

Relationship between Teachers' Attitudes towards Technology Use in Education and Autonomy Behaviors

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ABSTRACT

With the advances in science and technology, the use of technology in education continues to become widespread. This situation also increases importance of studies on teachers' attitudes towards the use of technology in education. The present study aimed to examine the relationship between teacher attitudes concerning technology use in education and autonomy behaviors. Analyzes were carried out with the data collected from a total of 440 teachers. According to the analysis results, teacher attitudes concerning technology use in teaching do not change according to gender and school type, but according to their education level. While the autonomy behaviors of teachers do not vary in relation to their gender and education level, it differs according to the type of school they work. The attitudes of teachers regarding technology use in teaching and autonomy behaviors do not differ according to their professional seniority. According to the order of importance, the teacher's teaching process autonomy and professional communication autonomy behaviors significantly predict their attitudes regarding technology use in education. These two variables together explain 30% of teachers' attitudes toward technology use in education.

Keywords: Use of technology, technology attitude, teacher autonomy, educational technology.

INTRODUCTION

The developments in science and technology continue continuously, and these developments affect social life in different ways. The rapid advancement of technology leads to changes in many areas such as health, industry, education and so on. Along with the technological developments, different needs emerged in the education and instruction environments, which led the educators to use technology actively.

The current changes in technology affect the education and competencies necessary for the individuals in the information society to benefit from technology effectively and to be successful in the technological environment (Durak & Seferoğlu, 2017). In order to keep up with these changes, teachers' acquiring the necessary technology usage skills is among the important topics in education. Along with the technological developments, the changes in the education systems also make changes compulsory in the learning-teaching activities. Especially in secondary and higher education institutions, the use of technology is increasing and teachers' use of technology is becoming almost mandatory (Yılmaz, 2016).

Reflections of technology, defined as the organized application of scientific or other systematic information (Galbraith, 2007), has led to emergence of the field of educational technology in the educational process. Educational technology was initially limited to the tools and materials used in education, but it has developed over time and has become a discipline covering a wide range from human and technology interaction to application technologies (Şimşek et al., 2008). According to Alkan (1998), education technology is a functional structuring of learning and education processes provided that the necessary knowledge and skills are used to control education in general and particularly learning. Educational technology is a process that includes the design, implementation, evaluation and development of learning-teaching processes (Alkan, 2005). Similarly, educational technology is expressed as a process in which technological tools are put into the service of education, including the planning, design, production, presentation and evaluation of education by Girginer and Özkul (2002). İşman (2003), on the other hand, explains educational technology as the application of all theoretical and practical studies as a program in enrichment and development processes of teaching areas in order to ensure effective learning.

Öksüz et al. (2009) state that many educators and researchers agree that technology use in teaching improves the education system. Through technology, solutions are sought for possible problems in education and an optimistic

perspective is presented that this search will produce positive results (Alkan, 1998). It is possible to increase the quality in learning-teaching processes and to make these processes more efficient and effective for teachers and students through educational technologies (Uşun, 2000). Providing multiple learning environments, meeting the individual needs of students and increasing their interest are some of the benefits of educational technologies (Yalın, 2003). With educational technologies, it is easier to reach the goals, lessons become more interesting, time is saved and more permanent learning can be provided (Katrancı & Uygun, 2013). It is stated that with technology use in the classroom environment, the interest, learning, curiosity and willingness of the students increase, the work of the teachers becomes easier, and a rich teaching environment is provided to the teachers and students (Kenar, 2012).

The use of technology in education brings various changes with it in the roles of teachers. Technology knowledge of teachers is seen as an important component that should be included in professional competencies (Mishra & Kohler, 2006; Zhao, 2003). The ability to use technology effectively in educational processes is closely related to the competencies and attitudes of teachers in the field of technological development (Yılmaz, 2016). It is suggested that an interaction and cooperation between students and teachers have developed with the use of technology in education (Alexiou-Ray et al., 2003). However, it is not known how the use of technology in education affects teacher autonomy.

Teacher autonomy refers to teachers' having desire, freedom and competence to control their teaching and learning processes (Huang, 2005). It represents the power and freedom to make decisions about teachers' professional activities (Feldmann, 2011). According to Öztürk (2012), teacher autonomy is the free movement of teachers to plan, implement and decide on professional activities. Of course, this freedom comes with accountability and competence. Teacher autonomy is based on the professional competencies of teachers, making decisions concerning the teaching process, school and students (Çolak, 2016). Ramos (2006) states that teacher autonomy should be handled within the framework of awareness, self-awareness, responsibility, struggle with difficulties, participation and cooperation, and role changes. While autonomy in the traditional sense is seen as the teacher making decisions independently from colleagues and managers and acting alone, in contemporary sense, it is expressed as teachers acting in cooperation with colleagues and managers, making decisions based on their professional competencies (Çolak et al., 2017).

Teacher autonomy has an important place in teaching processes (Gurganious, 2017). Teacher autonomy, gaining importance increasingly, is seen as an important determinant in the effectiveness of education. However, the autonomy of teachers is not adequately supported in Turkey and many factors that limit the autonomy of teachers exist. Taking all decisions about teaching issues from the center precludes teachers from organizing the educational setting by considering the needs of their students and by utilizing their competencies (Çolak & Altinkurt, 2017; Çolak et al., 2017). Instead of just waiting for teachers to perform the tasks assigned to them, supporting them to have the freedom to make decisions in the education and training process by using their knowledge and skills will produce more positive results (Çolak & Altinkurt, 2017). Therefore, determining how technology use in education relates to teacher autonomy is important.

In the literature, it is understood that studies concerning the use of technology in education are generally carried out within the framework of teacher competencies, opinions or attitudes (Çil, 2008; Emiroğlu, 2016; Dargut & Çelik, 2014; Demir et al., 2011; Durak & Seferoğlu, 2017; Öztürk, 2006; Şahin. and Namlı, 2018; Şimşek & Yıldırım, 2016; Yılmaz, 2016). As a result of a comprehensive content analysis study that examines the international studies concerning technology use of teachers, it is seen that the most discussed topics are teachers' using information and communication technologies as well as the factors that affect their use of those technologies (Sert et al., 2012). According to a similar survey conducted in Turkey, the most extensively studied issues are teachers' using information technology for instructional purposes, teachers' competencies in using technology, attitudes, perceptions and beliefs and their opinions about technology usage (Kurtoğlu & Seferoğlu, 2013). In the studies related to teacher autonomy, various variables such as school climate (Blömeke & Klein, 2013; Çolak & Altinkurt, 2017), job satisfaction (Çolak et al., 2017; Perie & Baker, 1997), learner autonomy (Vieira, 2010; 2020; Yazıcı, 2016) student achievement (Ayril et al., 2014; Gurganious, 2017) and teaching styles (Baradaran, 2016) are discussed. However, there is no study investigating the relationship between the use of technology in education and teacher autonomy. Accordingly, the current study aimed to examine the relationship between teacher attitudes regarding technology use in education and teacher autonomy. For the purpose of the study, answers to the following questions are sought:

1. Do teachers attitudes concerning technology use in education differ according to gender, school type, education level and professional seniority significantly?
2. Do teachers' autonomy behaviors differ in relation to type of school, gender, education level and professional seniority significantly?

3. Do autonomy behaviors of teachers (teaching process autonomy, curriculum autonomy, professional development autonomy, and professional communication autonomy) significantly predict their attitudes concerning technology use in teaching?

METHOD

Research Model

A survey and correlational model were utilized in the study. Survey models are defined as research approaches that aim to describe a situation that existed in the past or already (Karasar, 2005). In correlational model, the degree and direction of the changes are tried to be determined (Fraenkel et al., 2011).

Study Group

The study group are composed of 440 teachers that work in various public and private schools affiliated to the Ministry of National Education. The group was determined by convenience sampling technique. In this technique, in accordance with the objective of the research, accessible groups are selected from which comprehensive data can be obtained (Fraenkel et al., 2011). Descriptive statistics related to the study group are provided in Table 1 below.

Table 1: Descriptive statistics related to demographical status of participants

		f	%
Gender	Female	266	60.5
	Male	174	39.5
Branch	Primary school teacher	100	22.7
	English teacher	55	12.5
	Mathematics teachers	48	10.9
	School counselor	28	6.4
	Science teacher	23	5.2
	Information Technologies teacher	20	4.5
	Other	166	37.8
Seniority	1-5 years	114	25.9
	6-10 years	93	21.1
	11-15 years	85	19.3
	16-20 years	70	15.9
	20 years and over	78	17.7
Education level	Associate	6	1.4
	Bachelor	346	78.6
	Graduate	88	20.0
School level	Primary School	137	31.1
	Middle School	169	38.4
	High School	134	30.5
School type	Public	388	88.2
	Private	52	11.8
Technological devices used mostly	Computer	274	62.3
	Smart board	252	57.3
	Phone	102	23.2

As seen in Table 1, 60.5% of the participants are female, while 39.5% are male. Primary school teachers (22.7%), English teachers (12.5%) and Mathematics teachers (10.9%) constitute the most frequent group of participants in terms of their branches. In terms of seniority, participants working for 1-5 years (25.9%) constitute 78.6% of undergraduate degree graduates in terms of education level, 38.4% of middle school level employees in terms of school level, and 88.2% of public-school teachers in terms of school type. When the technological tools that teachers use most frequently in the educational process are taken into consideration, it is understood that computers (62.3%), smart board (57.3%) and telephone (23.2%) are used respectively.

Data Collection Tools

In this study, Demographical Information Form, Scale of Attitude towards Technology and Teacher Autonomy Scale were used to collect data.

Demographical Information Form: It was developed by researchers to collect data on the demographic characteristics of the participants. In this form, there are questions about participants' gender, age, professional seniority, type of school they work, etc.

Scale of Attitude towards Technology: Yavuz (205) developed Scale of Attitude towards Technology in order to determine teacher attitudes concerning technology. The scale, which consists of 19 items, has five factors. The total variance explained by these five factors is 60.64%. Factor load values of the items in the scale range between .53 and .78. Item-total correlation values for the scale varying between .24 and .68 and Cronbach's Alpha coefficient is .87. Cronbach's Alpha coefficient of the scale used in the current study was calculated as .87.

The scale includes 13 positive, and 6 negative items. Each item in the scale is evaluated with a five-point rating that is expressed as "I strongly agree (5)", "I agree (4)", "I am indecisive (3)", "I disagree (2)" and "I strongly disagree (1)". Negative items are coded reversely while scoring.

Teacher Autonomy Scale: Teacher Autonomy Scale was developed by Çolak and Altinkurt (2017). The scale, consisting of a total of 17 items, has four factors. These factors are; teaching autonomy, curriculum autonomy, professional development autonomy, and professional communication autonomy. The variance explained by this four-factor structure is 63.84%. The factor load values for the items in the scale ranged from .51 to .86. Goodness of fit indices that were obtained by confirmatory factor analysis of the scale are $\chi^2 / sd = 2.23$, GFI = .90, AGFI = .86, RMSEA = .06, SRMR = .06, CFI = .97, IFI = .97, NFI = .94, NNFI = .96, PGFI = .66. The item-total correlation values of the scale ranging between .47 and .76, while the Cronbach's Alpha coefficient was found to be between .78 and .85 for the factors and it was .89 for the entire scale. In this study, Cronbach's Alpha coefficient of the scale was calculated between .81 and .93 for factors and .95 for the entire scale.

Total score can be obtained from the scale. The increase in the score obtained from the scale shows that the autonomy behaviors of the teachers increases. Items in the scale are answered between “strongly disagree (1)” and “strongly agree (5)”. There are not any reverse coded items in the scale.

Statistical Analyses

SPSS 25 was used to analyze data. Depending on the research questions, independent samples t test, one way variance analysis (ANOVA) and stepwise regression analysis were conducted. The upper limit of the margin of error is taken as .05.

Normality assumption for independent samples t-test and ANOVA was checked by examining the kurtosis and skewness coefficients and histogram graph. The kurtosis and skewness coefficients between -3 and +3 show that the normality assumption is met (Kline, 2011). The Levene test result established that the variances were distributed homogeneously for all subgroups, and the analyzes were performed assuming the variances were homogeneous. After independent samples t-test, "Cohen's d" values were examined to find out the effect size of independent variables on dependent variables. That Cohen's d value is less than 0.2 shows that the effect size is low, 0.5 is medium, and greater than 0.8 is considered high (Cohen, 1988).

For stepwise regression analysis, sample size, univariate and multivariate outliers, normality, linearity, homoscedasticity, multicollinearity and independence of errors assumptions were examined (Hair et al., 2014). No outliers were found in the data set and it was concluded the sample size of 440 people was adequate in accordance with the criteria $[n \geq 50 + 8m]$ (the number of independent variables in m) provided by Tabachnick and Fidell (2012). The scatter plots of the residues were examined, and it was observed that the assumptions of normality, linearity and homoscedasticity were met. For multicollinearity assumption, that the correlation coefficient between variables is less than .90 (Field, 2009), VIF (Variance Inflation Factor) is less than 10 and TV (Tolerance Value) is greater than .10 are taken into consideration. Bivariate correlations between variables are given in Table 2. That VIF values of independent variables were between 1.79 and 5.01 and TVs are between .20 and .56 showed that multicollinearity assumption was met. Finally, the Durbin-Watson value was calculated as 1.57 and the assumption of independence of errors was met (Field, 2009). Then stepwise regression analysis was performed.

Table 2: Results of analysis of correlation between dependent and independent variables

	M	SD	1	2	3	4	5
1.Technology attitude	4.01	.61	1				
2. Teaching autonomy	4.05	.87	.53*	1			
3. Curriculum autonomy	4.03	.90	.49*	.89*	1		
4. Professional development autonomy	3.82	1.02	.42*	.71*	.68*	1	
5. Professional communication autonomy	3.83	.96	.44*	.66*	.62*	.58*	1

*p < .01

FINDINGS

Independent samples t test was conducted to determine if teacher attitudes towards technology use differ in terms of gender, school type and educational level. The results are given in Table 3 below.

Table 3: Independent samples t test results on teachers' attitudes towards technology use in terms of gender, school type and educational level

		<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>d</i>
Gender	Female	266	4.05	.60	1.60	
	Male	174	3.96	.61		
School type	State	388	4.00	.62	-.76	
	Private	52	4.07	.49		
Education level	Bachelor	346	3.98	.63	-2.04*	.26
	Graduate	88	4.13	.53		

* $p < 0.05$

The attitudes of teachers regarding using technology in teaching do not vary significantly in relation to their gender and the type of school they work in as seen in Table 3 ($p > .05$). With regard to education level, the statistical difference is significant with a moderate effect [$t(434) = -2.04, p < .05, d = .26$]. Accordingly, it can be stated that graduates' attitudes towards technology use in teaching are more positive than those of undergraduates.

ANOVA was conducted to determine whether teacher attitudes concerning use of technology in teaching differ depending on their professional seniority. ANOVA results are shown in Table 4 below.

Table 4: ANOVA results on teachers' attitudes towards technology use in education according to their professional seniority

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>
Between Groups	3.14	4	.79	2.17	.07
Within Groups	157.96	435	.36		
Total	161.11	439			

Table 4 shows that teachers' attitudes towards the use of technology in education do not differ significantly according to their professional seniority [$F(4, 435) = 2.17, p > .05$].

Independent samples t-test was conducted to determine if teachers' autonomy behaviors vary in relation to gender, school type and educational level. The results are provided in Table 5 below.

Table 5: Independent samples t-test results on teachers' autonomy behaviors in relation to gender, school type and educational level

		<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>d</i>
Gender	Female	266	3.99	.83	.87	
	Male	174	3.92	.81		
School type	State school	388	4.00	.80	2.21*	.32
	Private school	52	3.73	.90		
Education level	Undergraduate	346	3.94	.85	-1.25	
	Graduate	88	4.06	.68		

* $p < 0.05$

As seen in Table 5, autonomy behaviors of teachers do not differ significantly in relation to their gender and education level. With regard to the type of school they work, the statistical difference is significant with a moderate effect [$t(438) = 2.21, p < .05, d = .32$]. Accordingly, it can be said that teachers that work in public schools have more autonomous behaviors than teachers working in private schools.

ANOVA was conducted to determine whether teachers' autonomy behaviors differ according to their professional seniority. ANOVA results are presented in Table 6 below.

Table 6: ANOVA results on teachers' autonomy behaviors according to their professional seniority

	Sum of Squares	df	Mean Square	F	p
Between Groups	1.20	4	.30	.45	.78
Within Groups	293.32	435	.67		
Total	294.52	439			

Table 6 shows that teachers' autonomy behaviors do not differ significantly according to their professional seniority [$F(4, 435) = .45, p > .05$].

A stepwise regression analysis was carried out whether teachers' autonomy behaviors (teaching process autonomy, curriculum autonomy, professional development autonomy and professional communication autonomy) predict attitudes concerning technology use in teaching. The results are displayed in Table 7 below.

Table 7: Stepwise regression analysis results on prediction of teachers' attitudes towards the use of technology in education

	Predictor	B	SE B	β	R	R ²	ΔR^2
Step 1	Constant	2.50	.12		.53	.28	
	Teaching process autonomy	.37	.03	.53**			
Step 2	Constant	2.42	.12		.55	.30	.02
	Teaching process autonomy	.30	.04	.43**			
	Professional communication autonomy	.10	.03	.15*			

* $p < .01$, ** $p < .001$

When Table 7 is examined, in the first stage of the stepwise regression analysis, 28% ($R^2 = .28, F_{(1, 438)} = 173.44, p = .000$) of teacher attitudes concerning use of technology in teaching is explained by teaching process autonomy ($\beta = .53, t_{(438)} = 13.17, p < .001$). In the second stage, when professional communication autonomy is added ($\beta = .15, t_{(437)} = 2.84, p < .01$), this ratio advances to 30% ($R^2 = .30, \Delta R^2 = .02, F_{(2, 437)} = 92.16, p = .000$). It was determined that other variables related to autonomy behavior (curriculum autonomy and professional development autonomy) did not significantly predict the attitudes of teachers regarding technology use in teaching.

DISCUSSION AND CONCLUSION

This study, which examines the relationship between teachers' attitudes towards use of technology in education and autonomy behaviors, firstly examined whether technology attitudes vary in relation to gender, school type and education level. According to the results obtained, teacher attitudes concerning technology use in education do not change in relation to gender and the type of school studied, but change according to the level of education. The attitudes of graduate teachers towards technology use in educational practices are more positive than undergraduates. According to a study conducted by Dargut and Çelik (2014) with prospective teachers, female teachers were found to hold more positive attitudes concerning technology use compared to males. The results of Çil (2008), Yaman (2007) and Öztürk (2006) are also in this direction. On the other hand, the studies conducted by Şimşek and Yıldırım (2016) and Menzi et al. (2012) with teacher candidates found that there was no gender difference in technology use in education. According to Şahin and Namlı's (2018) study, male teacher candidates' attitudes regarding technology use in teaching are more positive. Upon examining the studies conducted with teachers, it is seen that the results obtained are congruous with the findings of the current study and attitudes towards the use of technology in education do not change according to gender (Bahar et al., 2009; Çelik & Bindak, 2005; Çınarar et al., 2016; Yılmaz, 2016). This shows that in the technology age we are in, teachers whether male or female have similar attitudes concerning technology use in the educational process. Teacher attitudes concerning use of technology in teaching do not differ in terms of their work in private or public schools. The fact that private schools have better conditions than public schools in terms of physical facilities does not change the attitudes towards technology use. Whether they work in a private or public school, teacher attitudes concerning technology towards use in teaching are similar. That the attitudes of graduate teachers towards technology use in education are more positive than those of undergraduates is consistent with the findings of Yılmaz (2016). In addition, in the study conducted by Baltacı (2005), it was found that the frequency of use of educational technologies increased with the increase in the education levels of teachers. This result can also be evaluated in the same direction.

According to another result of the study, autonomy behaviors of the teachers do not vary in relation to their gender and education levels, they differ according to the type of school they work at. Accordingly, it is understood that teachers that work in state schools display more autonomous behaviors than teachers working in

private schools. Also, according to Çolak's (2016) study, teachers' autonomy behaviors do not vary according to their gender and educational level. In addition, the study results conducted by Pearson and Hall (1993) and Çolak et al. (2017) show that teachers' autonomy behavior does not vary according to gender. The roles of men and women in the society are encouraging men to grow up more autonomously. However, it is possible to state that the level of education eliminates the stereotypes that exist in the society, although the autonomous behaviors of teachers do not change according to their undergraduate or graduate degrees in the study. The study group consists of university graduates. Therefore, it can be considered as a normal result that autonomous behaviors do not differentiate according to gender in this group. Nevertheless, that teachers working in state schools exhibit more autonomous behaviors can be interpreted due to the low job anxiety of these teachers. Most of the teachers working in private schools can adapt to the general practices in the school and the demands of the school administrators in order not to lose their jobs. In this case, it is possible to state that this situation also reduces autonomy behaviors.

According to another result of the study, teacher attitudes concerning use of technology in teaching and autonomy behaviors do not change according to their professional seniority. Most of the studies on this subject (Bahar et al., 2009; Çınarlar et al., 2016; Namlu, 1998) shows that teachers' attitudes concerning technology use in teaching do not differ according to their professional seniority. However, according to Yılmaz's (2016) study, the attitudes of teachers regarding using technology in teaching vary according to their professional seniority. Teachers with low professional experience have more positive attitudes in this regard. The widespread use of technology today affects everyone equally. Therefore, it can be stated that having more or less professional seniority does not affect the attitude concerning technology use in teaching. With regard to seniority, different study results are encountered. According to the studies of Çolak (2016) and Çolak et al. (2017), teachers with lower professional experience have more autonomous behaviors while according to Şakar's study (2013), teachers with higher professional experience have more autonomous behaviors. In this study, no difference was found in teachers' autonomy behaviors in terms of professional seniority. The teachers, who have started the profession newly, can act autonomously because they do not adopt the corporate culture yet. As time goes by, institutional culture is adopted, however, autonomy behaviors can continue with the comfort of experience.

According to the conclusion reached in the study, the teachers' teaching process autonomy and professional communication autonomy behaviors positively and significantly predict the attitudes concerning technology use in educational practices. According to this result, autonomy of teaching process has a critical role with regard to attitude concerning technology use in teaching. As teaching process autonomy increases, positive attitudes of teachers concerning technology use in teaching also increase. Çolak (2016) addresses autonomy of the teaching process as the decisions made about teaching and classroom management. The amount of time to devote to certain activities in the lessons, the selection of instructional methods and techniques, determining the methods of assessment and evaluation, rewarding students, the way of communication in the classroom, class order and rules are evaluated within teaching process autonomy.

Professional communication autonomy reflects the way in which teachers can express their opinions with colleagues, managers and parents without anxiety and fear. This type of autonomy allows teachers to organize the teaching process according to their professional competencies (Çolak, 2016; Çolak and Altınkurt, 2017). Teaching process autonomy and professional communication autonomy positively affect teacher attitudes concerning use of technology in teaching. There are rapid changes in the field of education. However, there are some areas where there is no change. These areas are the rights of teachers to determine teaching methods, use technology, plan and present materials, and select appropriate measurement and evaluation tools (Gacoin, 2018). It is important to support the autonomy of teachers in these areas. According to Froese-Germain et al. (2013), teachers state that the use of technology provides them autonomy. Thanks to the use of technology, teachers can direct the teaching process as they wish. According to Sehrawat (2014), teachers can teach more efficiently when they are autonomous. Autonomous teachers hold discussions about the pedagogical applications of technology use in education, their decisions and what is the best use of technology for students (Gacoin, 2018). The findings revealed by this study show that teachers who are autonomous hold more positive attitudes about technology use in teaching. Therefore, it is possible to state that technology use in teaching and autonomy affect each other mutually.

As a result, the findings of this study show that teachers' education levels, teaching process autonomy and professional communication autonomy are important in internalizing positive attitudes concerning technology use in teaching. It is thought that these results will be guiding in applications to be carried out regarding the use of technology in education. In this study, the variables that predict teacher attitudes concerning use of technology in teaching are limited to their autonomy behaviors. Therefore, future studies may examine the predictability of

different variables. The fact that the study is a cross-sectional one can be expressed as another limitation. The attitudes of teachers regarding using technology in teaching can also be investigated longitudinally.

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