Teachers' Use of Smart Boards in the Schools: A Review of Graduate Thesis Conducted in Turkey

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Abstract: With the constantly developing technology, the education given in the schools has become far beyond the classical understandings and equipments. Such a transformation has made it compulsory for teachers to have some competencies, to acquire some skills, and to use technology above a certain level. Turkey is aware of the importance of using technology in education and thus equips public schools with state-of-the-art technological tools via a reformist project called FATIH. Within the scope of this project, smart boards were installed in each classroom. Since this integration, teachers have been using these tools and researchers have been investigating their usage. In this study, a literature review was conducted to explore teachers' use of smarts boards in Turkey. The research reviewed this study is limited to graduate theses completed in universities in Turkey and published by YOK thesis center. The relevant studies were accessed by using the keywords such as "smart board", "smart board use and "teacher's use of smart board". The studies found as a result of this scanning were filtered and summarized through the use of 4N1K methodology. As a result, it was concluded that teachers' use of smart boards differed in terms of branches, demographic characteristics, computer usage, status of receiving in-service training, and technological predisposition. In addition, while there were studies on the use of smart boards in different branches, no study has been found on classroom/primary teachers in the literature.

Keywords: Smart board, Teachers' usage, Graduate thesis, Literature review

Introduction

The world is in a rapidly developing process in recent years. Especially in the 21st century, this development has gained a great momentum. The places where children spend most of their time have shifted from streets to schools, and therefore schools are expected to be multi-purpose. Now schools are institutions that prepare our

children for the life. The rapid development of information and communication technologies, the higher expectations of people from life, the problems that humanity has to solve in the new world (sustainable energy, global warming, epidemic diseases, health problems, refugees, etc.) are seen as the reasons that accelerate the change. Change has also removed educational institutions from their traditional definitions. The main goal of the schools is now to raise individuals who have the skills to solve aforementioned problems through education. These skills, called 21st Century skills, include but not limited to reading/language skills, mathematics/science literacy, critical thinking and problem solving, communication and cooperation, creativity and innovation, taking initiative and self-direction, productivity and accountability, and media literacy (Yurt, 2023).

Teachers who can train students with the skills mentioned above are expected to be able to keep up with the times, have a command of technology and use it effectively in their classrooms. According to the teacher standards determined by the International Society for Technology in Education (ISTE), teachers should:

- support student learning and encourage creative and innovative thinking,
- design and develop the learning experiences and assessments required by the digital age, ensuring that students become responsible for their own learning and manage their own learning processes,
- demonstrate competencies appropriate to the digitalizing world, collaborate with students, parents and colleagues in collaboration via digital tools in order for students to be successful and innovative,
- inform about digital citizenship and responsibility on regional and global issues,
- contribute to their professional development through digital tools (ISTE, 2016).

With the constantly developing technology, the education given in schools has become far beyond the classical understanding and completely intertwined with technology. It is impossible to exclude technology, which has entered every stage of life, from education. The continuous improvement and renewal of education and the search for new methods are among the reasons why education cannot be separated from technology. Educational technology can be defined as creating favorable environments for facilitating learning and increasing success. The purposes of educational technology include adapting the training centers to life, increasing the efficiency of the training employees, and regulating and controlling the environmental variables. The understanding of education, which can no longer stay out of technology, has also made it compulsory for teachers to have some competencies, to acquire some skills, to use technology above a certain level even if they are not in their interests.

Turkey is also aware of the importance of using technology in education and therefore has implemented a nationwide reform movement in education called The Project of Increasing Opportunities and Improving Technology (FATIH) since 2010. It was initiated for the effective use of information technology tools in lessons, in a way to appeal to more sense organs in the learning-teaching process, in order to ensure equality of opportunity in education and training and to improve the technology in the schools. It has five main components as: providing schools with hardware and software, developing and managing educational e-content, in-service

training of teachers, conscious, secure, manageable and measurable use of technology, and effective use of technology in curriculum (MEB, 2011). With the FATIH project, schools were equipped with some state-of-the-art vehicles. Of these, smart boards were distributed to the schools. The number of smart boards installed in the schools reached 522,691 according to July 2022 data (MEB, 2011).

The smart board is a technological product that allows us to do everything we can do on any computer, with a giant screen operated only by touching. Until smart boards came out, computers and projectors were educational technologies that were used a lot in education. The use of computer alone made it difficult for the teacher, especially in large and crowded classrooms; projection has reduced this situation, but it has not been a complete solution. The integration of smart boards can reduce the workload of teacher and thus increase the participation and desire of the students towards learning (Demirbilek, 2022; Karaca, 2018).

There are several types of smart boards. The oldest one is those boards with pens. When the screen of the board is touched with the pen, sound waves are emitted from the pen and transmitted to the device. The device detects the location of the sound waves it receives, so it detects the movement. Most of the devices we use today are resistive. This means that when we touch the board, the board detects movement. When we touch the board, an electrical signal is generated. Those with capacitive surfaces have a conductive material inside the screen. It causes the voltage to drop when the screen is touched. The coordinates of the contacted point are calculated by the controller and sent to the computer. These systems allow more than one touch at the same time. This situation makes its use widespread. This technology is also used on the screens of smartphones, tablets and other touch devices. Infrared smart board systems work similar to that of a remote. When we touch the remote, the lamp called the LED at the end of the remote sends an infrared signal, in return, the receiver on the television processes the LED signal and sends it to the system. Infrared smart boards also work this way (Emko Egitim Cozumleri, 2020).

In Turkey, smart boards have started to be distributed to schools in three phases. The first phase covered distribution to high schools, the second phase to junior high schools, and the third phase to primary schools, kindergartens and newly built schools. If we look at the general features of Phase 3 boards, it has an i7 processor, 16 GB Ram, 512 GB SSD hard disk. In addition, the screen has a 65 inch 16:9 LED Panel 1920×1080 Full HD resolution (MEB, 2011).

Method

In this study, a literature review was conducted to explore teachers' use of smarts boards in Turkey. The research reviewed this study is limited to master's and doctoral theses completed in the universities in Turkey and published on the web site of Council of Higher Education (YOK) National Thesis Center. A search was conducted using the search engine on the YOK's web page. The relevant studies were accessed by using the keywords such as "smart board", "smart board use and "teacher's use of smart board". The studies obtained as a

result of the scanning were examined and the full texts of the studies found suitable were read thoroughly. Annotated summaries were created and tabulated through including such information as citation (who conducted the study and when?), problem statement or purpose of the study, methodology (research design, sample, data instruments etc.) and main findings.

Results

As a result of the literature review, a total of 18 relevant studies were found. Of these, one was a doctoral thesis and the remaining 17 were master's theses. The data collection tools used in these studies were distributed as follows: Teachers' Opinion Forms (3 studies), Smart Board Acceptance and Usage Intention Scale (1 study), LCD Panel Interactive Board Attitude Scale (1 study), Attitude Scale towards Smart Boards in Visual Arts Lesson (1 study) and The Self-Efficacy Scale for Using the Interactive Whiteboard (2 studies). As far as the research methodology used is concerned, two studies was conducted using mixed methods, one study was conducted using quantitative methods while the rest of them were conducted using qualitative methods. Regarding the samples of the studies, six of them selected teachers from all branches in a mixed manner and the remaining were distributed as follows: physics teachers (1 study), mathematics teachers (1 study), music teachers (1 study), visual arts teachers (1 study), social studies teachers (3 study), science teachers (2 study), and religion and/or vocational courses teachers (3 study). The studies found in the review were categorized under three main themes: (a) studies examining teachers' opinions and experiences on smart board use, (b) studies examining teachers' attitudes and self-efficacy towards smart board use and (c) studies examining the level of teachers' use of smart boards

Opinions and Experiences on Smart Board Use

Some studies have examined teachers' opinions and experiences regarding the use of smart boards in their classroom teachings. For example, Altincelik (2009) explored the opinions of 132 primary school teachers about the suitability of interactive whiteboards for primary school teaching. Data were collected using a questionnaire form. According to the her findings, participating teachers think that teaching lessons using smart board gives better results in permanence of learning and student motivation than traditional methods, attracts students' attention and enables them to participate more actively in the lesson, but occasionally cause technical problems which cause a waste of time or slow down in-class activities.

Akgun (2014) investigated student attitudes and teachers' views on the use of smart boards in mathematics lessons. He carried out this research with seven teachers and 220 7th grade students who received lessons from teachers who had experience in the use of smart boards for 3 years or more. The research is a survey model study and quantitative data were collected. As a result, teachers believe that the use of smart boards has a positive effect on students, increases interest in mathematics, and makes learning permanent.

Cicek (2014) examined the opinions of teachers working in secondary schools on the effect of using smart boards installed in classrooms within the scope of FATIH project on permanence in teaching and motivation of students with quantitative and qualitative data. She reached the conclusion that teachers use smart board effectively, make learning permanent if technical problems are not experienced, and increase motivation for the lesson. Moreover, teachers think that the use of smart boards saves time, enriches teaching by providing visual and aural features, and provides great convenience for teachers to handle subjects that are difficult and complex for students to understand.

Saruhan (2015) collected the opinions and expectations of music teachers' about smart boards using a questionnaire technique with 218 music teachers working in different types of schools. According to the results, it was observed that the teachers actively used the smart board. Smart board was viewed as successful both in increasing the motivation of students and teachers and in ensuring the permanence of learning with its unique features. Participants reported the inadequacy of the internet infrastructure, the lack of software and the inadequacy of in-service training programs. Considering the opinions of the teachers, it was concluded that the use of smart board could be made more effective by taking the necessary in-service training and eliminating the software and hardware deficiencies.

As a part of his master thesis, Hicyilmaz (2015) examined visual arts teachers' opinions about the use of smart boards in the Visual Arts courses. The research was descriptive in nature and designed by survey methodology. Participants stated that they learned how to use the smart board with the in-service training they received; they were insufficient in the use of smart boards; that the smart board had a positive effect on the academic success of the students; made the student active; provided advantages such as visual learning and increasing the positive attitude of the student towards the Visual Arts course. They also stated that the most common problems they encountered while using the smart board in the Visual Arts lesson were the limited gallery for the Visual Arts lesson, the lack of infrastructure, and the difficulty of accessing the Internet.

Karaca (2018) explored the views of social studies teachers who started using smart boards within the scope of FATIH project. Using a mixed model of research approach, he used a questionnaire technique in the quantitative dimension and a semi-structured interview form in the qualitative dimension. The data analysis indicated that the use of smart boards provided convenience in using visual elements, activated the students and increased their attention, was effective in embodying abstract subjects and saved the use of many teaching materials. In addition to these, it was determined that there were limitations in the use of smart boards such as power cuts, disconnection from the Internet, technical malfunctions and problems encountered in their solution, and the lack of ready-made materials suitable for social studies disciplines.

Attitudes and Self-efficacy towards Smart Board Use

Kaya (2019) examined the technopedagogical education competencies of social studies teachers and their self-efficacy in using smart board and determined the relationship between them. He used a mixed research

methodology and collected data from 101 social studies teachers working in secondary schools. According to the results obtained, it was determined that social studies teachers' self-efficacy levels for the use of smart boards were above the average level; differed significantly according to the information technology education and daily use of the smart board; moderately and positively correlated with technopedagogical education competencies; but did not differ significantly according to gender, age, seniority, and computer use proficiency.

Kurt (2021) inspected teachers' attitudes towards acceptance and use of the smart board. Using a descriptive survey methodology, he collected data from 343 teachers working in primary, secondary and high schools through the use of Smart Board Acceptance and Intention to Use scale. He determined that teachers' intention to accept and use the smart board is at a high level. There was no significant difference in teachers' level of acceptance and intention to use the smart board according to gender, graduation, educational status, type of school they work, marital status, seniority, age and education on smart board. However, significant differences were found according to school level and branch.

Demirel (2019) investigated the relationship between teachers' digital competence levels and their use of smart boards in teaching. His research included 431 teachers working in 50 secondary schools in 16 different provinces and used the Digital Empowerment Scale as a data collection tool in the study. According to the results of the research, it was seen that the digital competence level of the teachers was high and there were positive and significant low-level correlations between digital competence level and the weekly smart board usage time and the positive opinions about smart boards.

Solak (2012) investigated the attitudes of teachers working in primary and secondary education towards the use of smart boards according to the technology acceptance model. The research was descriptive and conducted in the survey model. The study group consisted of 230 teachers selected through simple random sampling method. As a result of the research, it was determined that perceived usefulness, perceived ease of use and subjective norms of teachers for smart boards had a linear effect on their intention to use smart boards.

Citil (2019) determine teachers' anxiety levels about smart boards and their computer self-efficacy perception levels as well as the relationship between them. She applied the Smartboard Anxiety Scale and Computer Self-Efficacy Perception Scale on a sample of 712 high school teachers. Teachers' failure and stress levels in the use of smart boards were found to be low. Furthermore, computer self-efficacy perception level was found to be negatively correlated with different dimensions of smart board anxiety levels.

Usage of Smart Boards

Kizilkaya (2018) used the survey method to determine teachers' use of smart boards in terms of various variables with the sample of 100 social studies teachers working in 50 public and private secondary schools. He concluded that the participant teachers used smart boards at a moderate level on average. In addition, it was observed that the level of use of smart boards did not change significantly according to age, gender, length of

service, and education level.

Soylu (2018) conducted a study to determine the use of the smart board installed in schools within the scope of FATIH Project of science teachers. She used a descriptive survey research design and collected data from 146 teachers who teach 5th, 6th, 7th and 8th grade science lessons in public secondary schools. She found that teachers use the smart board effectively, mostly by connecting to the internet; using it the most in biology-related courses and least in physics-based courses; using it the most for evaluation and supporting the lesson with visuals and animations and least for reading and listening activities. The most common problems faced by teachers when using the smart board were slow Internet connection, broken or frozen touch screen.

Yalci (2019) observed the smart board use skills of religion and vocational high school teachers in his study. He collected the data through semi-structured interview forms with 22 religion and vocational lessons teachers working in primary, secondary and high schools. He concluded that participating teachers were very willing to use smart boards in their lessons, they tried to use modern teaching methods-techniques to make the lesson more attractive, and they strived to enrich the course materials. However, he also revealed that they had some difficulties in terms of technological infrastructure in schools, they did not receive support from other stakeholders of education (student-parent-teacher-school administration) for various reasons and they needed some training on the use of technology.

Tatli (2014) explored the usage of interaction features of smart boards of teachers working in secondary education institutions in terms of a number of variables. He utilized a mixed method approach in his research and the sample for the qualitative part of study included 535 teachers working in schools within the scope of (FATİH) Project pilot implementation schools. As a result, the level of teachers' use of the interaction features of the smart board did not vary across gender, education level and branch whereas significantly differed by professional experience, city, computer ownership, computer experience, internet experience, smart board training, smart board training in their own field, previous use of smart board, duration of board use, frequency of smart board use and recommending smart board use.

Conclusion

This study reported the findings of literature review of graduate thesis conducted in Turkey about teachers' usage of smart boards. The target population and sample of the studies were branch teachers. Hence research focusing on classroom teachers who work in primary/elementary schools was not investigated. There is no thesis in the literature that covers all teachers including both classroom and branch teachers or compare them. The review reveals that there has been no experimental research conducted in the relevant theses.

The studies were grouped in three main categories. The firs category is about the opinions of teachers about smart boards. Generally speaking, teachers believe that unless technical problems are experienced, the use of

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smart boards increases the motivation of students to participate in the lesson and makes learning permanent. They think that the use of smart board can be made more effective by taking the necessary in-service trainings and eliminating the software and hardware deficiencies. It has been observed that there is no difference in the opinions of teachers regarding the use of smart boards by age, gender, length of service, and education level. The second category is about psychological traits related to smart board usage. Some teachers state that they find themselves psychologically inadequate in the use of technology and they are hesitant to use smart board because they do not trust themselves. The high level of digital competence of teachers, the in-service training they receive, and their computer usage history seem to increase their use of smart boards. The third group of studies is related to the usage of smart boards. The findings indicate that the level of smart board use of teachers who can use computers or receive in-service training on the use of smart boards was mostly at the level of writing, watching visuals, and using online materials. The characteristics of teachers such as age, gender, years of service and education level do not affect the level of smart board usage.

The review indicates that in the studies the use of smart boards by teachers is not detailed enough as professional usefulness and superficial observations are made. Since the efficient use of smart boards is really important for the future of the FATIH project, it is important that the situation should be examined from this perspective as well. Almost all studies conducted as a part of master's degree and only one study is germane to doctoral degree. Doctoral students may be encouraged and advised to study this topic in order to support teachers' smart board usage. The smart boards distributed to the schools constitute a whole in terms of Turkey's economy, as they are expensive tools with the latest system features in terms of technology. It is important to continue investigating the use of boards as the inadequate benefit of these high-cost vehicles harm the country.

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