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Postgraduate Students' Knowledge of and Attitude towards the SMART Board in the Education Department of Kuwait University

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Abstract
The Aim of this study is to investigate postgraduate students' attitude towards the SMART board and their knowledge of it. A sample of 20 students of education in Kuwait University took part. Two questionnaire constructs were developed, for attitude and knowledge, and demographic data was also gathered. It was assumed by the researcher that there would be a relationship between the attitude and the knowledge scales, and that the gender of students would affect their attitude and knowledge. Also, it was hypothesised that their education/degree level would influence their attitude and, finally, that these demographic variables (age, gender and degree level) would be significant predictors of SMART board knowledge. It was found that female participants showed more knowledge of SMART boards, as did those specialising in science. Gender was the only significant predictor of variance in knowledge. Explanations for these outcomes were suggested and critical discussion of the study was presented.

Introduction
Information computer technology (ICT) is developing at a rapid pace and has been embraced in every branch of life, including education. ICT plays a vital role in the learning environment and offers novel opportunities for teachers and learners during the educational process. The effectiveness of education is known to be enhanced by the conscious use of instructional technology (Isman, Abanmy, Hussein & Al Saadany, 2012; Tataroglua & Erdurana, 2010).
One such instructional technology is the interactive whiteboard (IWB). The IWB was originally designed for the office setting, and has been adopted for use in schools only recently (Morgan, 2011). Whilst IWBs can be used as presentation devices, it has features that take it beyond a mere display function. The IWB is a large touch-sensitive display screen connected to a data projector and computer. The display panel exhibits pictures projected from the computer. Changes can be input electronically using a mouse or keyboard, as well as by touch (Kennewell & Morgan, 2003; Manny-Ikan, Dagan, Tikochinski & Zorman, 2011; cf.Morgan, 2011). Thus, students and teachers are able to write on the board, by touching the board directly, or by using a special pen. Users are able to annotate the surface of the whiteboard and these annotations can be printed, saved to a computer, or distributed over a network. The IWB allows for the integration a range of multi-media, such as text, pictures, sound, images, film and CD-ROMs, as well as resources from the internet (López, 2009; Morgan, 2011). Features include (but are not limited to) drag and drop, and hide and reveal of items, erase, highlighting, animation and visual or auditory feedback (López, 2009; Manny-Ikan et al., 2011; Morgan, 2011).
The IWB also allows for a real-time transmission mode, enabling a two-way interaction to occur between teacher and student and the medium (Bryant & Hunton, 2000; cf. Morgan, 2011). Even as a mere presentation device, IWBs are valuable in increasing student motivation (Glover and Miller 2002a as cited by Kennewell & Morgan, 2003). However, the crucial advantage of the IWB in a pedagogical setting is its interactivity, which facilitates active learning, as opposed to passive reception of information by students. In addition, the recordability of the IWB means that end products can be stored to be re-used or later deconstructed (Al-Saleem, 2012). Moreover, the large size of the IWB means that collaborative group work is facilitated and that IWBs are accessible for all students including young children and those with a visual or physical impairment (Glover and Miller 2002, Smith 2002, Wood, 2001, as cited by Kennewell & Morgan, 2003).
The IWB facilitates whole-class teaching. Whole-class teaching has been shown to be more successful in teaching some subjects (López, 2009; Morgan, 2011). Using this approach, the teacher is able to instruct the whole class whilst differentiating between the learning needs of pupils of different abilities. For example, the IWB has the capacity to be split into a number of screens and each one can be used to address students at different comprehension levels (Miller & Glover, 2002; cf. Morgan, 2011). In addition, it is possible to use the IWB to flip back to review material in order to assist lower ability groups (Morgan, 2011). IWB based programs, allow for the incorporation of assessments into lessons to enable continual evaluation of pupils' progress. These programs can provide the learner immediate feedback. There is also the opportunity for responses to be sent to a computer to be stored and analysed to help instructors identify areas for review (López, 2009).

Researchers often emphasize the use of multi-modal teaching to match the varied learning styles of learners. This is much facilitated by the use of the IWB which enables the provision of teaching that captures the interest of visual, auditory, and tactile learners (López, 2009; Morgan, 2011). Specifically, the large visual framework of the IWB appeals to visual learners who comprise the majority of young learners. The use of auditory features such as music, song and speech can augment auditory learning and student interaction with the IWB through movement provides a unique opportunity for tactile learning. In addition to facilitating a teaching style which appeals to various learning styles, IWBs may also appeal to each of the intelligences as described by Howard Gardner (1993): logical-mathematical, linguistic, spatial, bodily kinaesthetic, musical and inter- and intra-personal (López, 2006).

Several studies have examined students' attitudes towards use of the IWB. Students displayed a greater enjoyment, interest and attention towards learning and increased engagement in the learning process (López, 2009). Additionally, use of the IWB increased students' motivation to learn and facilitated students' desire to remain on-task (Hall & Higgins, 2005 as cited by Manny-Ikan et al., 2011). This increased interest and attention was reflected in a superior understanding of the subject matter and enhanced recall and retention of information by learners. Interactive games not only augmented students' enjoyment but also typically resulted in an increase in correct responses. In fact, significant academic gains have been observed as a direct result of IWB use (Isman et al., 2012).

Furthermore, pupils instructed using the IWB resource showed increased self-esteem (Knight, Pennant, & Piggott, 2005, cf. Morgan, 2011), higher levels of attendance (Al-Saleem, 2012) and improved behaviour (Isman et al., 2012). The use of IWBs in lessons altered the attitudes of students, bestowing upon them the desire to be active participants in lessons and resulting in greater interaction between students and teacher, and students and each other (López, 2009; Manny-Ikan et al., 2011). Students were found to listen, support and encourage each other more (Duran & Cruz, 2011).

Research has not focused specially on the effect of demographic variables (such as, age, gender and experience) on students' attitude towards the IWB and whether these gains are equal amongst different academic groups. In addition, whilst Forrest (2005; cf. Morgan, 2011) described how pupils quickly gain knowledge of IWB use it is unclear how knowledge level affects attitude of IWB use. Further it is unclear how knowledge levels differ between demographic groups. It is possible that IWB knowledge may increase gains from IWB use. Alternatively, student engagement may only be short-term and there is a risk that the students will cease to be interested over time (Lancia, 2009, as cited by Manny-Ikan et al., 2011). Thus, the IWB may be less useful for students with greater knowledge.

Whilst the IWBs are indicated for use across several subjects, specific aspects may lend towards the use of IWBs in teaching foreign languages. A major aspect of the IWB is that it supports and encourages whole-class teaching, communication, interaction, and the exchange of opinions and ideas. In addition it is possible for students to present projects on the IWB. Students may guide other students in IWB use by giving directions. All of this communication may be conducted in the target language, thus encouraging language practice and creating novel opportunities for such practise (Al-Saleem, 2012). The progression of speech amalgamation and recognition technologies also means that pupils are able to carry out near-natural conversations with IWB programs (López, 2009).

In addition, the IWB aids internet-use in teaching, meaning that the class is linked to the world around them. This facilitates contact with other cultures and the exploration of other cultures' linguistic and cultural competence (Duran & Cruz, 2011). Further, it is possible to bring students' own cultural experiences through images and multimedia. This enables learners to construct their own knowledge by building on their prior experiences (López, 2009). In addition, as mentioned previously, the IWB lends itself to teaching which appeals to various learner styles, as well as the various intelligences as described in López, (2006). It is possible that members of a given culture will be more advanced in one type of intelligence compared to members of another culture, whether these cultures reside in the same geographic location or not. This may result from any of a mixture of geographic, political, and social circumstances (Nieto & Bode, 2008 as cited by López, 2009). This means that that the IWBs are an ideal tool for teaching learners from diverse cultural backgrounds.

In summary: the SMART board supports social interaction, collaboration, student engagement, and a student centred environment where students control their own learning experiences. The interactive whiteboard is a SMART board that can easily be applied to any curriculum. The board, which can be beneficial to both the teacher and the learner, appeals to most students because it taps into visual, tactile and audio spheres. In Kuwait, little is known about postgraduate students' knowledge of the SMART board, hence the main **objective** of this study is to develop *attitude* and *knowledge* scales to evaluate students' views about SMART board use in their classes. A number of hypotheses were formulated for the purpose of this study, as can be seen in the table below.

Operationalization of constructs:

Based on previous knowledge of SMART boards and by reviewing the literature, the researcher designed two constructs:

1. Knowledge of SMART boards: consisting of 10 questions about the functionality of the SMART board, these questions were generated and formulated from the researcher's general knowledge of Smart boards and based on the literature review explained previously.
2. Attitude towards SMART boards: consisting of 15 questions asking participants about their views regarding SMART boards. Again the questions were formulated based on general knowledge and attitudes as well as a review of the literature.

Research Hypotheses

	Hypothesis	**DV**	**IV**
1.	Knowledge of SMART boards has a significant relationship with the attitude towards it.	Attitude, Knowledge	
	Knowledge of SMART boards will have no significant relationship with the attitude towards it.		
2.	There is a significant difference between male and female participants in their knowledge of SMART boards.	Knowledge	Gender
	There is no significant difference between male and female participants in their knowledge.		
3.	There is a significant difference between male and female participants in attitude towards SMART boards.	Attitude	Gender
	There is no significant difference between male and female participants in attitude SMART boards.		
4.	Level of degree being studied for will have a significant effect on the attitude towards SMART boards.	Attitude	Degree
	Level of degree being studied for will have no significant effect on the attitude towards SMART board		
5.	Students' speciality will have a significant effect on knowledge of SMART boards.	Knowledge	Speciality
	Students' speciality will have no significant effect on knowledge of SMART boards.		
6.	Knowledge is significantly predicted using attitude, age and gender.	Knowledge	Attitude, Age, Gender
	Knowledge is not significantly predicted using attitude, age and gender.		

Methodology

Design:

This study used a questionnaire method; this questionnaire involves two constructs; one includes questions (10 questions) about students' knowledge of how the SMART board operates and its functions. The other construct included 15 questions dealing with students' attitude towards the use of SMART boards, i.e. their behaviour and feelings about it and the way they see its advantages and disadvantages. Questionnaire design is popular in social science and in education it will provide the researcher with an opportunity to answer the research hypotheses using inferential statistics (to make inferences from the small sample to the bigger population).

Participants:

The researcher gained help for an assistant (volunteer) from the University of Kuwait and in particular the Education Department. Following an opportunity sampling method, 20 questionnaires were spread among students and the all were returned; the students were studying for postgraduate degrees (High postgraduate diploma, MSc). Opportunity sampling refers to the non-probability method of recruiting participants using participants who are easily accessible. The recruitment of participants was carried out using a member of staff in the Education Department who agreed to assist the researcher in data collection.

Procedure:

After reviewing the literature, the researcher built two constructs regarding the SMART board, mainly students' *knowledge* and *attitude* towards SMART boards. Following that, they were translated into Arabic and handed to a senior lecturer in the Education Department in Kuwait University. The questionnaire was considered valid. The questionnaire along with the consent form was handed to participants and it took about eight minutes on average for each participant to fill in. Then the completed questionnaires were collected and the participants were thanked for taking part in the study.

Data coding:

Data was coded into SPSS for the attitude construct and the knowledge construct plus the demographic details. Knowledge questions were coded 'correct' or 'incorrect' while the attitude question were coded on 5-point likert scale (1=strongly disagree to 5=strongly agree). Negative questions were recoded to match other positive questions (e.g. Question 5 in the knowledge construct). For the knowledge scale, a variable for the total number

of correct answers was created and, for the attitude scale, an average was computed for the attitude construct.

Validity:

Validity refers to the extent to which the questionnaire reflects the main objectives of the study, i.e. how relevant the questionnaire is in answering the main hypotheses. This type of validity is called is 'content validity' or 'logical validity'; it is mainly concerned with how well it measures the social construct (e.g. attitude or knowledge). Validity was achieved by sending the questionnaire to a senior member of staff in Kuwait University who approved the questions and declared it suitable for the study and the use of participants. Also the questionnaire could be considered valid since most of the information was gathered based on previous literature findings and general facts about SMART boards.

Reliability

Reliability reflects the consistency between answers within a construct, or a questionnaire. The question asked is: does the construct and its items/questions reflect the same ideas and produce similar results? This study use an internal reliability measured through Cronbach's Alpha. This is achieved through SPSS analysis and has a value between 0 and 1, 1 being 100% consistency between items. Generally research considers 70% consistency between items (correlation) to be sufficient. In this study, alpha for the attitude scale of fifteen questions was found to be 0.949 (95%). For the ten questions of the knowledge scale, alpha was found to be 0.585 (58%).

Table 1: Reliability of Knowledge

Reliability Statistics	
Cronbach's Alpha	N of Items
.585	10

Table 2: Reliability of Attitude

Reliability Statistics	
Cronbach's Alpha	N of Items
.949	15

Results

The main aim of this study is to investigate Kuwaiti students' attitude towards the SMART board and how much knowledge they have about it. In the past two sections (Introduction & Methodology) the construction of the questionnaire was explained and the hypotheses were listed. Each hypothesis will either be accepted or rejected depending on the statistical outcomes from the manipulated tests. Essentially it is important to explore the dependent variables (DVs) and see if they are suitable for parametric or non-parametric tests. There are several methods of assessing whether data are normally distributed or not, i.e. the actual distribution of the variables fit the pattern we would expect if it is normal. The most common statistical tests are Kolmogorov-Smirnov and Shapiro-Wilks tests. Graphical methods, such as Q-Q probability plot and frequency histogram are also applied. The Shapiro-Wilk test shows if the DVs follow a normal distribution. If the result of Shapiro-Wilk is significant, i.e. probability is less than 0.05 than the null hypothesis can be rejected and data are not normally distributed, otherwise normality should be assumed. Table 3 shows that the null hypothesis has not been rejected. The two DVs are not significant (attitude = 0.618 and knowledge = 0.217), confirming that both variables have come from a normal distribution. Furthermore, both the frequency histogram and the Q-Q plot tests presented in Figures 1-4, shows that the DVs do seem to follow approximately a normal distribution, except of several outliers which deviate from the straight line. The data may also be considered interval (continuous) and, together with the normality, this confirms that parametric tests can be used with this data (Appendix 1).

Table 3: Normality of constructs

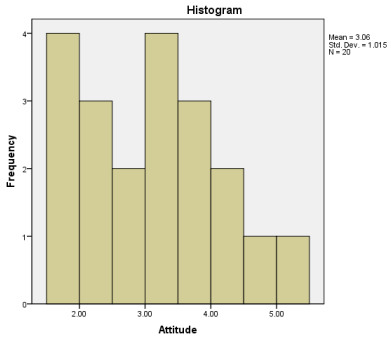
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude	.106	20	.200*	.964	20	.618
Knowledge	.156	20	.200*	.938	20	.217

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Figures 1 & 2: Distribution of attitude scores



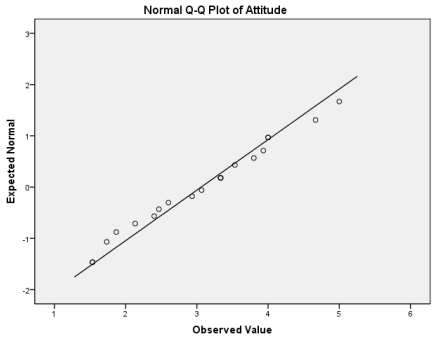
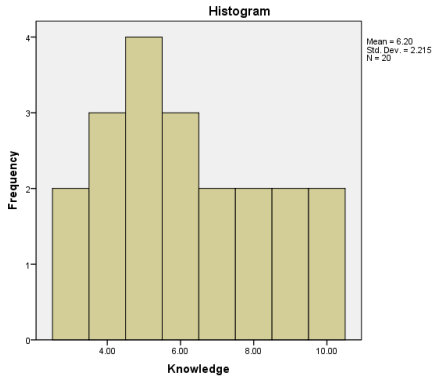
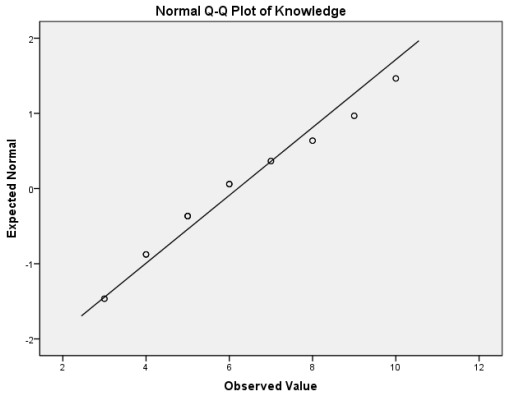


Figure 3 & 4: Distribution of knowledge scores





H1:

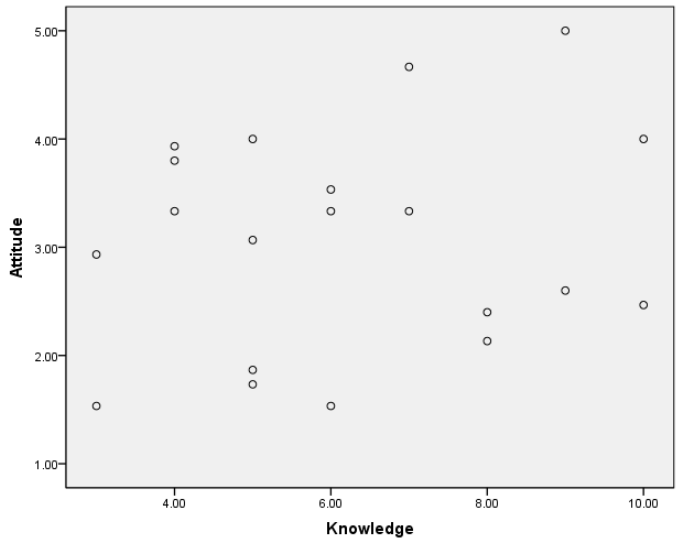
For this hypothesis a Pearson correlation test is used, which measures the strength of the association between two different variables, and in this case the strength of the association between attitude towards SMART boards and knowledge of SMART boards. The test results in a value for the Pearson r coefficient that can vary between 0 and 1, or 0% to 100%, either negative or positive association; such association can be small, moderate or strong. By applying the Pearson's correlation test no significant association was found between the attitude and the knowledge variables, $r(20) = 0.17$, $p = 0.472$. This indicates no association between the variables (changes in one variable do not significantly lead to positive or negative changes in the other) (Appendix 2.1). It also can be perceived from the scatter plot presented in Figure 5 that the points are not closely scattered about an underlying straight line, so we say there is no strong linear relationship between the two variables.

Table 4: The correlation coefficient between attitude and knowledge

Correlations

		Attitude	Knowledge
Attitude	Pearson Correlation	1	.171
	Sig. (2-tailed)		.472
	N	20	20
Knowledge	Pearson Correlation	.171	1
	Sig. (2-tailed)	.472	
	N	20	20

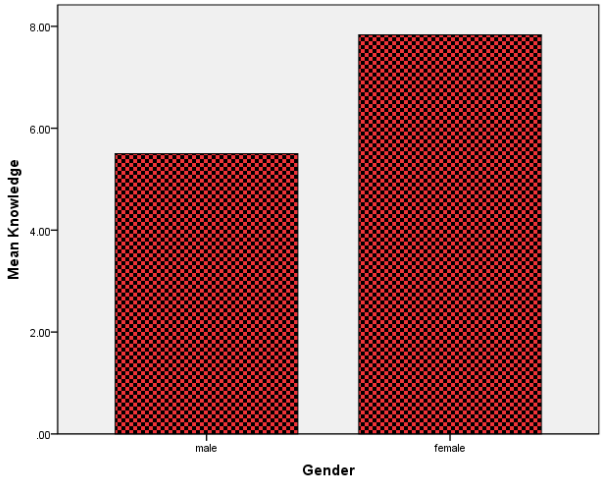
Figure 5: A Scatter-plot reflecting the linear association between the attitude and knowledge



H2:

In the second hypothesis the researcher was interested in seeing if gender has an effect on knowledge of SMART boards. The male (14) and the female (6) groups were compared against each other based on their knowledge scores. To see if this comparison yields any difference, an Independent Groups t-test was utilised. By looking at the t-test, and assuming equal variances (Levene's p = 0.429), and the descriptive statistics tables the outcome showed significant difference between both genders [t(18)=2.41, p<0.05/p=0.026]. Therefore the female group showed significantly more knowledge of SMART boards (Mean score = 7.83 out of 10) than the male group (Mean score = 5.50) (Appendix 2.2).

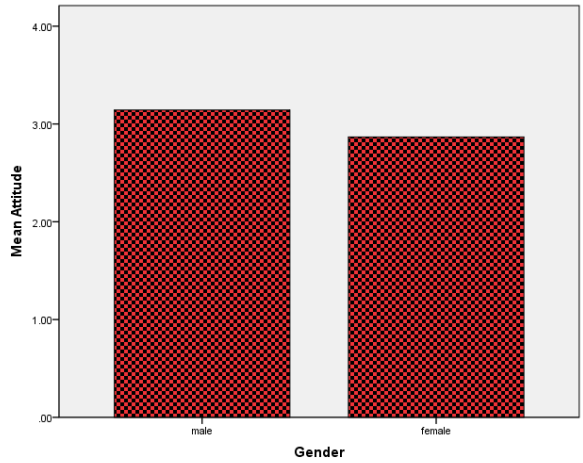
Figure 5: Mean knowledge scores by gender



H3:

Similar to the second hypothesis, but this time the researcher was interested in seeing if gender had an effect on attitude towards SMART boards. The male (14) and the female (6) groups were compared against each other based on their attitude scores. To test if a significant effect on attitude exists for gender, the t-test table showed equal variances (Levene's p = 0.154) and no statistically significant difference between the genders t(18)=0.547, p>0.05/p=0.591. Therefore both groups shared the same strength of attitude. By looking at averages for both genders (female mean = 2.86; male mean = 3.14) it can be seen that both held a positive attitude as shown by means greater than the neutral score of 2.5 (mid-point of 5-point scale) (Appendix 2.3).

Figure 6: Mean attitude scores by gender



H4:

Depending on the level of degree students are studying for, their attitude towards SMART board is assumed to be affected. The degree variable has two levels (Higher Diploma, MSc/MA). 13 participants were in the Higher Diploma level and 7 in the MSc or MA. Thus the appropriate test was the independent samples t-test. Although the Higher Diploma group had a higher attitude average (M=3.13) compared to the MSc/MA group (M=2.92) the difference was not statistically significant t(18)=0.431, p=0.672. Therefore it can be understood that the degree type had no impact on the attitude of participants towards SMART boards (Appendix 2.4).

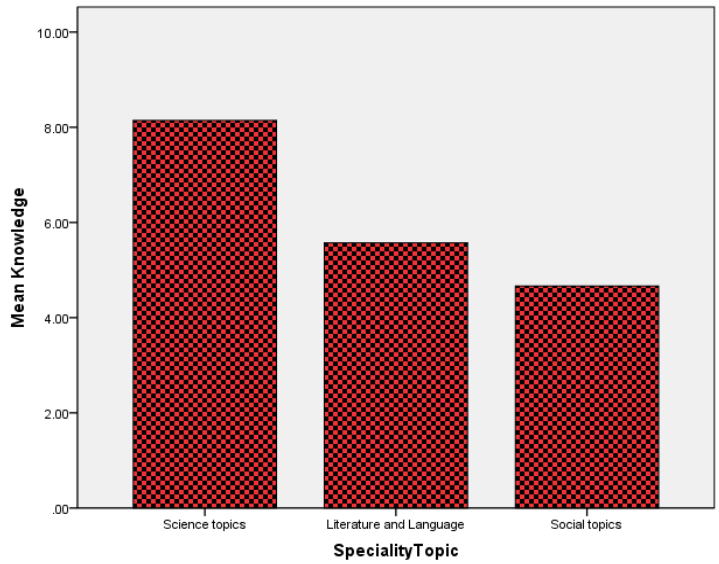
Table 5: Descriptive statistics of the qualification groups

Group Statistics of Attitude				
PG.Degree	N	Mean	Std. Deviation	Std. Error Mean
Higher Diploma	13	3.1333	.95530	.26495
MSC/MA	7	2.9238	1.18599	.44826

H5:

In this part of the analysis, the main interest is to find if the subject speciality as an independent variable (Science, Literature/language and Social topics) has an effect on the amount of knowledge students have about SMART boards. For this hypothesis, an ANOVA test is used because there are more than two values of the independent variable. The results showed that the speciality type does have a significant impact on students' knowledge, F(2,17)=7.37, p=0.005. This leads to the conclusion that students with different specialities have significantly different results (Science=8.14, Literature/language=5.57, Social=4.66) in respect to their knowledge of SMART boards. To test where the significant difference lies, a Post-Hoc Tukey HSD test was utilised and it was found that the difference was mainly between Science compared to Literature/language, and between Science and Social topics). Both of these differences are significant at p=0.031 and p=0.005 respectively (Appendix 2.5).

Figure 7: Mean knowledge scores by speciality



H6:

The final part of analysis is concerned with trying to predict if the knowledge of SMART boards can be predicted using three independent variables, namely, attitude, age and gender. For this purpose it is appropriate to use a Multiple Regression. This test determines if the predictors can explain changes within the dependent variable and if these changes are statistically significant. Firstly, it is explained that overall R (correlation) is 55%, and the R Square is 30.2% (Table 6).This shows that there seemed to be a moderate correlation and that the model of regression explains 30.2% of the variance in the knowledge of SMART boards. The next step shows whether the model of regression can be used to predict knowledge, and it was found not to be significant $F(3,16)=2.30$, $p=0.115$. Despite that, gender was found to be the only significant variable to predict knowledge of SMART boards ($t=2.45$, $p=0.028$). This indicates that being a female increase the likelihood of having more knowledge of SMART boards (Appendix 2.6).

Table 6: Model summary of regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550[a]	.302	.171	2.01632

a. Predictors: (Constant), Gender, Attitude, Age

Table 7: ANOVA test of model fit

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.151	3	9.384	2.308	.115[a]
	Residual	65.049	16	4.066		
	Total	93.200	19			

a. Predictors: (Constant), Gender, Attitude, Age

b. Dependent Variable: Knowledge

Table 8: The Beta coefficients and the significance for each predictor

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.626	2.578		.631	.537
	Attitude	.524	.460	.240	1.138	.272
	Age	-.092	.604	-.033	-.153	.881
	Gender	2.445	1.013	.519	2.413	.028

a. Dependent Variable: Knowledge

Discussion

This study investigates students' attitude towards SMART boards in Kuwait University and their knowledge of these boards. By reviewing the literature, it was evident that this particular topic had not been investigated in the context of Kuwait nor, specifically, with the selected sample, providing the researcher with the opportunity to statistically explore it for the first time. A total of six hypotheses were assumed, and they were all statistically investigated using statistical tests through SPSS. This part of the study will consider each hypothesis and the corresponding results to explain it in relevance with earlier research. Discussion of limitations will be also stated.

The first hypothesis of this study states that ***"Knowledge of SMART boards will have a significant relationship with the attitude towards it".*** However the statistical outcome disconfirmed it and led to its rejection and the acceptance of the null hypothesis (of no correlation). One can actually argue against the concept of having a positive relationship between knowledge and attitude. More use of the SMART board might lead to more frustration amongst users especially when the board is faulty and has low connection with broadband internet, so having more knowledge of its down-side might lead to a poorer attitude. Looking at earlier research, Forrest (2005 as cited by Morgan, 2011) described how pupils quickly gained knowledge of IWB use. Since it is unclear how knowledge level affects attitude towards IWB use, it is hard to see how both relate to each other.

The second hypothesis was that ***"There is a significant difference between male and female participants in their knowledge of SMART boards",*** and the statistical test supported this hypothesis, leading to the conclusion that females have better knowledge compared to male students. Female students in Kuwait could be seen as highly motivated and generally achieving higher academic marks in comparison to males. This might explain the amount of information they have regarding the SMART board.

Thirdly it was hypothesised that ***"There is a significant difference between male and female participants in attitude towards SMART boards"***. This hypothesis was statistically rejected, showing that gender does not influence students' attitude. Although the knowledge of students was lower amongst the male students, the attitude towards the SMART board was found similar. It seems that both genders value the importance of this technology and the way they feel towards it, but it seems that female students are the more likely to seek and gain knowledge about the SMART board.

The fourth hypothesis stated that ***"The level of degree being studied for will have a significant effect on attitude towards SMART boards".*** However the results indicated its rejection and the acceptance of the null hypothesis. Although it is expected that those studying for higher degrees might have interacted more with the SMART board due to their greater involvement in the education environment, that does not seem to be the case. Those studying for higher degrees might be relying more on individual learning compared to others at a lower level who might be involved in more traditional board teaching.

The fifth hypothesis stated that ***"Students' speciality will have a significant effect on their knowledge of SMART boards"***. This hypothesis was confirmed and it was found that those with a speciality in science showed more knowledge compared to others in the literature/languages and social specialities. There is a tendency among science graduates to be more skilled with technology or ICT in general due to their field of studies which is very much based on technology. Therefore they might have developed a better attitude towards the SMART board compared to students in the other specialities. Social, literature or language specialities might rely less on technology, especially in Kuwait where there seems to be greater adherence to traditional ways of learning and teaching. This would be the most obvious explanation for such differences in knowledge of the SMART board across specialities.

Finally, the sixth hypothesis stated that **"*The level of knowledge can be significantly predicted using attitude, age and gender"***. The results showed that predicting knowledge of SMART boards can only be significantly explained by gender, i.e. females are likely to have more knowledge compared to males. This is in line with the earlier hypothesis assuming a gender effect. Regression analysis is generally more powerful than other forms of statistics such as the t-test and ANOVA, but requires a higher number of participants, something that the current study has not met. This study was based on a small sample and that might explain why other variables were not

significant predictors or do not explain variances within the dependent variable.

To conclude, this study of Kuwaiti graduate students in the Education Department showed two main significant results where hypotheses were accepted. However, other findings were not statistically significant. Gender was found to have significant effect on the level of knowledge students have regarding the SMART boards, and that favours the female students over the males. Furthermore speciality seems to have a significant effect on the knowledge of participants regarding SMART boards, the obvious explanation for that could be the fact that science topics are more technology based, leading to better knowledge. Implications can be withdrawn from this study, but careful consideration should be given to the sample size, and the questionnaire construction (i.e. including more items) and conducting a factor analysis to see whether latent variables exist. Such an analysis will only increase the understanding of SMART boards and their influence on students.

This study has several **implications**. It surely reflects gender disparities in knowledge of SMART boards, and hence policy makers and the University of Kuwait should consider improving the knowledge of male postgraduate students regarding the use of SMART boards. Most of the graduate students will work in the education system; hence it is vital for them to have sufficient knowledge in order to improve their pedagogic skills and their teaching capabilities. But before relying on this study, it is also important to consider a larger sample and other aspects of ICT and how these are related to knowledge and acceptance among students.

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Appendix

Statistical Outputs:

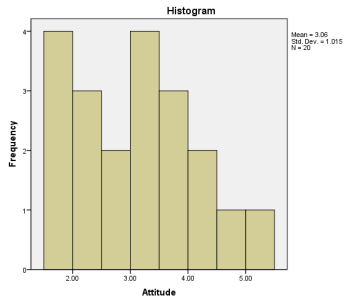
1. **Normality:**

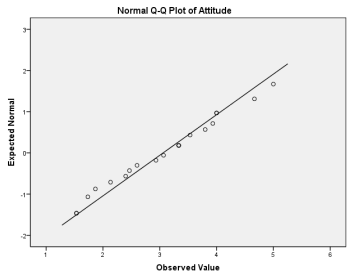
Tests of Normality

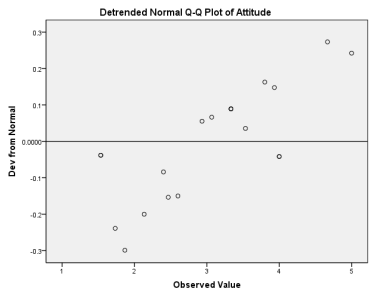
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude	.106	20	.200*	.964	20	.618
Knowledge	.156	20	.200*	.938	20	.217

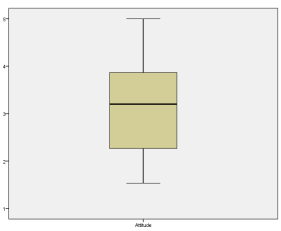
a. Lilliefors Significance Correction

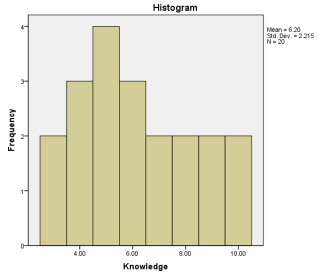
*. This is a lower bound of the true significance.

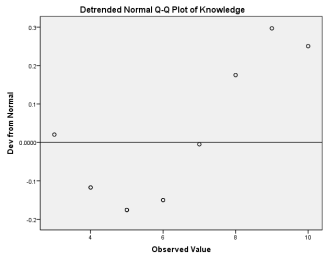


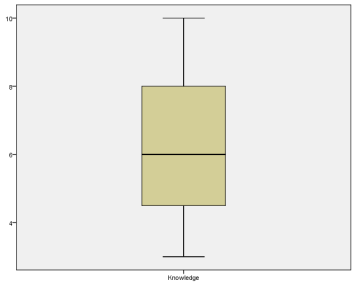












2. Hypotheses: SPSS Out-put

2.1:

Correlations

		Attitude	Knowledge
Attitude	Pearson Correlation	1	.171
	Sig. (2-tailed)		.472
	N	20	20
Knowledge	Pearson Correlation	.171	1
	Sig. (2-tailed)	.472	
	N	20	20

2.2:

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Knowledge	male	14	5.5000	1.82925	.48889
	female	6	7.8333	2.31661	.94575

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Knowledge	Equal variances assumed	.656	.429	-2.419	18	.026	-2.33333	.96454	-4.35975	-.30691
	Equal variances not assumed			-2.192	7.815	.061	-2.33333	1.06464	-4.79857	.13190

2.3:

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Attitude	male	14	3.1429	.89666	.23964
	female	6	2.8667	1.32799	.54215

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Attitude	Equal variances assumed	2.210	.154	.547	18	.591	.27619	.50487	-.78450	1.33688
	Equal variances not assumed			.466	7.041	.655	.27619	.59275	-1.12378	1.67616

2.4:

Group Statistics

	PG.Degree	N	Mean	Std. Deviation	Std. Error Mean
Attitude	Higher Diploma	13	3.1333	.95530	.26495
	MSC/MA	7	2.9238	1.18599	.44826

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Attitude	Equal variances assumed	.349	.562	.431	18	.672	.20952	.48658	-.81274	1.23179
	Equal variances not assumed			.402	10.296	.696	.20952	.52071	-.94618	1.36522

2.5:

Descriptives

Knowledge

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Science topics	7	8.1429	1.34519	.50843	6.8988	9.3869	6.00	10.00
Literature and Language	7	5.5714	2.22539	.84112	3.5133	7.6296	3.00	10.00
Social topics	6	4.6667	1.36626	.55777	3.2329	6.1005	3.00	7.00
Total	20	6.2000	2.21478	.49524	5.1634	7.2366	3.00	10.00

ANOVA

Knowledge

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.295	2	21.648	7.374	.005
Within Groups	49.905	17	2.936		
Total	93.200	19			

Multiple Comparisons

Knowledge
Tukey HSD

(I) SpecialityTopic	(J) SpecialityTopic	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Science topics	Literature and Language	2.57143*	.91583	.031	.2220	4.9208
	Social topics	3.47619*	.95322	.005	1.0308	5.9215
Literature and Language	Science topics	-2.57143*	.91583	.031	-4.9208	-.2220
	Social topics	.90476	.95322	.618	-1.5406	3.3501
Social topics	Science topics	-3.47619*	.95322	.005	-5.9215	-1.0308
	Literature and Language	-.90476	.95322	.618	-3.3501	1.5406

*. The mean difference is significant at the 0.05 level.

2.6:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550[a]	.302	.171	2.01632

a. Predictors: (Constant), Age, Attitude, Gender

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.151	3	9.384	2.308	.115[a]
	Residual	65.049	16	4.066		
	Total	93.200	19			

a. Predictors: (Constant), Age, Attitude, Gender
b. Dependent Variable: Knowledge

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.626	2.578		.631	.537
	Gender	2.445	1.013	.519	2.413	.028
	Attitude	.524	.460	.240	1.138	.272
	Age	-.092	.604	-.033	-.153	.881

a. Dependent Variable: Knowledge

3. Questionnaire:

Information Sheet

Dear Participant
My name is I am a postgraduate student in the University of Exeter (England). As part of my educational attainment this questionnaire is designed for the purpose of investigating postgraduate students' knowledge of SMART boards (interactive) and their attitude towards it. This questionnaire is made of three parts enquiring about some background information, knowledge of SMART boards and the attitude towards it respectively. Your participation will be appreciated, if you agree to take part please be sure of the confidentiality of your information. Feel free to raise any issues relating to the questionnaire and feel free to withdraw at any given time. If you require further information regarding the topic please contact me on the details below and I can happily discuss it further. Please sign below to confirm your participation.
Signature……
Thank you for your participation

Part 1: Background Information: Please tick the boxes in Grey

1. What is your gender:

Male		Female	

2. What is your age category?

20-25 years		26-30 years		31-35 years	
36-40 ears		40 years and above			

3. What is your educational degree are you studying for

Higher diploma		MSC/MA		PhD	

4. What is your speciality area?

Science		Literature and languages		Social	

Part 2: Knowledge of SMART Boards:

1. The SMART board is used for educational institutes only

Correct		Incorrect		Don't Know	

2. SMART board facilitates whole-class teaching

Correct		Incorrect		Don't Know	

3. SMART board can be split into a number of screens

Correct		Incorrect		Don't Know	

4. SMART boards can be used to address students at different comprehension levels

Correct		Incorrect		Don't Know	

5. SMART boards are not useful for visual learners

Correct		Incorrect		Don't Know	

6. Smart Boards are not useful for auditory learners

Correct		Incorrect		Don't Know	

7. SMART Boards are useful for tactile learners

Correct		Incorrect		Don't Know	

8. SMART boards allow the educator to flip back to review material

Correct		Incorrect		Don't Know	

9. A SMART board is touch sensitive display screen

Correct		Incorrect		Don't Know	

10. Information on SMART boards can be stored

Correct		Incorrect		Don't Know	

Part 3: Attitude towards SMART boards: Please tick underneath the appropriate answer

Question	Strongly Disagree	Disagree	I don't know	Agree	Strongly Agree
11-SMART boards have had an impact on my learning					
12.I find it easy to understand seminars/lectures when lecturers use SMART boards					
13.SMART boards minimise distractions					
14.I find it easy to use SMART boards					
15.The use of SMART boards Is highly motivating					
Class discussion is easily promoted via SMART boards					
SMART boards are more beneficial compared to traditional teaching tools					
SMART boards are very interesting educational tool					
SMART boards have increased my understanding of technology					
SMART boards improved my attendance in the university					
The SMART meets my learning needs					
SMART boards improve my self-esteem					
SMART boards allow me to participate in class discussions					
I know how to operate and use SMART boards is a useful skill					
Lecturers seem at ease when using SMART boards					

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