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Full Length Research Paper

Interactive Whiteboard factor in Education: Students' points of view and their problems

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The main purpose of this study is to investigate the students' viewpoints and the problems they face during the use of Interactive Whiteboard (IWB). This research has been applied on 202 students in primary school and high school in Ankara. In this study, the quantitative data were collected through "IWB Survey Questions" (Student Views). To identify any significant differences in terms of gender and duration of using IWB for students' views, t-test and one-way ANOVA were used. No significant differences were found in terms of gender. There is a clear difference between primary school and high school students' views about the use of IWB. During this study it was observed that students generally had a positive attitude towards the use of IWB. Students identified teachers' inefficiency to use IWB, technical problems, insufficiency of e-materials and their wonders about the radiation and eye health as problems.

Key words: Interactive whiteboards (IWBs), FATIH Project, Education technologies, E-Learning.

INTRODUCTION

An interactive whiteboard (IWB) is an interactive display system that is commonly used in educational applications. IWB forms a link between a teaching surface and a digital projector and computer. A large wall-mounted panel is the most commonly used "teaching surface" that allows the user to operate the computer via interacting with the projected image. There has been a considerable increase in the number of IWBs installed in schools in the world. There has been an increasing awareness of the need to understand the match between technology and pedagogy in the development of interactive learning supported by IWBs in schools around the World (Glover et al. 2005). In this context, IWBs have a great potential for learning-instruction process.

IWBs are generally perceived by students and teachers as a positive asset for the classroom learning environment. The researchers indicated that IWB raises not only children's motivation for study but also teacher's teaching efficiency. Classes supported by IWBs had a faster pace and less time was spent during group work (Aydınlı and Elaziz, 2010; Digregorio and Sobel-Lojeski, 2010; Glover et al., 2005; Gregory, 2010; Lee and Boyle, 2004; Marzano and Haystead, 2009; Smith et al. 2006).

IWBs have been initially developed in 1990s for use in the corporate sector; they have been used only within the last several years as educational instructional tools in classrooms. There are three key potential benefits of IWBs that are most frequently discussed in the literature: increases in student engagement, more effective visual representation, and learning through greater classroom interaction (İşman et al., 2011; Morgan, 2008; Smart, 2006, 2010; Winzenried et al., 2010).

Since 1997, the government of United Kingdom has greatly invested in Information and Communications

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Technology (ICT) for education, including interactive whiteboard. The government believes that IWB will raise children's learning efficiency. Australia and America have also introduced IWB into elementary education. Many existing studies showed that IWB can increase interaction between teachers and students as well as students motivation and enjoyment (Beeland, 2001). However, only a few studies on children's viewpoints about IWB are found (Smith et al., 2005). We still lack studies regarding students' points of view about IWB.

Qualitative research and field research confirms that the use of IWBs has a positive effect on student engagement and can have constructive effects on teacher attitudes. The findings of studies which stated that using IWB in lessons has increased students' motivation and class participation during teaching-learning process. In general, the results of studies stated that both students and teachers have generally positive attitudes toward the use of IWBs in learning process and they are both aware of the potential uses of this technology (Aydınlı and Elaziz, 2010; BECTA, 2007, 2010; Erduran and Tataroğlu, 2009; JEI, 2010; PILTI, 2009). The statistical analysis revealed that the more teachers use IWBs, the more they enjoy this technology. It was also found that as the number of hours of IWB exposure increases, students' awareness of the distinctiveness of IWB technology increases. The use of IWB as an instructional tool has a beneficial effect on student engagement in classroom lessons and led to improved student behavior. Teachers and students believe that IWB had a high impact on revitalizing the classroom (Yanez and Coyle, 2011; Manny-Ikan et al., 2011; Xu and Moloney, 2011). IWB has been welcomed enthusiastically by a large number of primary school teachers and its take-up in schools has proceeded with unprecedented rapidity. Pupils are universally enthusiastic about the interactive whiteboards, because of their clear visibility ("We can see!"), the easy access to ICT through touch they enjoy, and the added variety they bring to lessons. Students and teachers strongly preferred to use interactive whiteboards in the classroom. Using an IWB led to a faster pace of instruction. Using IWBs led to increased student engagement, primarily because of the visual aspects of the interactive whiteboards. IWB manufacturers have documented the positive themes of student engagement, motivation, and appeal to students with different learning styles (European Schoolnet, 2006; Marzano and Haystead, 2009; Winzenried et al., 2010).

New technologies in teaching have never been greater and with the recent addition of IWBs, teachers are able to integrate this tool into their lessons. IWB is not only an innovative tool which meets the requirements of cognitive and learning styles, but also different types of intelligence in a group class. This recent technology has inspired many teachers to further their expertise in teaching and facilitate learning (Campregher, 2010). Bearing in mind the increase of IWB technology investments, there is a strong need for the evaluation and thus, improvement of actual IWB use in schools (Zittle, 2004). Although the newness of the technology was initially welcomed by pupils any boost in motivation seems short-lived. Statistical analysis showed no impact on pupil performance in the first year in which departments were fully equipped. IWBs are mainly being used: as a data projector which can navigate to multiple Screens. Pupils were far more cautious about the impact of IWBs on behavior. Some were reluctant to go out to the front of the class to use the board (European Schoolnet, 2006; Marzano and Haystead, 2009).

In the studies, children also showed technical problems and lack of skill in using IWB. Students also highlighted, however, technical problems, teacher and students' information and communication technology skills and students' lack of access to the technology as negative aspects. The findings suggest that IWBs appear to be having some impact on the discourse moves used in whole class teaching, but this impact is not as extensive as that claimed by the advocates of IWBs. Lessons during which IWBs are used had a faster pace and less time was spent on group work. Student engagement behaviors increased significantly when IWB was used for instructional purposes. IWBs play a vital role in stimulating student interactivity in classroom instruction (Smith et al., 2006; Smith et al., 2005). There are many researches which showed that IWB can raise teaching efficiency. Children are motivated in lessons with IWB and the motivation can raise the interest of children in study (Lan and Hsiao, 2011; Smith et al., 2006). Turkey has started a project, Movement of Enhancing Opportunities and Improving Technology, abbreviated as FATIH, to develop and disseminate IWB and tablet PC use, in particular, in secondary schools. In the classrooms of the schools which are within the scope of the FATIH project, there are IWB (white board and IWB combined), internet connection, and tablets computers and document cams for each student and teacher. Teachers may use both IWB and white board. In addition, tablet computers used by the students and teachers are connected to IWB. Photos of these classrooms can be seen in Figure 1. (MEB, 2012). In order to achieve successful results through such projects, it is essential to examine the existing problems and shortcomings of using IWB and tablet PCs in classroom.

Introducing IWB into teaching is not only a current trend but also a major policy of education. Many studies indicated that IWB can increase the interaction between teachers and students as well as students' motivation and enjoyment from teachers' viewpoints. However, a study to understand and describe the opinion from children's view is hardly found (Lan and Hsiao, 2011).

The main goal of this study is to evaluate both students' perceptions and their use of IWBs. Because of the increasing usage of IWB, it is necessary to study

Figure 1. FATIH Project Classrooms with IWB.

Figure 2. Teaching Environment in the Classroom with IWB.

children's viewpoints on IWB.

Research objective

The main purpose of this study was to investigate the students' viewpoints and the problems they face during the use of IWB.

Research questions

This study aims to answer the following questions;

What are the most commonly used features of IWBs by the students?

Is there a difference between the male students' viewpoints and female students' viewpoints about use of IWBs?

Does duration of using IWB change the students' viewpoints about using IWBs?

Are there any differences between the primary grade students' viewpoints and high grade students' viewpoints about using IWBs?

METHOD

Investigation method of this study was survey method.

Study group

Study group was comprised of a primary school and a high school in Ankara which have been chosen for the initial pilot implementation of FATIH project. In these schools which were equipped within the scope of FATIH project, all students from the four last-grade classrooms of the primary school (8th grade) (Figure 1) and the four first-grade classrooms of the high school were taken as samples. The survey has been applied on one primary school (98 students, 4 classes) and one high school (104 students, 4 classes) classes of which are equipped with IWB.

Research Environment

The classrooms evaluated during the study were specially equipped within the scope of FATIH project. All students and teachers were given tablet computers. Tablet computers and IWBs were connected t Internet. Moreover, in each classroom LCD IWBs were installed and a teaching environment allowing both teachers and students to use IWBs was designed (Figure 2).

A learning-teaching environment, in which both LCD IWB and white board can be used, was designed. There was an interaction between IWB and the tablet computers used by the students.

Instrument and Data Analysis

This research was modeled as a descriptive survey model. Descriptive survey design, which includes quantitative data analyses, was used as a research method in this study. The research hypothesis is to determine whether there were differences about gender, school type and duration of using IWB in the classroom setting or not. In the study, the data were collected through the "Student Interactive White Board Survey Questions" which was developed by Aytaç and Sezgül (2012). The

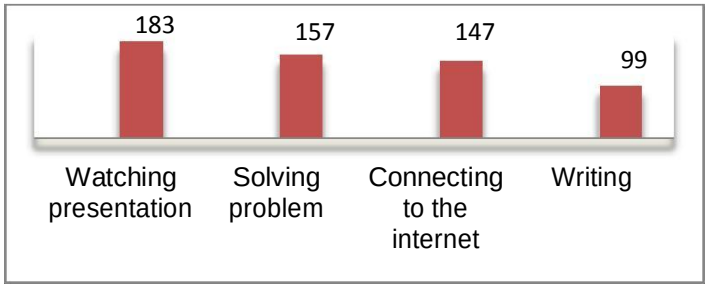

Figure 3. The features of an IWB used by students.

questionnaire consisted of questions about demographics, usage, and students' perceptions related to IWBs. The questionnaire consisted of 19 statements with a Likert-scale response and a ranking exercise of the importance of various aspects related with IWB. In the consequence of the confirmatory factor analysis, 19 items included in the scale were distinctive in nature and they were comprised of a single factor aimed at determining the students' views on IWB.

The questionnaires' cronbach alpha reliability is .82. To identify any significant differences between gender and duration of using IWB, t-test (two groups), one-way ANOVA and Scheffe tests were used. To compare the primary school and high school groups on the viewpoints about interactive whiteboard scale, the quantitative analysis of the collected data was conducted through one-way ANOVA.

Data of the study were collected in 2012-2013 training-education year. Having been given brief information about the study, students were asked to mark their agreement levels about the items included in the scale on the measurement means.

RESULTS

The features of an IWB used by students are given in Figure 3. Watching presentations, Solving problem, Connecting to the internet, Writing.

90% of the students have stated that they use IWB to watch the presentations of their friends/teachers; 86% of them have expressed that they use IWB to solve problems; and finally 73% of them have stated that they use it to connect to Internet. As is seen, students use IWBs most for the purpose of watching the presentations (presentation during courses, films and pictures). Secondarily, it may be observed that they use IWBs during solving problems in math courses and for connection to Internet.

Students' points of view on using IWBs are given in Table 1. According to the results, the majority of the students (% 77,2, =4,18) had a positive attitude and they enjoy in general the having access to IWBs in their classrooms. 57% of the students stated that using IWB in lessons has increased their academic success.

Approximately 2/3 (%58,5 =2,36) of the students expressed that they did not have any problems with using IWBs. 62,9% (=3,76) of the students stated that their teachers encouraged them to use IWBs.

Sensitivity problem of the touch screen, calibration settings and the lack of pen tool were regarded by half of the students (%62,5, =3,72) as an important technical problem/limitation with regard to use of IWBs.

About 2/3 (%60,9, =3,50) of the students wonders about the radiation emitted by IWBs and their eye health. 79,2% (=4,14) of the students reflects the fact that they had an eye pain when they spend a long time looking at IWBs.

More than half of the students consider that the content on IWB is not sufficient. Lack of e-materials was also a highly-noted limitation found during this the study. 72, 7% (=3,92) of the students stated that their teachers presented the content they prepared on their own on IWBs.

While 78,8% (=4,04) of the students reflect that their teachers use IWBs in lessons, approximately 2/3 (=2,36) of them think that they cannot use IWBs efficiently. In addition, 73,7% (=3,85) of the students stated that they cannot follow the lesson since IWBs increases the pace of their teachers during lessons and 63% (=2,62) of them reflected the fact that they cannot establish an eye contact with their teachers.

Approximately 1/3 (=2,71) of the students think that IWBs decrease student-student interaction during classes. Moreover, 55% (=2,59) of the students have the opinion that IWBs have no effect in developing a cooperative learning environment in the classroom.

Table 2 shows the results of T-test conducted to determine the differences between the viewpoints of the students in terms of gender.

There is a difference in student viewpoints between males and females with use of IWB (t (2437)=2,325, p<.05 (Table 2).

Table 3 shows the results of variance analysis conducted to determine the differences between the viewpoints of the students depending on the duration of the use of IWBs.

There is a difference in student's viewpoints between duration of using IWB during one week (F (3-2437)=14,838, p<.01). The results of One way Anova for demonstrating between the duration of IWB using of the students in a week and students viewpoints significant

Table 1. Student Views Feedback on the Use of IWBs.

Opinions about IWB		I totallydisagree	I disagree	I am notsure	I agree	I totallyagree		The level ofparticipation
1. Lessons become more enjoyable and funny when IWB is used in the teaching-learning process.	f	10	12	24	40	116	4.18	Agree
	%	5	5.9	11.9	19.8	57.4		
2. I am having trouble with using IWB.	f	70	48	37	23	24	2.36	Disagree
	%	34,7	23.8	18,3	11,4	11,9		
3. I am concerned about the fact that IWBs emit radiation and is harmful to eye health.	f	18	15	46	57	66	3.50	Agree
	%	8,9	7,4	22,8	28,2	32,7		
4. My teachers usually use IWB in lessons.	f	5	13	25	49	110	4.04	Agree
	%	2,5	6,4	12,4	24,3	54,5		
5. Using IWB increase my interest and engagement towards the course.	f	8	17	29	52	96	3.87	Agree
	%	4,0	8,4	14,4	27,8	47,5		
6. My teacher is lecturing too fast with IWB, I cannot keep up.	f	10	19	24	56	92	3.85	Agree
	%	4,9	9,5	11.9	27,9	45.8		
7. My teacher use IWB in teaching activities; I cannot make eye contact with the teacher.	f	64	38	37	33	30	2.62	I am not
	%	31,7	18,8	18,3	16,3	14,9		sure
8. The contents which are displayed on IWB is sufficient.	f	74	29	31	43	25	2.48	Disagree
	%	36,6	14,4	15,4	21,3	12,4		
9. I learn faster and easier when IWB is used in the classroom.	f	10	11	39	50	92	3.88	Agree
	%	5,0	5,4	19,3	24,8	45,5		
10. My knowledge does not become permanent when IWB used in lessons	f	13	12	37	44	9	3.82	Agree
	%	6.5	5,9	18,3	21,8			
11. My teacher doesn't use IWB effectively in lessons.	f	12	12	42	45	91	3.84	Agree
	%	5,9	5,9	20,8	22,3	45,1		
12. The interaction with my friends is reduced when my teachers use IWB.	f	59	30	36	32	45	2.71	I am not
	%	29,2	14.8	17,8	15,8	22,4		sure
13. Using IWB doesn't increase collaboration and communication with my friends in classroom.	f	27	27	45	44	59	3.38	Agree
	%	13,4	13,4	22,3	21,8	29,2		
14. My teacher usually shows the content which is prepared by himself/herself on IWB	f	9	16	30	54	93	3.92	Agree
	%	4,5	7,9	14,9	26,7	46,0		
15. My teacher encourages us to use IWB.	f	13	21	41	50	77	3.76	Agree
	%	6,5	10,4	20,3	24,8	38,1		
16. Using IWB in teaching-learning process increases my academic performance.	f	20	22	47	41	73	3.46	Agree
	%	9,9	11,1	22,2	20,6	36,5		
17. My eyes are tired after we continually look at the IWB screen.	f	11	11	20	56	104	4.14	Agree
	%	5,4	5,4	9.9	27,7	51,5		
18. My attention disperses in lessons because of the technical problems we have while using IWB (calibration settings, sensitive problem, lack of pen tool etc.).	f	12	25	33	45	82	3.72	Agree
	%	5,9	12,4	16,3	22,3	40,6		
19. Using IWB provides a cooperative learning environment in the classroom.	f	86	25	23	18	50	2.59	Disagree
	%	42,6	12,4	11,4	8,9	24,8		

differences are given Table 3.

According to Scheffe test results, there is a significant difference student's views between using IWB in 11 hours and above group (4. group, =3.82) and the others; 1-2 hours (1.group =3.37), 3-5 hours (2.group, =3.14), 6-10 hours (3. Group, =3.50).

Table 2. The Results of T- Test According to Gender Variables.

Gender	N	Mean	F	SS	dt	T	P
Male	88	3.66	4.175	.89	200	2.325	.04
Female	114	3.74	.82				

Table 3. The Results of One way Anova According to Duration of Using IWB.

Source of Variance	Sum of Squares	Df	Mean Square	F	Sig.	Sig. Diference
Between Groups	32,964	3	10,898	14,838	,000	4-1,2,3 group
Within Groups	1789,89	2437	,734			
Total	1822,58	2440				

Table 4. The Results of T- Test about Students' use of IWB

School Level	**N**	**Mean**	**F**	**S**	**df**	**T**	**P**
Primary School	98	3.12	13.75	.46	200	15,074	.00
High School	104	2.81		.55			

Table 4 shows the results of T-test conducted to determine the differences between the viewpoints of the students in terms of school types.

There is a clear difference in primary school (6-14 age) and high school (15-19 age) students views with teachers' use of IWB (t (2517)=15.074, p <.01). Primary school teachers used IWB during classes more than high school teachers (Table 4).

DISCUSSION

It is stated in the related literature that IWBs are educational tools used not only for different in-class applications but also for enrichment of classroom environment and for a more interactive teaching process. According to the research, use of IWBs stimulates student interest and attention leading to increased motivation and engagement during lessons. Incorporation of technology into classroom instruction not only kindles student attentiveness, satisfies the accommodation of student needs, and utilizes instructional strategies consistent with the current technological tools available, but also complies with state and federal technology mandates (Gregory, 2010; Gillen et al., 2008; Morgan, 2008; Pamuk, et al., 2013; Smith et al., 2005). In addition the use of IWB facilitated teaching-learning process and makes more enjoyable and funny. Most students agreed that using an IWB is motivating, engaging, and enjoyable. This result is in parallel with other studies (Aydınlı and Elaziz, 2010; BECTA, 2007; Smart, 2010; Yanez and Coyle, 2011). The results of this study showed that the use of IWB can enhance the learning process and influence learning styles as well as increase students' motivation. Students think that the use of IWB increases their achievements but some research does not support it very much (Levy, 2002). There is some agreement that IWBs have a positive effect on student motivation. Some caution that that heightened motivation correlated with IWBs may be due to the novelty factor and may decrease over time especially if IWB is overused (Lan and Hsiao, 2011; Schroeder, 2007).

One of the most common findings from this research has been an association between IWB use and improved student motivation and engagement. Similar findings were reported by earlier reviews of the research literature. The most widely claimed advantage of IWBs is that they motivate pupils because lessons are more enjoyable and interesting, resulting in improved attention and behaviour. Pupils report that their lessons are faster-paced, more funny and exciting (Beeland, 2001; Levy, 2002; Marzano and Haystead, 2010; Smith et al., 2006; Smith, et al., 2005). Students must be allowed to use IWBs themselves.

In this study, students usually complain about technical problems, they do not like when IWB does not work properly in the processing courses. From a pedagogic point of view, the technical problems (sensitivity problem, calibration settings and lack of pen) lead to a slowdown in

teaching process, concentration problems and loss of time. The results of this study compromise with the findings of study conducted by Pamuk and et al. (2013) and Yanez and Coyle (2011).

IWB is a technology where engagement of boys and girls was noted equally. In all of the OECD countries, there appear to be differences in boys' and girls' attitudes (engagement, self-attainment and motivation) towards ICT. Boys have a more positive attitude towards computers, less computer anxiety and more computer confidence than girls (İşman, et al., 2012). In this study, no significant differences between the attitudes of male students and female students were found.

In this study, it was found that the sudents' attitudes became more positive as the duration of the use of IWB in classroom extended. This result supported the finding of the study which is stated by Aydınlı and Elaziz (2010) and Yanez and Coyle (2011). The findings of this study indicate that, the students will have a positive attitude toward using IWBs if the teachers use it in an effective way. If teachers lack confidence and ability, perceptions can change, and IWBs can be perceived as just another presentational 'gimmick'. Finally the results indicate the need to change the school culture, classroom pedagogy to support enthusiasm and innovation in teaching and learning (İşman, et al., 2012; Smith, et, al., 2005).

They relate this to the fact that IWBs can be perceived as easy to use, visual, interactive, immediate, and matching the students' digital culture. Lastly, students are aware of a teacher's confidence in using and ability to use an IWB (Slay et al., 2008). In this study, primary school students thought that teachers used IWB as "Internet-based projection device in comparison with secondary school students. This result supported the finding of the study which is stated by Pamuk et al. (2013) and Türel (2012). In this study, primary school and secondary school students' points of view show that their teachers do not use IWB efficiently. These results are in parallel with the findings of Pamuk et al. (2013) and Yanez and Coyle (2011) studies.

In Turkey, teachers recently have begun to use this instructional tool in primary and high schools. Results indicated that teachers experienced a lack of technical skills, pedagogical knowledge, and lack of materials regarding the effective use of IWB (Saltan et al., 2010). Students said that when teacher used IWB more often in class, they became passive. When commenting on IWB problems, students addressed the need for solving both technical problems and problems related with the contents of IWB. The integration of IWBs into classes depends on an established and durable technical infrastructure with all components including computer, projector, and Internet connection. Teachers' lack of technological leadership roles lead to students' negative views about IWBs.

In this study, students said that IWBs appear to enrich the teaching process but they actually weakens the student-student interaction. Students said that when teacher used IWB more often in class, they became passive. The results of the study showed that the use of IWB in a constructivist frame does not provide a positive contribution to student-student communication. However, results indicate that teachers were not able to design a collaborative learning process using IWBs. Most students believed that IWBs provided time efficiency for their instruction. Likewise, researchers suggest that using an IWB reduces the time spent recreating instructional materials and content (Digregorio and Sobel-lojeski, 2010; Gregory, 2010; Pamuk, et al. 2003). Teachers said that when they used IWB more often in class, the students have become passive day by day and also they had difficulties in creating social learning environments (Aytaç and Sezgül, 2012).

Teachers usually use IWBs for presentation in Turkey. The results regarding preferred features of IWBs were in parallel with the results of a previous study conducted by Pamuk, et al. (2003) and Türel (2011) and which examined students' perceptions about IWB use in Turkey.

Studies have shown that collaboration, active participation, and a student-centered approach benefit students' learning needs, particularly with middle education students (Morgan, 2008). Students' engagement behaviors increase significantly when IWB is used for instructional purposes. At the same time, IWB plays a vital role in stimulating student interactivity in classroom instruction.

IWB study (European Schoolnet, 2006) found that interactive whiteboards affect the classroom interaction. There is a faster pace (number of interactions between teachers and students) in the whiteboard lessons compared to the non-whiteboard lessons (Lan and Hsiao, 2011).

The British Educational Communications and Technology Agency (BECTA) report indicates that IWBs enhanced the overall classroom experience (BECTA, 2007, 2010). The results of this study support the BECTA reports findings. When IWBs are used as instructional tools, they increase the level of students' engagement in learning activities. In addition to the observed positive impacts on student engagement, the research shows that using IWBs helps teachers with streamlining their preparation, being more efficient in their Information and Communication Technology (ICT) integration (Beeland, 2001; Levy, 2002; Smith, et al., 2005). According to these results;

a). Teachers should be taught how to use IWB effectively,

b). Teachers should be encouraged to use IWB more and more,

c). It should be ensured that students participate in using IWB with teachers,

IWB should be one of the important alternatives while

implementing new education programs. Additional lesson materials are required. More electronic lesson materials should be developed to cover the whole curriculum and student age range.

During the interviews with the students, they emphasized that one of the important factors for the effective use of IWBs is the teacher, and the effectiveness would certainly depend on how well teachers can use these technologies (Bulut ve Koçoğlu, 2012; Lan and Hsiao, 2011; Pamuk, et al., 2013). The results of this research support that IWBs affect learning in several ways, including raising the level of student engagement in a classroom, motivating students and promoting enthusiasm for learning. The results of this research showed that the main actor is teacher who is using IWBs effectively. The teachers have got a very important role in integrating ICT into their classrooms. IWB is not a magic device, but an exemplary teacher might do magic if they use IWBs in the right way and select the proper teaching methods.

CONCLUSION

In this study, it was observed that students in general have a positive attitude towards IWB. Students were found to be generally eager to use and enthusiastic about IWBs. Encouragement of the students by their teachers can be regarded as a positive attitude. In addition, technical problems faced during the use of IWBs and insufficiency of e-materials was determined to be significant problems related with the use of IWBs. Particularly, materials and contents displayed on IWB were found to be inefficient for meeting the expectations and requirements of the students.

A decrease in the eye-contact between the students and their teachers during IWB use and perception of the students that their teachers cannot use IWBs efficiently suggest a number of negativity in terms of classroom management and in pedagogical respect. Based on the students' views, it can be seen that teachers use IWBs as an 'internet based projector'. Rapid teaching via IWB was observed to have a negative effect on the permanence of the information obtained by the students during courses. Even though the fact that IWB increases the interaction between the students and their teachers and it increases the pace during courses, it can be seen that this communication is rather a one-dimensional one from the teacher towards the student. Within this context, within the scope of FATIH project, there emerges a need to correct the technical and pedagogical shortcomings of the teachers in using IWB.

It is observed that female students have a more positive attitude towards IWB when compared to male students. As the duration of IWB use extends, the attitudes towards IWB become more positive. Students in primary schools think that their teachers use IWB more efficiently when compared to high school students. Primary school students' positive perception about the use of İWB during courses may be influential on this fact.

SUGGESTIONS

IWBs are generally perceived by students as a positive addition to the classroom learning environment. In addition, the research suggests that these effects are related to variables such as teacher training, technological leadership, school culture, technical support, lesson preparation and practice time. Further research needs to be carried out to discover when and how IWB should be used to facilitate more active pupil involvement and achievement.

Within the context of FATIH project, teachers should be encouraged to use Training Information Network more efficiently and the contents (z-book) should be enriched. It would be useful to solve various problems such as problems with filtering, calibration settings, and lack of pen and touchscreen property and to provide technicalsupport to teachers in this respect.

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