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Effect of Principals' Technological Leadership on Teachers' Attitude towards the Use of Educational Technologies

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Abstract. In today's world of technology, integration of Information and Communication Technologies (ICT) into education has become crucial. However, without teachers' genuine efforts, it does not seem possible to effectively integrate technology in classroom practice. Teachers' positive attitude towards educational technologies is considered to be essential for the integration of technology into teaching and learning. Research has also shown that principals' technology leadership could be correlated with teachers' integration of educational technology into classroom teaching. This study aims to explore the effect of secondary school principals' technological leadership on teachers' attitude towards educational technology. Data regarding principals' technology leadership were collected using the "Technology Leadership Scale" developed by Sincar in 2009, and data regarding teachers' attitudes towards educational technology were collected using the "Attitude Towards Educational Technology Scale" developed by Pala in 2006. The statistical analysis has revealed that principals' technological leadership had little effect on teachers' positive attitude towards the use of educational technologies and did not have a significant effect on their negative attitude.

Keywords: Technological leadership, educational technology, secondary school.

1 Introduction

In today's world of technology, integration of Information and Communication Technologies (ICT) into education has become crucial in government programs [1] so that the members of modern societies can manage and use excessive information to solve complicated problems and to cope with the evolving demands of the information age. In the emerging knowledge society of our age, educating individuals to be capable of gathering and using information fast and effectively has become a priority for educational institutions. That is why the integration of available technologies into educational processes and the effective use of technological resources has gained importance.

Integration of technology in education has become important in education not only in developed countries but also in developing countries [2]. As a developing country, The Ministry of Education in Turkey has made great efforts and supported major

financial investments to integrate ICT into teaching and learning environments. Such projects as e-school, e-registration, e-personnel, e-teacher, the EBA (Education and Informatics Network) and FATİH (Movement of Enhancing Opportunities and Improving Technology) projects have been started to this end. In the scope of the FATİH project, a huge sum of money (800 million Turkish Lira (TL) in 2012 and 1.4 billion TL in 2013) has been invested in developing hardware for schools, distributing tablet personal computers (PCs) to all teachers and students, enabling electronic resources for classroom use, improving Internet connection at schools, developing a technology-friendly curriculum and organizing training events for the teachers and administrators [3]. However, without teachers' genuine efforts, it does not seem possible to effectively integrate technology in classroom practice. Teachers' positive attitudes towards educational technologies are considered to be essential for the integration of technology into teaching and learning. Teo states that teachers are the key players in the integration of technology into education, and highlights the importance of teachers' efficient and appropriate use of technology in maximising teaching and learning [4]. In addition, research shows that teachers' will and competencies in using technology are closely related to their attitude towards educational technologies, which in turn has a great influence on the integration of technology in classroom practice [5, 6, 7, 8, 9, 10].

Leadership is considered to be one of the most influential factors on the practices at school [11]. Anderson and Dexter state that "all of the literature on leadership and technology acknowledges either explicitly or implicitly that school leaders should provide administrative oversight for educational technology" [12]. There is some research which supports this view, stating that technology leadership has a significant influence on teachers' technology use [13, 14, 15, 16]. However, there is some other research which highlights that teachers' beliefs, competencies and perceptions regarding the use of technology could determine their use of technology in class and leadership might not be as influential on their attitude as expected [4, 17, 18, 19, 20]. The review of the literature reveals some controversial findings about the influence of school principals' technology leadership on teachers' attitudes towards educational technologies.

2 The Principal as a Technology Leader

According to Dougherty et al., a technology leader "enables others to effectively and successfully use, manage, assess, and understand technologies of the designed world" [21]. As a technology leader, a school principal needs to understand and be capable of using recent technologies. More importantly, a technology leader should understand and manage the changes brought by the technological advancements as well as supporting the teaching staff through developing their confidence in and capabilities of using technology at school [22].

The literature on the qualities of a technology leader mainly indicates four aspects [23, 24, 25]: *human-centeredness*; *communication and cooperation*; *vision*; and *support*. Being human-centered means that decisions and practices at school are centered on the needs and expectations of school staff. In other words, technology

leaders show regard to ethics, justice and equity in technology use as well as being vigilant about the issues related to technology use [24]. Another factor that affects technology leadership is interpersonal and communication skills [14, 25, 26, 27, 28, 29]. Technology leaders need to be able to use technology to carry out their own duties and to communicate with others [12]. Chang et al. even state that interpersonal and communication skills are much more important for technology leaders than having technological expertise, because they cannot convey this expertise without these skills [23]. Another important quality of a technology leader is being visionary and establishing a vision at school that fosters the integration of technology in education and receives support from all the stakeholders [12, 28, 29, 30, 31, 32]. Ross and Bailey state that vision is essential to give school staff direction and guidance for the proper integration of technology into classroom practice [33]. Supporting teachers in understanding and using technology, providing necessary hardware and software and being a model for the efficient use of technology is another significant characteristic of a technology leader [12, 34, 35, 36].

Recently, numerous studies have been done about the attitudes of school principals towards technology and their technological leadership qualities [22, 37, 38, 39, 40, 41, 42, 43]. However, many of these studies do not focus on the effect of these qualities on teachers' attitudes towards integrating technology into teaching processes. Moreover, the review of the literature shows some controversial findings regarding the effect of technology leadership on teachers' attitude towards the use of technology. Therefore, studies investigating the relationship between these two constructs might shed light on the future discussions regarding the issue.

This study aims to explore the effect of secondary school principals' technology leadership on teachers' attitude towards educational technology and the way they use technology at school. As mentioned earlier, there are not enough studies in the literature that examine the effect of principals' technology leadership on teachers' attitudes towards educational technology. This study is considered to contribute to the literature in this respect. Furthermore, findings of the study could shed light on regulations regarding the integration of technology into education.

3 Teachers' Attitude towards Technology

Teachers' attitude towards technology is considered to be a key factor in integrating technology in classroom interaction [2, 4, 8, 17, 18, 44, 45, 46]. Huang and Liav state that implementation of technology depends on the positive attitude towards it rather than the state of technology at school [45]. Teo points out the fact that teachers' positive feelings towards the use of technology would reinforce their intentions to use it [4]. Davis et al. state that teachers' behavioral intentions to use technology are determined by their attitudes towards it [18].

In the literature, mainly three theories are mentioned in order to explain teachers' use of technology: the Technology Acceptance Model (TAM) [17], the Theory of Planned Behaviour (TPB) [47] and the Unified Theory of Acceptance and Use of Technology (UTAUT) [44]. TAM specifies perceived usefulness, perceived ease of use, attitude towards use and behavioral intention to use technology. According to

TPB, teachers' behavioral intentions to use technology are shaped by their attitude towards technology, subjective norms (that is, the extent to which people important to the teacher think the use of technology is important and beneficial) and teachers' perceived behavioral control regarding technology use (that is, their perception of how easy or difficult it would be to use technology). In addition to these theories, Christensen and Knezek developed the model of Will Skill Tool [8]. The model postulates that teachers' will, skill and access to technology tools are necessary to integrate technology in classroom instruction. Common to all these theories or models is the importance of teachers' attitude towards the use of educational technologies. As pointed out earlier, teachers are the key players in integrating technology into actual classroom practice and it seems impossible without teachers' positive approaches to the use of educational technologies.

4 Method

This is a relational descriptive study that aims to determine the effect of school principals' technology leadership on teachers' attitude towards educational technologies. The universe of the study comprises 320 teachers working at secondary schools in Tekirdağ, Turkey. Questionnaires were distributed to the whole universe and 255 questionnaires were returned. Three of the questionnaires were incomplete, so they were not included in the analysis. The remaining 252 questionnaires were included in the analysis. One hundred and thirty-two (52.4%) of the participants were female and 120 (47.6%) were male. Twenty (7.9%) of the participants were aged between 21-30 years, 104 (41.3%) were aged between 31-40 years, 102 (40.5%) were aged 41-50 years and 26 (10.3%) were aged over 51 years. Eighty-eight (34.9%) of the participants teach physical sciences (mathematics, physics, chemistry, biology), 90 (35.7%) teach humanities (literature, geography, history, philosophy, psychology), 62 (24.6%) teach languages (English and German) and 12 (4.8%) teach fine arts.

Data regarding principals' technology leadership were collected using the "Technology Leadership Scale" developed by Sincar [24]. The scale has four factors (human-centeredness, communication and interaction, vision and supportiveness) and the Cronbach's Alpha was .98. Data regarding teachers' attitude towards educational technology were collected using the "Attitude towards Educational Technology Scale" developed by Pala [48]. The scale has two factors (positive and negative) and the Cronbach's Alpha for the positive attitude factor was .95 and Cronbach's Alpha for the negative attitude factor was .84. Cronbach's Alpha shows the internal consistency of a scale and indicates the reliability of the scale used in the research. Scales are usually required to have a reliability of .70 or more. Thus, scales used in this research can be accepted as reliable.

5 Discussion

This study aimed to analyze the effect of technology leadership on secondary school teachers' attitudes towards the use of educational technologies in classroom practice.

First, teachers' attitudes towards educational technology use and their perceptions regarding school principals' technology leadership were analysed using descriptive statistics. Then, the effect of perceived technology leadership on teachers' attitudes towards educational technology was analysed using a regression test.

5.1 Teachers' attitudes towards the use of educational technologies

The results of the analysis showed that teachers have positive rather than negative attitudes towards the use of educational technologies. The results of the statistical analysis can be seen in Table 1.

Table 1: Teachers' Attitudes towards Educational Technology

	N	\bar{X}	SS
Positive Attitude	252	3.964	0.611
Negative Attitude	252	2.285	0.565

According to the results of the analysis, it can be said that teachers have positive attitudes towards technology use in class. According to Davis's theory of TAM [17], perceived ease of use affects perceived usefulness and, as a result, the attitude towards use. Teo states that facilitating conditions such as providing technology tools might have a greater effect on teachers' use of technology than the behaviours of school principals [4]. As mentioned earlier, in the scope of the FATIH project, schools have been provided with interactive whiteboards and projectors as well as computers and Internet connection. As such, teachers have been provided with a large amount of free and ready-to-use electronic resources within the EBA (Education and Informatics Network) project. All these developments might have increased teachers' perceived ease of use and this might have increased their positive attitude towards the use of educational technologies.

However, it should also be noted that the findings show teachers have some levels of negative attitudes towards educational technology use. These teachers seem to believe that technology could hurt teachers' discipline in class. They also indicate that use of educational technologies could not be appropriate for testing purposes and could not be suitable to teach some subject areas.

These findings might suggest that teachers are influenced by traditional beliefs about teaching and testing which usually focuses on teacher-centeredness. Ertmer et al. [1] suggest that technology be placed in the hands of students and they should be supported to use technology to communicate, collaborate and solve problems using more complicated thinking skills. A student-centered approach and a collaborative classroom environment are considered to be a prerequisite to the effective use of technology in class [1, 49, 50, 51, 52, 53, 54]. In addition, it might be considered that teachers are not well informed about the use of educational technologies for testing purposes and student-centered education. This idea could be supported by teachers' answers to two questions asked on the data collection form. The first question was about whether they received any training about the use of technology in class. Two hundred and twenty-four (88.9%) of the participants indicated that they received in-service training. However, 146 of these participants have only attended one training

event within the scope of the FATIH project. With this project, it was aimed to build interactive whiteboard systems at schools and to connect this system with tablet PCs which were distributed to teachers and students for free. At the beginning of the 2013-2014 school year, teachers were trained about the use of these interactive whiteboards. One hundred and four of the participants have indicated that they attended courses on the use of Microsoft Office programs and web page design. As a result, it can be seen that teachers only received training on how to use some technological devices rather than ways of integrating educational technologies into education processes. In addition, during the data collection period, teachers complained that the Internet connection was not offered effectively. They also noted that the scope of in-service training courses regarding the integration of technology was not enough in terms of content and length.

Two hundred and thirty-four (92.9%) of the research participants noted that they used educational technologies in class. However, 118 of these participants stated that they only used the interactive whiteboard in classroom interactions and 44 indicated that they used the Internet to do research while they prepared lessons or examinations. Seventy-six of the teachers using interactive whiteboards indicated that they used it to show videos or visuals, 62 reported using it at the presentation stage of the lesson, 30 to do extra tests and exercises, 28 to make the lesson more enjoyable, and 8 to use time more efficiently. These findings show that providing an interactive whiteboard for every classroom affected the integration of technology in classroom instruction. However, it should be noted that teachers need to be offered more training on using interactive whiteboards in a way that leads to a more student-centered education process.

5.2 Perceived technology leadership of school principals

Analysis of the data regarding teachers' perceptions of school principals' technology leadership showed that school principals demonstrate a good level of technology leadership ($\bar{X}=3.39$). However, the finding indicates teachers partially agree that their school principals are technology leaders, which might mean that they have higher expectations from their school leaders as a technology leader.

Table 2. Perceived Technology Leadership of School Principals

	N	\bar{X}	SS
Human-centeredness	252	3.42	0.75
Support	252	3.40	0.84
Communication and cooperation	252	3.35	0.75
Vision	252	3.34	0.78
TOTAL	252	3.39	0.73

As technology leaders, school leaders according to teachers (see Table 2) seem to be human-centered and supportive. Compared to these two dimensions, they seem to be less visionary, communicative and cooperative, which indicates that school leaders might not be as future oriented as expected in promoting the use of technology at school. Also, they might not be using technology efficiently for better communication with school staff and stakeholders. However, developing a schoolwide shared vision

for technology and involvement of the stakeholders in the enabling and development of necessary technological structures are considered to be a priority for an effective technology leadership [12, 29, 31]. Therefore, it is important that school principals try to understand the direction and trends of technology development and maintain a clear technology vision as well as having necessary interpersonal and communication skills to convey this understanding and vision to the stakeholders.

5.3 Effect of technology leadership on teachers' attitudes towards the use of educational technologies

Although school principals are considered to be good technology leaders, this seems to have little effect on teachers' attitudes towards educational technology (see Table 3). In other words, it can be said that teachers have a positive attitude towards using technology in class regardless of principals' support as a technology leader.

In addition, technology leadership does not have a significant effect on teachers' negative attitudes towards educational technologies. In other words, teachers' negative attitudes towards technology use in classroom practice seem to be related to some other factors rather than technology leadership. Teachers' negative attitudes towards educational technologies might be related to some background factors such as technology infrastructure [12], teachers' beliefs about teaching [1] or teachers' beliefs about technology [17, 46].

Table 3: Effects of Technology Leadership on Teachers' Attitudes towards Educational Technology

	B	SE	β	T	p
Constant	3.305	0,178		18,516	0,000
<i>Technology Leadership</i>	0.195	0,052	0,232	3,776	0,000

Dependent Variable: <i>Positive Attitude</i>				
F=14.259	R=0.232	R²=0.054	p < .01	

	B	SE	β	T	p
Constant	2.527	0,169		14,952	0,000
<i>Technology Leadership</i>	0.071	0,049	0,092	1,462	0,145

Dependent Variable: <i>Negative Attitude</i>				
F=2.137	R=0.092	R²=0.008	p > .01	

Teo indicates that teachers' intentions to use technology could be much more related to perceived ease of use and perceived usefulness rather than technology leadership of school leaders [4]. He also points out that the environment in which teachers use technology could be more important than the support of school principals. Robert and Handerson state that teachers might depend on their sense of professional duty and personal interest to integrate technology in education rather than an institutional mandate such as a school principal [19]. Another reason why

technology leadership did not have a considerable effect on teachers' attitudes towards technology could be linked to the centralist organisation of the educational institutions in Turkey. In other words, the centralised management system in Turkey does not give much autonomy to school principals, especially in terms of finance and resource acquisition. Therefore, the Ministry of Education is considered to be responsible for providing technology tools and promoting the use of technology at schools. That is why the recent initiatives taken by the Ministry might have been more effective than school principals' technology leadership on teachers' attitudes towards technology. Similarly, as Ajzen states in the theory of planned behaviour [47], subjective norm, that is, the extent to which people important to the individual think the behaviour should be performed could influence teachers' attitudes towards technology use. In our study, teachers could have regarded the Ministry as their subjective norm and the recent focus of the Ministry on the use of technology might have resulted in their positive attitude towards the use of technology.

Analysis of the dimensions of technology leadership demonstrated that being supportive and visionary has more influence on teachers' positive attitude towards educational technologies (see Table 4). In other words, school principals who are future-directed about the use of technology at school, who can follow and share technological developments with school staff and who can improve facilities and offer opportunities for the integration of technology might help develop a positive attitude towards technology use at school.

Table 4. Effects of Technology Leadership Dimensions on Teachers' Positive Attitudes towards Educational Technology

	B	SE	β	T	p
Constant	3.361	0.177		19.042	0.000
<i>Human-centeredness</i>	0.176	0.050	0.216	3.495	0.001
Dependent Variable: <i>Positive Attitude</i>					
F=12.216 R=0.216 R²=0.047 p < .01					
Constant	3.387	0.157		21.544	0.000
<i>Support</i>	0.170	0.045	0.233	3.783	0.000
Dependent Variable: <i>Positive Attitude</i>					
F=14.308 R=0.233 R²=0.054 p > .01					
Constant	3.411	0.174		19.514	0.000
<i>Communication and Cooperation</i>	0.165	0.051	0.202	3.258	0.001
Dependent Variable: <i>Positive Attitude</i>					
F=10.616 R=0.202 R²=0.041 p > .01					
Constant	3.368	0.165		20.442	0.000
<i>Vision</i>	0.178	0.048	0.229	3.715	0.000
Dependent Variable: <i>Positive Attitude</i>					
F=13.800 R=0.229 R²=0.057 p > .01					

As Ross and Bailey state, technology leaders should provide teachers with a vision which directs and guides the integration of technology into education [33]. Inkster notes that creating a vision regarding the use of technology by both teachers and students is a significant indicator of a principals' technology leadership [29]. Bailey highlights the importance of providing access to technology resources and increasing opportunities to acquire these resources as well as pointing out the significance of

providing service and technical support in schools [31]. Our findings support these ideas from the literature, although the effect of technology leadership seems to be inconsiderable.

6 Conclusion

A review of the literature demonstrates controversial findings on the effect of school principals' technological leadership on teachers' attitudes towards technology. Although many researchers indicate the importance of leadership in the effective integration of new technologies in teaching and learning [13, 14, 15, 16], there are some researchers that suggest teachers' perceptions regarding technology could be more influential in their use of technology [4, 17, 18, 19, 20].

The findings of our study support the second view, in that technology leadership had a little effect on teachers' positive attitudes towards technology use, and did not have a significant effect on their negative attitudes. This is considered to be the result of recent initiatives taken by the Turkish Ministry of Education, especially the FATİH project. In the scope of the FATİH project, schools are provided with interactive whiteboards and projectors as well as computers and Internet connection. As such, teachers are provided with a large amount of free and ready-to-use electronic resources. These developments might have increased teachers' perceived ease of use and this might have increased their positive attitudes towards the use of educational technologies. In addition, the centralised management system of education in Turkey could be another reason why school principals' technology leadership did not have a significant influence on teachers' attitudes towards technology. As a result of this management system, the Ministry of Education is in charge of providing technology tools and promoting the use of technology at schools. Therefore, the recent initiatives taken by the Ministry might have been more effective on teachers' attitudes towards technology. Similarly, teachers' could have regarded the Ministry as their subjective norm rather than school principals, and the recent focus of the Ministry on the use of technology might have resulted in their positive attitudes towards the use of technology.

Although teachers were found to have a positive attitude towards educational technologies, there are still teachers who are cautious about using technology in classroom interactions. In addition, our investigation revealed that teachers are trying to use technology in a way that supports their traditional teacher-based views of teaching. However, it is highlighted in the literature that effective use of technology in teaching and learning requires a student-centered approach to teaching [52, 55]. Therefore, teachers should be offered courses where they can find the opportunity to adopt new approaches to teaching to integrate technology more efficiently into classroom practice. Moreover, rapid technological changes require on-going training for teachers so that they can develop more advanced skills and knowledge on the use of educational technologies. In short, teacher professional development should be central in the management of technology integration into education processes.

Further empirical and theoretical work seems to be necessary in order to understand the role of school principals as technology leaders as well as to identify

factors that affect the attitude of teachers towards educational technologies. The use of technology in education has become significant globally and also culture is considered to be influential in the use of technologies [56]. Therefore, further studies could be conducted to compare the use of educational technologies in different countries and cultures.

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