

## **THE EFFECTS OF THE INTERACTIVE WHITE BOARD USAGE ON THE STUDENDTS' LEARNING LEVEL AND AN APPLICATION IN THE FINANCIAL MARKETS COURSES**

**Res. Assist. Yasemin ERTAN**  
**Faculty of Economics and Business Administration**  
**Uludag University, Bursa, TURKEY**

**Res. Assist. Elif YÜCEL**  
**Faculty of Economics and Business Administration**  
**Uludag University, Bursa, TURKEY**

**Res. Assist. Esen KARA**  
**Faculty of Economics and Business Administration**  
**Uludag University, Bursa, TURKEY**

**Prof. Dr. Lale KARABIYIK**  
**Faculty of Economics and Business Administration**  
**Uludag University, Bursa, TURKEY**

### **ABSTRACT**

The effect of intense and fast lifestyle emerged from globalization has also an influence on education. As the access to the information increases, the information load on the students is increasing gradually as well. The need to give more and new information to the students in a short period of time made new technologies a requirement to be used in education. For this reason, lecturers are searching for new ways that they can teach more efficiently and get benefit from the educational technologies to make students learn more easily.

These tendencies are also observed in the accounting and finance in which the numerical data is intensively used. According to various educational theories, using visual aid as well as audio methods is increasing the efficiency of the education. On the other hand, conventional teaching methods are supported by PowerPoint presentations and the need of internet utilization appears in the finance education due to the importance of accounting and mathematical calculations.

The use of interactive whiteboard technique, that is an educational method providing these opportunities, is quite new.

This study examines how interactive white board technique, that appeals to students both aurally and visually, affects graduate students' learning in "Financial Markets Course" by using pretest-posttest control group model.

**Keywords:** Interactive White Board, Computer Assisted Education, Multiple Intelligences Theory.

## **INTRODUCTION**

Rapid development of technology has a deep influence on education and science world as well as all sections of society in today's world and also utilization of information and communication technologies have become a necessity (Taşpınar & Gümüş, 2004, p.2). In view of technology use of students as a part of their daily life, classical education that has been in school-teacher-student triangle for thousand years has remained incapable and using new multi-channel alternatives has become a necessity (Oğuz, Oktay, & Ayhan, 2004, p.21).

In the presence of changing society, the only way to provide more effective education is systematically redesigning teaching and learning processes and also mutually using human and technological resources by integrating learning and communication (Reiser, 1987, p.11).

In addition to identifying the necessary changes in accounting education and providing professional skills and knowledge in an accounting course during undergraduate education, Accounting Education Change Commission has been established under American Association of Accountants. The aim of this Commission is to keep the education up to date and commission states that the aim of the lectures nowadays is to teach students how to learn instead of conveying information through conventional methods (Position and Issues Statements of the Accounting Education Change Commission, 1990). Teaching students how to learn requires reaching information from different resources, assessing and using it, and also using technologies like internet. As a result topics are represented more effectively with the help of technology during learning and teaching processes, learning time decreases and teaching becomes more pleasant and comprehensible.

One of the most advanced educational technologies, interactive white board technology is a technology that transmits computer screen to the whiteboard by means of a projector and that enables controlling the computer by only touching the whiteboard with a special pen (Becta, 2003, p.1). Many studies indicate that the interactive white board technology facilitates and increases learning. Hwang et al. (2006) has developed a web-based interactive whiteboard system helping elementary students to solve mathematics problems.

A questionnaire conducted after the lecture has evaluated the students' attitude towards interactive whiteboard. It shows that students are pleased with area of use and ease of use of the interactive whiteboard; they have become eager to solve problems by using interactive whiteboard, and to correct the mistakes that their friends have done on the board. Mechling, Gast, & Krupa (2007) have analysed the effect of interactive whiteboard technology on teaching reading to students with mental disabilities Although none of the students could match the objects and photos with the target words before interactive whiteboard technology, after the application of the technology students have become 85.2% successful in matching objects with the words, 88.9% successful in matching words with the objects. Ekici (2008) evaluates the effect of the interactive whiteboard technology utilization on the success of 6<sup>th</sup> grade primary students in mathematics through applying interactive whiteboard technology to experimental group and using traditional method of teaching in the control group.

The research results indicate that there is a significant difference between successes prior to teaching and after the teaching in the experimental group and this difference is in favor of the teaching after the technology has been applied.

So, using interactive whiteboard technology is beneficial for mathematics teaching. On the other hand, there is a significant difference between success of the experimental group and the success of the control group after teaching and the significance is in favor of the experimental group. Schmid (2008) in his study analyzes the integration of interactive whiteboard technology to lectures conducted on the doctoral program students taking English course. According to the questionnaire, interactive whiteboard enhances the students' learning, increases their interest to the course and helps them better understand the course content.

The studies on the utilization of interactive whiteboard technology in education mainly focus on measuring the fact that how students perceive interactive whiteboard technology during lessons. However the number of empirical studies assessing the influence of interactive whiteboard technology on success of the students is relatively few. But to the extend of our knowledge, there are no studies that examine the advantages of interactive whiteboard technology in teaching and the effect of the technology on the success of students in a finance education at the graduate level so far.

This study examines the effects of educational advantages of interactive whiteboard technology on the success of graduate students in the Financial Markets course.

## **INTERACTIVE WHITEBOARD TECHNOLOGY**

Nowadays, just chalk and board are not enough to attract attention of the students who are intensely exposed to external stimulus like television and computer. In the presence of a changing society, the only way to provide more effective education is redesigning teaching and learning processes systematically and using human and technological resources mutually by integrating learning and communication (Reiser, 1987, p.11). Thus, well educated individuals as the products of applied modern education system have the ability to represent societies in which they live in an international arena (Ozsoy, 2003, p.24).

### **Theories of Learning Supporting the Use of Technology in Education**

The influence of sense organs on learning is indisputably tremendous. The more appealing the teaching to the sense organs, the more effective and permanent the learning is. Several theories of learning assert that technological tools have an influence, which words cannot achieve alone, on directing individuals, focusing their attention, and their capability to analyze and synthesize.

For instance, according to Ausubel, the proponent of the "Teaching via Presentation" strategy, instead of recording the information as is, students relating new knowledge to relevant concepts that they already know achieve meaningful learning and have remembered them for a long time. For this reason teachers should give lots of examples and should use visual stimulus such as graphics, charts, pictures (Akinoğlu et al., 2007, pp.38,173,174). Visual stimulus are logical networks specifying reason-result relationship between different cases, circumstances and concepts. These visual stimulies that are especially used to achieve aims at cognition, application, analyses and synthesis steps are associated with cognitive phases presented by Bloom (Yalın, 2002, pp.69,72).

Max Wertheimer from Gestalt school of psychology however asserts in his classic "Productive Thinking" that individuals should understand the inner structure of knowledge in order to learn. Visual learning is one of the techniques of learning the inner structure of knowledge (Lawrance, 2007, p.1).

Gagne indicates that the aim of teaching is the development of students' problem solving skills that is parallel to Wertheimer. According to Gagne, learning depends on configuration of external stimulus with cognitive processes. (Akinoğlu et al., 2007, p.131)

Cognitive theorists further explain learning by means of internal processes. According to cognitive theory, some parts of the environmental stimulus have come to short-term memory via selective perception. Short-term memory is a memory that holds a small amount of information for a short period of time. Considering the capacity of the short-term memory despite all the stimuli competing for attention, attractive stimulus should be presented to ensure that learners focus on the objective (Yalın, 2002, p.83). Long-term memory with a larger capacity on the other hand permanently holds the information in a complex mental organization.

Information stored in the long-term memory can be retrieved more easily and can move into short-term memory by means of visual aids (Miller, Yay, & Bekir, 2008, p. 304). Utilization of technology ensures that short-term memory holds the information for a longer time and information is moved into long-term memory. Interactive whiteboard creates multiple learning environments (Erduran & Tataroğlu, 2009, p.19). Thus, interactive whiteboard technology is appropriate for entire class teaching (Bennett & Lockyer, 2008, p.298; Glover, Miller, & Averis, 2001, p.258). The theory of dual coding memory is one of the most important theories on how information is permanently encoded and stored into the memory. According to this theory, information is stored in long-term memory both aurally and visually. Hence, information presented aurally and visually has a higher chance of retrieval (Paivio, 2006, p.3). Studies show that concrete words are rehearsed more likely than abstract words and pictures more than words. Using visual symbols with verbal representations provides multiple paths to retrieve the information from the memory (Yalın, 2002, p.87).

Theory of multiple intelligences emphasizes that individuals come into the learning environment with different intelligence levels. Theory suggests that everyone learns with different reasons, in different ways and with different speed. Using technological tools in education offer greater number of students learn more easily than theory of multiple intelligences in the areas of verbal-linguistical, logical-mathematical and visual-spatial intelligence offers (Akinoğlu et al., 2007, pp.133, 134). Offer

### **Utilization of Whiteboard Technology in Education**

Since computers entering into education environment, advances in technology used in classes increase without any slow down. One of these developments is "the interactive whiteboard technology" that becomes more and more prevalent in our country in recent years. Interactive white board technology that enables using white boards just like computers is first produced by Smart Technologies Company in the U.S.A. in 1991 (Shenton & Pagett, 2007, p.129). Interactive white board technology is a technology that moves computer screen to the whiteboard by means of a projector and that enables controlling the computer by only touching the whiteboard with a special pen (Becta, 2003, p.1).

Whiteboard provides ability to intervene in actions performed on the screen immediately by the screen's interactive touch-sensitive feature. Interactive white board technology makes possible to attach sound clips, videos, and animations to the course material that we already have and it is capable of stressing such as screening, zooming in and out. Particularly, its ability of internet connection makes lessons more attractive and they can be easily remembered (Becta, 2003, p.1).

**Interactive white board can be used in place of all traditional and modern class resources such as books, blackboard, overhead projector, maps, pictures, numerical axis, calculators, slides, and video players and it is also a useful presentation tool that enables students to access to the information having been collected for many years and taking up lots of space in bookcases with just one-touch (Becta, 2003, p.1).**

**Particularly schools in developed countries make large investments on interactive white board technology that is believed to have a positive effect on the success of the students (Slay, Sieborger, & Hodgkinson-Williams, 2008, p. 1322).**

**Interactive white board technology usage in classes has some favorable results for both students and teachers. For example, interactive white board use increases the attendance of students to courses (Erduran & Tataroğlu, 2009, p.19) (Wall, Kate; Higgins, Steve; Smith, Heather, 2005, p. 864) (Hodge, Sue; Anderson, Bill, 2007, p.277). Students focus their attention and are motivated by means of interactive whiteboard usage (Wall et al., 2005, p.859; Slay et al., 2008, p.1334; Erduran & Tataroğlu, 2009, p.19; (Bennett et al., 2008, p.297; Beauchamp, Gary; Kennewell, Steve, 2008, p.312; Schmid, 2008, p.1558; Mechling et al., 2007, p.1879; Hodge et al., 2007, p.277). It facilitates students' understanding of ideas and concepts and also strengthens and expedites their learning (Wall et al., 2005, p.857; Wood & Ashfield, 2008, p.94; Schmid, 2008, p.1560).**

**It enables teaching a specific topic in different ways by the use of different programs. (Wall et al., 2005, p.858). Therefore, it appeals to different learning styles (Ball, 2003, p.6; Schmid, 2008, p.1560). For instance, individuals learning via kinesthetic learning style learn more easily since they are able to move objects, individuals learning through hearing can learn without any difficulties since they participate into in-class discussions, and visual learners learn more easily since they can see the material developed on the screen. Not using materials, which are detrimental and cause infection such as chalk, felt pen, enables teaching in a more hygienic and healthy environment (Becta, 2003, p.2). Courses taught by interactive whiteboard can be saved into computer and augmented as lecture notes.**

**Consequently, students who do not attend to lessons can follow topics (Becta, 2003, p.2). Interactive white board can also be used in increasing students' information communication skills, thinking skills, software utilization skills, and general learning skills such as note-taking and note preparation (Hodge et al., 2007, p.278). Interactive white board technology increases students' interest in searching information on internet and processing information (Hodge et al., 2007, p.278). It allows for using games that can support learning process (Wall et al., 2005, p.858) and makes lessons more entertaining (Wall et al., 2005, p.859; Erduran & Tataroğlu, 2009, p.20). It makes it possible to use and combine a wide variety of multimedia resources such as articles, pictures, videos, websites, and sounds (Levy, 2002). It allows for a student-centered approach and provides an opportunity for participants' interaction (Geer & Barnes, 2007, p.92).**

**Interactive white board utilization reduces teachers' class preparation time since it enables saving lessons and using them again (Bennett, Sue; Lockyer, Yori, 2008, p. 297). It reduces the need to use the board and increase the pace of teaching through facilitating the usage of available material (Wood et al. 2008, p. 89; Ball, 2003, p. 6; Glover et al., 2003, p. 185; Bennett et al., 2008, p.298; Schmid, 2008, p.1561). Teachers look for new ways and methods of teaching that they have already taught and thus their creativity has enhanced (Hodge et al., 2007, p.279; Bennett et al., 2008, p.297).**

Moreover, it reduces the instructors' workload by giving an opportunity to save, to share and to reuse course materials (Wood et al., 2008, p.89; Glove et al., 2003, p.263). It also provides an opportunity for instructors to make effective presentations by combining multimedia resources with the course content (Geer & Barnes, 2007, p. 92)

On the other hand, dark classrooms can create negative influence on students during interactive whiteboard utilization (Erduran & Tataroğlu, 2009, p.20).

It can cause technological problems like other technological tools and latency time for calibration (Wall et al., 2005, p. 863; Erduran & Tataroğlu, 2009, p. 20). Furthermore, instructors teaching more rapidly can cause information overload on students (Schmid, 2008, p.1562). Since the entire necessary course materials are given students without difficulty, this can encourage students to be lazy (Schmid, 2008, p. 1563).

## LITERATURE SURVEY

The studies on the utilization of interactive whiteboard technology in education mainly focus on measuring the fact that how students or teachers perceive interactive whiteboard technology during lessons. (Glover & Miller, 2001; Levy, 2002; Wall et al, 2005; Hwang et al., 2006; Geer- Barnes, 2007; Schmid, 2008; Slay et al., 2008; Wood & Ashfield, 2008; Lewin et al., 2008; Beauchamp et al., 2008; Elaziz, 2008, Erduran & Tataroğlu, 2009; Bennett et al., 2008). Most of these researches show that interactive whiteboard utilization has favorable result in terms of students and teachers. These studies based on teachers' and students' point of view are deficient in the actual effect of interactive white board technology on learning, interaction in class, success and different types of skills (Higgins et al., 2005,p. 213). So, empirical studies should analyze this effect.

Some of the studies evaluate the integration process of interactive whiteboard technology to classrooms. According to Armstrong et al. (2005) integrating interactive whiteboard technology into classes is a more complicated process than building interactive whiteboards and loading the software. Teachers should be educated on using interactive whiteboards and on-the-job training should be provided as well. According to Beauchamp (2004) teachers must be educated since the commencement of the technology usage. However, teachers need time to combine and assimilate topics that they have learnt and their course experiences. Each teacher has different aptitude towards using technology and consequently has different learning style and rate. As the teachers' self-confidence is increasing, they will prefer using the technology to a greater extend, make students use the technology to a greater extend and therefore self-confidence of the students will rise as well. Hodge and Anderson examine the effect of integration of interactive whiteboard technology to primary schools and they concluded that what is important is how the technology is used not presence of the technology (2007). Successful utilization of the interactive whiteboard technology in class depends on the ability to use it.

Limited number of empirical studies indicates positive results of use of interactive whiteboard technology in class. Akdemir (2009) compare the influence of using interactive whiteboard technology and blackboard in geography courses. The study points out that interactive whiteboard technology increases the success of the students and for this reason it can be preferred over blackboard. Ekici (2008) examines whether interactive whiteboard technology has an influence on the success of the students in the 6<sup>th</sup> grade of the primary school in mathematics.

To analyze this, experimental group has used interactive whiteboard and control group has learned the course by means of traditional methods. The research results indicate that there is a significant difference between successes prior to teaching and after the teaching in the experimental group and this difference is in favor of the teaching after the technology has been applied. In addition, there is a significant difference between success of the experimental group and the success of the control group after teaching and the significance is in favor of the experimental group. Tataroğlu (2009) analyzes the influence of interactive whiteboard utilization on success of the 10<sup>th</sup> grade students in mathematics, on the aptitude towards mathematics course, and on their self-sufficiency level. His study shows that there is not any significant difference between successes of the students in classes that the interactive whiteboard is used and success of students in classes where the interactive whiteboard is not used.

Also, there is not any significant difference between control group's and experimental group's attitude toward mathematics before the application and there is however a significant difference between control group's and experimental group's attitude toward mathematics after the application.

Furthermore, this result is in favor of the experimental group. Moreover, when students between 7 and 11 years of age are educated by interactive whiteboard, there are advantages that are directly related to time of reading, writing, mathematics, and science (Lewin et al., 2008).

The critical factor in this study is the length of time that the students are educated. Beauchamp and Kennewell (2008) have not found a significant difference between the success of the classes in which the interactive whiteboard is used and the success of the classes in which the interactive whiteboard is not used

## RESEARCH METHODOLOGY

### The Aim of the Application

This study evaluates the effect of the independent variable, "interactive whiteboard utilization", on the dependent variable which is "efficiency of personal gains of graduate students throughout the Capital Markets course"

### Hypothesis

To find the effect of interactive whiteboard technology on the success of the students after teaching, following hypothesis is developed:

$H_0 : \mu = \mu$  There is not any significant difference between experimental group's and the control group's success after teaching.

$H_1 : \mu \neq \mu$  There is a significant difference between experimental group's and the control group's success after teaching.

### The Method Used

Of all the actual experimental types, this research applies 'the model with the pretest and posttest control group' (Karasar, 2008, p.97). There are two groups formed by unbiased assignment in pretest-posttest control grouped model. One of them is used as an experimental group and the other one is used as a control group. Measurements are done before and after the experiment in both groups. Pretest enables identifying degree of similarities between groups prior to the experiment and correcting posttest results in line with them.

Symbolic view of the model is as follows:

$G_1$	R	$O_{1.1}$	X	$O_{1.2}$
$G_2$	R	$O_{2.1}$		$O_{2.2}$

**Figure: 1**  
**Symbolic View of The Model With Pretest-Posttest Control Groups**

In this model, pretest and posttest measurement results should be used together in order to decide the effect of X. For this purpose:

- Percent increases in the pretest-posttest scores are found for each group and increase in means are compared, or,
- Pretest scores are used as covariate and their covariance with posttest scores is analyzed, or,
- Pretest scores ( $O_{1.1}$ ,  $O_{2.1}$ ) are first compared and if there is not any significant difference, then difference between means are tested by only using posttest scores.

### **Data Collection**

Of all the non-thesis and thesis graduate students of the Department of Business Administration at the Institute of Social Sciences at Uludag University, the universe of this research is students taking Financial Markets course in the 2009-2010 Academic Year. The sample of this research is formed by 22 students who have attended Capital Markets course and posttest. In this study, experimental group comprises of non-thesis graduate class and control group consists of graduate students with thesis. The number of samples in each group is equal.

### **Analysis**

This study contains pretest and posttest prepared as achievement test to measure the academic achievement of the students. Experts verify the validity of the tests. Analyses are conducted at 5% significance level. Pretest and posttest results of the students are entered into the SPSS 17.0 in order to conduct statistical analyses.

Pretest has 36 questions to determine the homogeneity of the experimental group and the control group. Reliability of the achievement test is tested on the 55 graduate students who previously took the Capital Markets course at the Institute of Social Sciences at Uludag University. Measurement tools' reliability test is conducted by the use of Cronbach  $\alpha$  test. As a result of the evaluation, 10 questions reducing the reliability of the test are eliminated. Cronbach  $\alpha$  reliability coefficient of the test is found as 0.604. Considering the fact that reliability coefficient between 0.600 and 0.800 is reliable enough, there is no need to eliminate more questions from the test in order to keep the number of the questions at an adequate level.

Kolmogorov-Simirnov test is used to analyze whether test results have normal distribution since the number of observations are more than 30 and the results show that they have normal distribution since asymp. significant value of 0.773 which is larger than 0.05.

Afterwards pretest measurement tool that contains 26 questions is applied to both experimental group and control group. At this point Shapiro-Wilk test is used to examine whether results have normal distribution since the number of observations is less than 30. Significant value of experimental group is 0.384 and the significant value of control group is 0.530. Data follows normal distribution as those values are larger than 0.05.



One-way-ANOVA test is used to determine the homogeneity of the experimental and control group. The result of the one-way-ANOVA test is 0.418 that is a result of the statistical operations conducted through Statistical Analysis package. So, experimental group results are not significantly different from control group since 0.418 is larger than the 0.05 significance level. In other words they are homogenous. The following table provides means and standard deviations of the experimental and the control group.

**Table: 1**  
Means and standard deviations of the experimental group and the control group

Groups	N	Mean	Standard Deviation
Experimental	11	61.27	16.644
Control	11	62.55	18.742

The proof of the homogeneity is the very close means and the standard deviations of the pretest. After determining the homogeneity of the groups, topic, "Stock Exchange Index", is taught via traditional methods to control group and via interactive whiteboard to experimental group and then, 10 question posttest measurement tool conducted on both groups in order to measure the class acquisitions of interactive whiteboard system. Shapiro-Wilk test is used to examine whether results have normal distribution since the number of observations is less than 30. Significant value of the experimental group is 0.613 and significant value of the control group is 0.979. Data follows normal distribution since those values are larger than 0.05.

Afterwards, hypotheses are tested to assess the effect of interactive whiteboard technology on the success of the students subsequent to teaching. Test statistics is calculated at  $\alpha = 0.05$  (%95) significance level and the results are evaluated.

The following table provides independent sample t-test results that show whether posttest scores of the experimental group are significantly different from the scores of the control group.

**Table: 2**  
T-Test Results of Posttest Scores of  
The Experimental Group Students And The Control Group Students

Posttest	N	Mean	Standard Deviation	t	p
Exp. Group	11	77.27	14.178	-.723	0.404
Control Group	11	72.55	16.397	-.723	0.404

Table: 2 presents t-test results of the post-test scores of the experimental group students and the control group students. P-value is 0.404 and the H0 is accepted since p-value is larger than 5% (0.05) significance level. Therefore, success of the experimental group after the teaching is not significantly different from the success of the control group subsequent to teaching.

## RESULTS

Studies related to interactive whiteboard usage in education are grouped into two. Some of them measures students' and teachers' perception of interactive whiteboard. These studies generally state that interactive whiteboard increases the learning capacity. Relatively small number of empirical studies yields different results.

As a result of this study conducted on the graduate students taking financial markets course, there is not any significant difference between posttest scores of experimental group and control group.

While average success of the group using interactive whiteboard was less than the control group before the experiment, it goes ahead of the control group after the experiment.

Since the mean of the pretest scores of the experimental and control group students are different, experimental application is more effective in increasing the success of the students than the success of the application given to control group.

Nonetheless, few students in the sample could have affected the application results. And also the fact that the scope of the application is limited to one course and the institute has just started to use interactive white board technology could have an influence on the application results. In view of that, future empirical research may improve this research.

#### **BIODATA and CONTACT ADDRESSES OF AUTHORS**



**Research Assistant Yasemin ERTAN** was born in Bursa in 1980. She graduated from Gazi University Faculty of Business Administration in 2005. She started her graduate education in Uludag University Social Sciences Institute in 2005 and she started to work in Uludag University Faculty of Business Administration as a research assistant in 2006. She attend postgraduate program of Uludag University Social Sciences Institute.

**Research Assistant Yasemin ERTAN**  
Faculty of Economics and Business Administration  
Uludag University, Bursa, TURKEY  
Email: [yasertan@uludag.edu.tr](mailto:yasertan@uludag.edu.tr)



**Research Assistant Elif YÜCEL** was born in Bursa in 1983. She graduated from Uludag University Faculty of Business Administration in 2005. She started her graduate education in Uludag University Social Sciences Institute in 2005 and she started to work in Uludag University Faculty of Business Administration as a research assistant in 2006. She attend postgraduate program of Uludag University Social Sciences Institute.

**Research Assistant Elif YÜCEL**  
Faculty of Economics and Business Administration  
Uludag University, Bursa, TURKEY  
Email: [emugal@uludag.edu.tr](mailto:emugal@uludag.edu.tr)



**Professor Lale KARABIYIK** graduated from Uludag University Faculty of Business Administration, Turkey in 1986. She received her graduate degree in Uludag University Faculty of Business Administration, Turkey in 1989. She received her PhD. at Accounting and Finance Department in Uludag University Faculty of Business Administration, Turkey in 1993 and she also works as a lecturer in the same department since 2005.

Professor Lale KARABIYIK  
Faculty of Economics and Business Administration  
Uludag University, Bursa, TURKEY  
Email: [lale@uludag.edu.tr](mailto:lale@uludag.edu.tr)



**Esen KARA** was born in Bursa in 1980. She graduated from Uludag University Faculty of Business Administration in 2008. She started her graduate education in Uludag University Social Sciences Institute in 2008 and she started to work in Uludag University Faculty of Business Administration as a research assistant in 2009. She attend postgraduate program of Uludag University Social Sciences Institute.

Research Assistant Esen KARA  
Faculty of Economics and Business Administration  
Uludag University, Bursa, TURKEY  
Email: [esen\\_cimilli@hotmail.com](mailto:esen_cimilli@hotmail.com)

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