Software and Hardware Problems That Teachers Experience When Using Smart Board

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Abstract: It is inevitable to use information technologies in education field as in every field. Public and private educational institutions have attempted to equip classes with these technologies. One of these technologies is smart boards. Smart boards are set up in the classrooms of public education institutions within the scope of the FATIH project and your teachers are available. There are advantages and disadvantages to using technology in education. For this reason, the question of what are the problems they face while teachers are using the opportunities offered by these technologies has always been a matter of curiosity. Therefore, the purpose of this research is to reveal the hardware and software problems on the smart board used within the scope of the FATIH project. As a research model, data was collected through a questionnaire by using survey research within the scope of quantitative research method. Considering the results of the research, limited internet connection, loss of time, problem with connection to other devices, inadequate technical support and educational materials have been identified as the main reported problems of some software.

Keywords: Smart Board, Interactive Board, Information Technologies, Smart Board Problems, FATIH Project, Smart Board Software and Hardware Problems

Introduction

With the development of technology, tools such as blackboard, chalk, and plugs used in classrooms have been replaced by more advanced digital technology-based devices. Boards, which are indispensable for classrooms, were also affected by this change and left their place to smart (interactive) boards. A smart board also known as interactive white board takes the whole thing you need in a whiteboard and mixes it with the excitement of a touchscreen to carry a teacher's classes to life. It is an interactive display in the layout of a whiteboard that reacts to person input both without delay or via different devices.

A smart board is a tool used via educators to venture and connect with their content, videos, interactive lessons, presentations, and different digital media. Also recognized as an interactive whiteboard, the floor itself is a contact screen usually with four pens to write on it. Using their software, teachers can create interactive lessons, combine video and other websites into the lesson as properly as manipulate the textual content on the screen.

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Students can write on the board as properly to remedy problems, show evidence of an answer or whatever else the trainer would desire for.

As technological know-how continues to advance, so do the cutting-edge smart boards. When asking, how does a smart board work, most smart boards are comprised of a board that is plugged into electricity and typically a USB cord to plug into a laptop or computer. Then there is normally a projector element that may want to be installed to the ceiling or on an arm related to the smart board. Once the smart board is connected and recognized through the laptop or laptop and the picture is projected upon it, the instructor or the college students can now use the pens or their finger to write on the board, pick out something from a website, underline, spotlight or use something they could do on a touchscreen on the screen. The software program includes the multi-touch technological know-how that lets in up to 4 students to write on the display at the identical time. This allows them to clear up problems, work collectively to reply questions or take notes all together.

An interactive whiteboard, also known as a smartboard, it is an interactive display in the format of a whiteboard that reacts to user input either directly or through other devices. Smart boards can engage college students with the lesson. This can inspire college students to take notes and participate, and it can facilitate lively learning. Smart boards beautify cooperation and collaboration, making the classification fascinating and fun—all the greater reason why smart boards ought to be set up in each classroom. Students will brainstorm extra in team activities, resulting in fantastic problem-solving. Check out how teachers can interact with college students the usage of this technology.

FATIH Project

FATIH (The Movement to Increase Opportunities and Improve Technology) Project in education was launched in 2010 with the purpose of providing equal opportunities in education and improving the technology in schools using information technology.

“Informatics that can support education within the scope of FATIH Project in Education. It is aimed to deliver technology (IT) equipment to all schools, classrooms, teachers and students. In this context, it has been seen that the "Information Technology Classes", which were installed before, fulfill their duties adequately, but the fact that there is only one classroom equipped with IT equipment in our schools cannot fully meet the need. In this context, a need has arisen for every classroom to be equipped with smart boards so that all our teachers in the school can use IT equipment to support their lessons at the same time.” (MEB, 2017). When we look at the FATIH project expansion, it is the practice of using technology correctly by providing various opportunities for students to improve their study areas. FATIH Project, which is designed to provide the best education for each of our students, to reach the highest quality educational content and to provide equal opportunities in education, is the largest and most comprehensive education movement in the world regarding the use of technology in education.

Education Computing Network (EBA) is an online education platform created as a part of the FATIH project. The purpose of the platform is to integrate information technologies into education. EBA offers reliable and accurate e-contents suitable for grade levels and continues to be developed. The smart boards used in the FATIH project was created with the classical white board mounted on the rail system on top of the interactive board next to the classical white board. Smartboard used in FATIH project were described with different names in schools. These are interactive whiteboard, interactive whiteboard, smart board, electronic board or digital whiteboard.

Smart Boards in Education

Smart boards in education have many effects on using technology correctly and facilitating education and training. By using the smart board in their lessons, teachers provide permanent learning in education, make students love the lesson, use a visual interface and also offer various supportive software. The beneficial and harmful effects of educational use purposes have been examined in many studies.

It has been revealed that the effect of smart boards on student achievement and motivation is much more successful than the classical effect (Akar, 2020; Alanoglu & Karabatak, 2021; Bakare, Ariyo, & Ojo, 2021; Emre, Kaya, Özdemir, & Kaya, 2011). The smart board is an educational material that allows students to learn more easily the data appropriate for their age by enabling them to comprehend more easily, and collects the attention, interest and motivation of the students (Sakız, Aksu, Özden, & Şimşek, 2014). Teachers will use a computer, a projector, a special pen, or a finger as a touchscreen, and the smart board, which also acts as a normal board, will facilitate learning in education and offer rich content (Çelen, Çelik, & Seferoğlu, 2011; Gezgin & Mihci, 2020; Kaysi, Yavuz, & Aydemir, 2021; Serdar, Demirel, & Harmandar Demirel, 2022). It is seen that the smart board makes many contributions to education in terms of making the lesson more fun for both the teacher and the student, providing permanent learning, bringing together the factors that increase success, and attracting attention in a shorter time.

It has been revealed that students are more motivated in the lesson where they use the smart board, they come to the lesson prepared, and they participate more in that lesson (Smith, 2000). There are many benefits of the smart board to teachers. Some of these are making the lesson more effective, providing permanent learning to the student, presenting the visual and auditory perception, making the lesson fun by presenting examples from daily life. In the literature, it is similar to this study (Bilici, 2011). Although the smart board has many benefits, there are many hardware problems, internet infrastructure problems, problems due to power cuts, lack of materials, etc. in previous studies in the use of smart boards. There are many problems. It has been revealed that teachers do not experience any problems while using the lesson time, except for the problems caused by technical reasons (Türel, 2012). When we look at the source of technical problems, it is seen that the lack of technical infrastructure, the lack of knowledge and inadequacy of teachers about technology, and the smart board contribute to education by drawing a certain limitation (Türel, 2012). Although smart boards are developing day

by day, some problems regarding software and hardware continue.

These problems cause different problems from smart board to smart board. Because of the high sensitivity of the fixed-mounted smart boards on the wall, the cost is high and the repair costs are costly (Türel, 2012). Teachers are generally able to provide fast and freezing-free operations that they expect from smart boards. If this is not the case, the loss of time experienced until the device freezes and the program crashes as a result of switching on and off, or the loss of time for the processes to return to normal adversely affects the course. In addition, the effect of this situation on students distracts them, breaks their commitment to the lesson and creates a negative effect in the classroom. This leads to a waste of time to refocus the lesson. In another study that supports this, the effect of technical problems on students and teachers causes a decrease in motivation and distraction (Smith, Higgins, Wall, & Miller, 2005).

Teachers also have many problems with software. These include not being able to add animations, file extensions not opening, not providing enough content, etc. are problems. Teachers complain that they lose the air of the lesson in the classroom when they have difficulties and lose time while working on the smart board (eg, loss of time in opening and closing the smart board, freezing problems experienced in the system) (Çetinkaya & Keser, 2013).

Teachers think that with the content on the smart board, the lessons pass quickly, so permanent learning does not occur and the control of the lesson becomes difficult. In the studies carried out, problems arise in connecting smart boards with other devices, the screen resolution is insufficient compared to the size of the board, the storage units do not contain enough storage space, the temporary memory does not provide the desired performance, causing freezing and system failures, and power outages due to infrastructure technical problems observed in studies (Cetinkaya & Keser, 2013).

Method

The purpose of this research is it reveals the hardware and software problems while utilizing interactive board in the class in the scope of the FATIH project. Research questions of the study are as follows:

- What kind of software problems do teachers have with the smart board during the lesson?
- What kind of hardware problems do teachers have with the smart board during the lesson?
- Does the smart board provide sufficient support to teachers in terms of educational materials content?
- What are the most common problems or problems that teachers encounter when using smart boards?

A descriptive research model was conducted. In order to reveal the software and hardware problems experienced by the teachers in the research, it was deemed appropriate to use the survey research, which is included in the Quantitative Research, and a questionnaire was used to collect data in this study so that the data could be obtained from the source objectively. In order to collect the data, the teachers who will participate in

the study were informed about the subject to be researched. It was aimed to reveal the software and hardware problems experienced on the smart board by applying a 28-item Likert-type scale to the teachers as data collection.

A survey and data collection method were used to reveal the software and hardware problems experienced on the smart board. The survey consists of two parts. In the first part, the demographic characteristics of the participating teachers are included. In the second part, Likert type questions about software and hardware problems related to smart board are formed. While creating the survey questions, attention was paid to the findings obtained from the studies carried out in this field, taking into account the problems experienced on the smart board before. After submitting the final form of the questionnaire to experts in this field and the consultant of the study, some items were added and questions were removed and then put into practice. The Likert-type questions in the survey questions consist of 20 items and the grading of the form is "totally disagree (1)", "disagree (2)", "partially agree (3)", "I agree (4)" and "I totally agree (5)".

Results

100 teachers were participated to study 52 male teachers and 42 female teachers from different branches (see Table 1).

Table 1. Participants

Gender	Frequency (f)	Percent (%)
Male	52	52.0
Kadın	48	48.0
Subject		
IT	10	10.0
Turkish	10	10.0
Math	16	16.0
Science	12	12.0
Social Sciences	9	9.0
Music	3	3.0
English	18	18.0
Art	2	2.0
Physical education	3	3.0
Guidance	5	5.0
Religious & Ethics	7	7.0
Technology & Design	5	5.0

When the experience of the teachers is examined, it is seen that there are teachers who have teaching experience between 11-20 years. When we look at the overall research, it is seen that 42.0% are individuals who have been teaching for 10 years or more.

In order to collect the data, the teachers who will participate in the study were informed about the subject to be researched. It was aimed to reveal the software and hardware problems experienced on the smart board applying a 28-item Likert-type scale to the teachers as data collection. When the answers given by the Information Technologies teachers to the questions are examined, the software problems are frequently caused by the restrictions (internet, software, etc.) on the interactive boards that prevent effective use and the materials in the smart board are not suitable for the learning outcomes of my course. It is seen that he mostly gave the answer of "I totally agree" to his questions. According to the results of the survey, due to the fact that they are experienced in this subject, other branch teachers should also be qualified in certain basic trainings.

Table 2. Frequency Table of Problems

Gender	Hardware	Software	Admin
Male	42	45	15
Female	58	55	24

When the Table 2 is examined, it has been determined that men face fewer problems than women. It is seen in the table that women experience the most difficulties in the face of the problems they have experienced. It has been revealed by the data of the vast majority that there are no problems with the smart board support in general with the school administrators.

Table 3. Frequency Table of Problems based on Years of Service

Years of service	Hardware	Software	Admin
11-20	24	16	3
21-30	13	22	8

According to the results of the survey, it has been revealed that experienced teachers have less problems than teachers who have just started their profession. This shows that as the experience of the smart board increases, the probability of intervening against the encountered problems increases (see Table 3).

Table 4. Frequency Table of Age Experience Cross Tabulation

Gender	Hardware	Software	Admin
Male	32	38	35
Female	28	36	39

When the Phi coefficient test is applied, it is seen that the results are close to each other. Men show that they are older than women in hardware problems. Women are more likely to experience hardware problems at the age when they start working. Software problems were revealed as a result of testing, which showed close data for both. It has been revealed that men have problems at an early age compared to women in manager-related problems (see Table 4).

Table 5. t-Test Results comparing Males and Females on Software Problems

Gender	X	SS	t	F
Male	2.41	1.48	0.401	29
Female	2.25	1.41	0.402	27

Independent samples t-test revealed that female teachers experience more software problems than male teachers ($p<0.05$) (see Table 5).

The frequency of survey was examined; it has been revealed that most of the teachers in the verbal department have connection problems with other technological devices. When the frequencies of calibration problems when using the interactive board are examined, it is seen that the values are close to each other. When the problem caused by the poor screen resolution is examined, it is seen that most of the teachers marked the option I totally disagree. This documents that improvements were seen in the smart board phase 2 study. It was seen that the failure to solve the technical service problems in a short time made many teachers aggrieved (f=34) and marked the option I totally agree.

Discussion & Conclusion

In this research, it has been prepared to determine the software and hardware problems experienced in the smart board and to present an improvement report. The data were collected by taking the opinions of the individuals teaching in primary education institutions through questionnaires. In terms of the reliability of the study, it was aimed to reveal the problems that the smart boards were installed and the teachers who used actively used it frequently. The validity of the questionnaire was taken into account by keeping male and female teachers close to the study on different branches at the same time. It is seen that detailed studies on this subject were taken into consideration after the phase 2 distribution process, in response to many problems experienced after the introduction of smart boards into our education and training lives. When we examine the three main headings and sub-questions on the hardware problems on the smart board, software problems on the smart board and the administrator support of the smart board in the questionnaire applied to the teachers, the problems that the teachers have experienced with the smart board have been revealed. In addition to the differences in some problems, when examined in general terms, the problems of teachers working in primary education institutions show a basic unity. The main reason for this seems to be that the problem causes another problem. For example, it was revealed that teachers could not reach sufficient material due to the limited use of the internet. When we look at the problems they have experienced in common, it is seen that the loss of time experienced in opening and closing the smart board, the connection problems of the smart board with other devices, the internet usage problems on the smart board, the lack of sufficient educational material on the smart board, and the delays caused by technical service support. It was obtained from the survey results that the teachers were undecided on some issues. It has been observed that they are undecided about the functionality of the handwriting recognition

feature and the smart board software. The reason for this is understood from the answers given to other items of the problems they have experienced with the smart board, and it has been seen that those who have problems with the hardware have a more positive view of the software problems. When the hardware problems on the smart board are compared with the other studies on this field, it has been seen that some problems continue and there are no improvement studies on this. In some hardware-related problems, different questions were preferred and the technical service units had problems in fulfilling their duties due to small details, so the teachers had to deprive the subject that they were going to cover in their lessons by depriving them of visual and auditory materials. This situation reveals the lack of permanent learning. As hardware, it is seen that the opening and closing time experienced in the phase 1 series smart boards continues with the phase 2 series. This result has also been reached in other studies (Çetinkaya & Keser, 2013; Türel, 2012). It is seen that this problem, which is experienced in other studies examined, continues. One of the other problems experienced is the connection problem with the peripheral units, the developing technology and the poor quality production of the connection point of the input and output units, as well as the unknowingly forcing and tampering with these areas by the teachers, causing some problems.

It has been observed that the software problems experienced in the smart board should decrease gradually, and the needs opened with the developing technology could not be met. Many of their teachers complained about not being able to access sufficient material due to internet restrictions and lack of educational materials. In the studies conducted (Çetinkaya & Keser, 2013; Emre, Kaya, Özdemir & Kaya, 2011; Türel, 2012), data supporting the result were found. It is seen that a situation that creates a problem brings another problem along with it. When the data I obtained with the previous studies are compared, it has been seen that some problems in setting the toolbox and calibration have been eliminated to some extent. In this context, within the scope of the FATIH Project, a study should be carried out to increase the number of common areas that teachers can use instead of internet restrictions and to open useful sites to users. Unlike similar studies, when we examined the teachers' thoughts on preparing materials on the smart board and the problems they experienced, it was determined that the teachers themselves could not prepare the material and only used it as a presentation tool.
It is perceived only as a reflective visual and auditory device, especially for verbal lessons. It has been determined that Information Technologies teachers are more conscious and have less problems in serving the purpose of the interactive whiteboard in this regard. It is seen that the biggest problem of teachers is the internet restrictions that they have problems in finding and preparing materials.

In the survey questions made in order to reflect the opinions of school administrators with the smart board to the teachers, it was seen that the administrators were open to and supported the new technology to a large extent. It has been observed that they tend to help teachers about the subjects they need. These results show that technological developments in schools are better than in the past or that they are warm to new teaching technologies. When examined in general, improvements were seen according to the studies on this subject, where improvements were made according to the phase 1 series of smart boards. The effective use of the smart board helps to solve and reduce the problems if the R&D employees pay attention to the work done on these issues in order to identify the frequently experienced problems and to provide the necessary support.

Recommendations

According to the result of the study the following recommendations can be made to both teachers, administrator and policy makers:

1. Teachers about the smart board should be informed about the actions to be taken in case of simple hardware and software problems.
2. By controlling the smart boards with the remote opening module, efforts should be made to reduce unnecessary time loss and increase the processing capacity of hardware devices.
3. The R&D department dealing with smart board problems should be developed and brought to a structure that will produce solutions in a short time.
4. Internet restrictions should be reviewed and useful sites should be opened.
5. In addition to the user manuals, a simple intervention booklet should be produced against the problems experienced.
6. By increasing the storage capacity inside the smart board, the materials should be sifted through with the annual update.
7. It should be integrated into the smart board software by making applications similar to the EBA system, where teachers can obtain materials.
8. When the teacher tries to open the work he has prepared at home on the smart board, checks should be carried out at regular intervals so that he does not encounter the version and update problems he encounters.
9. The seminars given to the teachers are not one-off, but the innovations of the developing technology should be conveyed and training should be given at regular intervals in order to use them more effectively.
10. A remote intervention team should be established with an online network connection where teachers can get help in case of problems.
11. A solution should be provided in a short time by having technical service personnel in schools only for this purpose.
12. The problems experienced by the schools should be listened to, and improvement efforts should be increased by forming a whole.

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