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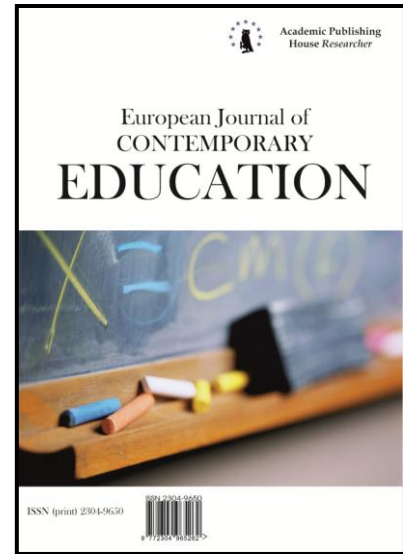
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## Material Development to Raise Awareness of Using Smart Boards: An Example Design and Development Research

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### Abstract

This study aims to develop training material that will help raise awareness in prospective teachers regarding the benefits of using smart boards in the classroom. In this study, a Type 2 design and development research method (DDR) was used. The material was developed by applying phases of ADDIE – an instructional systems design model. The development process was informed by Mayer’s multimedia design principles and Gagné’s instructional events. The subject and the target group of the research was defined at the stage of needs analysis. Powtoon, an online content development tool, was used to produce multimedia material with the aim of raising awareness regarding the benefits of using smart boards in the classroom. An expert instructional designer guided the entire process of the material development. Upon completion of the development phase, three field experts were consulted and improvements were then conducted in compliance with their suggestions. Next, the material was presented to 39 teacher candidates. After they reviewed the material, their opinions were collected. These opinions were analyzed under four aspects: message, visual, sound, and overall effect. The material reached its final form following the applications of ameliorations in line with observations conducted during its application and the feedback given by the teacher candidates. Participants of the study stated that the material, on the whole, was impressive, beneficial, and captivating.

**Keywords:** Smart Board, Design Development Research, Instructional Design, ADDIE, Mayer.

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## **Introduction**

The ever-developing state of technology urges the educational system to be renewed constantly. It is now considered necessary to utilize the facilities offered by modern technology and include new tools into the educational process that are appropriate to a younger generation's requirements and characters, alongside traditional educational tools and materials. It is an educator's duty to blend the new technologies of this digital age into education and to help their students to be successful in their academic career and life [1]. For this reason, educators are required to combine technology with their field of profession [2].

Vallis and Williamson believe that smart boards offer a "...good solution for solving the problem of having only one computer for a large number of students by making it easy and enjoyable for both teachers and students to interact with educational software" [3]. Researchers conducted in the field, however, show that teachers shy away from using smart boards, although they think that they are effective and useful and if they are used, they use them only as projectors or for searching the Internet and do not benefit from the many other facilities of the smart boards [4,5]. The main reason teachers and teacher candidates may not feel confident in their ability to use smart boards is because they did not receive adequate user training [1]. Thus, if they feel incompetent, teachers are not less likely to use the smart boards.

In Turkey, as part of an educational project called FATİH, classrooms of many schools have been equipped with smart boards to integrate technology into education [6]. This project aims to encourage teachers to use interactive smart boards to increase the effectiveness of their teaching. In order to increase the rate of teachers' usage of interactive smart boards, the Turkish Ministry of Education is providing in-service trainings during seminar terms held every year [7]. In this regard, it is suggested that if a full awareness can be created in teachers and a subsequent change occurs in their attitudes, the interactive smart boards will begin to be used as commonly as conventional boards. Therefore, it is important to encourage pre-service teachers to integrate interactive smart boards in their lessons when they first begin their teaching careers. When reviewing the curricula of faculties of education in Turkey, it was seen that there are not any courses that teach how to use the smart boards [8]. In our study, to encourage our colleagues to use interactive smart boards more effectively, material was developed that would highlight the many benefits smart boards offer.

## **Method**

In terms of our selected scientific research methods, we preferred to use a Type 2 design and development method (DDR). DDR can be described as the systematic study of design, development, and evaluation process [9]. There are two types of DDR research models. Type 1, also called product and tool research, pertains primarily to studies of the design and development of products and tools. This type of research has a tendency to combine the task of doing design and development and studying the processes. These researches often document a particular design and development process. On the other hand, the Type 2, or model research, pertains to studies of the development, validation, and use of design and development models. Model research (Type 2) may focus the validity or effectiveness of an existing or newly constructed development model, process, or technique. These studies often seek to identify and describe the conditions that facilitate successful design and development [10]. Richey and Klein [11] state that DDR researches are generally reported as phases of the ADDIE model which is considered as the core instructional design model. The name "ADDIE" stands for Analysis, Design, Development, Implementation, and Evaluation, which are the five phases suggested by this instructional design model to create effective teaching tools [12]. In our study, apart from the ADDIE model, the design stage of the material also benefitted from the multimedia design principles [13] and the instructional events suggested by Gagné [12].

In this section, the development stage of the material that was conducted by following the phases of analysis, design, development, implementation, and evaluation (ADDIE) will be presented.

## **Analysis**

During the analysis phase, specifications and preferences of the target group were examined. The target group was defined as undergraduate students who were born in a year between 1980

and 2000 -Generation Y- [14]. In the literature, this generation is described as young individuals, for which two thirds were introduced to a computer before the age of five; who have fast information access devices; who get quickly bored; and who spend about 15 hours of their day using media and communication technologies [15]. Based on knowing their attributes, to be able to reach out this group more directly and gain their attention, we decided to create a computer and Internet based material. Considering also that this group gets quickly bored and can access information very fast, it was important that the material should not take a long time to finish, be captivating so will not bore the teacher candidates, and be comprised of short instructions. Keeping all these aspects in mind, we decided to design the material as an online multimedia video that can be accessed from anywhere over the Internet with a computer or any smart device.

### Design

During this phase, the content of the instructional material was designed. The content to be transferred into the material was first written and saved in a word processor file, then the texts and instructions used in the material were extracted from this file. In particular, the contents suggested on the web site of *EBA* (Educational Informatics Network) – a sub-project of FATİH project which comprises reliable online resources- were used for creating this file [16]. For this, a sample of instructional software programs created for various courses and suggested on the *EBA* website, were examined and subsequently referred to in the developed material (Figure 1).



**Figure 1.** A Screenshot from the Geography Lesson

The examples were chosen from different science fields so that it can be shown that smart boards are technological devices can be used in the instruction of all courses.

To increase the impact of the designed material, personalization and signaling principles were primarily taken into consideration; a concept drawn from Mayer's principles for designing multimedia learning tools. During the design of the material, the instructional events outlined by Gagné [17] were also considered, and the screens were designed in accordance with the events of gaining attention (reception) and informing learners of the objective (expectancy).

After the basic layout and content of the material to be developed were defined, the search for a suitable software program was conducted. Meanwhile, available e-learning tools were examined and the PowToon, the 19<sup>th</sup> most popular online e-learning tool in 2015 [18], was finally selected as the content development tool with which the screenplay of the content was produced.

Since the interface of PowToon is similar to that of PowerPoint, it offers a familiar development screen for the users. With its wide selection of animated characters, objects, backgrounds, and sounds and video addition, it has all the tools and objects needed for the planned video material to be produced. As it also offers some of its content creation facilities for free, it is an ideal tool for teachers to produce their own materials.

### Development

The personalization principle from Mayer's principles for designing multimedia learning tools [12] suggests that close friendly relationships between the teacher and the learner and using words in conversational style rather than formal style, help people learn better. For this reason, it

was decided that an informal conversational language should be used in the produced material. Since the material was going to be watched individually by the teachers, it was thought that establishing a friendlier link with the user could help them to receive the conveyed message in a much more open manner. With this, the aim was to increase the effect of the material and make the learning more permanent.

The second principle of Mayer that was used in the production of the material was the signaling principle. According to this principle, when the key words and pictures that are crucial for the instructional subject are emphasized, the learning process becomes more permanent [12]. For this reason, in the content of the material, some cues have been used, some words have been emphasized, and appearing-disappearing effects and different colors were used to grab the attention of the user. In Figure 2, the introductory screen is shown.



**Figure 2.** The Introductory Screen

The development phase also benefitted from the instructional events outlined by Gagné. The gaining attention event is described as ensuring the learners concentrate on the content of the material by applying special methods to draw their attention to the subject point. In the developed material, in order to gain the teacher candidates' attention, a page asking a question was designed as shown in Figure 3.



**Figure 3.** A Sample Screen Shot

This question was expected to stimulate the teachers' abilities to retrieve the information in their mind and become cognitively ready to proceed to other pages. Cognitive preparedness is described as the readiness of the neural system of a learner to receive and process information [19].

Another event we used during the development phase was informing learners of the objective. In line with this event, a screen that provided fundamental information for the teachers was produced in the first part of the material (Figure 4).



**Figure 4.** Information Screen

In the last stage, the aim was to produce a material with an appearance that is pleasing to the eye and reflect visual integrity. For this, a color wheel was examined and a color set was formed from the complementary colors on the disk [20]. All of the screens were designed by staying consistent to the colors on the color set. Moreover, while producing the material, we aimed to stimulate the emotions of the teacher candidates. In order to accomplish this, contents that emphasized the importance of the subject and the teacher candidate were designed and accompanied with background music that was expected to motivate the audience (Figure 5).



**Figure 5.** A Sample Screen for Motivation

### **Implementation**

In DDR research, the developed product must be used in the actual intended context [21]. In this respect, it has been provided that the developed instructional material was used by 39 prospective teachers who were seniors at Balıkesir University's Faculty of Education in the 2014-2015 academic year. After they viewed the material, opinions of the teacher candidates were collected through the distribution of a form on which they could write their thoughts about the material. In order to display consistency with the material itself, the same characters and the conversational language used in the material were also used on the form (Figure 6).



**Figure 6.** The Form Prepared to Collect Opinions from Teacher Candidates

### Evaluation

Throughout the development process, an expert of the field was consulted and necessary adjustments in accordance with his advices were conducted. Moreover, additional suggestions from three academics teaching at the Department of Computer and Instructional Technologies were obtained and applied to the material. The evaluation phase of the ADDIE instructional systems design framework requires evaluating each of the four phases during any stage of the development in order to carry out necessary revisions [11]. Below is the summary of the revisions and updates performed according to the results of observations, which were conducted while the teacher candidates were using the material as well as the feedback provided by the teacher candidates:

- The first suggestion was to insert a real voice into the material. In line with this, the background music was removed and instead, voice explanations for each screen were recorded and inserted into the material.
- The second suggestion was related to the font faces used in the material that do not support the Turkish characters. New font faces were selected and used in the material.
- Another criticism was in reference to the speed of screen flow. Users thought that the screens were proceeding too fast. The durations of each screen were extended to make the screens flow at a slower pace.

### Findings

In the implementation phase, a content analysis was performed on the opinions collected from the teacher candidates. The main aim of the content analysis was to reach concepts and relations that can explain the gathered data [22]. For this purpose, the suggestive statements in the data have been encoded. The relationships between the codes were examined and the suggestions were analyzed under four aspects: message, visual, sound, and overall effect. These themes as defined at the end of the analysis and the codes and frequencies of these themes are given in [Table 1](#).

**Table 1.** Themes and Codes

Message	f	Visual	f	Sound	f	Overall Effect	f
Understandable	9	Beautiful	19	Voice can be added	5	Impressive	12
Friendly	7	Remarkable	12	Sound is compatible with the flow	4	Catchy	9
Texts are long	4	Font face	10	Sound is distracting	3	I wasn't bored	6
		Compatible colors	8			Useful	5

Comments of the participants regarding the content of the material were coded within the “message” theme. It is evident that participants mainly concentrated on “understandability”, “friendliness”, and “length” of the messages. The majority of the participants felt that the messages were clear and understandable.

*The video you prepared is clear and understandable. I think the friendly, conversational manner used in the video leaves a permanent effect on the audience (P18).*

However, participants also felt that the texts shown on the screen were too long. Meanwhile, they found that the content in general was sincere and friendly. These comments indicate that the use of Mayer’s personalization principle has attained its goal.

*I liked the video to be enriched with visual objects, the light colored background and its conversational informal language. It was sincere, clear and understandable (P21).*

The second theme that was defined via content analysis was the “visual” theme under which the participants stated their opinions on the visual aspects of the material that appeared on the screen. It is evident that the participants mainly focused on “beauty”, “remarkability”, “font face”, and “compatibility of colors”. The majority of the participants thought that the design of the material was beautiful and remarkable. This result indicates that Mayer’s signaling principle provided the expected benefits.

*I really liked the video. I really liked the pictures and screen transition effects. The video flows very smoothly (P6).*

Moreover, participants stated that the colors used in the material were pleasantly compatible with each other. This shows that choosing complementary colors has been effective. Meanwhile, many of the participants expressed their dislike of the font face that did not support Turkish characters. The font was changed in a way that satisfied the participants.

*To read the texts could be much more enjoyable if a font that supports Turkish characters would have been used (P34).*

During the content analysis, the opinions and critiques of the participants related to the sound of the material were coded as belonging to the “sound” theme. While some of the teacher candidates thought that the background music was compatible with the flow of the material content, some of them thought that it was distracting. However, the majority of the participants stated that the material should also have a voice presentation. As previously stated in the evaluation section, experts also suggested adding voice recordings to the material. Taking these suggestions into account, the background music was removed and voice recordings explaining the material content shown on the screen were inserted.

*It was a bit difficult to read the texts. Some parts just passed before I managed to read it all. Also, the texts can be voiced over (P14).*

*Texts were a bit long. This is why, if the texts are voiced, it would be more impressive (P33).*

The teacher candidates’ thoughts on the overall impression left by the material were coded under the theme “overall effect”. The majority of participants stated that the material was catchy. They also expressed that they were not bored watching it and found it really useful. Thus, we can conclude that by conducting the design of the material in accordance with the results obtained from the examination of the target group’s personal attributes and specifications of the Generation Y during the examination phase, we were able to create a material that sustained the interest of the participants.

*The video you produced was not boring. It changed my thoughts. It was a useful video for me... (P19).*

### **Conclusion and suggestions**

In conclusion, both participants and experts found the material impressive and relevant to its aim. It is evident that with the developed material, teacher candidates will be more willing to use the interactive smart boards. With this increased awareness, it is expected that prospective teachers will integrate technologies, such as the interactive smart boards, into their classes when they being their teaching career.

The findings obtained at the conclusion of the research show that theoretical information used while developing a material, increases the quality of the material and helps in producing a useful and functional product.

The study was planned as a Design Development Research (DDR) and the product of the research was presented for the use of a group comprised of prospective teachers. The final form of the material was developed in line with the feedback offered by the group.

It is our recommendation that through cooperative work conducted with the Ministry of Education, teachers can be encouraged to use technology, particularly smart boards, in their classrooms.

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