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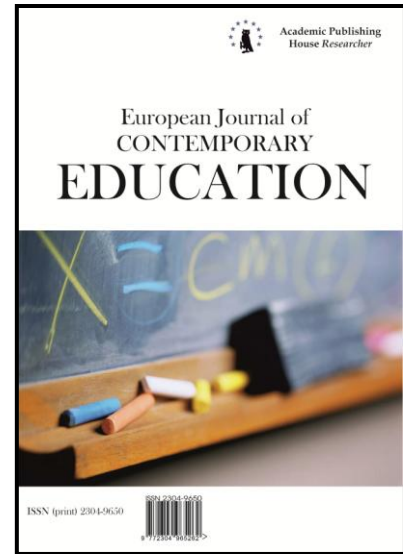
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## Preferences and Attitudes for Using Interactive Whiteboards in Different Courses and Learning

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### Abstract

The purpose of the study is to investigate teachers' and students' considerations, preferences, attitudes and awareness related to using Interactive Whiteboards in 7-12 grades and different courses, and learning. 1013 students from elementary and secondary schools and 65 teachers from different schools were selected to take questionnaire for defining their preferences and awareness for using IWBs in teaching and learning processes. Descriptive statistical analyses were used to investigate whether there were differences between students' and teachers' views based on the survey items. The tests of research questions generated discussion and conclusions were given at the end of the study.

**Keywords:** Interactive Whiteboard (IWB), preferences of teachers' and students', IWB variables, teaching and learning in 7-12 grades and courses.

### Introduction

Computers and new technologies have been used extensively to teach students with different learning and cognitive styles since the beginning of 1970s (Alessi & Trollip, 1991; Gagne', Wager & Rojas 1981; İpek, 1995, 2001, 2010, 2011; Mechling, Gast & Krupa, 2007; Aydin, Dogan & Kınay, 2013). Information and communication technologies have become unavoidable for teachers and students (Sirin and Caglayan, 2013; Ozyurt, 2012). Recent improvements in instructional strategies have led to discussions about the effect of their teaching strategies and tools. These dimensions have been used and discussed as important design factors for message design, screen design and text design in instructional process as well as interface design in high quality instructional software.

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An interactive whiteboard (IWB) is a large interactive display connected to a computer and projector. Using IWBs requires a framework for understanding its characteristics that define users' success and performance in different perspectives (Sözcü & İpek, 2012). All preferences for IWBs are to be integrated with instructional software, e-learning tools and instructional strategies. Awareness of IWBs as an instructional tool to improve teaching and learning process provides new rules and opportunities for using visual literacy and other types of literacy concepts, which can be defined as new literacy, including media, knowledge, readability, computer, and financial, digital literacy (Altun, 2005, İpek, 2007). The contents of literacy should be included and well-defined in programming process to teach and present effectively any content for users of IWBs.

Both students and teachers generally perceive IWBs as positive additions to their classrooms. Research has revealed that IWBs do not only increase students' motivation to study but also help teachers become more efficient in teaching due to time saved during group activities (Glover, Miller, Averis & Door, 2005; Digregorio & Sobel-Lojeski, 2010; Smith, Hardman & Higgins, 2006; Marzano & Haystead, 2009; Aytac, 2012). Use of IWBs can increase the interactive potential between teachers and students along with active student involvement and motivation (Essig, 2011). Thus growing prevalence of interactive learning tools such as the interactive whiteboard requires that the close relationship between technology and pedagogy be understood (Glover; Miller; Averis, & Door, 2005).

Glover and his colleagues (2007) report that the starting point for such fresh outlook on pedagogy is teacher awareness and implementation of interactivity. Integrating technology, pedagogy or instructional approach and learning styles can be defined as instructional variables for using IWBs (Sözcü & İpek, 2012). Teachers also indicate two variables for pedagogical approach including preparation time for lessons and students' individual learning skills (Digregorio & Sobel-Lojeski, 2010; Schuck & Kearney, 2007). In addition, teachers should learn to teach actively, by including a wide range of media and instructional materials such as video, audio-visuals, graphics, animations, text and print materials (Şimşek, 2012).

There are several studies on the use of IWBs for educational purposes. One of the first studies that showed effects of IWB on achievement indicates no significant differences between schools that use IWBs and those that do not (Higgins, Beauchamp, & Miller, (2007). In addition, no difference was found on test scores in mathematics and sciences between IWB and non-IWB classrooms (Schuck & Kearney, 2007), nor did IWBs have an impact on student performance (Higgins et al. 2007). On the other hand, Lewin, Somekh, and Steadman (2008) indicate that positive gains were considered in literacy, mathematics, and science for students aged 7-12. These results were related to lesson time that students had been taught using an IWB. Interactive teaching helps higher achievement; motivation is another variable for learning and achievement. In general, IWBs had a positive effect on motivation (Armstrong et al, 2005; Becher & Lee, 2009; Glover et al. 2007; Hall & Higgins, 2005; Lewin et al. 2008; Schuck & Kearney, 2007; Wall, Higgins, & Smith, 2005; Wood & Asfield, 2008). However there is not enough research considering motivation directly as psychological and pedagogical variables for IWB use (Sözcü & İpek, 2012). On the other hand, it is important to remember that technology can enhance students' achievement if IWBs are used effectively and its materials are well created as well as multimedia learning.

Isman, Abanmy, Hussein, & Al Saadany (2012) found that Saudi teachers at secondary schools held a positive attitude toward using interactive whiteboards in classes. Bruce, McPherson, Sabeti, & Flynn (2011) studied when and how IWBs were used as effective tools in teaching mathematics. The researchers observed that students participated in classes more actively. Dhinsa and Emran (2011) conducted a research study on how a constructivist approach supported by IWB helped decrease gender difference in chemistry classes. Gender difference was found to be increased when organic chemistry was thought through conventional teaching methodology, while it was decreased when a constructivist approach supported by IWB was used. Deaney et. al. (2009) concluded that thinking skills could be developed through IWB technology. The results of Erduran and Tataroğlu's 2009 study on science and math teachers revealed that use of interactive boards had a positive impact on the learning environment, student attention and student participation (Erduran & Tataroğlu, 2009). In an earlier experimental study by Weimer (2001), students' attitudes towards a class project were measured and the results showed that the students in the class with the smart board had greater motivation.

There is still little research into IWB effects on the different work places and areas based on different view of approaches (Baran, 2010; Bennett & Lockyer, 2008). The research topics are different with instructional variables which include using IWBs in geology (Ateş, 2010), integrating IWBs in classrooms (Bennett & Lockyer, 2008; Jewitt, Moss, & Cardini, 2007; Lewin et al. 2008; Shi et al., 2003; Xu & Moloney, 2011), learning collaborative activity (Mercer, Warwick, Kersher & Staarman, 2010), and effecting attitudes and contributions (Adıgüzel, Gürbulak & Sarıçayır, 2011; Baydaş, Esgice, Kalafat & Göktaş, 2011; Digregorio & Sobel-Lojeski, 2010; Ekici, 2008; Kaya & Aydın, 2011; Mathews-Aydinli & Elaziz, 2010; Sherton & Pagett, 2007; Zengin, Kırılmazkaya & Keçeci, 2011). In addition, using IWB and its applications are to be indicated as a vital topic for teaching and learning in classrooms.

This paper identifies different preferences, attitudes and awareness of students and teachers for using IWBs efficiently. Nowadays, teachers teach different courses in their schools which are named as private, public and other type of secondary schools consequently. So the courses are here defined as math, science, social studies, languages and others including art, drawing and music for students. Teachers teach various courses such as sciences, arts and languages at different schools. For this, all variables related to using IWB are considered and discussed in the paper.

## Research

### Purpose of the Study

The purpose of the study is to investigate considerations regarding on preferences, attitudes and awareness of teachers' and students' for using Interactive Whiteboards (IWBs) in 7-12 grades classes for different courses and learning. The aims of our study are to investigate the effects of IWBs on

- Student preferences about and attitudes toward different courses.
- Teacher preferences about and attitudes toward different courses.

## Methods

### Participants:

The research used a descriptive statistics and its analysis approach to explore the basic context, and awareness and preferences of the participants as students and teachers. Sixty-five elementary and secondary school teachers who teach at different grades and 1013 students attending those schools in Istanbul participated in the study.

**Table 1.** IWBs use of students' and teachers' related to different grades and ages

	N	Male	Female	6-14 ages	15-19 ages	Elementary	High
Teachers	65	37	28	-	-	37	28
Students	1013	532	481	504	508	440	573

The demographics information and its variables for teachers and students related to IWB learning variables are used in data analysis and discussion findings. This study deals with different courses and IWB learning variables such as instructional-pedagogical, psychological and technological items related to attitudes and preferences.

### Gathering Data

The paper used two data collection tools, which are described below: a survey for students and a survey for teachers. And its reliability and validity has been considered in high scores as  $r=.80$  and  $r_x=.64$ . In addition to these activities, expert view is used to indicate its validity and reliability as well as pilot work with twenty five students randomly selected from all grades and types of schools.

### Teacher Survey

A questionnaire was administered to 65 teachers at the different levels of classrooms and schools at the end of Spring and Fall semester 2011. The questionnaire consisted of two parts

including general information items for teachers and their experience in using IWBs and 33 statements with Likert-scale response and ranking general attitudes and preferences of teachers' related the IWB. Part one includes the following subjects with fourteen (14) items in details such as time of experiences, types of teaching school, using the IWB, computer literacy, and using characteristics of IWB.

### **Student Survey**

A questionnaire was administrated to a thousand and thirteen (1013) students at the different grades and schools at the end of the fall semester 2011. The questionnaire consisted of two parts including eight (8) general information items for students' opinions of using IWB and 24 statements with Likert-scale response options and ranking preferences of students' reflections related the IWB.

"Student Interactive White Board Survey" developed by Aytaç ve Sezgül (2012) was conducted on 202 students. Because teacher form of the scale didn't have enough sample size to be able to make factor analysis, validity and reliability analyses were made on student form. Validity and reliability analyses were applied on 300 students which was ten times higher than the number of items (24). The performance provided high reliability with questionnaire and indicated enough validity as well.

Firstly, explanatory factor analysis was conducted for all items as a part of principal component analysis. The value of KMO sample adequacy was found as .911 and the approximate chi-square value of Barlett Sphericity test was found as 3067.54 ( $p < .05$ ). It was observed that common variances were above .38 and all the items were gathered under single factor. This single factor with eigenvalue of 8.146 explains 33.942% of total variance. At the same time, break point on the screen plot was examined and it was seen that the scale showed a single-factor structure also on the break point. The factor loads of items under single factor changed between .34 and .79. According to Büyüköztürk (2002), this finding shows that the scale has a general factor. The fact that the variance caused by the first factor before rotation was above 30% is considered to be another proof for a general factor (p. 126). Therefore, it is concluded that the scale has a single-factor structure.

The reliability coefficient calculated for the whole scale was found as .80. It is seen that an item that could be removed from the scale will not cause any important increase in Cronbach alpha value.

### **Analysis of Data**

For this purpose, objectives as indicated will be reviewed to explain preferences for each item. The survey items except for beginning parts are formed as a five-point Likert scale, with the alternatives labeled from 'Strongly disagree (1), to 'Strongly Agree' (5). To avoid halo effect, several questions were phrased negatively. Analysis of data is intended to explain main problem and sub research problems as follows. All ranges in five-point Likert scale were calculated according to this rule from 5 to 1 scale. We made decisions for differences in attitudes and preferences between students and teachers and for differences between grade levels and courses. And then we classified learning and teaching variables in using IWBs according to a framework created by Sözcü and İpek (2012).

### **Findings**

After the responses were analyzed, research questions were investigated to clarify all responses based on survey which consists of several parts. For the research, questions named as instructional, psychological and technological items were defined and then students' and teachers' attitudes and preferences related to those items were evaluated. All findings were presented to explain and discuss rest of questions in Tables from 2 to 7.

### ***Students' attitudes and preferences toward the use of IWBs***

It can be seen that the participants in the study generally have positive attitudes towards IWB use. It is stated that use of IWB gives students new opportunities in the class, facilitates their comprehension of the lessons and makes the lessons more entertaining. We can conclude that IWBs generally have positive contributions to students' success. This is the case in other studies,

too (Dhinsa & Emran, 2011; Bruce et. Al., 2011; Erduran & Tataroğlu, 2009; Isman et al., 2012; Weimer, 2001).

There were some results for using IWB based on students'gender, grades and courses and learning as well. 47% of the students were aged 15-19 and 53% were between 6-14. The number of girls was slightly larger than that of boys (respectively 53% & 47%). Elementary school students (grades 1-8) made up 47 % of the sample and the rest was high school students in grades 9-12., 69% of students responded that they had used IWBs before, whereas 29% responded they had not. 50% of the students in the former group had been using IWBs more than three years, and 73% used them more than eleven hours in a week. IWBs were preferred in courses as visuals (12%), numerical (41%), verbal (17%), foreign language (7%) and all of them (23%). Several items in the student questionnaire aimed to investigate the participants' preferences toward the use of IWBs in terms of perceived effect on learning as instructional-pedagogical, psychological and technological variables (see Tables 1, 2, 3, 4 and 8).

**Table 2.** Students' attitudes and preferences about the use of IWBs and learning (Instructional-Pedagogical)

		SD	D	NI	A	SA	Mean	STD
Q3- I cannot learn enough when IWB used in class because of the crowd.	F	396	289	163	74	91	2.19	1.27
	%	39.1	28.5	16.1	7.3	9.0		
Q4- I can easily present my presentations and contents using IWB	F	73	55	124	347	414	3,96	1.18
	%	7.2	5.4	12.2	34.3	40.9		
Q12- My teacher is lecturing too fast with IWB, I cannot keep up.	F	330	256	180	142	105	2.44	134
	%	32.6	25.3	17.8	14.0	10.4		
Q15- My knowledge does not become permanent when IWB used in lessons	F	385	277	191	78	82	2.21	1.25
	%	38	27.3	18.9	7.7	8.1		
Q17- My teachers use IWB effectively in lessons.	F	55	31	130	343	454	4.10	1.08
	%	5.4	3.1	12.8	33.9	44.8		
Q19- Without IWB the course would be more difficult to understand	F	157	130	250	237	239	3.27	1.36
	%	15.5	12.8	24.7	23.4	23.6		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

**Table 3.** Students' attitudes and preferences about the use of IWBs and learning (Psychological)

		SD	D	NI	A	SA	Mean	STD
Q5- I like lessons withthe IWB	F	53	44	95	329	492	4.15	1.10
	%	5.2	4.3	9.4	32.5	48.6		
Q13- I'm not interested in the contents presented using the IWB	F	398	250	152	114	99	2.28	1.34
	%	39.3	24.7	15.0	11.3	9.8		
Q16- Using IWB increases collaboration and communication among students.	F	165	156	294	190	208	3.12	1.34
	%	16.3	15.4	29.0	18.8	20.5		
Q21- My teacher encourages us to use IWB.	F	135	100	267	272	239	3.38	1.30
	%	13.3	9.9	26.4	26.9	23.6		
Q24- I like to use an IWB in front of the class.	F	129	92	150	228	414	3.70	1.41
	%	12.7	9.1	14.8	22.5	40.9		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

**Table 4.** Students' attitudes and preferences about the use of IWBs and learning (Technological)

		SD	D	NI	A	SA	Mean	STD
Q8- Having an IWB in my classroom encourages me to use computer and Internet	F	167	133	200	215	298	3.34	1.43
	%	16.5	13.1	19.7	21.2	29.4		
Q-9- My teacher doesn't use IWB effectively in lessons.	F	637	192	66	66	52	1.72	1.16
	%	62.9	19.0	6.5	6.5	5.1		
Q20- My teacher usually shows the content which is prepared by himself/herself on the IWB	F	59	77	133	349	395	3.93	1.16
	%	5.8	7.6	13.1	34.5	39.0		
Q23- I find opportunity to learn from different sources using IWB.	F	82	66	165	326	374	3.83	1.22
	%	8.1	6.5	16.3	32.2	36.9		

Notes: F = frequency, SD = strongly disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

### **Teachers' attitudes and preferences toward the use of IWBs**

The first part of the survey dealt with general information about teachers' background knowledge of IWBs and the frequency and purpose of their use in the different courses. Thirty-six teachers were working in private schools and 29 teachers were in public schools. Teachers with 3-12 years of experience preferred using IWBs in their schools. 69% of the teachers reported that they had training in using IWBs and they used IWBs more than 11 hours a week. More than half of the teachers (56%) stated that they used IWBs before in their classes. Teachers used IWBs in their classes as verbal (26%), numerical (30%), visual (10%), foreign language (18%), and all of them (16%). For using IWBs, teachers effectively use in math (25%), Turkish (19%), foreign language (17%), science (6%), biology (6%), social studies (5%), history (5%), geography (5%), drawing and art (3%), chemistry (3%), and physics course (3%) as well. More than one-third of the teachers (38%) also used IWBs for more than three years and 70% used them in every class. A majority of them (78%) preferred and recommended using IWBs. Teachers used IWBs for purposes such as presenting their own materials (18%), writing (20%), saving documents (10%), connecting to the internet (12%), presenting materials prepared by students (7%), watching movies (6%), presenting audio-visu-als (8%), presenting business software and educational materials (3%), drawing background plans (6%) and communicating with students (2%), as can be seen in [Tables 5 to 8](#).

**Table 5.** Teachers' attitudes and preferences about the use of IWBs and learning (Instructional-Pedagogical)

		SD	D	NI	A	SA	Mean	STD
Q1- Using IWB in teaching-learning process increases students' academic performance.	F	1	4	3	42	15	4.06	0.73
	%	1.5	6.2	4.6	64.7	23.1		
Q3- Presentations and explanations are more effective when I use IWB.	F	1	2	4	33	25	4.27	0.72
	%	1.5	3.0	6.2	50.8	38.5		
Q10-Students prefer teaching with IWB	F	2	2	8	36	17	4.08	0.72
	%	3.0	3.0	12.4	55.4	26.2		
Q15- Classroom management is more difficult when using IWB	F	18	36	5	5	1	2.00	0.90
	%	27.7	55.4	7.7	7.7	1.5		
Q26- Use of IWB addresses to students' individual differences	F	2	7	18	30	8	3.54	0.95
	%	3.1	10.8	27.7	46.2	12.3		
Q30-Training for IWBs is good enough	F	2	21	17	19	6	3.09	1.05
	%	3.1	32.3	26.2	29.2	9.2		
Q31-I prefer taking training with IWBs and see examples of application	F	1	5	12	37	10	3.77	0.86
	%	1.5	7.7	18.5	56.9	15.4		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

**Table 6.** Teachers' attitudes towards and preferences for IWBs use and learning (Psychological)

		SD	D	NI	A	SA	Mean	STD
Q6-Students are more motivated when using IWB	F	0	4	8	39	14	3.97	0.77
	%	0.0	6.2	12.3	60.0	21.5		
Q7- Interaction with IWB (touching, responding to visual stimulus) leads to active learning	F	2	5	3	36	19	4.00	0.97
	%	3.1	7.7	4.6	55.4	29.2		
Q18-Students do not like using IWBs	F	17	33	7	6	3	2.13	1.01
	%	26.2	50.8	10.8	9.2	3.0		
Q25- Presentations in front of IWB enable students to express themselves and to use their body language more effectively	F	0	2	15	38	10	3.86	0.70
	%	0.0	3.1	23.1	58.5	15.4		
Q34- I believe that using IWB motivates learning	F	2	3	4	39	17	4.00	0.91
	%	3.1	4.6	6.2	60.0	26.2		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

**Table 7.** Teachers' attitudes and preferences about the use of IWBs and learning (Technological)

		SD	D	NI	A	SA	Mean	STD
Q8-It is difficult for me to use IWB in the class	F	23	28	7	3	3	1.97	1.05
	%	39.9	43.8	10.9	4.7	4.7		
Q9-IWB supports and encourages modern teaching approaches and applications	F	1	5	4	35	20	4.05	0.91
	%	1.5	7.7	6.2	53.8	30.8		
Q13-I generally use IWB to use educational CDs related to the subject	F	10	23	11	18	3	2.71	1.17
	%	15.4	35.4	16.9	27.7	4.6		
Q16-Students use IWB for presentations	F	9	24	11	17	4	2.74	1.17
	%	13.8	36.9	16.9	26.2	6.2		
Q19-I am using IWB systematically	F	1	5	5	22	32	4.22	0.99
	%	1.5	7.7	7.7	33.8	49.2		
Q20-Using IWB needs more lesson preparation time	F	7	16	11	21	10	3.2	1.25
	%	10.8	24.6	16.9	32.3	15.4		
Q21-Using IWB, I can easily reach to different materials (blogs, wiki, websites) and present them to whole class	F	2	7	4	28	24	4.00	1.07
	%	3.1	10.8	6.2	43.1	36.9		
Q23-Student are not ready to use IWBs	F	12	30	11	10	2	2.38	1.05
	%	18.5	46.2	16.9	15.4	3.1		
Q24-I own lesson contents and programs necessary to use IWB effectively	F	1	7	11	30	16	3.82	0.98
	%	1.5	10.8	16.9	46.2	24.6		
Q27-Use of IWB helps students to use tools and applications of information technologies more effectively.	F	0	1	8	42	14	4.06	0.63
	%	0	1.5	12.3	64.6	21.5		
Q29-I can find subjects from internet sites	F	4	14	12	26	9	3.38	1.12
	%	6.2	21.6	18.5	40.0	13.9		
Q32-Technology teachers help other teachers in using IWB	F	5	11	12	30	7	3.35	1.12
	%	7.7	16.9	18.5	46.2	10.8		
Q36-Colour agreement is good in IWBs	F	0	4	15	37	9	3.80	0.75
	%	0	6.2	23.1	56.9	14.3		

Notes: F = frequency, SD = strong disagree, D = disagree, NI = no idea, A = agree, SA = strongly agree; STD = standard deviation

**Teachers' and students' attitudes and preferences toward the use of IWBs in courses**

As a last point, teachers' and students' attitudes and preferences for using IWBs in different courses were evaluated. Based on Table 8, Turkish, social studies, and history were classified as verbal classes; science, chemistry, biology and physics were categorized as science courses, and

finally, drawing, foreign language and others were named as visual courses. As a result, the results and findings were given in Table 1 and 8.

**Table 8.** IWBs preferences, attitudes and awareness of students’ and teachers’ related to different courses

	N	Turk.	Soc	Hist	Geo	Math	Scie	Che	Bio	Phsy	Draw	Frgn	Oth.	Total
		Verbal					Science				Visual			All
Teachers	F	12	3	3	3	18	4	2	4	2	2	11	1	65
		17				20					7	11	10	65
	%	18.9	4.6	4.6	4.6	27.7	6.2	3.1	6.2	3.1	3.1	16.9	1.3	
		26.2												
Students	F	145	94	79	69	238	86	54	76	45	38	79	12	1013
		168												
	%	14.1	9.3	6.2	6.3	25.6	8.5	5.3	7.3	4.4	3.8	7.8	1.2	
		16.6				41.0					12.6	6.6	23.2	

**Discussion and future research**

It is a widely accepted fact that improvements in computer technology develop people’s skills, increase their fields of interest, and encourage active participation. Numerous internal and external factors affect students’ success in class. One of the external factors is the effective and enjoyable use of teaching technologies. External factors are financial and administrative support, which includes creating a learning environment by providing sufficient hardware throughout the process of programming and material development as well as providing constant finance and staff.

If smart boards are expected to produce the desired results in teaching and learning, their full potential should be learned and exploited. The teacher should adapt this tool to the particular teaching methodologies and approaches she employs in class and thus make good use of the opportunities offered by the smart board. However, it is essential that readymade materials that guide teachers be available because not every teacher may be equipped enough to prepare them.

A review of the literature suggests that a more comprehensive framework is needed to understand the effects of IWBs in learning environments. Within this framework (see tables from 2 to 7), the following items are put forward: the contextual factors, instructional/pedagogical, psychological and technological variables, the processes that affect IWB use, learning outcomes and achievement.

In order for IWBs to have their greatest positive influence on student learning, a deeper understanding of learner characteristics and achievement along with interactive school culture is needed. The contextual factors provide changes with administrators, parents and students. Investment process is an important side both instructional and technical approaches as well as psychological approach which effect motivation, perception, self-confidence. Teachers need time to practice and develop materials. IWBs also have long term effects on learners (see tables 1, 2, 3, 4 and 8). These results are similar to those in previous studies (Digregorio & Sobel-Lojeski, 2010; Mathews-Aydinli & Elaziz, 2010, Higgins et al. 2007).

In this study, a sizeable sample of elementary and high schools students and teachers from Turkey were surveyed for their opinions and attitudes about the use of IWBs in the schools. Now, the work includes more than thousand participations and their attitudes about the use of IWBs. According to results, Turkish students and teachers in general like using IWBs. Teachers agree that using IWBS affects students’ achievement; class management, interaction, practice and presentation of materials (see tables 1, 5, 6, 7 and 8). These results are the same as earlier ones (Armstrong et al, 2005; Glover et al, 2007; Hall & Higgins, 2005; Higgin et al, 2007; Mathews-Aydinli & Elaziz, 2010). In addition, instructional variables and psychological variables such as motivation, enthusiasm and attention were found to be important dimensions in learning and



teaching with IWBs (Ateş, 2010; Bennett & Lockyer, 2008; Shi et al, 2003; Mercer et al, 2010). Students and teachers prefer using IWBs for the similar courses as well as previous studies (Ateş, 2010; Bennett & Lockyer, 2007; Adıgüzel et al., 2011).

In general, teachers and students use IWBs in numerical, verbal, visual and foreign language courses respectively as earlier studies. And they also prefer IWBs for using distance learning and as a new tool in their classes. IWBs were found available for contributions effectively using informatics technologies and learning technologies. Most of the students (79%) prefer and like using IWBs in classes and 73% of students found using IWBs interesting. A majority of students (49%) indicated that having IWBs encourages computer and internet use. As a result, future research should focus on the long term impacts of IWBs on instructional/pedagogical, psychological and technological variables as well as contextual facts to reach achievement and learning outcomes. Also more research should to be done into how IWBs impact different learner characteristics, grades and courses.

### **Conclusion**

The findings of this study revealed that in Turkey both teachers and students have positive attitudes toward IWB use in schools. Students in all grades have positive attitudes in their classes for the use of IWBs. Students found the courses with IWB motivating and enjoyable. The study presents basic dimensions for creating and designing high quality materials for IWBs and all board of education around the world as well as in Turkey. It also conveys ideas and approaches for using IWBs in the future applications. Programmers, instructional designers and teachers will be able to easily understand the importance of the variables in and characteristics of approaches to using new learning technologies and developing high quality materials of IWBs. The study may indicate new research topics in experimental design to work on variables given on the framework for the future studies as well as using characteristics of IWBs in learning and teaching at different grade levels and courses. Future experimental studies may address IWB use in different levels and classes for multimedia learning and design.

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