



Akıllı Maket ve Aplikasyon Programından Oluşan Eğitim Setini Kullanan Öğrencilerin Eğitim Seti Hakkındaki Görüşleri

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Öz

Teknolojinin eğitime entegre edilmesi günümüz öğrenci profiline uymakta ve eğitime yeni bir soluk getirmektedir. Tıp ve sağlık eğitiminde teknolojiyi kullanan araştırmaların sayısı artmıştır. Çalışmanın amacı; temel tıp bilimleri eğitiminde kullanılmak üzere tasarlanmış, patentini aldığımız, eğitim setini kullanan öğrencilerden görüşlerini almaktır. Araştırmanın örneklemini oluşturan öğrenciler, Siirt Üniversitesi Sağlık Bilimleri Fakültesi Hemşirelik Bölümü 1. sınıf öğrencileri arasından randomize yöntemle (n=27) seçilmiştir. Araştırma verileri, "Yapılandırılmış Öğrenci Tanıtım Formu" ile "Sağlık Bilimleri Hemşirelik Bölümü Öğrencilerinin Akıllı Maket ve Aplikasyon Programından Oluşan Eğitim Seti Hakkındaki Görüşleri" yarı yapılandırılmış görüşme formları kullanılarak toplandı. Nitel yapıdaki bu çalışmada, elde edilen verilerin değerlendirilmesinde betimsel analiz tekniği kullanıldı. Öğrenci görüşlerine göre; sağlık ve tıp eğitimine teknolojinin entegre edilmesinin; öğrenci motivasyonuna, derse ilgisine ve dersi anlamasına olumlu etkileri olduğu belirlendi. Eğitim setinin de aynı etkilere sahip olduğu fakat geliştirilmesi gereken yönlerinin olduğu tespit edildi. Öğrenci deneyimlerini ve sürekli yenilenen teknolojik uygulamaları göz önünde bulundurarak, patentini aldığımız eğitim setine ait özellikleri iyileştirmenin, sağlık ve tıp eğitimine yeni bir bakış açısı getireceğini düşünmekteyiz.

Anahtar Kelimeler: Patent, Teknoloji Temelli Eğitim, Akıllı Etkileşimli Maketler, Temel Tıp Eğitimi

Student Opinions About the Training Set Consists of Smart Interactive Mockups and Application Program Used in Anatomy and Histology Education

Abstract

Technology integration into education fits today's student profile and brings a new breath to education. The number of studies using technology in medicine and health education has increased. The study aims to get the opinions of students who use the education set we have patented, designed to be used in primary medical sciences education. The students forming the sample of the study were selected from among the first-year students studying at the Nursing Department of the Faculty of Health Sciences of Siirt University by using a randomized method (n=27). The research data were collected using the semi-structured interview forms of the "Structured Student Introduction Form" and "The Opinions of the Health Sciences Nursing Department Students on the Training Set Consists of Smart Interactive Mockup and Application Program." This qualitative study used descriptive analysis to evaluate the data obtained. Student opinions determined that there were positive effects on student motivation, interest in the lesson, and understanding of the lesson by integrating technology into health and medical education. It was determined that the education set had the same effects but had aspects that needed improvement. Considering student experiences and constantly renewed technological applications, we think that improving the features of the education set we have patented will bring a new perspective to health and medical education.

Keywords: Patent, Technology-Based Education, Smart Interactive Mockups, Basic Medical Education

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1. Introduction

Information in the field of medicine and health is changing very quickly. It is essential to correctly convey reliable scientific research and these rapid changes to students (Çakmakkaya, 2021). In order to competent individuals in the fields of medicine and health, it is recommended to develop interactive education methods and systems that integrate basic education and clinical education (Hatala & Guyat, 2002). To meet these expectations in medicine and health education, developing new educational materials such as the education set (Taş & Bolatlı, 2022), which consists of smart interactive mockups and application programs may be beneficial.

Anatomy is one of the branches of science that forms the basis of medical education. It contains many details that need to be memorized and is a difficult science to understand (Mansouri et al., 2020). Difficulties encountered during anatomy education increase the need for alternative education tools that will increase the permanence of the course. At this point, technological applications that emerged with the understanding of 'learning everywhere' are becoming increasingly common in anatomy education (Trelease, 2020). Today, technological methods such as augmented reality (Fajrianti, 2022), virtual reality (Zhao, 2020), and mixed reality are successfully applied, but high costs prevent these applications from reaching large masses (Stirling & Moro, 2020). In addition to these applications, developing smart interactive mockups and mobile application programs integrated with these devices allows for obtaining the technological products required in education at a lower cost (Taş & Bolatlı, 2022). In response to this information, existing technological approaches must be further developed regarding education quality.

Histology is the branch of science that examines tissues under a microscope, also called microanatomy. Although it is not generally found interesting by students, it has a very important place in understanding the pathogenesis of diseases (Garcia et al., 2019). Traditional histology education relies heavily on light microscopes and limited slide views, often making it difficult for students to study collectively at the same time. Today, technology-supported applications that will facilitate histology education and also provide student-centered learning are applied as a complement to traditional education (Sharmin et al., 2021). Virtual laboratories (Lee et al., 2018), e-learning (Joaquim et al., 2022), digital images (Francis et al., 2022), and various animations and videos are among the alternative education strategies that have emerged in recent years with the developing technology (Campos-Sánchez, 2014). There is a need to develop applications that integrate such innovative approaches in education with traditional methods.

A technological education set (Taş & Bolatlı, 2022), consisting of smart interactive mockups and an application (mobile application) program, which allows learning branches of science such as anatomy and histology at the same time with a multidisciplinary approach, can provide solutions to the difficulties and needs in health and medical education. Our study aims to receive feedback from students regarding the applications of this education set (Taş & Bolatlı, 2022), which we have patented (Taş & Bolatlı, 2021) and which we have started to use in health education and to develop the education set in the direction of these feedbacks.

2. Material and Method

The study was carried out with the approval of Siirt University Ethics Committee, dated 09.08.2022, numbered 3121. A Research Permission Form was obtained from the institution where the study would be conducted, and the students filled out the Informed Consent Form.

2.1. Population and Sample of the Research

The research population was created by students studying at Siirt University, Faculty of Health Sciences, Department of Nursing between October 4, 2021 - June 10, 2022, and taking anatomy and histology courses during this period. Power analysis (NCSS-PASS Statistical package) was performed to determine the number of students who will constitute the research sample. This analysis concluded that the sample size should be at least 20 to conduct a study with $P \leq 0.1$ levels. Students in the sample group were determined by randomization by a researcher outside the study in terms of transparency. Accordingly, the purpose of the research was explained and a total of 27 students, who met the sampling criteria of the study, and were permitted to participate in the research after being informed, formed the sample of the research

2.2. Data Collection Tools

In the research, a training set consisting of a smart interactive mockup and application (mobile application) program was developed to integrate and implement anatomy and histology courses. All of the individuals participating in the study (n:27) were composed of students using this education set. The research data were collected using the semi-structured interview forms "Structured Student Introduction Form" and "The Opinions of the Health Sciences Nursing Department Students on the Training Set Consisting of the Smart Interactive Mockup and Application Program."

In the structured student introduction form, three questions were formed, including data on the students' sociodemographic characteristics, such as age and gender, and educational status. Regarding the reliability of the answers, the students were not asked about their personal information, such as name, surname, and number.

The questionnaire, in which the views of the health sciences nursing department students about the training set consisting of the smart mockup and application program were asked, was formed in the form of four open-ended questions in total. With the prepared questionnaire, students were asked for their opinions on using smart and digital technologies and mobile applications for teaching purposes in health sciences education. In addition, the students' experiences regarding the hardware and software (mobile learning) parts of the education set that we have patented and their opinions on how these features can be improved further were received.

2.3. Training Set Consisting of Smart Interactive Mockup and Application Program

The education set consists of two parts, software, and hardware. The hardware part shows the tissue or organ (e.g., stomach, heart, or kidney) models being studied with light and audio explanations. The software part has a QR code extension on the tissue or organ models studied. When the participant reads the QR code with the smart device in his hand, he can easily access all up-to-date information (documents, videos, simulations, etc.).

The hardware part of the invention has a mechanism that can give anatomical and histological formations at the same time. For this, a smart interactive mockup of the stomach was used in the study. One-half of the stomach mockup, which is attached with a hinge and can be opened and closed in two, shows the anatomical formations on the stomach. In contrast, the other half shows the histological formations in the stomach (Figure 1). There are touch and light sensors on the embossed surfaces corresponding to each formation. When students touch these sensors, the light turns on in the formation area corresponding to that sensor, and simultaneously, audible descriptive information about the formation can be reached through the speaker. Thus, the students reached the macroscopic and microscopic formations related to the three-dimensional stomach mockup they were working on simultaneously and comparatively. They experienced the anatomy and histology course in an integrated manner without using any other source. At the end of the experiment, the student's impressions of the hardware part of the education set were obtained through a questionnaire.



Figure 1. a. Interior view of the mockup b. Exterior view of the mockup c. View of the mockup with light

To access the software part of the education set, which consists of a smart model of the stomach, there is a QR code on the mockup. The students participating in the study read the QR code on the stomach mockup with their smart devices. Thus, they gained access to the mobile application program, which contains anatomical and histological information about the stomach (Figure 2). They gained experience by accessing this application's theoretical and practical information. At the end of the experiment, the student's impressions of the software part of the training set were obtained through a questionnaire.



Figure 2. Mobile app home page

2.4. Data Collection Process

For the study, the sample was determined (n:27), and then the students participating in the study were asked to fill in the Informed Consent Form. The students forming the sample of the study were selected from among the first-year students studying at the Nursing Department of the Faculty of Health Sciences of Siirt University by using a randomized method. The selected students gathered in the Faculty of Health Sciences classroom, and after the necessary explanations about the study were made, the Structured Student Introduction Form was applied. After this application, the students were given the necessary information about a smart mockup and software program training set, and they were allowed to experience this education set (in small groups) (Figure 3). At the end of this experience, a questionnaire was applied, which included the opinions of the students in the study about the training set consisting of a smart mockup and application program.



Figure 3. Students experience the model

2.5. Data analysis

This qualitative study used descriptive analysis to evaluate the obtained data. In the descriptive analysis, themes are determined within the scope of the research questions. Then, the data are summarized, interpreted, and evaluated in line with the themes. In the descriptive analysis, it is important to show and describe the data as they are (Sönmez & Alacapınar, 2014). Within the scope of the study, the data consisting of four open-ended questions were analyzed.

3. Results and Discussion

3.1. Result

Sixteen (59.3%) of the 27 students participating in the study were female, and 11 (40.7%) were male (Table 1). The average age of the students is 19.1. The students were predominantly Anatolian high school graduates, and students who graduated from other high schools (e.g., super high school, vocational high school, etc.) are also included in the study.

Table 1. Gender distribution of the students who participated in the study

Gender	n	%
Female	16	59.3
Male	11	40.7
Total	27	100

The descriptive analysis results of the data collected from the students through the questionnaire form are given below in order.

1. What are your opinions on the use of smart and digital technologies for teaching purposes in health sciences education?

Two main themes were identified when the answers to this question were examined. It was observed that the first main theme had four sub-themes, and the second main theme had two sub-themes (Table 2).

Table 2. Theme and sub-themes regarding the question "What are your views on using smart and digital technologies for teaching purposes in health sciences education?"

Themes	Sub-themes
1. Positive opinions regarding learning	a. Compliance with today's education system b. Increasing the desire to learn c. Being excited d. Providing opportunities for distance education
2. Concerns regarding to implementation	a. Having the necessary equipment to use the technology b. The education venue can fully allow for this training.

The opinions of the students about the sub-themes belonging to the main themes are as follows.

1. a "As a generation, we are very prone to use technology. For this reason, the education system can keep up with the times."
1. b "Different educational materials increase my interest in the lesson."
1. c "It would be very interesting as opposed to a monotonous education."
- 1.d "If it allows distant education, it will be very comfortable for us."
2. a "In order to receive technological education, the student should not be required to have various technological products (except for the phone). Otherwise, there will be inequality in education."
2. b "I think universities must provide the infrastructure to provide technological education."
2. What are your experiences with this developed education set? What are your suggestions for improvement?

Two main themes were identified when the answers to this question were examined. It was observed that the first main theme had five sub-themes, and the second main theme had five sub-themes (Table 3).

Table 3. Theme and sub-themes regarding the question of "What are your experiences with this developed education set? What are your suggestions for improvement?" theme and sub-themes

Themes	Sub-themes
<i>1. Positive opinions</i>	a. Increasing interest in the lesson b. Affecting the lesson in a positive way c. Increasing the permanence of information d. Access to information at any time of the day e. The number of repetitions
<i>2. Developable aspects of the model</i>	a. Improving sound quality b. Making its size more useful c. Adding other basic medical courses d. More comprehensive coloring and lighting e. Adding a screen

1. "The fact that the model is supported by technology makes the lesson more interesting than changed as the classic. For this reason, my interest in the course increased."

1. b "I learned the lesson in a shorter time. It had a positive effect on my understanding."

1. c "The fact that the model has sound, light, and three dimensions make the lesson practical. For this reason, the information stays in my memory for longer."

1.d "Accessing information anytime, anywhere is very important for a student."

1. e "Normally, when working in the laboratory, we have difficulty finding formations from the atlas. But it was very useful to reach the information as soon as we touched it on the mockup and to be able to repeat it as much as we wanted."

2. a "The sound was muffled and low."

2. b "The size is a bit useless. It can be worked on more easily if it is a little small."

2. c "It was very helpful to learn anatomy and histology simultaneously. It would be great if physiology were included in the same set."

2.d "It would be very good, especially for histology, if the model had coloration. Lighting could be more comprehensive."

2. e "Adding a screen to the mockup and having the information we hear written on the screen would be productive for learning."

3. What are your opinions on using mobile applications for teaching purposes in health sciences education?

One main theme was identified when the answers to this question were examined. It was observed that the main theme had three sub-themes (Table 4).

Table 4. Theme and sub-themes regarding the question "What are your opinions on using mobile applications for teaching purposes in health sciences education?"

Theme	Sub-themes
1. Positive opinions	a. Possibility of repeat b. Easy access to mobile devices c. Can be carried anywhere

1.a "It would be very useful to have the repetitions of the lectures we listened to. It is a great advantage to listen to it again and again when we miss the lesson or in the problem of distraction adaptation."

1.b "Mobile devices are devices everyone owns and uses frequently. I think it is very beneficial to be included in the education."

1.c "Because it is a device that can be carried anywhere, it allows spending free time."

4. What are your experiences with the developed education set's software part (mobile learning system)? What are your suggestions for improvement?

Two main themes were identified when the answers to this question were examined. It was observed that the first main theme had five sub-themes, and the second main theme had five sub-themes (Table 5).

Table 5. Theme and sub-themes regarding the question "What are your experiences with the developed education set's software part (mobile learning system)? What are your suggestions for improvement?"

Themes	Sub-themes
1. Positive opinions	a. Practical and convenient b. Increasing the interest and understanding of lesson c. The possibility of continuous repetition reduces stress d. Effectively designed e. It will increase success in academic courses.
2. Developable aspects of the model	a. More visuals should be used b. Having a three-dimensional image of the models c. Video times and quality d. Shapes and colors used e. Speed during loading and use

1.a "As it is practical to use, it saves time. It accelerates learning."

1.b "Because it is not a teaching method we routinely use, it increased my interest in the lesson."

1.c "After the lessons, I increased the number of repetitions thanks to the mobile application. I understood the lesson better."

1.d "Well thought out, simple and effective design"

1.e "Because it is on our phones, we have the chance to use it constantly. This increases our academic success."

2.a "More use of visuals in the mobile application makes the lesson easier to understand."

2.b "It would be better if the images were close to reality, for example, three-dimensional."

2.c "Videos could have a shorter duration, better picture, and sound quality."

2.d "Some colors have a positive effect on understanding. The application may be dominated by these colors."

2.e "The application could be faster when loading and using the app."

3.2. Discussion

In our study, we questioned the students' approach to smart and digital technologies and mobile applications in education; students had many positive opinions on integrating technology into classical education. We also stated that our education set, which has these technological features, makes the lesson more understandable and exciting, and we also received feedback on its development.

Introductory medical science courses such as anatomy and histology are essential in health science education. Today, smart and digital technologies are used in the education of these courses (Taş & Bolatlı, 2022). Today, when the Covid-19 pandemic is experienced,

it has been better understood that technological applications are necessary for education and training, as in many other fields (Nguyen & Kieuthi, 2020). In particular, the application areas of smart and digital technology-based applications in anatomy and histology courses are becoming increasingly common. Most of the students found the use of technology in education positive, and they stated that it increased their interest in the course and its permanence of the course. However, they stated that for the widespread use of technology, the infrastructure should be sufficient, and the necessary equipment should be provided to them. It is known that technological educational materials used in anatomy and histology courses increase pleasure in students and increase motivation (Donkin & Rasmussen, 2021). In general, we think that integrating technology into medical education would be beneficial.

In our study, in which we questioned students' perspectives on smart and digital technologies in health sciences education, we obtained results similar to the literature (Patra et al., 2022; Felszeghy et al., 2017). At this point, the students stated that innovative practices should be given more place in health sciences education. In addition, they stated that these applications would increase their motivation and interest, facilitate their comprehension skills, and provide faster and more permanent learning. They also stated that it would be more efficient to integrate smart and digital technologies to be used in education by integrating them with classical methods. In a study in which the education set application containing smart and digital technology was integrated with classical methods, the anatomy and histology course performance of the students was higher than the classical methods (Taş & Bolatlı, 2022) supports this approach of the students. Therefore, in the face of changing expectations of students and conditions affecting all areas of life, such as Covid-19, we think it is essential to develop materials that include smart and digital technologies in education.

In another study about the education set that includes smart and digital technologies, we found that the education set increased student achievement (Taş & Bolatlı, 2022). Although this education set application is successful, it needs to be further developed to increase the quality of education. In this study, we received feedback from students regarding the development of hardware and software aspects of our education set, which had previously contributed to academic success. The positive evaluations of the students on this subject stated that the simultaneous anatomy and histology lessons were beneficial. The invention made a significant contribution to visual memory. Being tangible facilitated understanding, and they could think in three dimensions. They also stated that such education sets should not be limited to anatomy and histology but should be designed for other branches. The aspects that students want to be developed about the invention are; improving the sound quality, giving the formations on the mockup in written form, and changing the lighting, coloring, and size of the invention. In addition, when the students touched the formations, they stated that the explanatory information they heard about the formation should be more detailed. In light of these evaluations, it can be said that it would be more beneficial to use our education set, which we use in health sciences education after the deficiencies emphasized by the students are eliminated. For example, when touching the touch sensor on the formation, on the one hand listening to the related audio information on the formation, on the other hand, reading the written information on the formation can provide two-way learning.

In health sciences education, giving introductory medical science courses such as anatomy and physiology with mobile applications is becoming increasingly common. In a study in which skeletal system anatomy was given to students via the mobile application, it was shown that this method significantly increased students' test success. Students stated that supporting education with technological applications besides traditional textbooks is more enjoyable, accessible, and effective (Bice et al., 2016). In another study, an application was developed for the oral histology course to be given via mobile application, which was installed on the smart device of the students. Students' experience with this application was taken, and students found such applications more fun, flexible, and easy to learn (Sharmin et al., 2022). In our study, students were asked about their opinions on mobile applications in health education, and students were asked about these applications. They reported that it has advantages such as allowing repetition, reducing stress, being easily accessible at any time, and reinforcing face-to-face lessons. In addition, they stated that such applications provide faster and more effective learning because they have both visual and auditory aspects. Accordingly, we think that integrating the mobile application feature and other smart and digital technologies while designing educational materials in the health field will significantly contribute to the quality of education. In the reviewed articles, it has been shown that mobile learning techniques used for basic medical education in different environments increase success and are more motivating compared to traditional learning methods (Erbek & Bolatlı, 2020).

It has been shown that the education set application, which includes mobile application technology, has positive effects on the academic success of health sciences students (Taş & Bolatlı, 2022). Although it is known that such applications are beneficial, the feedback received from the students shows that the mobile application programs used in education still need to be developed. In this study, the mobile application feature corresponding to the software part of the education set was experienced by the students. Students evaluated this application positively in line with the literature (Bice et al., 2016; Sharmin et al., 2022) and stated that it was helpful to reach it repeatedly, especially outside the faculty. Among the features of the mobile application that need to be developed are; increasing the sound quality, adding it to courses other than anatomy and histology, not having problems such as freezing of the system, and further increasing the knowledge pool in the application. In light of these evaluations, while developing a mobile application for health education, it should be noted that the application prepared is much more satisfying with basic and clinical information in terms of content. In addition, it is extremely important to take technological measures in order to avoid technical problems such as sound, image, and program running without freezing.

Limitations

The study was carried out on students studying at the faculty of health sciences. By adding students from other faculties related to health to the study group, the education set can be experienced with a wider perspective. Secondly, the education set can be evaluated more comprehensively by using smart interactive mockups of tissues or organs other than the stomach. Thirdly, increasing the number of students participating in the study may lead to more innovative ideas.

4. Conclusions and Recommendations

In today's world, where smart and digital technologies have become widespread in all areas of life, inevitably, these technologies will also take their place in the field of health and medicine. Therefore, there is a need for innovative educational materials that will facilitate the education of students. For this purpose, it would be useful to present the education sets to the students and modify them in line with the feedback from the students. In this study, we have demonstrated how the features of the hardware and software (mobile application) parts of the education set that we offer for the use of students can be further improved in line with student expectations. Considering student experiences and constantly renewed technological applications, we think that improving the features of the education set, which we have patented, will bring a new perspective to health and medical education.

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