-based lectures, not in the whole course, UES-SF is used to collect the data. For this study, the specific variable wanted to measure was an engagement in these interactive videos. Video engagement scales were also insufficient because such scales usually only mention video content and designs. But in this research, these interactive videos offer questions and feedback. That's why the researcher chose this scale more specifically. She also added an expression at the beginning of the scale, saying that you should answer the questions by considering the feedback. In addition, the lab assistant told the students to pay attention to these feedbacks while filling out the scales. In the consent forms they filled out, the subject of the study was clearly stated to the students. In this way, can be assumed that students complete the scales without ignoring feedback.

The UES-SF scale has been modified in the following manner. UES-SF aims to measure the engagement level of users who use any application, the application name is changeable. Thus, “Application X” expressions were replaced with “interactive videos.” For instance, “I felt frustrated while using this Application X.” was changed into “I felt frustrated while using the interactive videos.”

3.3.2 The Metacognitive Awareness Inventory

The Metacognitive Awareness Inventory (MAI) is one of the three frequently used self-report instruments to measure students’ metacognitive awareness (Harrison & Vallin, 2018). This inventory was created by Schraw and Dennison (1994) to measure the two theoretical dimensions of metacognition: 17 items for knowledge about cognition and 35 items for regulation of cognition. These dimensions also have metacognitive subcomponents. The components of knowledge about cognition are declarative knowledge, procedural knowledge, and conditional knowledge. The regulation of cognition includes planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation components. Table 6 shows these components and the numbers of items in the scale.

Table 6. The MAI Components and Numbers of Items

Dimension of Metacognition	Metacognitive Component	Number of Items
Knowledge about Cognition	Declarative Knowledge	8
	Procedural Knowledge	4
	Conditional Knowledge	5
Regulation of Cognition	Planning	7
	Information Management Strategies	10
	Comprehension Monitoring	7
	Debugging Strategies	5
	Evaluation	6

Because the metacognitive feedback was constructed considering the planning, monitoring, and evaluation components, only the 20 items related to these components (APPENDIX B) were used to collect data in this study.

In the MAI, the original response format is true-false options, but researchers have used various scale formats, especially Likert-types (Harrison & Vallin, 2018). In this research, the 5-point Likert type is utilized as the answer options of the MAI. The Cronbach's α for each factor was reported as .91 and α for the entire inventory is .95 (Schraw & Dennison, 1994). The internal consistency of the subscales ranges from .93 to .88 (Schraw & Dennison, 1994) and the item-total correlations range from .35 to .65 (Akın, Ramazan, & Çetin, 2007). With these values, this inventory can be accepted as a valid and reliable instrument.

3.3.3 The interview

The purpose of the semi-structured interviews was to examine how the participants evaluated the different types of feedback in interactive video lectures. The questions

were prepared by the researcher and her advisor in order to compare the feedback types in terms of supporting students' engagement and metacognitive awareness levels. The interview protocol (APPENDIX C) has three open-ended questions based on comparing feedback types in terms of preference, engagement, and metacognitive awareness.

3.4 Data collection procedures

This study was conducted in the four sections of the "Instructional Technologies and Materials Design" online course offered during the COVID-19 pandemic period. This course is an introduction to the design of learning environments integrating technology. The course has both lecture and lab sections. The lecture sections cover the theoretical background of technology-supported learning materials was tried to be explained, while the lab sections focus on developing such materials with different software. Since the course was fully offered online due to the COVID-19 pandemic, both lab and lecture parts were carried through Moodle, the learning management system of the university.

One of the major assignments of this course is to design an Articulate Storyline-based project. Articulate Storyline is an interactive multimedia software to design interactive technology-based learning media that can be used by teachers or students (Nabilah, Sesrita, & Suherman, 2020).

There existed six tutorial videos teaching how to use Articulate Storyline in the lab section of the course in the English language. These videos are screen-casted tutorials prepared and recorded by the course lab assistant (see Figure 2). These videos, which aim to develop students' technical and design skills about Articulate Storyline,

include sample topics, such as “Multiple Intelligence Theory” or “The Four Stages of Cognitive Development”. In other words, students saw how different interactive learning media designs can be prepared with Articulate Storyline about these topics in these videos. The video-based tutorials were shared with the students through the Panopto video service, which is integrated into the Moodle system of the university.

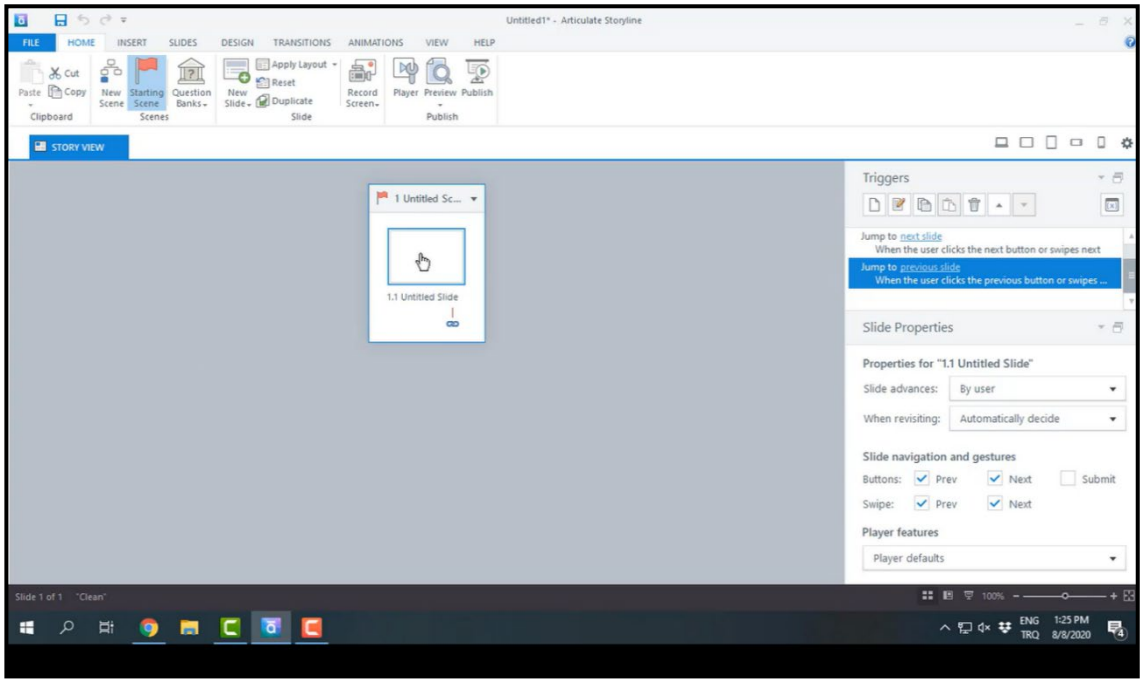

Figure 2. Sample video screenshot

The six videos were made interactive by adding quiz questions and feedback based on the content information retrieved from the articulate.bilgikurdu.net (2021). See APPENDIX D (for the English version) and APPENDIX E (for the original Turkish version) for the full list of comprehension questions and feedback embedded into the

video-based tutorials. The feedback and questions were prepared in Turkish, in students' native language, because when the feedback is in students' native languages, the students could be more actively engaged in feedback sessions (Aktaş, 2021).

The researcher, her advisor, and the course lab assistant worked together to determine the types of questions and their specific timing to appear in the videos. Each video had about three comprehension questions in the multiple-choice format about the topic of the video embedded into them (see Figure 3 for an example) using the Panopto Quiz features. As the course lab assistant is a subject matter expert, she first identified the learning objectives of the videos. She stated that question types suitable for these learning objectives were mostly knowledge and comprehension level question types. In order not to create an extraneous factor, it was tried to use the same level of question types in general.

There were 22 multiple choice questions in the six videos. All questions were prepared with two types of feedback changing according to the groups. While the quiz questions and timing were the same, participants received different feedback types based on the group they are randomly assigned to. The number of questions, video duration, and quiz question minutes according to the video titles were given in Table 7.

Table 7. Video and Question Information

The Topic of The Video	The Number of Questions	Video Duration	Question Minutes
1- Intro to Interface: Meeting with Boo	3	23:58	03:03, 12:33, 19:13
2- Presenting Content: Multiple Intelligence Theory	3	11:46	00:50, 05:45, 10:22
3- Presenting Content: The Four Stages of Cognitive Development	3	13:04	00:48, 06:08, 11:22
4- Presenting Content: The Four Stages of Cognitive Development	3	10:17	02:02, 05:47, 08:15
5- Presenting Content: The Four Stages of Cognitive Development	3	14:08	01:15, 07:21, 12:44
6-Final Project Layout	7	45:40	00:54, 03:29, 08:06, 18:30, 35:56, 39:50, 45:06

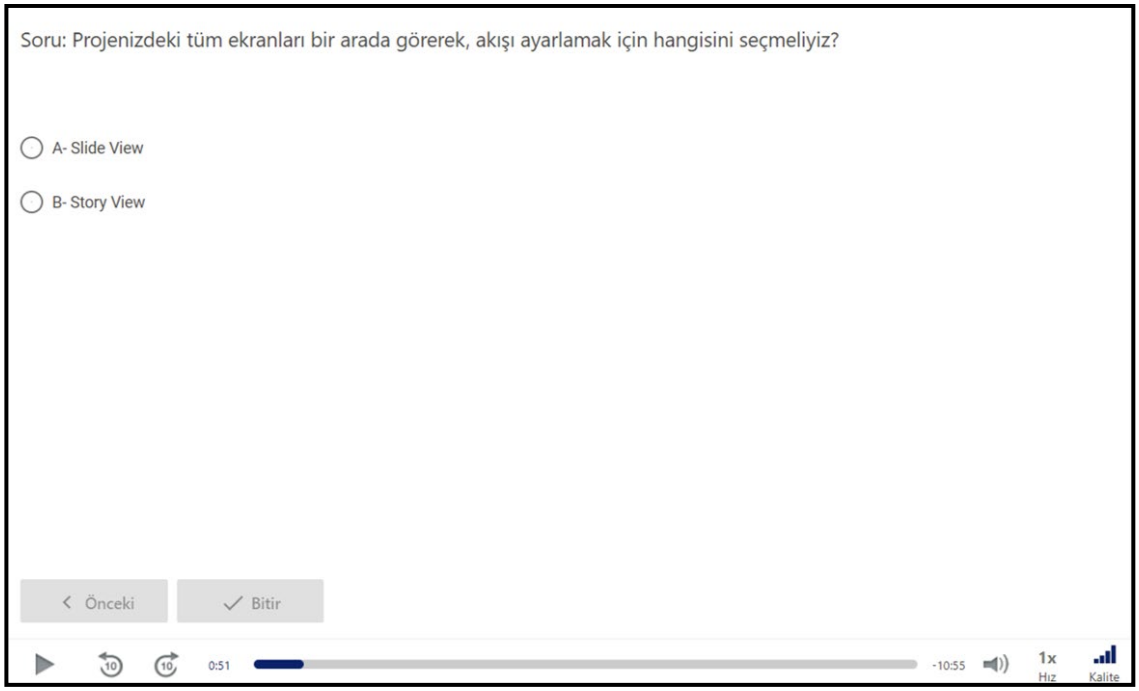

Figure 3. Sample multiple-choice question screenshot

3.4.1 Metacognitive feedback

In the metacognitive feedback group, the correct answer and the questions that aim to provide self-regulation were given to the students as feedback (see Figure 4 for an example metacognitive feedback screen). While preparing these questions, a regulatory checklist (King, 1991) and Tanner's self-questions table (Tanner, 2012) were utilized. As mentioned before, three essential metacognitive strategies widely used in the literature are planning, monitoring, and evaluation (Schraw, 1998). Thus, self-questions aiming to develop these strategies and related to the watched parts of videos were prepared as feedback. There are some examples of metacognitive feedback used in this study, strategies involved, and original self-questions utilized in Table 8.

Table 8. Examples of Metacognitive Feedback Resources

Original Self-Questions Utilized	Metacognitive Feedback in This Study	Metacognitive Strategies Used
What do I already know about this topic? (Tanner, 2012)	What do I know about the purpose of using the Timeline?	Planning
Do I find this interesting? Why or why not? How could I make this material personally relevant? (Tanner, 2012)	Did I find this feature interesting? Can I use it in my own project?	Monitoring
Would I do things differently next time? (King, 1991)	What would I do differently if I used the variables in my own project?	Evaluating

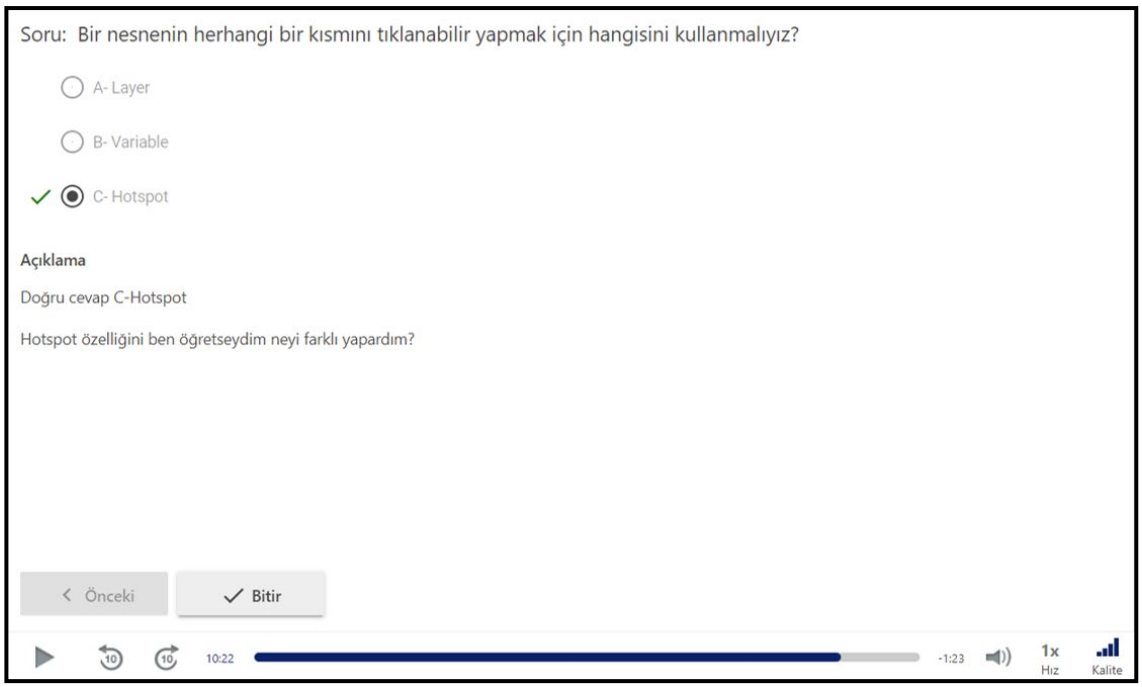

Figure 4. Sample metacognitive feedback screenshot

In this feedback group, for example, at the 02.02 minutes of the "4-Presenting Content: The Four Stages of Cognitive Development" video, students saw the first multiple-choice question about the watched part (see Figure 5). Students were expected to answer this multiple-choice question:

> Which trigger action should we choose when we use a button to switch to the other screen?
> A-Hide Layer
> B-Show Scene
> C-Jump to Slide

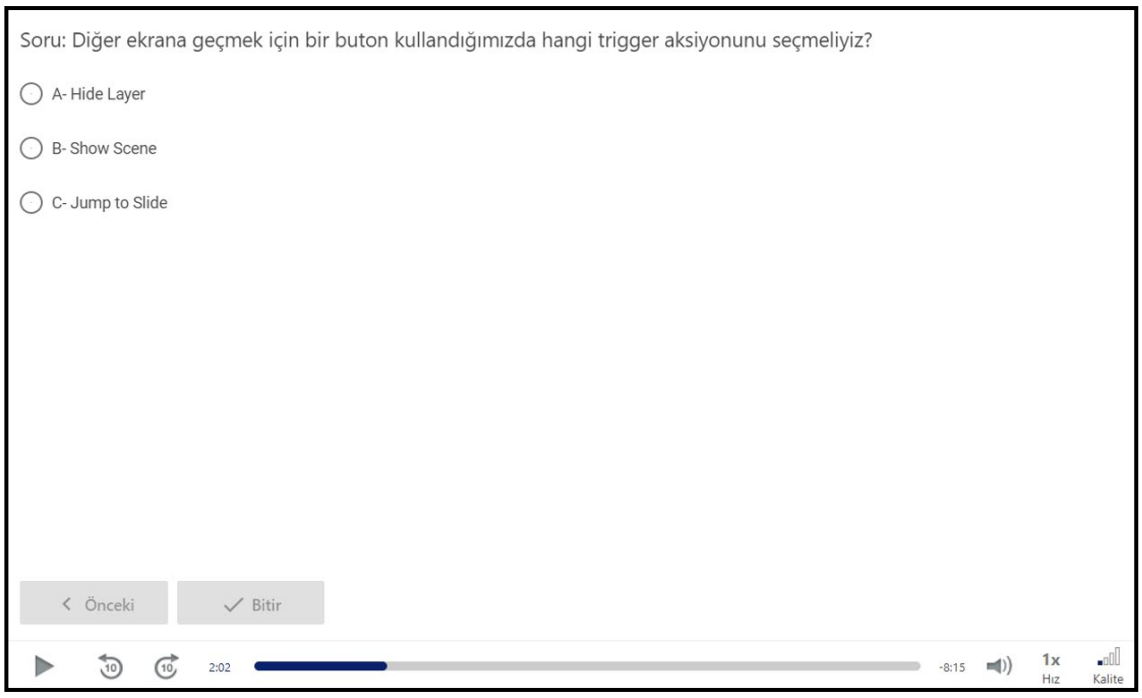

Figure 5. The first multiple-choice question of the "4-Presenting Content: The Four Stages of Cognitive Development" video

After the students answered the first multiple-choice question, they were given the right answer and the metacognitive feedback in the form of a self-reflective question (see Figure 6):

> The correct answer is C-Jump to Slide. Now you should ask yourself this question. What do I know about other trigger actions?

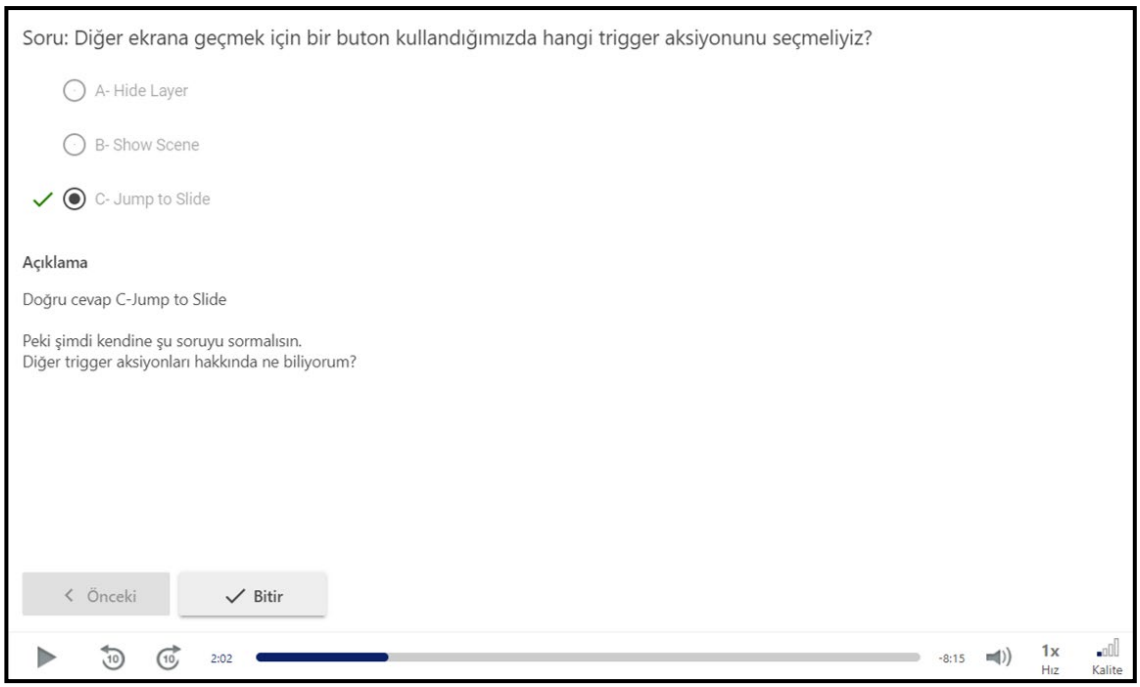

Figure 6. The first metacognitive feedback of the "4-Presenting Content: The Four Stages of Cognitive Development" video

Then, at the 05.47 minutes of this video, students saw the second multiple-choice question about the watched part (see Figure 7). Students were expected to answer this quiz question:

> Which one gives us a chance for changing the view of a thing according to a student's actions?
>
> A-Timeline
>
> B- States
>
> C- Notes

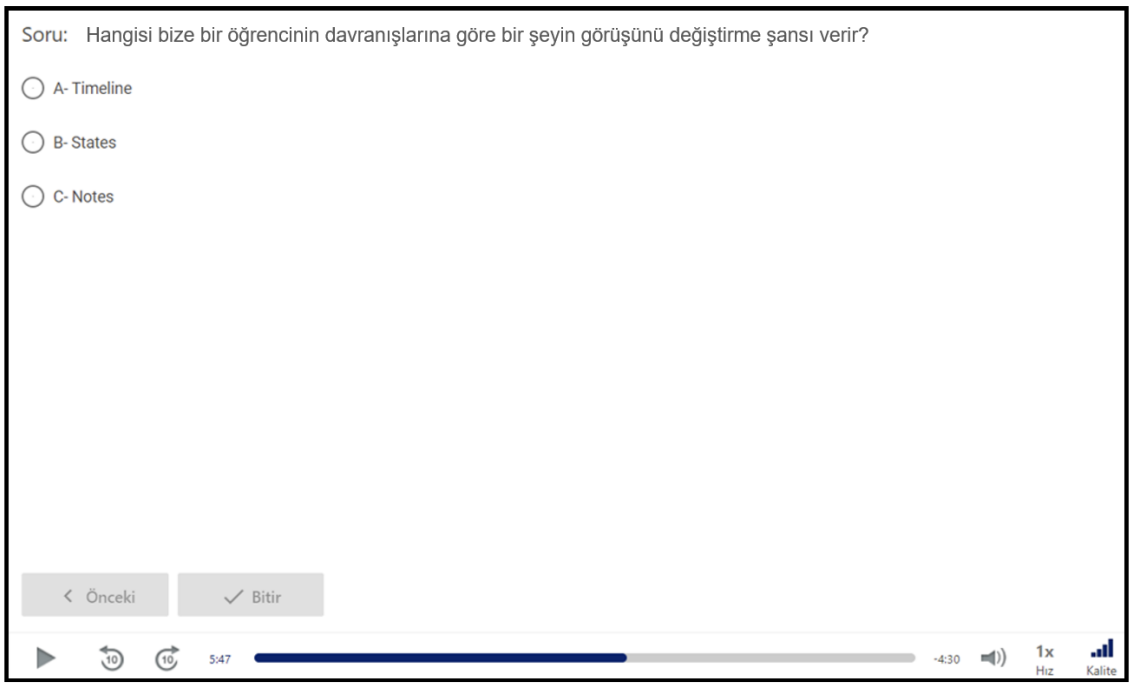

Figure 7. The second multiple-choice question of the "4-Presenting Content: The Four Stages of Cognitive Development" video

After students answered the second multiple-choice question, they were given the right answer and the second metacognitive feedback in the form of a self-reflective question (see Figure 8):

> The correct answer is B-States. Now you should ask yourself this question. What features in this video are similar to what I learned earlier?

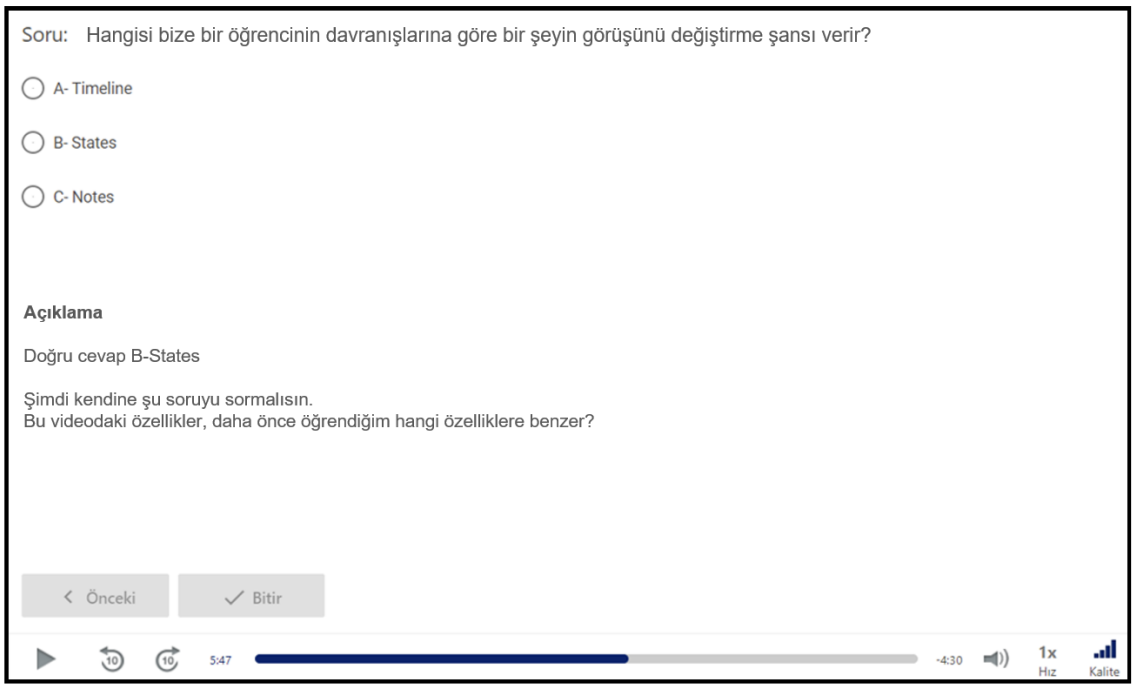

Figure 8. The second metacognitive feedback of the "4-Presenting Content: The Four Stages of Cognitive Development" video

Then, at the 08.15 minutes of this video, students saw the third multiple-choice question about the watched part (see Figure 9). Students were expected to answer this quiz question:

> If Stage 4 appears on the screen (not Stage 1) although the student moves the slider one step, what would be the Operator/Value duplication used in the Show Layer trigger for Stage 1?
>
> A- Equal to / 1
>
> B- Not equal to / 1
>
> C- Equal to / 4

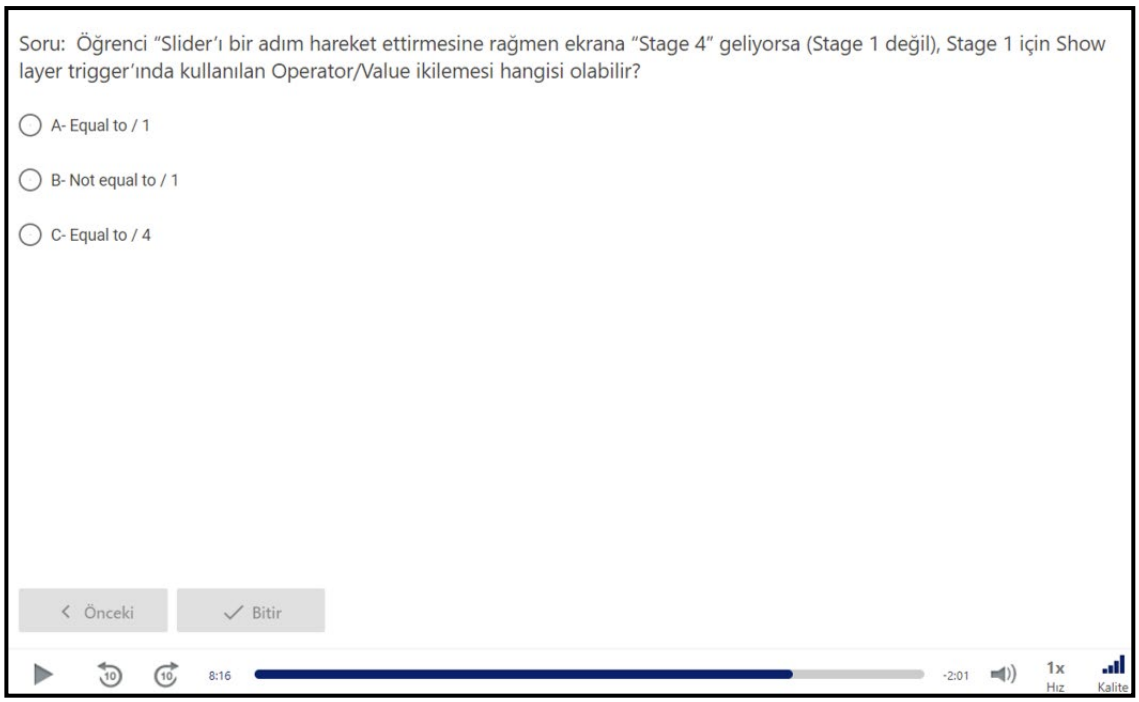

Figure 9. The third multiple-choice question of the "4-Presenting Content: The Four Stages of Cognitive Development" video

After the students answered the third multiple-choice question, they were given the right answer and the third metacognitive feedback in the form of a self-reflective question (see Figure 10):

> The correct answer is C-Equal to / 4. What should I pay attention to in order to use the Operator/Value concepts used for variables?

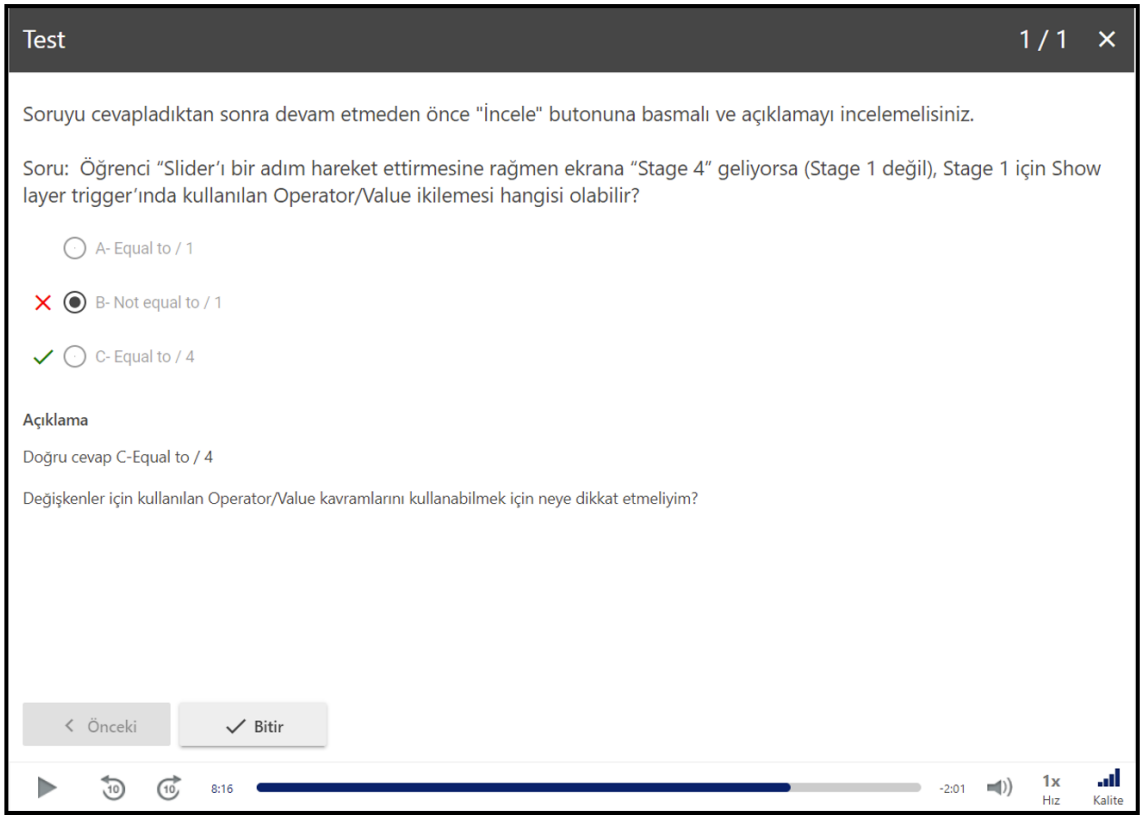

Figure 10. The third metacognitive feedback of the "4-Presenting Content: The Four Stages of Cognitive Development" video

3.4.2 Elaborated feedback

According to Chung and Yuen (2011), to promote students' self-regulation, elaborated feedback should include detailed information, essential hints, and conditions to assist students. Therefore, in the elaborated feedback group, when the students answer the multiple-choice question, they learned the correct answer and got detailed information about the answer as feedback (see Figure 11 for an example of elaborated feedback screenshot).

Table 9. Examples of Elaborated Feedback

Elaborated Feedback in This Study		
The correct answer is A-States With the states property, we can change any object depending on the student's action. We can set something to resize after being clicked or put an x on that object when the user clicks on the wrong object.	Detailed (Additional) Information	Hints about the Strategies
	With the states property, we can change any object depending on the student's action.	We can set something to resize after being clicked or put an x on that object when the user clicks on the wrong object.
The correct answer is D-All of them We can add triggers to anything (buttons, images, text, whatever you want) and we can also use multiple triggers together to create a more complex structure.	Detailed (Additional) Information	Hints about the Strategies
	We can add triggers to anything (buttons, images, text, whatever you want)	We can also use multiple triggers together to create a more complex structure.

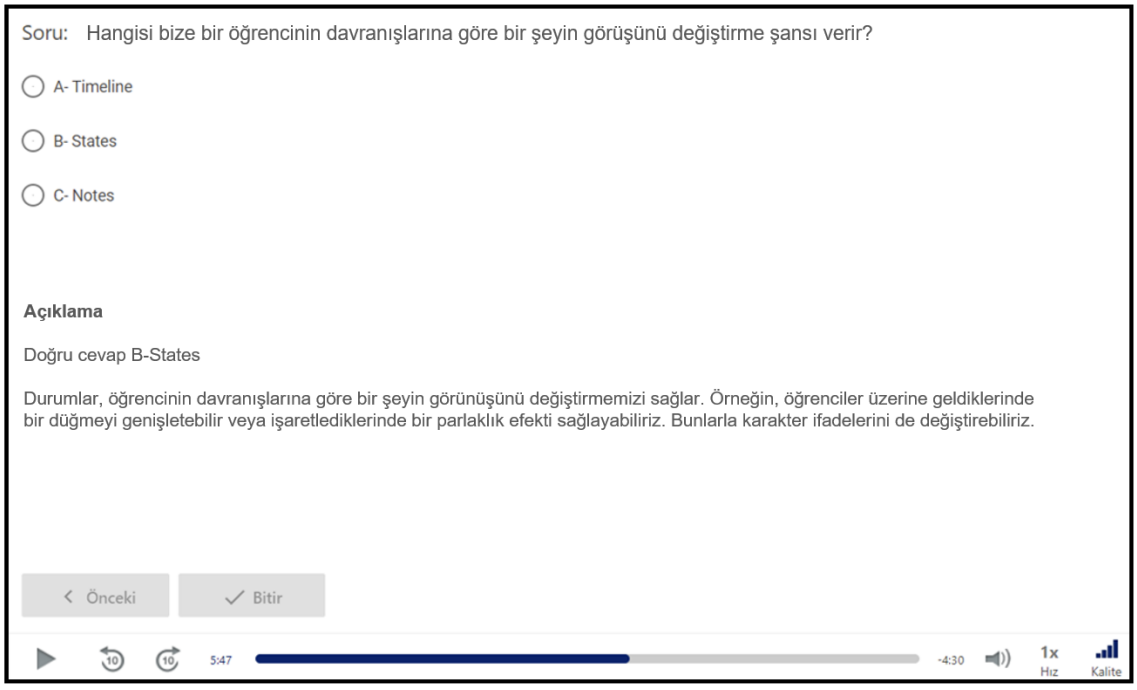

Figure 11. Sample elaborated feedback screenshot

In this feedback group, for example, at the 02.02 minutes of the same “4-Presenting Content: The Four Stages of Cognitive Development” video, students saw the same first multiple-choice question about the watched part (see Figure 5). After the students answered this first multiple-choice question, they were given the right answer and detailed information about the answer as an elaborated feedback (see Figure 12). Students were expected to read this elaborated feedback:

> The correct answer is C-Jump to Slide. When we add the Jump to Slide action to a text, button, or any object, we can switch to the slide we selected.

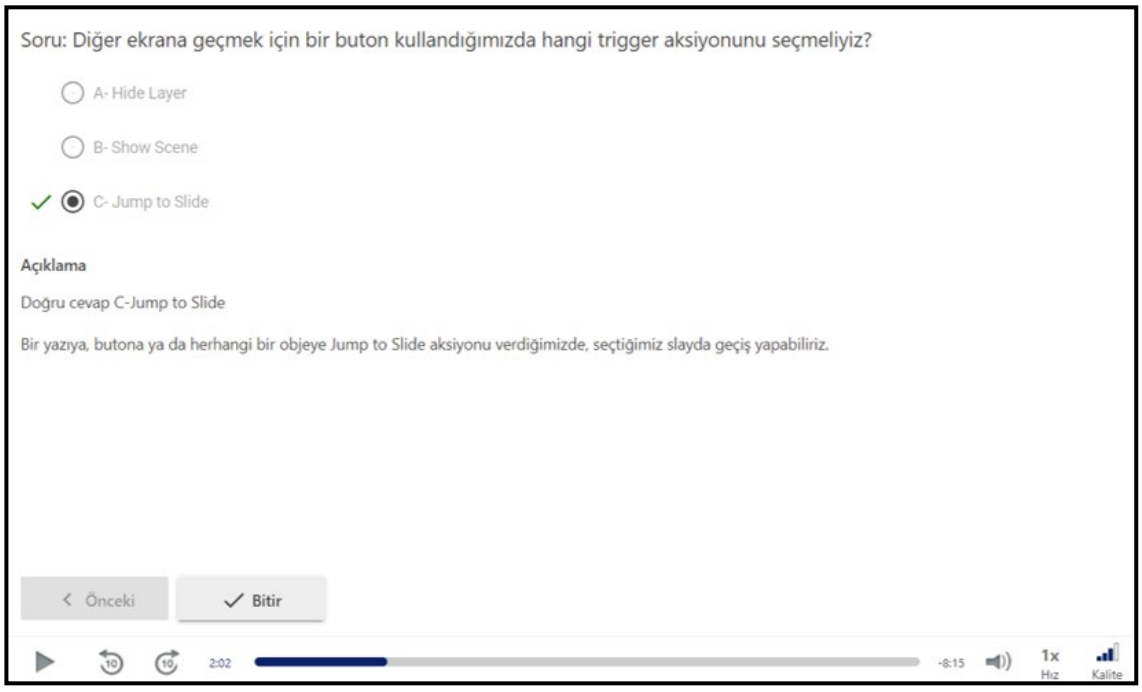

Figure 12. The first elaborated feedback of the “4-Presenting Content: The Four Stages of Cognitive Development” video

At the 05.47 minutes of the same video, students saw the same second multiple-choice question about the watched part (see Figure 7). After the students answered the second multiple-choice question, they were given the right answer and detailed information, and hints about the answer as an elaborated feedback (see Figure 13). Students were expected to read this elaborated feedback:

> The correct answer is B-States. States allow us to change the view of a thing according to a student's behaviors. For example, we can make bigger a button when students hover over it or add a shine effect when they tick it. We may also change character statements with them.

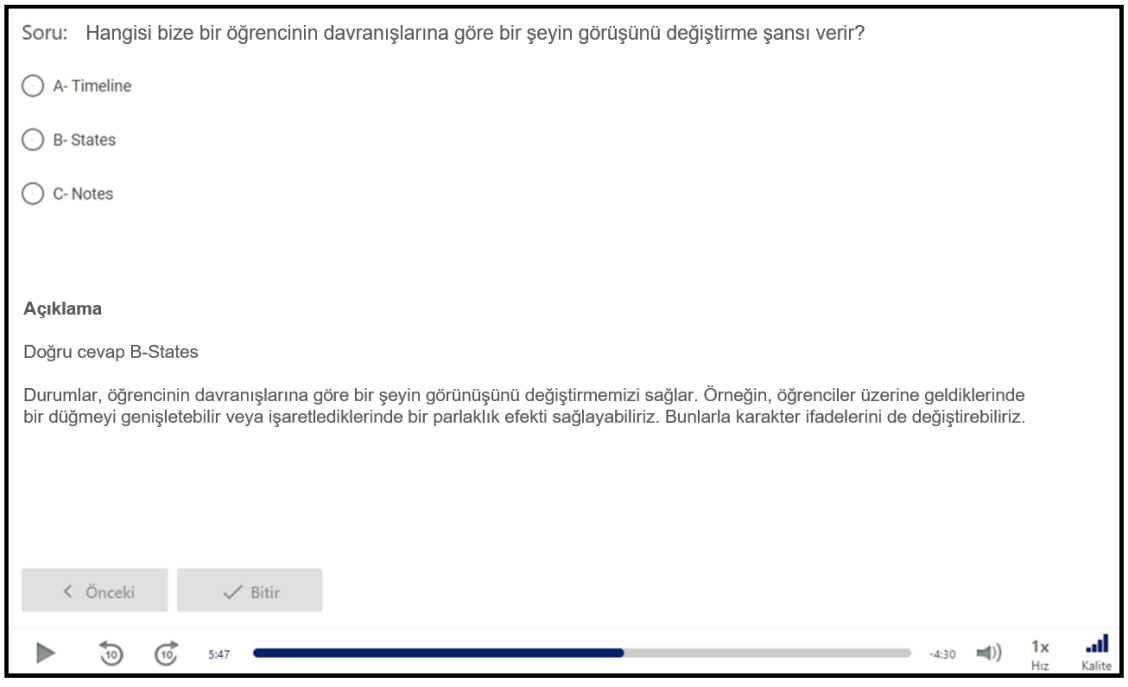

Figure 13. The second elaborated feedback of the "4-Presenting Content: The Four Stages of Cognitive Development" video

Finally, at the 08.15 minutes of the same video, students saw the same third question about the watched part (see Figure 9). After the students answered the third multiple-choice question, they were given the right answer and detailed information, and hints

about the answer as an elaborated feedback (see Figure 14). Students were expected to read this elaborated feedback:

> The correct answer is C-Equal to / 4. If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger's variables and values. So this happens when the value is equal to 4.

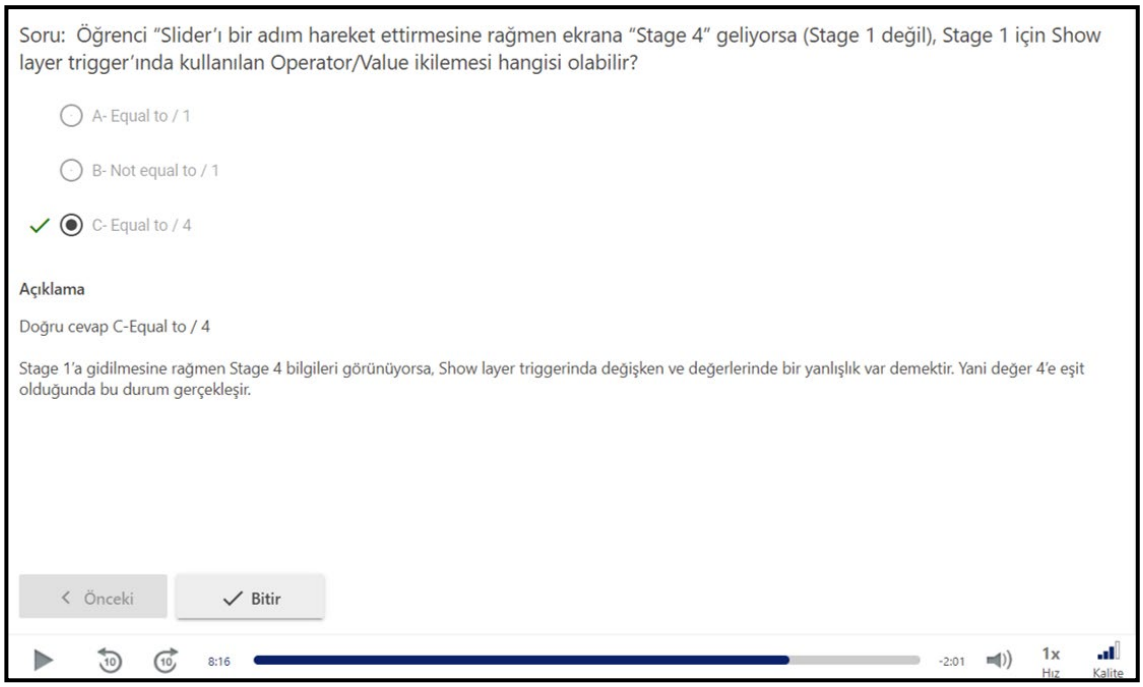

Figure 14. The third elaborated feedback of the "4-Presenting Content: The Four Stages of Cognitive Development" video

Before the application of the research, ethical approval was obtained from the Ethics Committee in Social Sciences and Humanities of Bogazici Universtiy (APPENDIX F). Students filled the consent form (APPENDIX G) before watching the video lectures. The consent form was added at the beginning of the first video and sent to the students as a message via Moodle. They were given access to either the metacognitive or the elaborated feedback, including videos depending on their group assignment.

Students in the metacognitive feedback group answered the quiz question and see the self-questions about the quiz question as metacognitive feedback. As mentioned before, these metacognitive feedback types were prepared in the following form; self-questions were generated according to video and quiz topics utilizing King (1991) and Tanner's (2012) self-question examples which are based on planning, monitoring, and evaluating strategies. Students in the elaborated feedback group answered the quiz question and see the elaborated feedback. As mentioned before, elaborated feedback can be prepared in different ways but for this study, these feedback types were prepared in the following form; a detailed explanation about the answer and if there are, hints about the strategies such as giving example or case were used.

Students had the right to answer the in-video questions only once because the correct answers were provided as part of the feedback in each group. Students in both metacognitive and elaborated groups completed the six video tutorials with either metacognitive or elaborated feedback in four weeks within the semester. After watching the total of six videos, students in both groups completed the UES-SF and the MAI scales via Google Forms. The links for the data collection tools were added at the end of the final video and sent to the students as a message via the Moodle at the end of the fourth week. Scales were open to fill for 15 days. Students filled out the scales during this time.

3.4.3 Interviews

A semi-structured one-on-one interviews were conducted with three volunteering students selected from the sample. The purpose of the interviews was to learn students' thoughts about in-video feedback and to further explain the quantitative findings of the study. The length of the interviews varied from 13 to 18 minutes.

During the interview, the researcher and the participants watched one of the videos together on a ZOOM meeting. The selected video (see Table 10 for details of the video) was shown to the participants by screen sharing, and when the quiz questions appeared on the screen, the participants were asked to provide an answer. After the participants answered the question, they had the opportunity to examine both types of feedback, side by side. Thus, both types of feedback could be analyzed and compared by the participants.

Table 10. Video Details

The title (theme) of the video	The topic of the video	The number of questions	Video duration	Question minutes
2- Presenting Content: Multiple Intelligence Theory	Hotspots in Articulate	3	11:46	00:50, 05:45, 10:22

3.4.3.1. The first quiz question

The first part of the video explained how and why the transition from story view to slide view was made. The first quiz question was shown at the 50th second (see Figure 15).

The question was “Which one should we choose to see all the screens in your project together and set the flow?”. The answer options were “Slide View” and “Story View”.

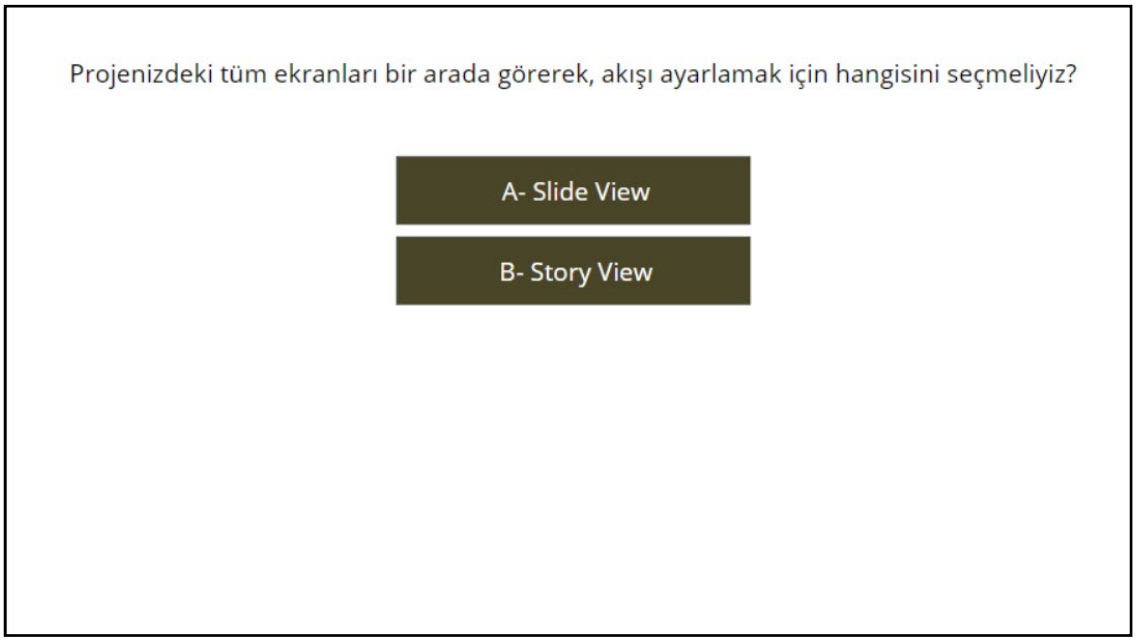

Figure 15. The first quiz question of the “2- Presenting Content: Multiple Intelligence Theory” video

After the students answered this question, they saw the following feedback (see Figure 16).

> Elaborated feedback: The correct answer is B- Story View
>
> With the story view, we see the general map of our project. We can see all the pages in our project and move the arrows with the lines connecting them. So we can edit the page orderings and relationships.
>
> Metacognitive feedback: The correct answer is B- Story View
>
> First, you should ask this question yourself.
>
> Why may I need a story view in my own project?

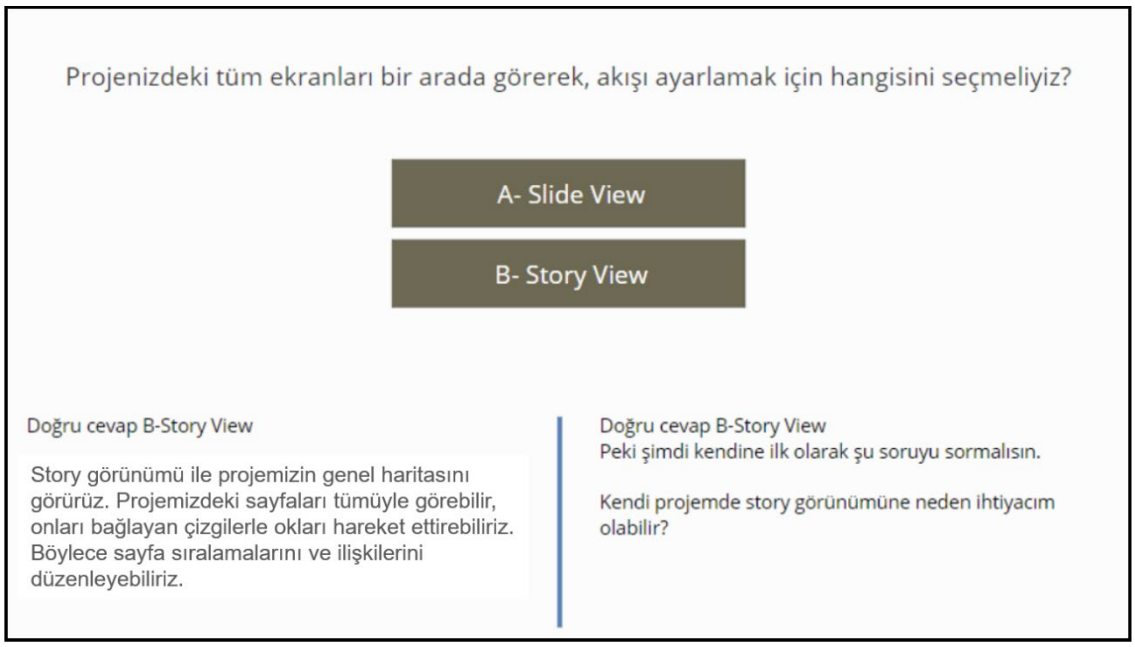

Figure 16. The feedback of the first quiz question in the "2- Presenting Content: Multiple Intelligence Theory" video

Participants were asked to examine both types of feedback (without putting any labels to them) and asked the interview questions.

3.4.3.2. The second quiz question

After the participants answered these interview questions, they continued to watch the video. At the 5:45th minute, the second quiz question appeared on the screen (see Figure 17). The question was "If we want to give feedback to the student with a pop-up screen, which one should we use?". Answer options were "Slide", "Layer", and "Transition".

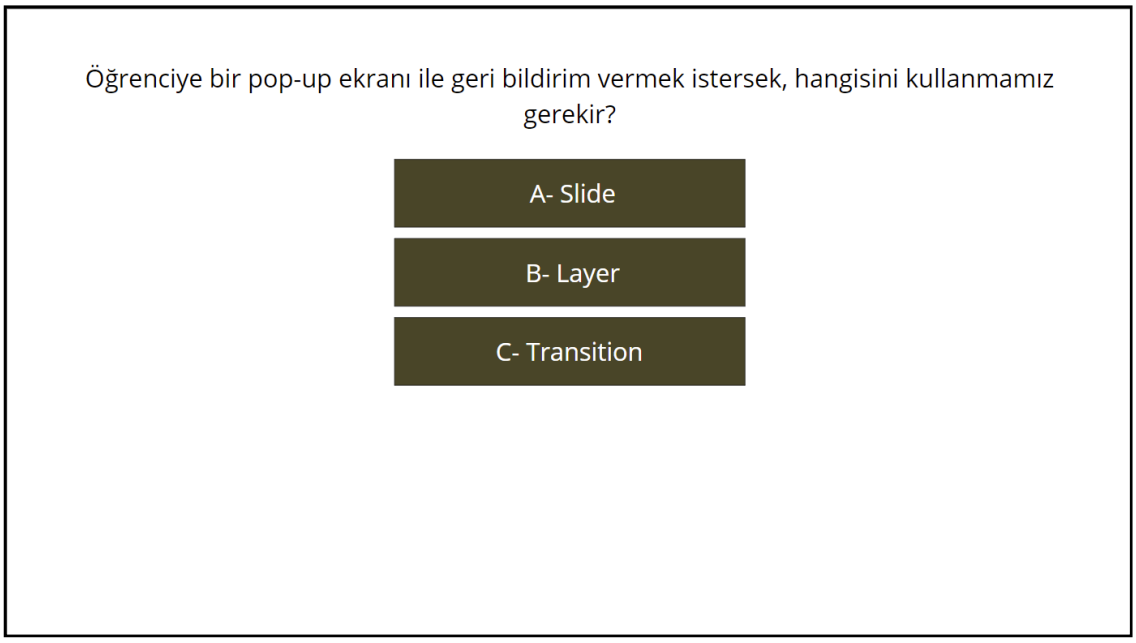

Figure 17. The second quiz question of the "2- Presenting Content: Multiple Intelligence Theory" video

After the participants answered the second question, they saw the following feedback on the screen (see Figure 18).

> Elaborated feedback: The correct answer is B- Layer
>
> Layer allows us to add objects on top of each other and triggers the display of different content according to students' actions. With this tool, we can create and manage many interactions on a page.
>
> Metacognitive feedback: The correct answer is B- Layer
>
> Now, you should ask this question yourself.
>
> Do I understand for what purposes I can use the layer feature?

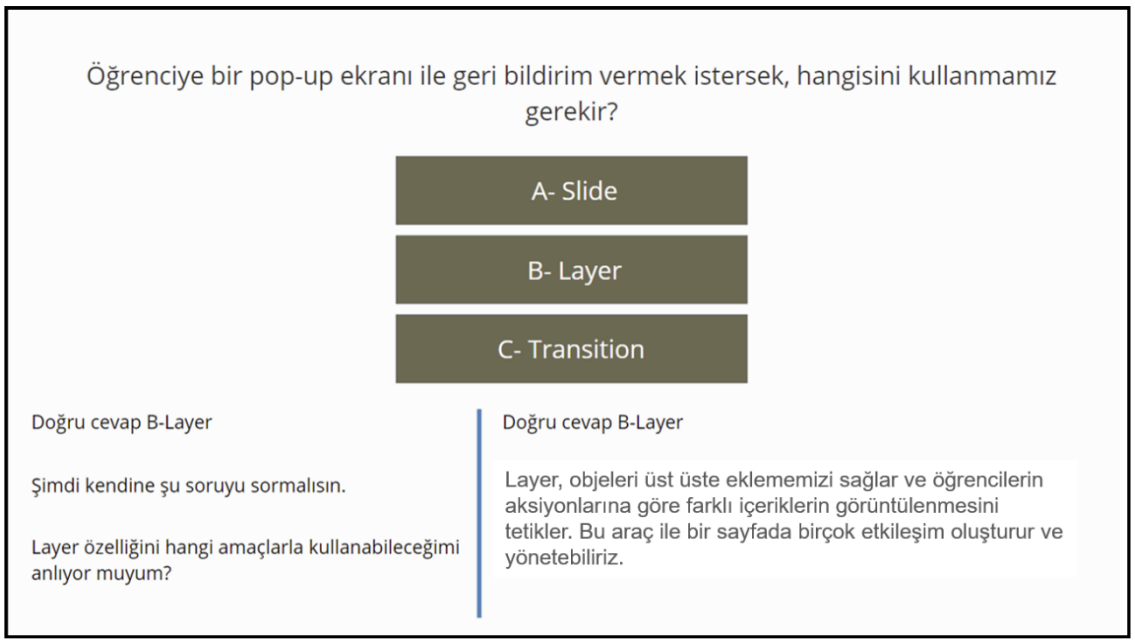

Figure 18. The feedback of the second quiz question in the "2- Presenting Content: Multiple Intelligence Theory" video

The feedback layout on this screen had been changed. This time, the one on the left one was metacognitive feedback, and the right one was elaborated feedback. Then, participants again were asked the interview questions.

3.4.3.3. The third quiz question

At the 10:22th minute of the video, the third quiz question appeared on the screen (see Figure 19). The question was "Which one should we use to make any part of an object clickable?". Answer options were "Layer," "Variable," and "Hotspot."

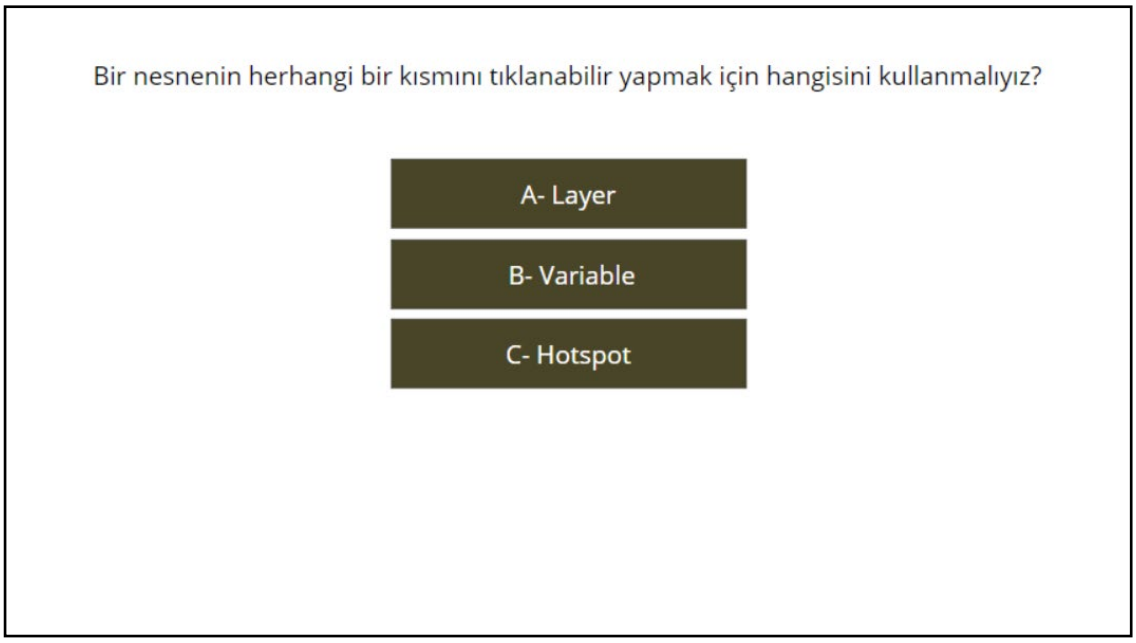

Figure 19. The third quiz question of the "2- Presenting Content: Multiple Intelligence Theory" video

After the participants answered the third question, they saw the following feedback on the screen (see Figure 20).

> Elaborated feedback: The correct answer is C-Hotspot
>
> The hotspot makes any part of an object (from the orange in the basket to the apple in the box) clickable. We can add an invisible hotspot to the desired part of an object. So when the student clicks on it, the content is triggerable.
>
> Metacognitive feedback: The correct answer is C-Hotspot
>
> Now, you should ask this question yourself.
>
> What would I do differently if I taught the hotspot feature?

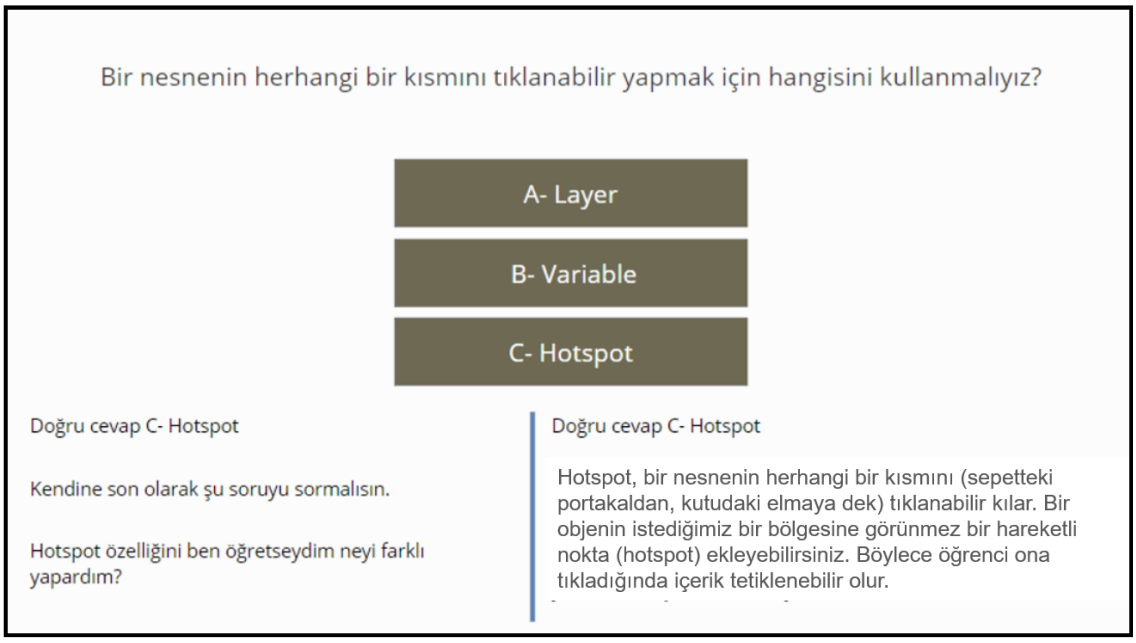

Figure 20. The feedback of the third quiz question in the "2- Presenting Content: Multiple Intelligence Theory" video

Participants were given time to read both types of feedback. The feedback layout on this screen was the same as the previous screen. The left one was metacognitive feedback, the right one was elaborated feedback. For the last time, the participants were asked the interview questions.

3.5 Data analysis

The data were analyzed with respect to each research question in the following manner.

3.5.1 Is there any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?

For the first research question, the UES-SF scores were tabulated in an Excel form from the Google Forms site. They were calculated according to positive and negative item scores, and the total scores were determined for each student. For the positive items of the UES-SF, five points for “strongly agree” answers, four points for “agree” answers, three points for “neither agree nor disagree” answers, two points for “disagree” answers, and one point for “strongly disagree” answers were assigned. For the negative items, one point for “strongly agree” answers, two points for “agree” answers, three points for “neither agree nor disagree” answers, four points for “disagree” answers, and five points for “strongly disagree” answers were assigned. With this calculation, the maximum total score can be 60 since there are 12 items on the scale.

After the determination of total scores, all data were entered into an Excel sheet, and a unique ID was given to each student. In this sheet, there were three columns including the student ID, the group number (V1 for the metacognitive group, V2 for the elaborated group), and the UES-SF scores of each ID.

Then, the quantitative data were analyzed with the IBM SPSS Statistics software. First of all, descriptive statistics, such as mean and median, were calculated. Then the parametric test assumptions were checked to determine if a parametric test can be used for inferential statistics analyses.

The normal distribution of the test scores was analyzed. Based on this analysis, it was decided that non-parametric tests can be used for the UES-SF scores since the scores were not normally distributed. Thus, the Mann-Whitney U test, which is a non-parametric test, was conducted to examine if the difference between the UES-SF scores of both groups was significant.

3.5.2 Is there any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?

For the second research question, the MAI scores were tabulated in an Excel form from the Google Forms site. A single MAI scores was calculated for each student. As mentioned before, there were 20 positive items in planning, monitoring and evaluation components of the MAI. Five points for “strongly agree” answers, four points for “agree” answers, three points for “neither agree nor disagree” answers, two points for “disagree” answers, and one point for “strongly disagree” answers were given. With this calculation, the maximum total score can be 100 since there are 20 items on the scale.

After the determination of total scores, all data were entered into an Excel sheet, and a unique ID was given to each student. In this sheet, there were three columns including the student ID, the group number (V1 for the metacognitive group, V2 for the elaborated group), and the MAI scores of each ID.

These quantitative data were analyzed with the IBM SPSS Statistics software. First of all, descriptive statistics, such as mean and median, were calculated. Then the

parametric test assumptions were checked to determine if a parametric test can be used for inferential statistics analyses.

The normal distribution of the test scores was analyzed. Based on this analysis, it was decided that non-parametric tests can be used for the MAI scores since the scores were not normally distributed. Thus, the Mann-Whitney U test, which is a non-parametric test, was conducted to examine if the difference between the MAI scores of both groups was significant.

3.5.3 How do the students evaluate the different types of feedback in interactive video lectures?

ZOOM meetings were recorded for all three student interviews. The interviews were transcribed and descriptive explanations of the transcriptions were made. The researcher tried to understand how the participants evaluated the elaborated and metacognitive feedback in terms of preference, metacognitive awareness, and engagement. Then examining these descriptions, some inferences were made. The first interview question asked which feedback type the students preferred. The second interview question aimed to understand which feedback type the students chose for their metacognitive awareness. Finally, the third interview question focused on which feedback type the students chose for their engagement (see Appendix C for the interview questions).

CHAPTER 4

RESULTS

4.1 Is there any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?

The descriptive statistics results based on the data collected using the UES-SF scale showed that the engagement mean scores of students who watched the interactive videos with elaborated feedback (40.58) was higher than the engagement mean scores of students who watched the same videos with metacognitive feedback (38.85) (see Table 11).

Table 11. Descriptive Statistics of the UES-SF Scores

	N	Min	Max	Mean	Median	SD
Metacognitive Feedback Group	26	25	50	38.85	40.50	6.583
Elaborated Feedback Group	26	25	48	40.58	42.00	5.573

In order to examine if the mean difference between the two groups is statistically significant, first parametric test assumptions need to be checked, which are normality, interval or ratio scale of measurement, homogeneity of variances, and independence of observations, (Verma & Abdel-Salam, 2019).

A Shapiro Wilk test for normality was conducted to check the normal distribution of data, and z-values for skewness and kurtosis values were calculated. Shapiro Wilk's test results ($p > .05$) showed that the UES-SF scores of students who watched the interactive videos with metacognitive feedback were normally distributed (see Table 13) with the skewness of -0.486 (SE = 0.456) and the kurtosis of -0.375 (SE = 0.887) (see Table 12).

The Shapiro Wilk's test' results ($p < .05$) showed that the UES-SF scores of students who watched the interactive videos with elaborated feedback were not normally distributed with the skewness of -1.217 (SE = 0.456) and the kurtosis of 1.330 (SE = 0.887) (see Table 12 and Table 13). In addition, while the z-values values of the metacognitive feedback group, which are between -1.96 and 1.96, were in the acceptable range, the z-values values of the elaborated feedback group were not in the acceptable range (see Table 12).

Table 12. Skewness, Kurtosis and z-values of the UES-SF Scores

	Skewness	SE	z-value	Kurtosis	SE	z-value
Metacognitive Feedback Group	-0.468	0.456	-1.026	-0.375	0.887	-0.422
Elaborated Feedback Group	-1.217	0.456	-2.668	1.330	0.887	1.499

Therefore, the non-parametric Mann-Whitney U test was applied to examine if the mean difference regarding the engagement scores between the two groups is statistically significant.

Table 13. Shapiro-Wilk Test Results of the UES-SF Scores for Both Groups

	Statistics	df	Sig.
Metacognitive Feedback Group	0.961	26	.415
Elaborated Feedback Group	0.893	26	.011

The Mann-Whitney U test results showed that there was no statistically significant difference between engagement scores of students who watch the interactive videos with elaborated feedback and who watch the interactive videos with metacognitive feedback, z=-1.184, p>.05 (see Table 14 and Table 15).

Table 14. Mann-Whitney U Rank Test of the UES-SF Scores

	N	Mean	Sum of Ranks
Metacognitive Feedback Group	26	24.02	624.50
Elaborated Feedback Group	26	28.98	753.50
Total	52		

Table 15. Mann-Whitney U Test Statistics of the UES-SF

	UES-SF Score
Mann-Whitney U	273.500
Wilcoxon W	624.500
Z	-1.184
Asymp. Sig. (2-tailed)	.237

4.2 Is there any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback?

The descriptive statistics results based on the data collected using the MAI scale showed that the metacognitive awareness mean scores of students who watched the interactive videos with metacognitive feedback (72.23) was higher than the metacognitive awareness mean scores of students who watched the same videos with elaborated feedback (70.23) (see Table 16).

Table 16. Descriptive Statistics of the MAI Scores

	N	Min	Max	Mean	Median	SD
Metacognitive Feedback Group	26	58	91	72.23	71.50	8.373
Elaborated Feedback Group	26	40	87	70.23	72.50	10.297

In order to examine if the mean difference between the two groups is statistically significant, first parametric test assumptions need to be checked, which are normality, interval or ratio scale of measurement, homogeneity of variances, and independence of observations, (Verma & Abdel-Salam, 2019).

A Shapiro Wilk test for normality was conducted to check the normal distribution of data, and z-values for skewness and kurtosis values were calculated. Shapiro Wilk's test results ($p > .05$) suggested that the MAI scores were normally distributed for both metacognitive and elaborated feedback group, with the skewness of -1.073 (SE = 0.456) and the kurtosis of 1.652 (SE = 0.887) for the elaborated group and

the skewness of 0.400 (SE = 0.456) and the kurtosis of -.108 (SE = 0.887) for the metacognitive group (see Table 17 and Table 18). However, while the z-values values of the metacognitive feedback group, which are between -1.96 and 1.96, were in the acceptable range, the z-values values of the elaborated feedback group were not in the acceptable range (see Table 17).

Table 17. Skewness, Kurtosis and z-values of the MAI Scores

	Skewness	SE	z-value	Kurtosis	SE	z-value
Metacognitive Feedback Group	0.400	0.456	0.877	-0.108	0.887	-1.249
Elaborated Feedback Group	-1.073	0.456	-2.353	1.652	0.887	1.862

Thus, the non-parametric Mann-Whitney U test was applied to examine if the mean difference regarding the metacognitive awareness scores between the two groups is statistically significant.

Table 18. Shapiro-Wilk Result of the MAI Scores

	Statistics	df	Sig.
Metacognitive Feedback Group	.977	26	.811
Elaborated Feedback Group	.938	26	.118

The Mann-Whitney U test results showed that there was no statistically significant difference between metacognitive awareness scores of students who watch the interactive videos with elaborated feedback and who watch the interactive videos with metacognitive feedback, z=-1.184, p>.05 (see Table 19 and Table 20).

Table 19. Mann-Whitney U Rank Test of the MAI Scores

	N	Mean	Sum of Ranks
Metacognitive Feedback Group	26	27.15	706.00
Elaborated Feedback Group	26	25.85	672.00
Total	52		

Table 20. Mann-Whitney U Test Statistics of the MAI

	MAI Score
Mann-Whitney U	321.000
Wilcoxon W	672.000
Z	-.311
Asymp. Sig. (2-tailed)	.756

4.3 How do the students evaluate the different types of feedback in interactive video lectures?

This section is organized according to the interview questions separately for each quiz question.

4.3.1 The first quiz question

4.3.1.1 If you had to choose one of these two types of feedback, which one would it be? Why?

Student 1 chose the elaborated feedback for this question. The student said that this type of feedback gives more detailed information as a reason for preference. She also mentioned that this type of feedback concretizes and summarizes what is narrated in the video. Next, the researcher asked the positive and negative aspects of both types of feedback. The participant stated that she did not see any negative sides in any type of feedback. She said the metacognitive feedback encourages self-questioning and the elaborated feedback was summative and provided a detailed explanation.

Student 2 also said that she would prefer the elaborated feedback. As a reason, she mentioned that there was detailed instruction in this type of feedback. The participant had answered the question incorrectly. She stated that the metacognitive feedback did not help her find the right answer. That's why she said she didn't want to choose it. The researcher asked about the positive and negative aspects of both types of feedback next. She stated that the metacognitive feedback was insufficient for those who got the answer wrong. On the positive side, she mentioned that it can support creativity. For elaborated feedback, she said that the guide in the feedback was useful.

Student 3 stated that she did not remember much about the subject. For this reason, she stated that she chose the elaborated feedback because it gave information with detailed explanations. She also mentioned that this type of feedback helped her. Then the participant was asked about the positive and negative aspects of both types of feedback. The participant stated that metacognitive feedback helped self-questioning, but was insufficient for her. She said that this type of feedback would be more productive if a tip or explanation was added. In addition, the participant's thoughts for

elaborated feedback were that there was no need for too much detail. But she also stated that this feedback did not make her to think deeper about the topic.

4.3.1.2 Which type of feedback helped to increase your metacognitive awareness?

Student 1 answered this question as metacognitive feedback because it helped her question herself. Also, she said that this style of self-questioning could also be a good way of feedback. Student 2's answer was the elaborated feedback. She stated that metacognitive feedback might have been more helpful for brainstorming or thinking, but the level of knowledge was important here. She thought that her knowledge level was not sufficient to take advantage of the metacognitive feedback. That's why she said she chose the type of feedback that provided more detailed information to take action. Student 3 chose metacognitive feedback for the answer to this question. As the reason, she stated that this type of feedback provides reflection and questioning.

4.3.1.3 Which type of feedback kept you engaged in the video?

Student 1 answered this question as metacognitive feedback. She expressed that the question aroused her curiosity, so her interest increased. Student 2 chose the elaborated feedback. She said that she did not like feedback in the form of questions. Student 3 chose the metacognitive feedback. She said that since the elaborated feedback gave information about the answer directly, she would directly continue the video after reading the feedback without thinking. On the other hand, the metacognitive feedback made her continue to think about the video.

4.3.1.4 Summary of the evaluations after the first quiz question

Examining the answers to the interview questions after the first quiz question, the following inferences can be made. For the first quiz question, all three students stated that they preferred the elaborated feedback type. While explaining their answers, some of the keywords used by participants were “questioning,” “intriguing,” and “reflective” for metacognitive feedback, while “explanatory,” “detailed,” and “informative” for elaborated feedback.

However, when asked about the type of feedback that most increased their metacognitive awareness and engagement, two of the students chose the metacognitive feedback, while one chose the elaborated feedback. Similar keywords were also used in the answers to these questions. In addition, for metacognitive feedback, “brainstorming” and for elaborated feedback, “summative” keywords were used. Therefore, although all three students at first seemed to prefer the elaborated feedback, two of them switched to metacognitive feedback as the type of feedback to improve their metacognitive awareness and engagement.

4.3.2 The second quiz question

4.3.2.1 If you had to choose one of these two types of feedback, which one would it be? Why?

This time, Student 1 chose the metacognitive feedback. She stated that this feedback was appropriate and there was no need for too much detail, as in the elaborated feedback. The metacognitive feedback was enough for her. Then, the researcher asked the positive and negative aspects of these types of feedback. She explained that the elaborated feedback mentioned the topic at length but she did not need that.

Student 2 answered this question as elaborated feedback again. She stated that it was more effective for her to have clear instructions in the feedback. When the researcher asked about the positive and negative aspects of these types of feedback, she mentioned that metacognitive feedback made her think more. However, still this type of feedback was not enough for her, she also needed elaborated explanations added to this feedback. Such feedback was insuffient when she did not have a good grasp of the subject.

Student 3 also chose the metacognitive feedback this time, because she thought she had enough information to answer this question. However, she explained that she did not think this type of feedback would be very useful if she did not answer the question correctly or did not understand the subject. Then, the researcher asked the positive and negative aspects of these types of feedback. The participant said: “it [metacognitive feedback] was thought-provoking, but what will it make someone who doesn’t understand the subject think about?”. Then she added that a short description or a hint could be added to this feedback type. She stated for elaborated feedback that it explained the topic, but it didn’t help her think further. In short, she suggested combining both types of feedback, saying:

> The second type [elaborated feedback] again, for example, gave this information. For example, a question can be added to make you think about what else it can be used for. It can give information. For instance, we can give information and use the layer for a lot of things for this study after all. Perhaps, a question can be added that will make them think about what else it can be used for. (Student 3 / Interview)

4.3.2.2 Which type of feedback helped to increase your metacognitive awareness?

Student 1 answered this question as metacognitive feedback again because she thought that it helped her to think deeper about the subject. Similarly, Student 3 chose metacognitive feedback for the answer to this question. She stated that this type of feedback makes her think more. On the other hand, Student 2 answered this question as elaborated feedback. She stated that she received more information from this feedback which increased her awareness with the information she received. But she also argued that combining the two types of feedback could be more effective. She said:

> Something pops up in my head when there's informational feedback at the top and a question at the bottom. After that, when a question is asked to me, that is, when a question comes over something that has been already learned, I can think more. But when I look at it this way, it just seems like a question that doesn't make much sense. If I had to choose one, I would choose the one on the right [elaborated feedback], I would prefer the combination of the two more in terms of increasing my awareness. (Student 2 / Interview)

4.3.2.3 Which type of feedback kept you engaged in the video?

Student 1 answered this question as elaborated feedback. She stated that this feedback aroused her curiosity, so her interest also increased. She said:

> For example, there are sentences in the second feedback type [elaborated feedback] like "it allows us to decorate objects" and "many interactions are created". What are specific actions? It says it creates a lot of interactions, you can

> create layouts. What can be done other than what is shown in the video? I understand that it can be done from the second feedback. Therefore, the interest in the video increases. (Student 1 / Interview)

Student 2 chose the elaborated feedback, too. As the reason, she mentioned that she should have mastery of the subject or be interested in that subject for using metacognitive feedback. She said:

> An obvious question yes [about the metacognitive feedback question], but do I understand for what purposes I can use it? So, yes, I understand. I don't have enough background to say that I can use it here and there. Or I don't understand, it doesn't mean anything right now. I don't understand, then I'll go and investigate it. I really need to be interested in that subject. Well, if I want it enough to go and research it, obviously. (Student 2 / Interview)

Student 3 also chose the elaborated feedback for this interview question. She stated that she moved away from the video while looking for an answer to the question in metacognitive feedback. Because she mentioned that the question made her think about other things. But she said elaborated feedback made her come back to the video. She said:

> Now, for example, I will give a different answer than before, but while I was thinking if I understood for what purposes I could actually use it, I went and thought about what else I could use it for other than video. Thinking about it a little bit took me away from the video. But the other one actually made me re-imagine what I saw in the video. (Student 3 / Interview)

4.3.2.4 Summary of the evaluations after the second quiz question

Examining the answers to the interview questions after the second quiz question, the following inferences can be made. While two of the students stated that they preferred

the metacognitive feedback, this time only one of them preferred the elaborated feedback. Similarly, when they were asked to evalute their metacognitive awareness, the same two students also chose metacognitive feedback. However, in evaluating the type of feedback that increased engagement, two students, who chose the metacognitive feedback, switched their answers. In other words, all three students chose the elaborated feedback when they were asked to evalute their engagemet.

Some new keywords emerged during their explanations. For metacognitive feedback, “subject mastery requirement,” “making think”, for elaborated feedback, “explanatory,” and “effective” keywords were used. In sum, even if two students chose the metacognitive feedback for the first two interview questions (preference and metacognitive awareness), they changed their preference when they were asked to assess their engagement. Student 2 chose the elaborated feedback type for all interview questions.

4.3.3 The third quiz question

4.3.3.1 If you had to choose one of these two types of feedback, which one would it be? Why?

Student 1 chose the elaborated feedback type for this, which she found more descriptive. Although, she said something could be learned from the metacognitive feedback, still, she prefered the elaborated feedback. The positive aspect of the elaborated feedback was

that is was summative, and the metacognitive feedback made her think and that could be useful. She also argued that these two types of feedback could be combined. She said:

> So again in the second one [elaborated feedback], for example, you can add a floating-point layer at work, and make it clickable at work. You know, it's such a mini summary. So that's the positive side of it, and that's why I chose it. In the second [metacognitive feedback], it makes us think about our shortcomings; what I would have done differently, what I did not like or what I do not know. It may be useful to think about what could be improved as a positive aspect. I don't know, as a negative aspect, I think these two feedback types should be combined. And there should be only one type of feedback. (Student 1 / Interview)

Student 2 answered this question as metacognitive feedback this time. While giving this answer, she mentioned that the two types of feedback had separate purposes. She explained that she liked both, and preferred both to be given together. She said:

> This time I really liked the question [metacognitive feedback] and I even think the two feedbacks are very different from each other. It felt like these two feedbacks didn't serve the same purpose actually. That's why both of them are very beautiful separately, in fact the first one [metacognitive feedback] was very effective for me. I guess if I had to choose one, I think I would choose the first. But still, I would like both together. (Student 2 / Interview)

She explained the reason for her choice that when she didn't answer the quiz question correctly or she had fewer ideas, she needed an elaborated explanation, so in that case, she would have choosen the elaborated feedback type. Later, she suggested using both feedback and ordering them as elaborated feedback coming first and then metacognitive feedback next saying, "If there was a little explanation first, and then feedback like if I had done these, how I would have done it, it would be as if it would fit perfectly" (Student 2 / Interview).

Student 3 also chose the metacognitive feedback type this time because she noted that the elaborated feedback was not clear. She stated that the question in metacognitive feedback was more meaningful because she knew the answer to the quiz question correctly and how to use a hotspot. She said that thinking about the metacognitive feedback in this question helped her make more sense of the subject. Then, the researcher asked the positive and negative aspects of both types of feedback. She said the metacognitive feedback would be even better if it also had a short explanation. For the elaborated feedback type, she stated that it was explanatory but still not fully understood.

4.3.3.2 Which type of feedback helped to increase your metacognitive awareness?

All students chose the metacognitive feedback to increase their metacognitive awareness. Student 1 said, “So using questioning to raise awareness is a good method” (Student 1 / Interview). Student 2 answered this question as metacognitive feedback, but again suggested to use both to increase metacognitive awareness. She said “A short explanation first, and then the question on the subject both affect our awareness and I seem to engage more. Whether we learn about the subject, so I would actually like them both together.” (Student 2 / Interview). Similarly, Student 3 choose metacognitive feedback for the answer to this question. She stated that this type of feedback provides more opportunities for her to think and understand the subject.

4.3.3.3 Which type of feedback kept you engaged in the video?

Student 1 answered this question as elaborated feedback. She stated that this feedback aroused her curiosity, saying:

> Yes, I will say something similar again. It [elaborated feedback] tells us what to do on the hotspot. So again, it tells it very briefly. Probably not that much, of course, the hotspot feature, but seeing what you can do makes you wonder what else you can do. (Student 1 / Interview)

On the other hand, Student 2 chose the metacognitive feedback. She explained that she chose it because the question given in the feedback prompted her to the implementation, saying, “That the question orients towards practice does a little bit more, it actually keeps me with that question” (Student 2 / Interview). Similarly, Student 3 also chose the metacognitive feedback for this interview question. She stated that the comparison feature mentioned in the feedback made her think about the video again. She noted that the examples in the elaborated feedback took her out of the video. She said:

> I think it was the first one [metacognitive feedback] because when I thought about what I would have done differently, now I made a counter-compare there. I went back to the video again to see what it did in the video, so I can say that the first one supported it. The other [elaborated feedback] even drop it because of the orange in the basket and all, the example was good, but I actually started imagining other things from the video. Hence, this time it’s like it ripped from the video a bit. (Student 3 / Interview)

4.3.3.4 Summary of the evaluations after the third quiz question

Examining the answers to the interview questions after the third quiz question, the following inferences can be made. While two of the students stated that they preferred the metacognitive feedback, one of them preferred the elaborated feedback for the third

quiz question. However, when they were asked to evaluate their metacognitive awareness, all three students chose the metacognitive feedback. When asked to evaluate their engagement, two of the students chose metacognitive feedback, and one of them chose the elaborated feedback.

Similar keywords were also used for the third quiz question. Additionally, the "intriguing" keyword was used for the elaborated feedback type. In sum, for both preference and engagement questions, Student 2 and Student 3 chose metacognitive feedback, while Student 1 chose elaborated feedback. For metacognitive awareness questions, all students chose the metacognitive feedback.

4.3.4 General summary of the interview data

The general summary of the interview data was categorized according to three interview questions as follows.

4.3.4.1 Preference

While all students preferred the elaborated feedback for the first quiz question, for the second and third quiz questions, only two students preferred the elaborated feedback type. As the selection reasons of the elaborated feedback type, they stated generally that it was explanatory, summative and descriptive. Especially, when students answered the quiz question incorrectly, they tended to prefer the elaborated feedback type, which helped them to understand the subject (see Table 21 for students' preferences and their accuracy of answers). On the other hand, the students, who preferred the metacognitive

feedback type, said that it helped them to reflect and think deeper. In sum, students seemed to prefer both types of feedback, the elaborated feedback was preferred five times and the metacognitive feedback was preferred four times; however, the reasons for preference differed.

Table 21. Students' Preferences for the First Interview Question

Quiz Question	Students' Preferred Type of Feedback
First Quiz Question	Student 1 (Wrong answer) – The Elaborated Feedback Student 2 (Wrong answer) – The Elaborated Feedback Student 3 (Right answer) – The Elaborated Feedback
Second Quiz Question	Student 1 (Right answer) – The Metacognitive Feedback Student 2 (Wrong answer) – The Elaborated Feedback Student 3 (Right answer) – The Metacognitive Feedback
Third Quiz Question	Student 1 (Right answer) – The Elaborated Feedback Student 2 (Right answer) – The Metacognitive Feedback Student 3 (Right answer) – The Metacognitive Feedback

4.3.4.2 Metacognitive awareness

In general, the students chose the metacognitive feedback type when they were asked to pick the one that supported their metacognitive awareness. Only, one student chose the elaborated feedback type for the first and second quiz questions (see Table 22 for students' choices for their metacognitive awareness). For a general reason, they stated that they could think deeper about the subject with the help of this feedback type. An important point, made by the participants was that subject mastery level was critical to make use of the metacognitive feedback. In sum, students mostly chose the metacognitive feedback as the type of feedback that helped them to improve their

metacognition. Furthermore, they highlighted that metacognitive feedback was most useful when they had a certain level of mastery about the subject.

Table 22. Students' Choices for the Second Interview Question (Metacognitive Awareness)

Quiz Question	Students' Preferred Type of Feedback
First Quiz Question	Student 1 – The Metacognitive Feedback Student 2 – The Elaborated Feedback Student 3 – The Metacognitive Feedback
Second Quiz Question	Student 1 – The Metacognitive Feedback Student 2 – The Elaborated Feedback Student 3 – The Metacognitive Feedback
Third Quiz Question	Student 1 – The Metacognitive Feedback Student 2 – The Metacognitive Feedback Student 3 – The Metacognitive Feedback

4.3.4.3 Engagement

When the students were asked to pick the feedback that kept them engaged in the video, they seemed to prefer both types of feedback. Each student selected both types of feedback in different quiz questions (see Table 23 for students' choices for their video engagement). When the elaborated feedback included further information about the subject and attracted students' curiosity with a new idea or information, they found this feedback more engaging. Also, the metacognitive feedback was found to be engaging if it made them to think deeper about the subject. In both types of feedback, students wanted feedback not very distracting from the specific question or task. They further suggested to combine both types of feedback to take advantage of them both as they were serving different purposes.

Table 23. Students' Choices for the Third Interview Question (Enagement)

Quiz Question	Students' Preferred Type of Feedback
First Quiz Question	Student 1 – The Metacognitive Feedback Student 2 – The Elaborated Feedback Student 3 – The Metacognitive Feedback
Second Quiz Question	Student 1 – The Elaborated Feedback Student 2 – The Elaborated Feedback Student 3 – The Elaborated Feedback
Third Quiz Question	Student 1 – The Elaborated Feedback Student 2 – The Metacognitive Feedback Student 3 – The Metacognitive Feedback

The explanations of the students were translated into English by the researcher. The original quotations were given in APPENDIX H.

CHAPTER 5

DISCUSSION AND CONCLUSION

The current study compared the use of elaborated and metacognitive feedback strategies in interactive video lectures in terms of undergraduate students' engagement and metacognitive awareness levels. This study also aimed to investigate undergraduate students' evaluations of elaborated and metacognitive feedback in interactive video lectures based on qualitative data. The interactive videos, prepared with elaborated and metacognitive feedback, were used with undergraduate students in an online course offered in a state research university in the COVID-19 period. The first question of this study investigate to answer was whether there was any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. The results showed that there was no statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. The second question of the study examine to answer was whether there was any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. Similarly, the results showed that there was no statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. The third and last

research question of the study was about students' evaluations of these different types of feedback in interactive video lectures. Based on the qualitative findings, it can be stated that the two types of feedback do not provide a consistent superiority over each other. This is also consistent with the quantitative findings of the study.

In the following section, the findings of the study, the limitations, and further research suggestions were discussed.

5.1 Comparing elaborated and metacognitive feedback in terms of video engagement

The first question of this research focused on whether there is any statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. The analysis of this research question showed that there is no statistically significant difference between engagement scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

According to the literature, student engagement is critical in all educational environments because it is positively correlated with learning (Coates, 2005; Lee et al., 2021; Fredricks et al., 2004). In computer-based learning environments, tone way to improve better engagement is giving immediate feedback (Hepplestone et al., 2011). It is known that elaborated feedback, which stands out in terms of self-regulation among widely used feedback types in computer-based educational environments (Butler & Winne, 1995), can increase students' engagement (Wanga et al., 2019). Also, some

previous studies show that metacognitive feedback can positively affect learning (Mevarech & Fridkin, 2006) and engagement (Karaoğlan Yılmaz & Yılmaz, 2021). In sum, it is seen in the literature that both types of feedback could affect engagement. However, there was no comparison between the two. The results of this study showed that there was no significant difference between the two feedback types in terms of engagement. In other words, it can be said that the two types of feedback do not provide a consistent superiority over each other based on engagement.

One reason for this consequence may be the way the feedback is prepared because in the literature there are different strategies to prepare feedback for two types. For example, as mentioned in the literature review part of the current study, while elaborated feedback can include general guidance (Shute, 2008), it can also include cognitive or metacognitive hints (Golke et al., 2015). Similarly, utilizing different metacognitive feedback strategies can be seen in the literature such as self-questions for planning, monitoring, and evaluating prepared by Tanner (2012), or self-questions for comprehension, connection, strategic, and reflection prepared by Mevarech and Fridkin (2006). Therefore, the results might have been different if different strategies were used while preparing the feedback, other than the strategies used in this study.

Another reason may be the level or type of the quiz questions. According to the literature, when feedback includes information about the strategy used to solve the problem, students' self-regulation were higher (Diagnath & Büttner, 2008). This issue can affect students' engagement because it is known that self-regulation can decrease the dropout rates and disengagement of students (Cho & Shen, 2013). Also, the used MAI scale includes such items as problem-solving (Schraw & Dennison, 1994). And also

Narciss (2012) stated for elaborated feedback that it should include efficient strategies for solving the problem. In the current study, knowledge or comprehension level quiz questions were used. If higher-level questions such as application-level questions were used, the findings could have been different.

For further research, both types of feedback can be compared again by preparing with different strategies. In addition, higher-level question types can be used for quiz questions.

5.2 Comparing elaborated and metacognitive feedback in terms of metacognitive awareness

The second question of this research focused on whether there is any statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback. The analysis of this research question showed that there is no statistically significant difference between metacognitive awareness scores of students who watch interactive video lectures with elaborated feedback and who watch interactive video lectures with metacognitive feedback.

Metacognitive awareness is another essential factor in educational environments because it is also related to learning and achievement (Abdelrahman, 2020; Khan & Seemab, 2019; Khodaei et al., 2022; Ostafichuk et al., 2020). Giving immediate feedback can also provide opportunities for students to be more metacognitively aware (Molin et al., 2020). With mentioned strategies in the literature review part, elaborated

feedback can increase students' self-regulation (Chung & Yuen, 2011; Butler & Winne, 1995) and self-regulated students become aware of how to use metacognitive strategies to reach achievement (Lee et al., 2016; Zimmerman, 2008; Delen et al., 2014). Also, it is known that the self-questioning strategy which can be used for metacognitive feedback can develop students' metacognitive awareness (Altıok et al., 2019). In sum, it is seen in the literature that both types of feedback can affect students' metacognitive awareness levels. However, no studies compared these two types of feedback embedded into the in-video quizzes in terms of metacognitive awareness. According to the results, there was no significant difference between the two feedback types in terms of metacognitive awareness levels. In other words, it can be said that the two types of feedback do not provide a consistent superiority over each other based on metacognitive awareness.

Similar to the previous research question, one reason for this consequence might be the method the feedback types are prepared because in the literature there are different strategies to prepare feedback for two types. Also, the level of the quiz questions might be another reason. As stated before, in this study, knowledge or comprehension level quiz questions were used. If problem solving or application questions were used, the findings might have been different, because with problem-solving tasks, students' metacognitive regulatory abilities can be supported (Adagideli & Ader, 2017). For further research again, both types of feedback can be compared by preparing with different strategies. In addition, higher-level question types can be used for quiz questions.

Also, according to Schraw (1998), students should understand the importance of metacognition first, and then they should know the differences between metacognition

and cognition. Understanding this concept well is critical to develop metacognitive skills (Buttler & Wine, 1995). In other words, supporting metacognition begins with understanding the general metacognition concept, its' benefits, and its differences from cognition, after that, strategies can be used to promote metacognition (Schraw, 1998). On the other hand, this study was conducted in Turkey and according to a study conducted by Yeşilyurt (2013) in Turkey, pre-service teachers generally don't use metacognitive learning strategies often. Also, students are not used to this kind of self-question feedback. Thus, these feedback types may have been foreign to them. As mentioned above, using feedback as a strategy may not be enough for supporting metacognition. If students were more aware of the concept of metacognition, they could benefit more from this feedback types.

5.3 Students' evaluations of the feedback

The third question of this research focused on how students evaluate the different types of feedback in interactive video lectures in terms of preference, metacognitive awareness, and engagement.

In total, the elaborated feedback was chosen twelve times and the metacognitive feedback was chosen fifteen times. Students expressed similar reasons for these choices. Students, who prefer the elaborated feedback, generally stated that it was explanatory and informative. These descriptions are consistent with the literature because Golke et al. (2015) stated that elaborated feedback can include explaining why a specific response is correct and providing additional background or related information. Students, who

prefer the metacognitive feedback, generally stated that it helped them to think deeper about the subject. However, students stated that if they grasp the topic and answer the quiz questions correctly, they might choose to receive metacognitive feedback. Thus, metacognitive feedback required some prior knowledge or mastery. These explanations are consistent with the literature. According to Taub and Azevedo (2018), students with high prior knowledge can involve in processes including metacognitive strategies more than students with low prior knowledge.

In addition, all students emphasized that these two types of feedback can be combined and provided together. In general, they evaluated the purposes of the two types of feedback differently, and both had points that they found useful. Therefore, they stated that they would like to get both. As mentioned before, elaborated feedback can include metacognitive hints (Golke et al., 2015). This means that metacognitive feedback can be part of elaborated feedback and the two types of feedback can be used together. Students argued that such feedback would be both informative and helpful for deeper thinking. This suggestion has been one of the most striking points in the interviews. A similar application to this recommendation has not been found in the literature. But future research may try this combination.

5.4 Recommendations and implications for future research

The current study contributes to research in feedback types in interactive video lectures with the following suggestions.

Participants generally thought that subject mastery was an important prerequisite to take advantage of the metacognitive feedback. If they grasped the subject well and answered the quiz question correctly, they tended to receive metacognitive feedback. On the other hand, if they had less idea about the subject, they tended to increase their level of knowledge by getting elaborated feedback. Therefore, in-video feedback can be provided according to students' answers. If their answer is correct, metacognitive feedback can be provided. If their answer is incorrect, elaborated feedback can be given.

Also all three participants offered suggestions for combining and giving the two types of feedback together. They generally stated that feedback would include a short explanation and then followed by a reflection question together. Therefore, elaborated and metacognitive feedback can be combined and provided together.

In addition, one student stated that questions, which lead her to the implementation, in the metacognitive feedback was more effective in terms of her engagement. Therefore, metacognitive feedback focusing on implementation of ideas can be utilized more.

While all these feedback strategies are applied, it should be noted that the content of the feedback should be directly relevant to the topic and not distracting. The students stated that they could move away from the video when feedback gave irrelevant information or not directly related example about the topic.

5.5 Limitations of the study

The first limitation is that this study was conducted during the COVID-19 pandemic term. Most of the students were experiencing low motivation due to the COVID-19 pandemic. The loss of general motivation for scholing due to COVID-19 could be a factor affecting the results.

This research was conducted within the scope of only one course focusing on only one general topic. Thus, the video topic can be important for feedback preferences. The research can be repeated within the scope of different subjects and courses.

This study was conducted with preservice teachers. To generalize the research findings to a larger population, further research can investigate the role of feedback types on student motivation and metacognitive awareness with different groups of undergraduate students.

APPENDIX A

THE SHORT FORM OF THE USER ENGAGEMENT SCALE (UES-SF)

Item	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
FA-S.1 I lost myself in this experience.					
FA-S.2 The time I spent using Application X just slipped away.					
FA-S.3 I was absorbed in this experience.					
PU-S.1 I felt frustrated while using this Application X.					
PU-S.2 I found this Application X confusing to use.					
PU-S.3 Using this Application X was taxing.					
AE-S.1 This Application X was attractive.					
AE-S.2 This Application X was aesthetically appealing.					
AE-S.3 This Application X appealed to my senses.					
RW-S.1 Using Application X was worthwhile.					
RW-S.2 My experience was rewarding.					
RW-S.3 I felt interested in this experience.					

APPENDIX B

THE METACOGNITIVE AWARENESS INVENTORY (MAI) - PLANNING (1-7),

COMPREHENSION MONITORING (8-14), EVALUATING (15-20) ITEMS

Item	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1-I pace myself while learning in order to have enough time.					
2-I think about what I really need to learn before I begin a task.					
3-I set specific goals before I begin a task.					
4-I ask myself questions about the material before I begin.					
5-I think of several ways to solve a problem and choose the best one.					
6-I read instructions carefully before I begin a task.					
7-I organize my time to best accomplish my goals.					
8-I ask myself periodically if I am meeting my goals.					
9-I consider several alternatives to a problem before I answer.					
10-I ask myself if I have considered all options when solving a problem.					
11-I periodically review to help me understand important relationships.					

12-I find myself analyzing the usefulness of strategies while I study.					
13-I find myself pausing regularly to check my comprehension.					
14-I ask myself questions about how well I am doing while learning something new.					
15-I know how well I did once I finish a test.					
16-I ask myself if there was an easier way to do things after I finish a task.					
17-I summarize what I've learned after I finish.					
18-I ask myself how well I accomplish my goals once I'm finished.					
19-I ask myself if I have considered all options after I solve a problem.					
20-I ask myself if I learned as much as I could have once I finish a task.					

APPENDIX C

INTERVIEW PROTOCOL

Merhaba, öncelikle araştırma ekibimiz adına görüşmeye katıldığın için çok teşekkür ederim. Burada paylaşacağın görüşlerin video içi geri bildirim deneyimlerini daha iyi anlamamızı sağlayacak, araştırma ekibi hariç hiçkimse ile paylaşılmayacak, ve araştırma raporlarında da ancak takma isimler kullanılarak veriler paylaşılacaktır. Görüşmeyi Türkçe yapabiliriz. Bu Zoom görüşmesini kaydedeceğiz ve yalnızca sesi kullanacağız. Hazırsan ilk sorumla kayda başlamak isterim.

1- İki geri bildirim türünden birini tercih edecek olsaydın bu hangisi olurdu? Ve neden?
    a. İki geri bildirim türünü de olumlu ve olumsuz yönleri bakımından değerlendirebilir misin?
2- Hangi geri bildirim türü üstbilişsel farkındalığını arttırmana yardımcı oldu? Nedeb?

   (Üstbilişsel farkındalık: kendi düşünme sürecinin farkında olmak)
3- Hangi geri bildirim türü videoya olan ilgini sürdürmene yardımcı oldu? Neden?

APPENDIX D

QUIZ QUESTIONS AND FEEDBACK (ENGLISH)

Video: 1- Intro to Interface: Meeting with Boo

Question Number: 1

Question Time: 03:03

Question: What tool do we use to line up objects correctly and make sure they appear in the right place at the right time?

A-Trigger

B-Layer

C-Timeline

Elaborated Feedback: The correct answer is C-Timeline

We can use the timeline to correctly line up things and make sure they come out at the right time and place. We can see the objects we have added to the screen here, and we can edit the details such as displaying and staying on the screen with this tool.

Metacognitive Feedback: The correct answer is C-Timeline

Now you should ask yourself this question.

What do I know about the purpose of using the Timeline?

Video: 1- Intro to Interface: Meeting with Boo

Question Number: 2

Question Time: 12:33

Question: If we want to learn the school number of a student, which input type would make sense to choose?

A-Check Boxes

B-Radio Buttons

C-Data Entry

Elaborated Feedback: The correct answer is C- Data Entry.

Data Entry type is suitable as the student will write the school number himself. If we gave the user options, we could use one of the other two input types.

Metacognitive Feedback: The correct answer is C- Data Entry.

Now you should ask yourself this question.

How can I associate the Data Entry tool with my own project?

Video: 1- Intro to Interface: Meeting with Boo

Question Number: 3

Question Time: 19:13

Question: When the student's name is entered as Beren, which of the following should we write in order for the student's name to appear on the teacher selection screen?

A-%userName%

B-%Beren%

C-%teacherPreference%

Elaborated Feedback: The correct answer is A-%userName%

We have to write the username variable because we want the text that the user enters as the name to appear on the screen regardless of what the name is. Also, %% is used for variables and we don't have a variable named Beren.

Metacognitive Feedback: The correct answer is A-%userName%

Now you should ask yourself this question.

What would appear on the screen if I wrote other options?

Video: 2- Presenting Content: Multiple Intelligence Theory

Question Number: 1

Question Time: 00:50

Question: Which one should we choose to see all the screens in your project together and set the flow?

A-Slide View

B-Story View

Elaborated Feedback: The correct answer is B-Story View

With the story view, we see the general map of our project. We can see all the pages in our project and move the arrows with the lines connecting them. So we can edit the page orderings and relationships.

Metacognitive Feedback: The correct answer is B-Story View

Now you should ask yourself this question.

Why may I need a story view in my own project?

Video: 2- Presenting Content: Multiple Intelligence Theory

Question Number: 2

Question Time: 05:45

Question: If we want to give feedback to the student with a pop-up screen, which one should we use?

A-Slide

B-Layer

C-Transition

Elaborated Feedback: The correct answer is B-Layer

Layer allows us to add objects on top of each other and triggers the display of different content according to students' actions. With this tool, we can create and manage many interactions on a page.

Metacognitive Feedback: The correct answer is B-Layer

Now you should ask yourself this question.

Do I understand for what purposes I can use the layer feature?

Video: 2- Presenting Content: Multiple Intelligence Theory

Question Number: 3

Question Time: 10:22

Question: Which one should we use to make any part of an object clickable?

A-Layer

B-Variable

C-Hotspot

Elaborated Feedback: The correct answer is C-Hotspot

The hotspot makes any part of an object (from the orange in the basket to the apple in the box) clickable. We can add an invisible hotspot to the desired part of an object. So when the student clicks on it, the content is triggerable.

Metacognitive Feedback: The correct answer is C-Hotspot

Now you should ask yourself this question.

What would I do differently if I taught the hotspot feature?

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Question Number: 1

Question Time: 00:48

Question: If we need more screen space, which one should we change?

A-Layer

B-Resolution

C-Background

Elaborated Feedback: The correct answer is B-Resolution.

The screen resolution is automatically 720*540 (4:3), if we want to enlarge the screen area, we can choose 720*405 (16:9). If we want to determine a size ourselves, we can use the Custom option.

Metacognitive Feedback: The correct answer is B-Resolution.

Now you should ask yourself this question.

Do I remember where I can change the screen resolution?

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Question Number: 2

Question Time: 06:08

Question: If we want to use the color of an image we use later, which tool should we use?

A-Eyedropper

B-Animation

C-Layer

Elaborated Feedback: The correct answer is A-Eyedropper

If we apply an eyedropper on the image we use, we can find the same color in the image. To use this later, we can click the “Add to custom color” button.

Metacognitive Feedback: The correct answer is A-Eyedropper

Now you should ask yourself this question.

Did this feature pique your interest? Can I use it in my own project

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Question Number: 3

Question Time: 11:22

Question: What is the name of the feature that can change depending on the user's movement and provides dynamic content?

A-Triggers

B-Variables

C-Layers

Elaborated Feedback: The correct answer is B- Variables.

Variables are properties that can change depending on the user's action and provide dynamic content. It can remember the information entered in the application, evaluate it, correct it, and then use these variables wherever wanted.

Metacognitive Feedback: The correct answer is B- Variables.

Now you should ask yourself this question.

What could I do differently if I used the variables in my own project?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Question Number: 1

Question Time: 02:02

Question: Which trigger action should we choose when we use a button to switch to the other screen?

A-Hide Layer

B-Show Scene

C-Jump to Slide

Elaborated Feedback: The correct answer is C-Jump to Slide

When we add the Jump to Slide action to a text, button, or any object, we can switch to the slide we selected.

Metacognitive Feedback: The correct answer is C-Jump to Slide

Now you should ask yourself this question.

What do I know about other trigger actions?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Question Number: 2

Question Time: 05:47

Question: Which tool allows you to change the appearance of an object based on a student's actions?

A-Timeline

B-States

C-Notes

Elaborated Feedback: The correct answer is B-States

States allow you to change the appearance of an object based on a student's actions. For example, you can enlarge a button when students hover over it or add a glow effect when they click it. You can even change character expressions and poses with states.

Metacognitive Feedback: The correct answer is B-States

Now you should ask yourself this question.

What features in this video are similar to what I learned earlier?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Question Number: 3

Question Time: 08:15

Question: If Stage 4 appears on the screen (not Stage 1) although the student moves the slider one step, what would be the Operator/Value duplication used in the Show Layer trigger for Stage 1?

A-Equal to / 1

B-Not equal to / 1

C-Equal to / 4

Elaborated Feedback: The correct answer is C-Equal to / 4

If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger's variables and values. So this happens when the value is equal to 4.

Metacognitive Feedback: The correct answer is C-Equal to / 4

Now you should ask yourself this question.

What should I pay attention to in order to use the Operator/Value concepts used for variables?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Question Number: 1

Question Time: 01:15

Question: To which objects can we add an action such as screen change as a trigger?

A- Characters

B-Images

C-Textbox

D-All of them

Elaborated Feedback: The correct answer is D-All of them

We can add triggers to anything (buttons, images, text, whatever you want) and we can also use multiple triggers together to create a more complex structure.

Metacognitive Feedback: The correct answer is D-All of them

Now you should ask yourself this question.

Can I add multiple triggers to an object? Could this be necessary for me in my own project?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Question Number: 2

Question Time: 07:21

Question: Which one can we use to set a button to change color after click?

A-States

B-Notes

C-Transitions

Elaborated Feedback: The correct answer is A-States

With the states property, we can change any object depending on the student's action. We can set something to resize after being clicked or put an x on that object when the user clicks on the wrong object.

Metacognitive Feedback: The correct answer is A-States

Now you should ask yourself this question.

Do I understand what distinguishes the States property from other properties?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Question Number: 3

Question Time: 12:44

Question: Which one should we use to change the interface design that the student will see?

A-Preview

B-Publish

C-Player

Elaborated Feedback: The correct answer is C-Player

With the Player, we can change the interface that the student will see. With Publish we can publish the material we create. With Preview, we can see the interface that the student will see and act just like the student. We cannot make a change.

Metacognitive Feedback: The correct answer is C-Player

Now you should ask yourself this question.

Do I have enough knowledge to change the player properties in my own project? If not, how can I improve myself in this regard?

Video: 6-Final Project Layout

Question Number: 1

Question Time: 00:54

Question: Which one should we choose to edit the triggers in a screen in your project?

A-Slide View

B-Story View

Elaborated Feedback: The correct answer is A-Slide View

With the slide view, you can make adjustments on the screen you choose. With the Story view, you see the big picture of your project.

Metacognitive Feedback: The correct answer is A-Slide View

Now you should ask yourself this question.

Why might I need a slide view in my own project?

Video: 6-Final Project Layout

Question Number: 2

Question Time: 03:29

Question: Which trigger action should we choose when we use a button to switch to the other screen?

A-Hide Layer

B-Show Scene

C-Jump to Slide

Elaborated Feedback: The correct answer is C-Jump to Slide

When we give Jump to Slide action to a text, button or any object, we can switch to the slide we selected.

Metacognitive Feedback: The correct answer is C-Jump to Slide

Now you should ask yourself this question.

What do I know about other trigger actions?

Video: 6-Final Project Layout

Question Number: 3

Question Time: 08:06

Question: “I can add a trigger for screen transition to an image I uploaded from the outside.” is the statement correct?

A-True

B-False

Elaborated Feedback: The correct answer is A-True

You can apply triggers to almost any object. You can also add more than one trigger.

Metacognitive Feedback: The correct answer is A-True

Now you should ask yourself this question.

Can I add multiple triggers to an image? If I can, for what purposes can I use it?

Video: 6-Final Project Layout

Question Number: 4

Question Time: 18:30

Question: Which of the following statements is true?

A-We can trigger a button only to go to the next screen.

B-We can trigger a button only to go to the previous screen.

C-We can trigger a button to go to any screen we want.

Elaborated Feedback: The correct answer is C-We can trigger a button to go to any screen we want.

By using the Jump to slide trigger option, we can switch to any screen we want. To do this, we must select the “Slide” option from the trigger window as the screen we want.

Metacognitive Feedback: The correct answer is C-We can trigger a button to go to any screen we want.

Now you should ask yourself this question.

When I trigger a button to switch to another screen, not the previous or next screen, I can create a more complex structure. What does this do for me?

Video: 6-Final Project Layout

Question Number: 5

Question Time: 35:59

Question: If the student moves the “Slider one step” but “Stage 4” appears on the screen (not Stage 1), what would be the Operator/Value duplication used in the Show layer trigger for Stage 1?

A-Equal to / 1

B-Not equal to / 1

C-Equal to / 4

Elaborated Feedback: The correct answer is C-Equal to / 4

If Stage 4 information is visible despite going to Stage 1, there is an error in the Show layer trigger’s variables and values. So this happens when the value is equal to 4.

Metacognitive Feedback: The correct answer is C-Equal to / 4

Now you should ask yourself this question.

What should I pay attention to in order to use the Operator/Value concepts used for variables?

Video: 6-Final Project Layout

Question Number: 6

Question Time: 39:50

Question: If we want to remove the menu part in the interface that the student will see, which tool should we edit?

A-Preview

B-Publish

C-Player

Elaborated Feedback: The correct answer is C-Player

With the Player, we can change the interface that the student will see. With Publish we can publish the material we create. With Preview, we can see the interface that the student will see and act just like the student. We cannot make a change.

Metacognitive Feedback: The correct answer is C-Player

Now you should ask yourself this question.

Do I have enough knowledge to change the player properties in my own project? What would remove the menu do?

Video: 6-Final Project Layout

Question Number: 7

Question Time: 45:06

Question: If we want to open the material we have created via Internet Explorer, what type of output would be appropriate?

A-HTML 5

B-Flash

C-Scorm

Elaborated Feedback: The correct answer is A-HTML5

We can output HTML5 and Flash to open the material over the internet without the need for any tool. Scorm output can be used for integration into LMSs.

Metacognitive Feedback: The correct answer is A-HTML5

Now you should ask yourself this question.

If I had taught this course, what would I have done differently?

APPENDIX E

QUIZ QUESTIONS AND FEEDBACK (TURKISH)

Video: 1- Intro to Interface: Meeting with Boo

Soru Numarası: 1

Soru Zamanı: 03:03

Soru: Objeleri doğru şekilde sıralamak için ve doğru zamanda doğru yerde göründüklerinden emin olmak için kullandığımız araç hangisidir?

A-Tetikleyici

B-Katman

C-Zaman Çizelgesi

Detaylı Geri Bildirim: Doğru cevap C-Zaman Çizelgesi

Objeleri doğru şekilde sıralamak, doğru zamanda ve yerde çıktığından emin olmak için zaman çizelgesini kullanabiliriz. Ekrana eklediğiniz objeleri burada görebilir, ekrana çıkma, ekranda durma süresi gibi özelliklerini bu araçla değiştirebiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap C-Zaman Çizelgesi

Peki şimdi kendine ilk olarak şu soruyu sormalısın.

Timeline kullanımının amacı hakkında ne biliyorum?

Video: 1- Intro to Interface: Meeting with Boo

Soru Numarası: 2

Soru Zamanı: 12:33

Soru: Bir öğrencinin okul numarasını öğrenmek istiyorsak hangi input tipini seçmemiz mantıklı olur?

A-Check Boxes

B-Radio Buttons

C-Data Entry

Detaylı Geri Bildirim: Doğru cevap C- Data Entry.

Öğrenci okul numarasını kendi yazacağı için Data Entry tipi uygun olur. Eğer kullanıcıya biz seçenekler verseydik diğer iki input tipinden birini kullanabilirdik.

Üstbilişsel Geri Bildirim: Doğru cevap C- Data Entry.

Peki şimdi kendine şu soruyu sormalısın.

Data Entry aracını kendi projemle nasıl ilişkilendirebilirim?

Video: 1- Intro to Interface: Meeting with Boo

Soru Numarası: 3

Soru Zamanı: 19:13

Soru: Öğrenci ismini Beren olarak girdiğinde, öğretmen seçimi ekranında öğrencinin isminin görünmesi için aşağıdakilerden hangisini yazmalıyız?

A-%kullaniciAdi%

B-%Beren%

C-%hocaTercihi%

Detaylı Geri Bildirim: Doğru cevap A-%kullaniciAdi%.

Kullanıcı adı değişkenini yazmalıyız çünkü ismin ne olduğundan bağımsız kullanıcının isim olarak girdiği metnin ekranda görünmesini istiyoruz. Ayrıca, %% değişkenler için kullanılır ve Beren diye bir değişkenimiz yoktur.

Üstbilişsel Geri Bildirim: Doğru cevap A-%kullaniciAdi%.

Şimdi kendine şu soruyu sormalısın.

Diğer seçenekleri yazsaydım ekrana ne gelecekti?

Video: 2- Presenting Content: Multiple Intelligence Theory

Soru Numarası: 1

Soru Zamanı: 00:50

Soru: Projenizdeki tüm ekranları bir arada görerek, akışı ayarlamak için hangisini seçmeliyiz?

A-Slide View

B-Story View

Detaylı Geri Bildirim: Doğru cevap B-Story View

Story görünümü ile projemizin genel haritasını görürüz. Projemizdeki sayfaları tümüyle görebilir, onları bağlayan çizgilerle okları hareket ettirebiliriz. Böylece sayfa sıralamalarını ve ilişkilerini düzenleyebiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap B-Story View

Peki şimdi kendine ilk olarak şu soruyu sormalısın.

Kendi projemde story görünümüne neden ihtiyacım olabilir?

Video: 2- Presenting Content: Multiple Intelligence Theory

Soru Numarası: 2

Soru Zamanı: 05:45

Soru: Öğrenciye bir pop-up ekranı ile geri bildirim vermek istersek, hangisini kullanmamız gerekir?

A-Slide

B-Layer

C-Transition

Detaylı Geri Bildirim: Doğru cevap B-Layer

Layer, objeleri üst üste eklememizi sağlar ve öğrencilerin aksiyonlarına göre farklı içeriklerin görüntülenmesini tetikler. Bu araç ile bir sayfada birçok etkileşim oluşturur ve yönetebiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap B-Layer

Şimdi kendine şu soruyu sormalısın.

Layer özelliğini hangi amaçlarla kullanabileceğimi anlıyor muyum?

Video: 2- Presenting Content: Multiple Intelligence Theory

Soru Numarası: 3

Soru Zamanı: 10:22

Soru: Bir nesnenin herhangi bir kısmını tıklanabilir yapmak için hangisini kullanmalıyız?

A-Layer

B-Variable

C-Hotspot

Detaylı Geri Bildirim: Doğru cevap C-Hotspot

Hotspot, bir nesnenin herhangi bir kısmını (sepetteki portakaldan, kutudaki elmaya dek) tıklanabilir kılar. Bir objenin istediğimiz bir bölgesine görünmez bir hareketli nokta (hotspot) ekleyebilirsiniz. Böylece öğrenci ona tıkladığında içerik tetiklenebilir olur.

Üstbilişsel Geri Bildirim: Doğru cevap C-Hotspot

Kendine son olarak şu soruları sormalısın.

Hotspot özelliğini ben öğretseydim neyi farklı yapardım?

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 1

Soru Zamanı: 00:48

Soru: Ekranda daha fazla alana ihtiyacımız varsa, hangisini değiştirmeliyiz?

A-Layer

B-Resolution

C-Background

Detaylı Geri Bildirim: Doğru cevap B-Resolution.

Ekran çözünürlüğü otomatik olarak 720*540 (4:3) olarak gelir, ekran alanını büyütmek istersek 720*405 (16:9) seçebiliriz. Kendimiz bir ölçü belirlemek istersek ise Custom seçeneğini kullanabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap B-Resolution.

Peki şimdi kendine şu soruyu sormalısın.

Ekran çözünürlüğünü nereden değiştirebileceğimi hatırlıyor muyum?

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 2

Soru Zamanı: 06:08

Soru: Kullandığımız bir görselin rengini daha sonra da kullanmak istersek, hangi aracı kullanmayılız?

A-Eyedropper

B-Animation

C-Layer

Detaylı Geri Bildirim: Doğru cevap A-Eyedropper

Kullandığımız görsel üzerine eyedropper süreklersek görseldeki rengin aynısını bulabiliriz. Bunu daha sonra da kullanmak için “Add to custom color” butonuna tıklayabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap A-Eyedropper

Şimdi kendine şu soruları sormalısın.

Bu özellik benim ilgimi çekti mi? Kendi projemde kullanabilir miyim

Video: 3- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 3

Soru Zamanı: 11:22

Soru: Kullanıcının hareketine bağlı olarak değişebilen ve dinamik bir içerik sağlayan özelliğin adı nedir?

A-Tetikleyiciler

B-Değişkenler

C-Katmanlar

Detaylı Geri Bildirim: Doğru cevap B- Değişkenler.

Değişkenler, kullanıcının hareketine bağlı olarak değişebilen ve dinamik bir içerik sağlayan özelliklerdir. Uygulamaya girilen bilgileri aklında tutabilir, bunları değerlendirebilir, düzeltebilir ve sonra bu değişkenleri istediğiniz yerde kullanabilir.

Üstbilişsel Geri Bildirim: Doğru cevap B-Değişkenler.

Peki şimdi kendine şu soruyu sormalısın.

Değişkenleri kendi projemde kullansaydım neyi farklı yapabilirdim?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 1

Soru Zamanı: 02:02

Soru: Diğer ekrana geçmek için bir buton kullandığımızda hangi trigger aksiyonunu seçmeliyiz?

A-Hide Layer

B-Show Scene

C-Jump to Slide

Detaylı Geri Bildirim: Doğru cevap C-Jump to Slide

Bir yazıya, butona ya da herhangi bir objeye Jump to Slide aksiyonu verdiğimizde, seçtiğimiz slayda geçiş yapabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap C-Jump to Slide

Peki şimdi kendine şu soruyu sormalısın.

Diğer trigger aksiyonları hakkında ne biliyorum?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 2

Soru Zamanı: 05:47

Soru: Hangisi bize bir öğrencinin davranışlarına göre bir şeyin görünüşünü değiştirme şansı verir?

A-Timeline

B-States

C-Notes

Detaylı Geri Bildirim: Doğru cevap B-States

Durumlar, öğrencinin davranışlarına göre bir şeyin görüşünü değiştirmemize izin verir. Örneğin, öğrenciler üzerine geldiklerinde bir butonu genişletebilir veya işaretlediklerinde bir parlaklık efekti sağlayabiliriz. Onlarla karakter ifadelerini de değiştirebiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap B-States

Şimdi kendine şu soruyu sormalısın.

Bu videodaki özellikler, daha önce öğrendiğim hangi özelliklere benzer?

Video: 4- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 3

Soru Zamanı: 08:15

Soru: Öğrenci “Slider’ı bir adım hareket ettirmesine rağmen ekrana “Stage 4” geliyorsa (Stage 1 değil), Stage 1 için Show layer trigger’ında kullanılan Operator/Value ikilemesi hangisi olabilir?

A-Equal to / 1

B-Not equal to / 1

C-Equal to / 4

Detaylı Geri Bildirim: Doğru cevap C-Equal to / 4

Stage 1’a gidilmesine rağmen Stage 4 bilgileri görünüyorsa, Show layer triggerinda değişken ve değerlerinde bir yanlışlık var demektir. Yani değer 4’e eşit olduğunda bu durum gerçekleşir.

Üstbilişsel Geri Bildirim: Doğru cevap C-Equal to / 4

Kendine son olarak şu soruyu sormalısın.

Değişkenler için kullanılan Operator/Value kavramlarını kullanabilmek için neye dikkat etmeliyim?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 1

Soru Zamanı: 01:15

Soru: Ekran değişimi gibi bir aksiyonu trigger olarak hangi objelere ekleyebiliriz?

A-Karakterler

B-Görseller

C-Metin Kutusu

D-Hepsi

Detaylı Geri Bildirim: Doğru cevap D-Hepsi

Tetikleyicileri herşeye (düğmeler, resimler, metin, vb. istediğiniz her şeye) ekleyebiliriz ve daha kompleks bir yapı oluşturmak için birden fazla tetikleyici beraber de kullanabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap D-Hepsi

Peki şimdi kendine şu soruları sormalısın.

Bir objeye birden fazla trigger ekleyebilir miyim? Kendi projemde bu bana gerekli olabilir mi?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 2

Soru Zamanı: 07:21

Soru: Bir düğmeyi, tıklandıktan sonra renk değiştirecek şekilde ayarlamak için hangisini kullanabiliriz?

A-States

B-Notes

C-Transitions

Detaylı Geri Bildirim: Doğru cevap A-States

States özelliği ile herhangi bir objeyi, öğrencinin aksiyonuna bağlı olarak değiştirebiliriz. Bir şeyi, tıklandıktan sonra boyut değiştirecek şekilde ayarlayabilir veya kullanıcı yanlış nesneye tıkladığında o nesne üzerine x işareti koyabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap A-States

Şimdi kendine şu soruları sormalısın.

States özelliğini diğer özelliklerden ayıran şeyin ne olduğunu anladım mı?

Video: 5- Presenting Content: The Four Stages of Cognitive Development

Soru Numarası: 3

Soru Zamanı: 12:44

Soru: Öğrencinin görüceği arayüz tasarımını değiştirmek için hangisini kullanmalıyız?

A-Preview

B-Publish

C-Player

Detaylı Geri Bildirim: Doğru cevap C-Player

Player ile öğrencinin göreceği arayüzü değiştirebiliriz. Publish ile oluşturduğumuz materyali yayınlayabiliriz. Preview ile ise öğrencinin göreceği arayüzü görebilir ve tıpkı öğrenci gibi hareket edebiliriz. Bir değişiklik yapamayız.

Üstbilişsel Geri Bildirim: Doğru cevap C-Player

Peki şimdi kendine son olarak şu soruları sormalısın.

Kendi projemde player özelliklerini değiştirebilecek kadar bilgi sahibi oldum mu? Olmadıysam bu konuda kendimi nasıl geliştirebilirim?

Video: 6-Final Project Layout

Soru Numarası: 1

Soru Zamanı: 00:54

Soru: Projenizde yer alan bir ekran içindeki triggerları düzenlemek için hangisini seçmeliyiz?

A-Slide View

B-Story View

Detaylı Geri Bildirim: Doğru cevap A-Slide View

Slide görünümü ile seçtiğiniz ekran üzerinde düzenlemeler yapabilirsiniz. Story görünümü ile ise projenizin büyük resmini görürsünüz.

Üstbilişsel Geri Bildirim: Doğru cevap A-Slide View

Peki şimdi kendine ilk olarak şu soruyu sormalısın.

Kendi projemde slide görünümüne neden ihtiyacım olabilir?

Video: 6-Final Project Layout

Soru Numarası: 2

Soru Zamanı: 03:29

Soru: Diğer ekrana geçmek için bir buton kullandığımızda hangi trigger aksiyonunu seçmeliyiz?

A-Hide Layer

B-Show Scene

C-Jump to Slide

Detaylı Geri Bildirim: Doğru cevap C-Jump to Slide

Bir yazıya, butona ya da herhangi bir objeye Jump to Slide aksiyonu verdiğimizde, seçtiğimiz slayda geçiş yapabiliriz.

Üstbilişsel Geri Bildirim: Doğru cevap C-Jump to Slide

Peki şimdi kendine şu soruyu sormalısın.

Diğer trigger aksiyonları hakkında ne biliyorum?

Video: 6-Final Project Layout

Soru Numarası: 3

Soru Zamanı: 08:06

Soru: “Dışarıdan yüklediğim bir görsele ekran geçişi için trigger ekleyebilirim.” ifadesi doğru mudur?

A-Doğru

B-Yanlış

Detaylı Geri Bildirim: Doğru cevap A-Doğru

Tetikleyicileri (Trigggers) neredeyse tüm nesnelere uygulayabilirsiniz. Ayrıca birde fazla da trigger ekleyibilirsiniz.

Üstbilişsel Geri Bildirim: Doğru cevap A-Doğru

Kendine şimdi şu soruları sormalısın.

Bir görsele birden fazla trigger ekleyebilir miyim? Eğer ekleyebilirsem bunu hangi amaçlarla kullanabilirim?

Video: 6-Final Project Layout

Soru Numarası: 4

Soru Zamanı: 18:30

Soru: Aşağıdaki ifadelerden hangisi doğrudur?

A-Bir butona sadece sonraki ekrana gidecek şekilde trigger verebiliriz.

B-Bir butona sadece önceki ekrana gidecek şekilde trigger verebiliriz.

C-Bir butona istediğimiz her ekrana gidecek şekilde trigger verebiliriz.

Detaylı Geri Bildirim: Doğru cevap C- Bir butona istediğimiz her ekrana gidecek şekilde trigger verebiliriz.

Jump to slide trigger seçeneğini kullanarak istediğimiz her ekrana geçiş sağlayabiliriz. Bunu yapmak için trigger penceresinden “Slide” seçeneğini istediğimiz ekran olarak seçmeliyiz.

Üstbilişsel Geri Bildirim: Doğru cevap C- Bir butona istediğimiz her ekrana gidecek şekilde trigger verebiliriz.

Kendine son olarak şu soruyu sormalısın.

Bir butona önceki ya da sonraki ekrana değil bir başka ekrana geçiş yapması için trigger verdiğimde, daha kompleks bir yapı oluşturabilirim. Bu benim ne işime yarar?

Video: 6-Final Project Layout

Soru Numarası: 5

Soru Zamanı: 35:59

Soru: Öğrenci “Slider’ı bir adım hareket ettirmesine rağmen ekrana “Stage 4” geliyorsa (Stage 1 değil), Stage 1 için Show layer trigger’ında kullanılan Operator/Value ikilemesi hangisi olabilir?

A-Equal to / 1

B-Not equal to / 1

C-Equal to / 4

Detaylı Geri Bildirim: Doğru cevap C-Equal to / 4

Stage 1’a gidilmesine rağmen Stage 4 bilgileri görünüyorsa, Show layer triggerinda değişken ve değerlerinde bir yanlışlık var demektir. Yani değer 4’e eşit olduğunda bu durum gerçekleşir.

Üstbilişsel Geri Bildirim: Doğru cevap C-Equal to / 4

Kendine son olarak şu soruyu sormalısın.

Değişkenler için kullanılan Operator/Value kavramlarını kullanabilmek için neye dikkat etmeliyim?

Video: 6-Final Project Layout

Soru Numarası: 6

Soru Zamanı: 39:50

Soru: Öğrencinin göreceği arayüzde menu kısmını kaldırmak istersek, hangi araç üzerinden düzenleme yapmalıyız?

A-Preview

B-Publish

C-Player

Detaylı Geri Bildirim: Doğru cevap C-Player

Player ile öğrencinin göreceği arayüzü değiştirebiliriz. Publish ile oluşturduğumuz materyali yayınlayabiliriz. Preview ile ise öğrencinin göreceği arayüzü görebilir ve tıpkı öğrenci gibi hareket edebiliriz. Bir değişiklik yapamayız.

Üstbilişsel Geri Bildirim: Doğru cevap C-Player

Peki şimdi kendine şu soruları sormalısın.

Kendi projemde player özelliklerini değiştirebilecek kadar bilgi sahibi oldum mu? Menüyü kaldırmak ne işe yarayabilir?

Video: 6-Final Project Layout

Soru Numarası: 7

Soru Zamanı: 45:06

Soru: Oluşturduğumuz materyali İnternet Explorer üzerinden açmak istersek, hangi tür çıktı almamız uygun olabilir?

A-HTML 5

B-Flash

C-Scorm

Detaylı Geri Bildirim: Doğru cevap A-HTML5

Materyali herhangi bir araca gerek duymadan internet üzerinden açmak için HTML5 ve Flash türünde çıktı alabiliriz. Scorm çıktısı ise LMS'lere entegre edilmeleri için kullanılabilir.

Üstbilişsel Geri Bildirim: Doğru cevap A-HTML5

Kendine son olarak şu soruyu sormalısın.

Bu kursu ben öğretseydim, neleri farklı yapardım?

APPENDIX F

ETHICS COMMITTEE APPROVAL

Evrak Tarih ve Sayısı: 12/12/2020-257

T.C.
BOĞAZİÇİ ÜNİVERSİTESİ
SOSYAL VE BEŞERİ BİLİMLER YÜKSEK LİSANS VE DOKTORA TEZLERİ ETİK İNCELEME KOMİSYONU
TOPLANTI TUTANAĞI

Toplantı Sayısı	:	10
Toplantı Tarihi	:	10/12/2020
Toplantı Saati	:	13:00
Toplantı Yeri	:	Zoom Sanal Toplantı
Bulunanlar	:	Prof. Ebru Kaya, Prof. Dr. Fatma Nevra Seggie, Dr. Öğr. Üyesi Yasemin Sohtorik İlkmen
Bulunmayanlar	:	Prof. Dr. Özlem Hesapçı Karaca

Ezgi Rabia Diri
Eğitim Teknolojisi

Sayın Araştırmacı,
"Etkileşimli Videolarda Ayrıntılı ve Üstbilişsel Geri Bildirim Kullanılmasının Üniversite Öğrencilerinin Videolara Katılımı Üzerindeki Etkilerinin Karşılaştırılması" başlıklı projeniz ile ilgili olarak yaptığınız SBB-EAK 2020/47 sayılı başvuru komisyonumuz tarafından 10 Aralık 2020 tarihli toplantıda incelenmiş ve uygun bulunmuştur.

Bu karar tüm üyelerin toplantıya çevrimiçi olarak katılımı ve oybirliği ile alınmıştır. COVID-19 önlemleri kapsamında kurul üyelerinden ıslak imza alınamadığı için bu onam mektubu üye ve raportör olarak Yasemin Sohtorik İlkmen tarafından bütün üyeler adına e-imzalanmıştır.

Saygılarımızla, bilgilerinizi rica ederiz.

Dr. Öğr. Üyesi Yasemin
SOHTORİK İLKMEN
ÜYE

e-imzalıdır
Dr. Öğr. ÜyesiYasemin Sohtorik
İlkmen
Öğretim Üyesi
Raportör

SOBETİK 10 10/12/2020

APPENDIX G

CONSENT FORM

Araştırmayı destekleyen kurum: Boğaziçi Üniversitesi

Araştırmanın adı: Etkileşimli Videolarda Ayrıntılı ve Üstbilişsel Geri Bildirim Kullanılmasının Lisans Öğrencilerinin Videolara Katılımı ve Öz-Düzenleme Becerileri Üzerindeki Etkilerinin Karşılaştırılması

Proje Yürütücüsü: Diler Öner

E-mail adresi:

Telefonu:

Araştırmacının adı: Ezgi Rabia Diri

E-mail adresi:

Telefonu:

Proje Konusu: Günümüzde oldukça tercih edilen video tabanlı öğretim yönteminde öğrencilerin video süresince pasif olmamaları için, video içlerinde öğrencilere soru sorma, geri bildirim verme gibi seçenekler sunan etkileşimli videolar geliştirilmiştir. Etkileşimli videolar öğrencilerin öğrenme sürecine aktif olarak katılmalarını hedefler. Bu araştırmanın amacı etkileşimli videolardaki soruların yanıtlarına verilen geri bildirim çeşitlerinin, lisans öğrencilerinin videolara katılımı ve öğrencilerin öz-düzenleme becerileri üzerindeki etkisini karşılaştırmaktır.

Öz düzenleme becerilerinin artması öğrencilerin katılımını olumlu etkilediği için karşılaştırılacak geri bildirimler öz düzenleme becerilerini destekleyecek şekilde seçilmiştir. Bu yüzden videolarda ayrıntılı geri bildirim ve üstbilişsel geri bildirim stratejileri kullanıcaktır.

Dersi alan öğrencilere videolar etkileşimli olarak sunulacaktır. Öğrenciler rastgele iki gruba ayrılacaktır. Bir gruptaki öğrenciler ayrıntılı geri bildirim olan videoyu, ikinci gruptaki öğrenciler üstbilişsel geri bildirim stratejileri olan videoyu izleyeceklerdir. Videolar sonrasında uygulanacak olan 5'li likert tipi ölçekler için toplam 1 hafta süre verilmiştir.

Bu çalışma Boğaziçi Üniversitesi etik kurulu onayı ile Bilgisayar ve Öğretim Teknolojileri Öğretmenliği bölümünde yapılacaktır.

Onam: Sizi etkileşimli videolarda kullanılan geri bildirim stratejileirinin karşılaştırılmasına yönelik yapmak istediğimiz araştırmaya katılmaya davet ediyoruz. Bu çalışma sonucunda etkileşimli videolarda katılımı en çok arttıran geri bildirim tipini tespit etmeyi umuyoruz.

Araştırmaya katılmayı kabul ettiğiniz takdirde sizlerden, hazırlanan etkileşimli videoyu düzenli izlemeniz, video içindeki soruları cevaplamanız ve cevabınıza verilen geri bildirimleri incelemeniz istenecektir. Uygulama sonrası yapılacak mülakat araştırma verisi olarak kullanılacaktır.

İsminiz ve bu bilgiler tamamen gizli tutulacaktır. Çalışmaya katılmanız tamamen isteğe bağlıdır. Çalışmaya katılmazsanız yapmanız gereken ders içi yükümlülükleriniz değişmeyecektir. Sadece sizden ölçek ile veri toplanmayacaktır. Çalışmaya

katılmadığınız durumda herhangi bir şekilde negatif etkilenmeyeceksiniz. Tüm ders yükümlülükleri ve puanlandırmaları tüm öğrenciler için eşittir. Sizden ücret talep etmiyoruz ve size herhangi bir ödeme yapmayacağız. Sizden alınan örnek ileride başka çalışmalar için de kullanılabilir. İstediğiniz zaman çalışmaya katılmaktan vazgeçebilirsiniz. Bu durumda sizden almış olduğumuz veriler imha edilecektir.

Yapmak istediğimiz araştırmanın size risk getirmesi beklenmemektedir. Tasarladığımız videolar ile daha verimli bir video tabanlı öğrenme deneyimi yaşamanızı beklemekteyiz. Ayrıca, araştırma sonucunda edinilen bilgiler takdirinde, video tabanlı öğrenme literatürüne katkıda bulunmayı hedeflemekteyiz.

Bu formu imzalamadan önce, çalışmayla ilgili sorularınız varsa lütfen sorun. Daha sonra sorunuz olursa, Ezgi Rabia Diri'ye email yolu ile sorabilirsiniz. Araştırmayla ilgili haklarınız konusunda Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler Yüksek Lisans ve Doktora Tezleri Etik İnceleme Komisyonu'na (SOBETİK) danışabilirsiniz.

Bana anlatılanları ve yukarıda yazılanları anladım. Formun bir örneğini aldım / almak istemiyorum.

Çalışmaya katılmayı kabul ediyorum.

Katılımcı Adı-Soyadı:……..

İmzası:

Tarih (gün/ay/yıl):...../...../.....

APPENDIX H

INTERVIEW QUOTES (ENGLISH-TURKISH)

English Translation / İngilizce Çeviri	Original Quote / Orjinal Alıntı
The second type [elaborated feedback] again, for example, gave this information. For example, a question can be added to make you think about what else it can be used for. It can give information. For instance, we can give information and use the layer for a lot of things for this study after all. Perhaps, a question can be added that will make them think about what else it can be used for. (Student 3 / Interview)	İkincisi yine belki, mesela bu bilgiyi vermiş. Başka ne için kullanılabilir falan diye mesela düşündürtecek bir soru eklenebilir. Yine bilgi verip, bu konu atıyorum bu çalışma için sonuçta layerı bir sürü şey için kullanabiliriz. Eee hani, başka ne için kullanabileceğini düşündürtecek bir soru belki eklenebilir. (Student 3 / Interview)
Something pops up in my head when there's informational feedback at the top and a question at the bottom. After that, when a question is asked to me, that is, when a question comes over something that has been already learned , I can think more. But when I look at it this way, it just seems like a question that doesn't make much sense. If I had to choose one, I would choose the one on the right [elaborated feedback], I would prefer the combination of the two more in terms of increasing my awareness. (Student 2 / Interview)	Üstte bir bilgi geri bildirimi, altta bir soru olduğu zaman kafamda bir şey oluşuyor. Bunun ardından bana bir soru sorulması oluşmuş bir şeyin üzerinden soru gelince daha çok düşünebiliyorum. Fakat bu şekilde baktığımda soruya sadece, biraz çok da bir şey ifade etmeyen bir soru gibi duruyor. İlla birini seçmem gerekirse sağdakini seçerdim, tercihen ikisinin birleştirilmesini farkındalığımın artması açısından daha çok tercih ederdim. (Student 2 / Interview)
For example, there are sentences in the second feedback type [elaborated feedback] like "it allows us to decorate objects" and "many interactions are created". What are specific actions? It says it creates a lot of interactions, you can create layouts. What can be done other than what is shown in the video? I understand that it can be done from the second feedback. Therefore the interest in the video increases. (Student 1 / Interview)	Mesela ikinci sorun için ikinci olunan cevapta yani nesneleri süslememizi sağlar, birçok etkileşim oluşturulur gibi cümleler var. Bu da hani belirli eylemler nedir? Işte birçok etkileşim oluşturur, düzenler yaratabilirsiniz diyor. Şimdiye kadar dışında yani videodaki gösterdiği şeyler dışında neler yapılabilir? Yapılabilir olduğunu anlıyorum ikinci feedbackten. O yüzden videoya olan ilgi artıyor. (Student 1 / Interview)

An obvious question yes, but do I understand for what purposes I can use it? So, yes, I understand. I don't have enough background to say that I can use it here and there. Or I don't understand, it doesn't mean anything right now. I don't understand, then I'll go and investigate it. I really need to be interested in that subject. Well, if I want it enough to go and research it, obviously. (Student 2 / Interview)	Açık bir soru evet ama hangi amaçlarla kullanabileceğimi anlıyor muyum? Yani, evet anlıyorum. Şurada şurada şurada kullanabilirim diyecek kadar backgroundum yok şu an. Ya da anlamıyorum, bir şey ifade etmiyor şu anda. Anlamıyorum, o zaman gideyim araştırayım. O konuya gerçekten ilgi duymam gerekiyor. Bunu gidip araştıracak kadar istiyorsam yani açıkçası. (Student 2 / Interview)
Now, for example, I will give a different answer than before, but while I was thinking if I understood for what purposes I could actually use it, I went and thought about what else I could use it for other than video. Thinking about it a little bit took me away from the video. But the other one actually made me re-imagine what I saw in the video. (Student 3 / Interview)	Şimdi mesela, yine öncekinden farklı cevap vereceğim ama, burada aslında hangi amaçlarla kullanabileceğimi anlıyor muyum diye düşünürken, gittim videodan başka ne için kullanabilirim diye düşündüm. Mesela biraz biliyor olmamla da alakalı olabilir. Biraz onu düşünmek videodan biraz kopardı beni. Ama diğeri aslında direk, videoda gördüğüm şeyleri tekrardan hayal etmemi sağladı gibi oldu bu defa. (Student 3 / Interview)
So again in the second one [elaborated feedback], for example, you can add a floating-point layer at work, and make it clickable at work. You know, it's such a mini summary. So that's the positive side of it, and that's why I chose it. In the second [metacognitive feedback], it makes us think about our shortcomings; what I would have done differently, what I did not like or what I do not know. It may be useful to think about what could be improved as a positive aspect. I don't know, as a negative aspect, I think these two feedback types should be combined. And there should be only one type of feedback. (Student 1 / Interview)	Yani yine ikincisinde mesela işte hareketli nokta katmanı ekleyebilir, işte tıkanabilir kılar. Hani böyle çok mini mini bir özet oluyor anlatıma. O yüzden bunun olumlu yönü bu ve benim seçme nedenim de bu. Ikincisinde de hani işte eksiklikleri düşünmemizi sağlıyor bir yandan; Neyi farklı yapardım, neyi beğenmedim veya bilmiyorum. Ne geliştirilebilirdi diye düşünmek faydalı olabilir olumlu yön olarak. Olumsuz yön olarak da bilmiyorum bu iki feedback türü bence birleştirilmeli. Ve tek bir feedback türü olmalı. (Student 1 / Interview)
This time I really liked the question and I even think the two feedbacks are very different from each other. It felt like these two feedbacks didn't serve the same	Bu sefer gerçekten soruyu beğendim ve, hatta şöyle iki geri bildirimin ikisinin de çok farklı olduğunu düşünüyorum birbirinden. Aynı amaca hizmet

purpose actually. That's why both of them are very beautiful separately, in fact the first one [metacognitive feedback] was very effective for me. I guess if I had to choose one, I think I would choose the first. But still, I would like both together. (Student 2 / Interview)	etmiyorlar gibi geldi, iki geri bildirim aslında. Bu yüzden ikisi de ayrı ayrı çok güzel, hatta ilki bir evet bir etkili oldu soru bende. Sanırım birini tercih etmem gerekiyorsa sanırım ilkini tercih ederdim. Ama yine de, ikisini birden, daha çok isterdim. (Student 2 / Interview)
If there was a little explanation first, and then feedback like if I had done these, how I would have done it, it would be as if it would fit perfectly. (Student 2 / Interview)	Öncesinde biraz açıklama, bunları yapabilir, sonrasında ben bunları yapsaydım, nasıl yapardım gibi bir geri bildirim olsa, sanki tam olarak oturur gibi. (Student 2 / Interview)
So using questioning to raise awareness is a good method. (Student 1 / Interview)	Yani farkındalığı sağlamak için soru soru sormayı kullanmak iyi bir yöntem. (Student 1 / Interview)
A short explanation first, and then the question on the subject both affect our awareness and I seem to engage more. Whether we learn about the subject, so I would actually like them both together. (Student 2 / Interview)	Öncesinde kısa bir açıklama, sonrasında da, soru bence o konudaki, hem farkındalığımızı, hem daha çok çekiliyorum sanki, kendimizi ve o konuyu öğrenip öğrenmediğimizi bu nedenle ikisini de aslında beraber isterdim. (Student 2 / Interview)
Yes, I will say something similar again. It [elaborated feedback] tells us what to do on the hotspot. So again, it tells it very briefly. Probably not that much, of course, the hotspot feature, but seeing what you can do makes you wonder what else you can do. (Student 1 / Interview)	Ya evet yine benzer bir şey söyleyeceğim. Ya Hotspotta neler yapacağımızı anlatıyor. Yani yine tabii çok kısa bir şekilde anlatıyor. Muhtemelen tabii ki de bu kadar değil hotspot özelliği ama neler yapacağınızı görmek daha neler yapabileceğinizi de merak ettiriyor. (Student 1 / Interview)
That the question orients towards practice do a little bit more, it actually keeps me with that question. (Student 2 / Interview)	Sorunun uygulamaya yöneltmesi birazcık daha şey yapıyor, o soruda kalmamı sağlıyor aslında. (Student 2 / Interview)
I think it was the first one [metacognitive feedback] because when I thought about what I would have done differently, now I made a counter-compare there. I went back to the video again to see what it did in the video, so I can say that the first one supported it. The other [elaborated feedback] even drop it because of the	Sanırım ilki oldu çünkü, neyi farklı yapardım diye düşününce şimdi orada bir karşı compare girdim. Videoda şu ne yapmıştı diye, videoya geri döndüm tekrar, yani ilki destekledi diyebilirim. Diğeri de hatta kopardı çünkü sepetteki portakal filan, örnekleme iyiydi ama videodan kopup başka şeyler hayal etmeye başladım

orange in the basket and all, the example was good, but I actually started imagining other things from the video. Hence, this time it's like it ripped from the video a bit. (Student 3 / Interview)	aslında. Dolayısıyla, o biraz videodan kopardı gibi bu defa. (Student 3 / Interview)

REFERENCES

Abdelrahman, R. M. (2020). Metacognitive awareness and academic motivation and their impact on academic achievement of Ajman University students. *Heliyon, 6(9)*, e04192.

Adagideli, F. H., & Ader, E. (2017). Investigation of young children's metacognitive regulatory abilities in mathematical problem solving tasks. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *18(2)*, 193-211.

Ader, E. (2013). A framework for understanding teachers' promotion of students' metacognition. *International Journal for Mathematics Teaching and Learning*. Retrieved from http://www.cimt.org.uk/journal/ader.pdf

Akın, A., Ramazan, A., & Çetin, B. (2007). The validity and reliability of the Turkish version of the Metacognitive Awareness Inventory. *Educational Sciences: Theory & Practice*, *7(2)*, 671-678.

Aktaş, E. E. (2021). *The effects of traditional corrective feedback and language awareness enhanced feedback on learners' second language and foreign language writing performance development* (Master's thesis). Bahçeşehir University, Istanbul, Turkey.

Altıok, S., Başer, Z., & Yükseltürk, E. (2019). Enhancing metacognitive awareness of undergraduates through using an e-educational video environment. *Computers & Education*, *139(1)*, 129-145.

Attfield, S., Kazai, G., Lalmas, M., & Piwowarski, B. (2011). Towards a science of user engagement (Position Paper). *WSDM Workshop on User Modeling for Web Applications* (pp. 9-12), Hong Kong, China.

Boekarts, M. (1999). Self-regulated learning: where we are today. *International Journal of Educational Research*, *31(6)*, 445-457.

Bote-Lorenzo, M. L., & Gomez-Sanchez, E. (2018). An approach to build in situ models for the prediction of the decrease of academic engagement indicators in massive open online courses. *Journal of Universal Computer Science*, *24(8)*, 1052-1071.

Brown, A. (1987). Metacognition, executive control, self-regulation, and other more mysterious mechanisms. *In F. E. Weinert, & R. H. Kluwe, Metacognition, motivation, and understanding,* 65-116. NJ: Lawrence Erlbaum.

Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, *65(3)*, 245-281.

Cho, M. H., & Shen, D. (2013). Self-regulation in online learning. *Distance Education*, *34(3)*, 290-301.

Chung, Y. B., & Yuen, M. (2011). The role of feedback in enhancing students' self-regulation in inviting schools. *Journal of Invitational Theory and Practice*, *17*, 22-27.

Clariana, R. B. (1990). A comparison of answer until correct feedback and knowledge of correct response feedback under two conditions of contextualization. *Journal of Computer-Based Instruction*, *17(4)*, 125-129.

Clariana, R., Ross, S., & Morrison, G. (1991). The effects of different feedback strategies using computer-administered multiple-choice questions as instruction. *Educational Technology Research and Development*, *39(2)*, 5-17.

Coates, H. (2005). The value of student engagement for higher education quality assurance. *Quality in Higher Education* , *11(1)*, 25-36.

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston: Pearson.

Cummins, S., Beresford, A. R., & Rice, A. (2016). Investigating engagement with in-video quiz questions in a programming course. *IEEE Transactions on Learning Technologies*, *9(1)*, 57-66.

Çuhadar, C., & Kıyıcı, M. (2007). Uzaktan Eğitim Uygulamaları, In L. A. Gunes, *Bilgisayar I-II Bilgisayar Destekli Öğretim ve Uzaktan Eğitim*. 117-159. Ankara: Pegem A Yayıncılık.

Delen, E., Liew, J., & Willson, V. (2014). Effects of interactivity and instructional scaffolding on learning: Self-regulation in online video-based environments. *Computers & Education*, *78*, 312-320.

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning*, *3(3)*, 231-264.

Dignath, C., & Veenman, M. V. (2020). The role of direct strategy instruction and indirect activation of self-regulated learning—Evidence from classroom observation studies. *Educational Psychology Review*, *33(2)*, 489-533.

Eidenberger, M., & Nowotny, S. (2022). Video-based learning compared to face-to-face learning in psychomotor skills physiotherapy education. *Creative Education*, *13*, 149-166.

Flavell, J. H. (1976). Metacognitive aspects of problem solving, In L. B. Resnick, *The Nature of intelligence* (pp. 231-235). NJ: Lawrence Erlbaum.

Fredricks, J., Blumenfeld, P., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74(1)*, 59–109.

Garner, R. (1987). *Metacognition and reading comprehension.* NJ: Ablex Publishing.

Gassner, L. (2009). *Developing metacognitive awareness - A modified model of a PBL - tutorial.* Malmö: Malmö University.

Ghomi, M., Moslemi, Z., & Mohammadi, S. D. (2016). The relationship between metacognitive strategies with self-directed learning among students of Qom University of Medical Sciences. *Education Strategies in Medical*, *9(4)*, 248-259.

Gibbs, R., & Poskitt, J. (2010). *Student engagement in the middle years of schooling (years 7-10): A literature review.* Retrieved from Ministry of Education: https://www.educationcounts.govt.nz/publications

Golke, S., Dörfler, T., & Artelt, C. (2015). The impact of elaborated feedback on text comprehension within a computer-based assessment. *Learning and Instruction*, *39*, 123-136.

Guo, W., Chen, Y., Lei, J., & Wen, Y. (2014). The effects of facilitating feedback on online learners' cognitive engagement: Evidence from the asynchronous online discussion. *Education Sciences*, *4(2)*, 193-208.

Halverson, L. R., & Graham, C. R. (2019). Learner engagement in blended learning environments: A conceptual framework. *Online Learning*, *23(2)*, 145-178.

Harrison, G. M., & Vallin, L. (2018). Evaluating the Metacognitive Awareness Inventory using empirical factor-structure evidence. *Metacognition and Learning*, *13(1)*, 15-38.

Hepplestone, S., Holden, G., Irwin, B., Parkin, H. J., & Thorpe, L. (2011). Using technology to encourage student engagement with feedback: A literature review. *Research in Learning Technology*, *19(2)*, 117-127.

Hew, K. F. (2016). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS. *British Journal of Educational Technology*, *47(2)*, 320–341.

Hughes, A. J. (2017). Educational complexity and professional development: Teachers' need for metacognitive awareness. *Journal of Technology Education*, *29(1)*, 25-44.

Hulsman, R. L., & Vloodt, J. (2015). Self-evaluation and peer-feedback of medical students' communication skills using a web-based video annotation system. Exploring content and specificity. *Patient Education and Counseling*, *98(3)*, 356-363.

Jacobs, J., & Paris, S. (1987). Children's metacognition about reading. Issues in definition, measurement, and instruction. *Educational Psychologist*, *22(3)*, 255-278.

Jaehnig, W., & Miller, M. (2007). Feedback types in programmed instruction: A systematic review. *The Psychological Record*, *57(2)*, 219–232.

Karaoğlan Yılmaz, F. G., & Yılmaz, R. (2021). Learning analytics intervention improves students' engagement in online learning. *Technology, Knowledge and Learning, 27(2)*.

Khan, M. J., & Seemab, R. (2019). Moderating role of learning strategies between meta-cognitive awareness and study habits among university students. *Pakistan Journal of Psychological Research*, *34(1)*, 215-231.

Khodaei, S., Hasanvand, S., Gholami, M., Mokhayeri, Y., & Amini, M. (2022). The effect of the online flipped classroom on self-directed learning readiness and metacognitive awareness in nursing students during the COVID-19 pandemic. *BMC Nursing*, *21(1)*, 22.

King, A. (1991). Effects of training in strategic questioning on children's problem-solving performance. *Journal of Educational Psychology*, *83(3)*, 307–317.

Kohan, N., Arabshahi, K. S., Mojtahedzadeh, R., Abbaszadeh, A., Rakshani, T., & Emami, A. (2017). Self- directed learning barriers in a virtual environment: A qualitative study. *Journal of Advances in Medical Education & Professionalism* , *5(3)*, 116-123.

Kolas, L. (2015). Application of interactive videos in education. *International Conference on Information Technology Based Higher Education and Training (ITHET).* Lisbon, Portugal: IEEE.

Kovacs, G. (2016). Effects of in-video quizzes on MOOC lecture viewing. *Proceedings of 3rd ACM Conference Learning* (pp. 31-40).

Lee, B. G., Muthoosamy, K., Chiang, C. L., & Ooi, M. C. (2016). Assessing the metacognitive awareness among foundation in engineering students. *The IAFOR Journal of Education*, *4(2)*, 48-61.

Lee, H. W., Lim, K. Y., & Grabowski, B. L. (2010). Improving self-regulation, learning strategy use, and achievement with metacognitive feedback. *Education Tech Research*, *58(6)*, 629–648.

Lee, J., Sanders, T., Antczak, D., Parker, R., Noetel, M., Parker, P., & Lonsdale, C. (2021). Influences on user engagement in online professional learning: A narrative synthesis and meta-analysis. *Review of Educational Research*, *91(4)*, 518-576.

Lee, S. C., Irving, K., Pape, S., & Owens, D. (2015). Teachers' use of interactive technology to enhance students' metacognition: Awareness of student learning and feedback. *Journal of Computers in Mathematics and Science Teaching*, *34(2)*, 175-198.

Mandernach, B. J. (2012). *Indicators of engagement in the online classroom.* Retrieved from: https://www.facultyfocus.com/wp-content/uploads/2012/01/FF-Online-Student-Engagement-Report.pdf

Mevarech, Z., & Fridkin, S. (2006). The effects of IMPROVE on mathematical knowledge, mathematical reasoning and meta-cognition. *Metacognition and Learning*, *1*, 85-97.

Molin, F., Haelermans, C., Cabus, S., & Groot, W. (2020). The effect of feedback on metacognition - A randomized experiment using polling technology. *Computers & Education*, *152(2020)*, 103885.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, *3(2)*, 1-7.

Nabilah, C. H., Sesrita, A., & Suherman, I. (2020). Development of learning media based on articulate storyline. *Indonesian Journal of Applied Research*, *1(2)*, 80-85.

Narciss, S. (2012). Feedback strategies. In Seel, N.M. (eds), *Encyclopedia of the sciences of learning* (pp. 1289-1293). Springer, Boston.

Narciss, S. (2014). Feedback strategies for interactive learning tasks. In M. Spector, M. Merrill, J. Elen, & M. Bishop, *Handbook of research on educational communications and technology* (pp. 125-144). New York: Springer-Verlag.

Nawrot, I., & Doucet, A. (2014). Building engagement for MOOC students. *International World Wide Web Conference Committee*, (pp. 1077-1082). Seoul.

Nayır, F. (2017). The relationship between student motivation and class engagement levels. *Eurasian Journal of Educational Research*, 59-78. doi: 10.14689/ejer.2017.71.4

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education*, *31(2)*, 199-218.

O'Brien, H. L., & Toms, E. G. (2013). Examining the generalizability of the User Engagement Scale (UES) in exploratory search. *Information Processing and Management*, *49(5)*, 1092-1107.

O'Brien, H. L., Cairns, P., & Hall, M. (2018). A practical approach to measuring user engagement with the refined user engagement scale (UES) and new UES short form. *International Journal of Human-Computer Studies*, *112(2018)*, 28-39.

Omer Faruk, V. (2013). The impact of a question-embedded video-based learning tool on e-learning. *Educational Sciences: Theory and Practice*, *13(2)*, 1315-1323.

Ostafichuk, P., Nesbit, S., Ellis, N., & Tembrevilla, G. (2020). Developing metacognition in first-year students through interactive online videos. *2020 ASEE Virtual Annual Conference Content Access*. doi: 10.18260/1-2--34433

Pahl, C. (2004). Data mining technology for the evaluation of learning content interaction. *Association for the Advancement of Computing in Education (AACE), 3(4).* Waynesville, NC USA.

Pal, D., & Patra, S. (2020). University students' perception of video-based learning in times of COVID-19: A TAM/TTF perspective. *International Journal of Human–Computer Interaction*, 903-921. doi: 10.1080/10447318.2020.1848164

Paris, S., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, *36(2)*, 89-101.

Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In A. Wigfield, & J. S. Eccles, *Development of achievement motivation* (pp. 249-284). Academic Press.

Rice, K., & Kipp, K. (2020). How can educators tap into research to increase engagement during remote learning? *EdSurge News*, Retrieved from https://www.edsurge.com/news/2020-05-06-how-can-educators-tap-into-research-to-increase-engagement-during-remote-learning

Sato, M., & Loewen, S. (2018). Metacognitive instruction enhances the effectiveness of corrective feedback: Variable effects of feedback types and linguistic targets. *Language Learning*, *68(2)*, 507-545.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, *26(1)*, 113–125.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, *19(4)*, 460-475.

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review*, *7(4)*, 351-371.

Sebille, Y. V., Joksimovic, S., Kovanovic, V., & Mirriahi, N. (2018). Extending video interactions to support self-regulated learning in an online course. *35th International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education.* Geelong, Australia

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference.* Boston: Houghton Mifflin.

Shih, H.-c. J., & Huang, S.-h. C. (2018). The development of EFL learners' metacognition in a flipped classroom. *The Eighth CLS International Conference* (pp. 263-279). Singapore.

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research*, *78(1)*, 153-189.

Storyline. (2021). Retrieved from https://articulate.bilgikurdu.net/1.html

Şen, Ş., Yılmaz, A., & Geban, Ö. (2018). Self-regulated learning skills: Adaptation of scale. *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi*, *9(4)*, 339-355.

Tanner, K. D. (2012). Promoting student metacognition. *CBE—Life Sciences Education*, *11(2)*, 113–120.

Taub, M., & Azevedo, R. (2018). How does prior knowledge influence eye fixations and sequences of cognitive and metacognitive SRL processes during learning with an intelligent tutoring system? *International Journal of Artificial Intelligence in Education*, *29(1)*, 1-28.

Uğur, S., & Okur, R. (2016). Açık ve uzaktan öğrenmede etkileşimli video kullanımı. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi* , *2(4)*, 104-126.

Verma, J. P., & Abdel-Salam, A.-S. G. (2019). *Testing statistical assumptions in research.* Hoboken, John Wiley & Sons Inc.

Vural, Ö.F (2013). The impact of a question-embedded video-based learning tool on e-learning. *Educational Sciences: Theory & Practice, 13(2)*, 1315-1323.

Wagner, E. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education*, *8(2)*, 6-29.

Wanga, Z., Gonga, S.-Y., Xua, S., & Hua, X.-E. (2019). Elaborated feedback and learning: Examining cognitive and motivational influences. *Computers & Education* , *136(C)*, 130-140.

Weinstein, C., & Mayer, R. (1986). The teaching of learning strategies. In M. Wittrock, *Handbook of research on teaching* (pp. 315-327). New York: Macmillan.

Yeşilyurt, E. (2013). An analysis of teacher candidates' usage level of metacognitive learning strategies: Sample of a university in Turkey. *Educational Research and Reviews*, *8(6)*, 218-225.

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker Jr., J. F. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & Management*, *43(1)*, 15-27.

Zimmerman, B. J. (1986). Becoming a self-regulated learner. *Contemporary Educational Psychology*, *11(4)*, 307–313.

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner, *Handbook of self-regulation* (pp. 13-39). Academic Press.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future projects. A*merican Educational Research Journal*, *45(1)*, 166-183.