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DETERMINING SCIENCE TEACHERS' LEVELS OF MOTIVATION AND SELF-REGULATION REGARDING USE OF EDUCATION TECHNOLOGIES

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Abstract:
In line with the growing importance of use of education technologies in the field of education, teachers are increasingly expected to use education technologies in class environment and to provide students with appropriate environments and opportunities to use these technologies. This situation makes it necessary to investigate teachers' motivation for use of education technologies as well as their levels of self-regulation. For this reason, the purpose of this study was to determine science teachers' levels of self-regulation and motivation for use of education technologies. The research sample included a total of 107 science teachers (Female:42; Male:65) working in the cities of Diyarbakir (F:16; M:33) and Bingöl (F:26, M:32) in the academic year of 2015-2016. In the study, the survey method, one of quantitative research methods, was used. The results revealed that the science teachers participating in the study had high levels of self-regulation and motivation regarding the use of education technologies. In addition, it was found that the science teachers' levels of motivation regarding use of education technologies increased as they had higher levels of education. Depending on the findings, several suggestions were put forward including encouragement of science teachers to taking post-graduate education.

Keywords: science teachers, educational technology, motivation, self-regulation

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1. Introduction

Use of education technologies for effective applications in education is quite important, yet use of these technologies has special significance in science courses. The reason is that technology use in the learning process not only creates multiple-learning environments but also helps understand abstract and complex subjects more easily by addressing more sense organs of students (Taşçı, Yaman & Soran, 2010). The Science and Technology Curriculum prepared by the Ministry of National Education (MNE) points out that use of information and communication technologies in the teaching process provide teachers and learners with various benefits and that use of these technologies color up the teaching process (Ministry of National Education, 2013). Therefore, integration of new technologies into the teacher process is of great importance to increase the quality of education (Yılmaz, 2007). Technologies used in educational environment include the Internet, computer, interactive board, printer, scanner, social networks and multiple interactive environments. Education technology is defined as the whole of academic systems which allow establishing an effective teaching environment and solving the problems likely to be experienced in the learning process and which increase the quality and achievement of learning outcomes (Gökdere, Küçük & Çepni, 2004). It is a well-known fact that education technologies facilitate teaching and learning, allow effective use of time, make students more active and enrich the education environment by decreasing the cost (Öğüt, Altun, Sulak and Koçer, 2004). Considering all these benefits of education technologies, educational institutions should be supported with the technological equipment required by the current era (Aypay & Özbaşı, 2008). For this purpose, on the way to become an information society, the Movement to Enhance Opportunities and Improve Technology (known as FATIH Project) has been put into practice in Turkey recently.

The purpose of this project is to equip all elementary schools and secondary schools in the country with the Internet and interactive LCD boards, to provide all teachers and students with a tablet computer and to give in-service training to teachers (MNE, 2016). In order for this technological sub-structure in schools to function well, there is a need for motivated teachers who can actively use self-regulation strategies in a way to serve the intended purpose. Perkins (1985) points out that for effective use of technology, there should be related facilities; users should know technology well; and users of technology should be motivated. For this reason, teachers have great responsibilities for FATIH Project to be successful. The reason is that teachers obviously have an important role in the success of education projects as well as in the application of curricula (Çağıltay, Çakıroğlu, Çağıltay & Çakıroğlu, 2001). In this respect, teachers'

levels of self-regulation and motivation are of great importance to increase students' motivation, to create effective learning environments and to achieve educational reforms (De Jesus & Conboy, 2001). In addition, it is reported in related literature that teachers have important influence on students' motivation in science learning (Dede & Yaman, 2007). Therefore, a teacher with a high level of motivation always tries to be excellent in their instructional applications and to help their students understand the lessons thanks to these applications (Abdullah, Abidin, Luan, Majid & Atan, 2006). One way of making the most of use of technological tools in an education environment is to develop the technology-related motivations, interests, attitudes and skills of teachers who will use these tools (Uşun, 2000) because individuals are likely to have prejudice regarding a situation or an object which they have negative thoughts about even though that situation or object could actually be beneficial for them (Tataroğlu & Erduran, 2010). For this reason, it is a well-known fact that teachers' decisions, experiences, approaches, motivations and attitudes have influence on their technology use in education (Çağıltay et al., 2001). Another variable that has influence on teachers' use of education technologies in class is the self-regulation strategies. Self-regulation is defined as an active and constructive process in which individuals determine their own learning goals and try to regulate their behaviors, motivations and cognitions and which they restrict via the contextual properties around them (Pintrich, 2000). Self-regulation is associated with individuals' awareness of their own skills and with their control of their learning environment (Schraw, Crippen & Hartley, 2006). Risemberg and Zimmerman (1992) define self-regulation as 'determining the goals, developing strategies to achieve these goals and checking the outcomes of these strategies'. Teachers with high levels of self-regulation will be likely to help their students develop self-regulation learning strategies. Teachers are considered to be one of the most important elements of self-regulation learning environments. For this reason, determining teachers' perceptions of self-regulation learning is important for the development of studies conducted in this field.

As the importance of use of education technologies in the field of education, teachers are expected to use these technologies in class environment as well as to provide their students with appropriate environments and related opportunities to use these technologies. This situation increases the importance of teachers' levels of self-regulation and motivations regarding the use of education technologies. Teachers' self-regulation strategies and their motivation regarding the use of education technologies have influence on the use of technology for instructional purposes in class environment (Schraw et al., 2006). In this respect, teachers have the biggest responsibility for the integration of technology into class environment and for the achievement of

technology-based education projects like the FATIH Project. Therefore, it is fairly important to determine their levels of self-regulation and motivation regarding technology use. Accordingly, the purpose of this study was to examine science teachers' levels of self-regulation and motivation regarding the use of education technologies with respect to the variables of gender, years of teaching experience, age, education level, foreign language level and computer use time.

1.1 Sub-problems

1. What are science teachers' levels of motivation and self-regulation?
2. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to gender?
3. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to their educational backgrounds?
4. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to years of experience?
5. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to age?
6. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to foreign language level?
7. Is there a significant difference between the sub-dimension levels of science teachers' motivation and self-regulation regarding the use of education technologies with respect to computer use time?

2. Method

In this study, the survey method, one of quantitative research approaches, was used. The survey method helps collect data to determine individuals' behaviors, beliefs, preferences and attitudes regarding a certain situation (Bhattacherjee, 2012).

2.1. Participants

The study was conducted with a total of 107 science teachers (F:42, M:65), 58 of whom (F:26, M:32) were teachers in the city center of Bingöl and 49 of whom (F:16, M:33) were teachers in the city center of Diyarbakır in the academic year of 2015-2016.

2.2. Data Collection Tools

In the study, 'Self-regulation and Motivation Scale for Technology Learning' developed by Liou and Kuo (2014) was used as the data collection tool. The scale was made up of 39 items and seven factors. The original scale was adapted into Turkish for the purpose of determining science teachers' levels of self-regulation and motivation regarding the use of education technologies. The scale used in the study included four parts. The first part was related to the demographic backgrounds of the teachers participating in the study. The second part was about education technologies frequently used for science teaching. The first part was made up of items regarding motivation for use of education technologies. As for the fourth part, it included items for self-regulation regarding use of education technologies. The motivation dimension of the scale was made up of such sub-dimensions as Education Technology Use Self-Efficacy, Education Technology Use Value, Strategies for Active Use of Education Technologies, Encouragement in the Education Technology Use Environment, and Education Technology Use Goal-Orientation. The self-regulation dimension of the scale included the sub-dimensions of Triggering Self-regulation through Education Technologies and Self-regulation İmplementation through Education Technologies. The scale applied in the study was made up of five-point Likert-type items which were rated as "5=I Completely Agree", "4=I Agree", "3=I am Neutral", "2=I Disagree" and "1=I Completely Disagree". Considering the calculation of the gap width of the scale with the formula of "range width /number of groups to be formed (Tekin, 1996), the mean score ranges_taken as basis for the evaluation of the research findings were "1,00-1,80=Very Low", "1,81-2,60=Low", "2,61-3,40=Moderate", "3,41-4,20=High" and "4,21-5,00=Very High".

The original version of the scale was translated into Turkish by the researcher. The translated version was checked and revised for its language use by two faculty members who were teachers of English. In line with their views, the necessary changes were done. Following this, two faculty members expert in the field of biology education and two other faculty members from the department of Computer Education and Instructional Technologies were asked for their views about the scale. Eventually, the faculty members reached consensus on each item. Next, the scale was applied to two science teachers on face-to-face basis to determine whether the intended meanings of the items matched what the teachers understood from the items.

For the purpose of determining the construct validity of the 39-item scale, factor analysis was conducted. In order to reveal whether the data collected from 107 science teachers were appropriate to factor analysis, Kaiser-Meyer-Olkin (KMO) and Barlett tests were applied. As a result, KMO was found to be 0,89. Tavşancıl (2002) considers a KMO value close to 1 to be high. In addition, the Barlett test result was found to be 3788,89 ($p<.05$). The results of the two tests demonstrated that the data were appropriate to factor analysis. The results of factor analysis revealed that there were seven factors with Eigen values higher than 1. When the related literature is examined, it is seen that items with a factor loading of 0,4 or higher are not approved (Yılmaz and Çavaş, 2007). Therefore, as a result of the Principle Components Factor Analysis, 18 items which were found inappropriate to the structure of the scale due to the factor loadings lower than 0,4 were excluded from the scale.

The Cronbach Alpha internal consistency coefficients of the "Self-regulation and Motivation Scale for Technology Learning" developed by Liou and Kuo (2014) were .91 for the sub-dimension of technology learning self-efficacy, .88 for the sub-dimension of technology learning value, .90 for the sub-dimension of strategies for active learning of technology, .83 for the sub-dimension of encouragement in the environment of learning through technology, .91 for the sub-dimension of the learning goal-orientation through technology, .86 for the sub-dimension of triggering self-regulation through technology and .89 for the sub-dimension of self-regulation implementation through technology, respectively.

The results of the reliability analysis conducted for the Turkish version of the scale used in the study revealed the Cronbach Alpha internal consistency coefficient for the whole scale was .95. As for the Cronbach Alpha internal consistency coefficients for the sub-dimensions, they were .89 for Education Technology Use Self-Efficacy, .91 for Education Technology Use Value, .85 for Strategies for Active Use of Education Technologies, .92 for Encouragement in the Education Technology Use Environment, .94 for Education Technology Use Goal-Orientation, .84 for Triggering Self-regulation through Education Technologies and .94 for Self-regulation İmplementation through Education Technologies, respectively.

2.3. Analysis of Data

In the study, the research data were analyzed using the package software of SPSS 22.0 (Statistical Package for the Social Science). For all the statistical analyses conducted, the level of significance was taken as .05. For the purpose of comparing the science teachers' levels of motivation and self-regulation with respect to the variables of gender and educational backgrounds, independent samples t-test was used. For the comparison of

the science teachers' levels of motivation and self-regulation with respect to the variables of years of experience, age, foreign language level and computer use time, one-way analysis of variance (ANOVA) was conducted. In the event of a significant difference as a result of the variance analysis, Tukey test was used to determine which group caused the difference.

3. Findings

In this part of the study, the science teachers' levels of motivation and self-regulation strategies regarding the use of education technologies and the sub-dimensions related to these strategies were examined with respect to the variables of gender, educational background, years of experience, age, foreign language level and computer use time.

Table 1: Mean and Standard Deviation Valuable Related to Educational Technology Using Motivation and Self-Regulation Levels of Science Teachers

Variables	f	$\bar{X}$	SD
Educational Technology Using Self-Efficacy	107	4,14	,61
Educational Technology Using Value	107	4,20	,64
Educational Technology Active Using Strategies	107	4,14	,48
Educational Technology Using Environment Stimulation	107	3,58	,94
Educational Technology Using Goal Orientation	107	4,17	,69
Educational Technology Using Self-Regulation Triggering	107	3,08	,89
Educational Technology Using Self-Regulation Implementing	107	3,82	,78

As can be seen in Table 1, it was found that the science teachers high mean scores for the sub-dimensions of education technology use self-efficacy ($\bar{X}$=4.14), education technology use values ($\bar{X}$=4.20), strategies for active use of education technologies ($\bar{X}$=4.14), encouragement in the education technology use environment ($\bar{X}$=3.58) and education technology use goal-orientation ($\bar{X}$=4.17). Also, the science teachers were found to have moderate levels of triggering self-regulation through education technologies ($\bar{X}$=3.08) and high levels of self-regulation implementation through education technologies ($\bar{X}$=3.82). In addition, the science teachers had high levels of self-regulation ($\bar{X}$=3.55) and overall motivation ($\bar{X}$=4.04) regarding education technology use.

Table 2: Comparison of the averages for Educational Technology using Motivation and Self-Regulation based on gender variable

Variable	Dimension	Sub-Dimension	Groups	f	$\bar{X}$	Sd	t	P
Gender	Motivation	Educational Technology Using Self-Efficacy	Male	66	4,13	,62	-,122	,903
			Female	41	4,15	,59		
		Educational Technology Using Value	Male	66	4,18	,55	-,208	,835
			Female	41	4,21	,78		
		Educational Technology Active Using Strategies	Male	66	4,13	,45	-,172	,864
			Female	41	4,15	,53		
		Educational Technology Using Environment Stimulation	Male	66	3,60	,85	,360	,720
			Female	41	3,54	1,08		
		Educational Technology Using Goal Orientation	Male	66	4,18	,53	,381	,704
			Female	41	4,13	,88		
Gender	Self Regulation	Educational Technology Using Self Regulation-Triggering	Male	66	3,18	,82	1,487	,140
			Female	41	2,91	,98		
		Educational Technology Using Self Regulation-Implementing	Male	66	3,86	,66	,765	,446
			Female	41	3,75	,93		

When Table 2 is examined, it is seen that the science teachers' motivation sub-dimensions did not differ significantly depending on the variable of gender ($p>.05$). Similarly, it was found that the science teachers' levels of self-regulation strategies did not differ significantly with respect to their gender ($p>.05$).

According to Table 3, among the science teachers' motivation sub-dimensions regarding the use of education technologies, the sub-dimension of education technology use value was found to differ significantly in favor of those who had a post-graduate degree ($p<.05$). Similarly, a statistically significant difference was found between the sub-dimension of education technology use goal-orientation and the variable of educational background in favor of the participants who had a post-graduate degree ($p<.05$). On the other hand, no significant difference was found between the variable of educational background and the science teachers' education technology use self-efficacy, their strategies for active use of education technologies and encouragement in the education technology use environment ($p>.05$). Similarly, there was no statistically significant difference the variable of educational background and the science teachers' self-regulation strategies ($p>.05$).

Table 3: Comparison of the averages for Educational Technology using Motivation and Self-Regulation based on education level variable

Variable	Dimension	Sub-dimension	Groups	f	$\bar{X}$	Sd	t	P
Education Level	Motivation	Educational Technology Using Self-Efficacy	Under-graduate	95	4,08	,60	,186	,667
			Post-graduate	12	4,56	,43		
		Educational Technology Using Value	Under-graduate	95	4,14	,65	-2,347	,021*
			Post-graduate	12	4,60	,38		
		Educational Technology Active Using Strategies	Under-graduate	95	4,10	,45	-1,708	,091
			Post-graduate	12	4,35	,59		
		Educational Technology Using Environment Stimulation	Under-graduate	95	3,52	,94	-1,859	,066
			Post-graduate	12	4,05	,82		
		Educational Technology Using Goal Orientation	Under-graduate	95	4,12	,69	-1,990	,049*
			Post-graduate	12	4,53	,48		
Education Level	Self Regulation	Educational Technology Using Self Regulation-Triggering	Under-graduate	95	3,05	,88	-,693	,490
			Post-graduate	12	3,25	,95		
		Educational Technology Using Self Regulation-Implementing	Under-graduate	95	3,79	,73	-1,228	,222
			Post-graduate	12	4,08	1,07		

*(p<.05)

When Table 4 is examined, it is seen that there was no significant difference between the variable of years of experience and the science teachers' education technology use self-efficacy ($F_{(4-102)}$=1.423, p>.05). Similarly, no significant difference was found between the variable of years of experience and the participants' education technology use value ($F_{(4-102)}$=1.898, p>.05). In addition, the science teachers' strategies for active use of education technologies did not differ significantly with respect to the variable of years of experience ($F_{(4-102)}$=0,832, p>.05). Similarly, there was no significant difference between the variable of years of experience and the participants' encouragement in the education

technology use environment ($F_{(4-102)}$=1.371, p>.05). Also, no significant difference was found between years of experience and education technology use goal-orientation ($F_{(4-102)}$=1.168, p>.05).

Table 4: One-way variance analysis for educational technology using Motivation and Self-Regulation for science teachers based on averages for work experience

Variable	Dimension	Sub-dimension	Source of Variance	Sum of Squares	df	Mean Square	F	P
Experience	Motivation	Educational Technology Using Self-Efficacy	Between Groups	2,081	4	,52	1,423	,232
			Within Group	37,280	102	,365		
			Total	39,361	106			
		Educational Technology Using Value	Between Groups	3,034	4	,759	1,898	,116
			Within Group	40,765	102	,400		
			Total	43,800	106			
		Educational Technology Active Using Strategies	Between Groups	,771	4	,193	,832	,508
			Within Group	23,652	102	,232		
			Total	24,424	106			
		Educational Technology Using Environment Stimulation	Between Groups	4,842	4	1,211	1,371	,249
			Within Group	90,068	102	,883		
			Total	94,910	106			
		Educational Technology Using Goal Orientation	Between Groups	2,200	4	,550	1,168	,330
			Within Group	48,037	102	,471		
			Total	50,237	106			
Experience	Self Regulation	Educational Technology Using Self Regulation-Triggering	Between Groups	3,373	4	,843	1,056	,383
			Within Group	81,481	102	,799		
			Total	84,854	106			
		Educational Technology Using Self Regulation-Implementing	Between Groups	3,386	4	,847	1,423	,232
			Within Groups	60,671	102	,595		
			Total	64,057	106			

According to Table 4, there was no significant difference between the variable of years of experience and the science teachers' triggering self-regulation through education technologies ($F_{(4-102)}$=1.056, p>.05). In addition, no significant difference was found between the variable of years of experience and the participants' levels of self-regulation implementation through education technologies ($F_{(4-102)}$=1.423, p>.05).

When Table 5 is examined, it is seen that there was no significant difference between the variable of age and the science teachers' education technology use self-efficacy ($F_{(3-103)}$=2.558 p>.05). Similarly, no significant difference was found between the variable of age and the participants' education technology use value ($F_{(3-103)}$=2.480, p>.05). In addition, the science teachers' strategies for active use of education technologies did not differ significantly depending on their ages ($F_{(3-103)}$=1.514, p<.05). On the other hand, a significant difference was found between the variable of age and the participants' encouragement in the education technology use environment ($F_{(3-103)}$=4.872, p>.05). The results of Tukey HSD analysis revealed that the science teachers aged between 21 and 30 had significantly higher levels of encouragement in the education technology use environment ($\overline{X}$=3,72) when compared to those of the science teachers aged between 31 and 40 $\overline{X}$=3,17). In addition, the participants aged between 41 and 50 had significantly higher levels of encouragement in the education technology use environment ($\overline{X}$=4,20) than those of the participants aged between 31 and 40 ($\overline{X}$=3,17). On the other hand, no significant difference was found between the variable of age and the science teachers' education technology use goal-orientation ($F_{(3-103)}$=2.118, p>.05).

According to Table 5, there was no significant difference between the variable of age and the science teachers' levels of triggering self-regulation through education technologies ($F_{(3-103)}$=1.473, p>.05). However, a significant difference was found between the variable of age and the participants' levels of self-regulation implementation through education technologies ($F_{(3-103)}$=3.720, p>.05). The results of Tukey HSD analysis revealed that the science teachers aged between 21 and 30 had significantly higher levels of self-regulation implementation through education technologies ($\overline{X}$= 3,93) when compared to those of the participants aged between 31 and 40 ($\overline{X}$=3,47). In addition, the science teachers aged between 41 and 50 had significantly higher levels of self-regulation implementation through education technologies ($\overline{X}$=4,24) than those of the science teachers aged between 31 and 40 ($\overline{X}$=3,47).

Table 5: One-way variance analysis for educational technology using Motivation and Self-Regulation for science teachers based on averages for age

Variable	Dimension	Sub-dimension	Source of Variance	Sum of Squares	df	Mean Squares	F	P	Tukey Test
Age	Motivation	Educational Technology Using Self-Efficacy	Between Groups	2,729	3	,91	2,558	,59	-
			Within Group	36,632	103	,356			
			Total	39,361	106				
		Educational Technology Using Value	Between Groups	2,950	3	,983	2,48	,065	-
			Within Group	40,850	103	,397			
			Total	43,800	106				
		Educational Technology Active Using Strategies	Between Groups	1,032	3	,344	1,514	,215	-
			Within Group	23,392	103	,227			
			Total	24,424	106				
		Educational Technology Using Environment Stimulation	Between Groups	11,795	3	3,932	4,872	,003*	21-30> 31-40; 31-40< 41-50
			Within Group	83,115	103	,807			
			Total	94,910	106				
		Educational Technology Using Goal Orientation	Between Groups	2,919	3	,973	2,118	,102	-
			Within Group	47,318	103	,459			
			Total	50,237	106				
Age	Self Regulation	Educational Technology Using Self Regulation-Triggering	Between Groups	3,490	3	1,163	1,473	,226	-
			Within Group	81,364	103	,790			
			Total	84,854	106				
		Educational Technology Using Self Regulation-Implementing	Between Groups	6,262	3	2,087	3,720	,014*	21-30> 31-40; 31-40< 41-50
			Within Group	57,795	103	,561			
			Total	64,057	106				

*(p<.05)

Table 6: One-way variance analysis for educational technology using Motivation and Self-Regulation for science teachers based on averages for foreign language level

Variable	Dimension	Sub-dimension	Source of Variance	Sum of Squares	df	Mean Square	F	P
Foreign Language Level	Motivation	Educational Technology Using Self-Efficacy	Between Groups	,707	2	,353	,951	,390
			Within Group	38,654	104	,372		
			Total	39,361	106			
		Educational Technology Using Value	Between Groups	7,97	2	,398	,963	,385
			Within Group	43,003	104	,413		
			Total	43,800	106			
		Educational Technology Active Using Strategies	Between Groups	,628	2	,314	1,373	,258
			Within Group	23,795	104	,229		
			Total	24,424	106			
		Educational Technology Using Environment Stimulation	Between Groups	,804	2	,402	,444	,642
			Within Group	94,105	104	,905		
			Total	94,910	106			
		Educational Technology Using Goal Orientation	Between Groups	,078	2	,039	,081	,922
			Within Group	50,159	104	,482		
			Total	50,237	106			
Foreign Language Level	Self Regulation	Educational Technology Using Self-Regulation-Triggering	Between Groups	,183	2	,092	1,112	,894
			Within Group	84,670	104	,814		
			Total	84,854	106			
		Educational Technology Using Self-Regulation-Implementing	Between Groups	1,562	2	,781	1,300	,277
			Within Group	62,495	104	,601		
			Total	64,057	106			

When Table 6 is examined, it is seen that there was no significant difference between the variable of foreign language level and the science teachers' education technology use self-efficacy ($F_{(2-104)}$=0.951, p>.05). Similarly, no significant difference was found between the variable of foreign language level and the participants' education technology use value ($F_{(2-104)}$=0.963, p>.05). Also, the science teachers' strategies for active use of education technologies did not differ significantly depending on their levels of foreign language ($F_{(2-104)}$=1.373, p>.05). Similarly, there was no significant difference between the variable of foreign language level and the participants' encouragement in the education technology use environment ($F_{(2-104)}$=0.444, p>.05). In addition, there was no significant difference between the variable of foreign language level and the science teachers' education technology use goal-orientation ($F_{(2-104)}$=0.081, p>.05).

According to Table 6, there was no significant difference between the variable of foreign language level and the science teachers' levels of triggering self-regulation through education technologies ($F_{(2-104)}$=1.112, p>.05). In addition, no significant difference was found between the variable of foreign language level and the participants' levels of self-regulation implementation through education technologies ($F_{(2-104)}$=1.300, p>.05).

When Table 7 is examined, it is seen that there was no significant difference between the variable of computer use time and the science teachers' education technology use self-efficacy ($F_{(2-104)}$=1.408, p>.05). Similarly, no significant difference was found between the variable of computer use time and the participants' education technology use value ($F_{(2-104)}$=1.144, p>.05). In addition, the science teachers' strategies for active use of education technologies did not differ significantly with respect to the variable of computer use time ($F_{(2-104)}$=2.490, p>.05). Similarly, there was no significant difference between the variable of computer use time and the participants' encouragement in the education technology use environment ($F_{(2-104)}$=1.071, p>.05). Moreover, no significant difference was found between the variable of computer use time and the science teachers' education technology use goal-orientation ($F_{(2-104)}$=0.741, p>.05).

According to Table 7, there was no significant difference between the variable of computer use time and the science teachers' levels of triggering self-regulation through education technologies. ($F_{(2-104)}$=0.175, p>.05). In addition, no significant difference was found between the variable of computer use time and the participants' levels of self-regulation implementation through education technologies ($F_{(2-104)}$=0.943, p>.05).

Table 7: One-way variance analysis for educational technology using Motivation and Self-Regulation for science teachers based on averages for computer use time

Variable	Dimension	Sub-dimension	Source of Variance	Sum of Squares	df	Mean Square	F	P
Computer Use Time	Motivation	Educational Technology Using Self-Efficacy	Between Groups	1,038	2	,519	1,408	,249
			Within Group	38,323	104	,368		
			Total	39,361	106			
		Educational Technology Using Value	Between Groups	,943	2	,471	1,144	,323
			Within Group	42,857	104	,412		
			Total	43,800	106			
		Educational Technology Active Using Strategies	Between Groups	1,116	2	,558	2,490	,088
			Within Group	23,308	104	,244		
			Total	24,424	106			
		Educational Technology Using Environment Stimulation	Between Groups	1,915	2	,958	1,071	,346
			Within Group	92,994	104	,984		
			Total	94,910	106			
		Educational Technology Using Goal Orientation	Between Groups	,706	2	,353	,741	,479
			Within Group	49,531	104	,476		
			Total	50,237	106			
Computer Use Time	Self Regulation	Educational Technology Using Self Regulation-Triggering	Between Groups	,284	2	,142	,175	,840
			Within Group	84,569	104	,813		
			Total	84,854	106			
		Educational Technology Using Self Regulation-Implementing	Between Groups	1,141	2	,570	,943	,393
			Within Group	62,916	104	,605		
			Total	64,057	106			

4. Discussion and Results

When the research results are examined, it is seen that all the sub-dimensions regarding the science teachers' motivation for education technology use (education technology use self-efficacy, education technology use value, strategies for active use of education technologies, encouragement in the education technology use environment and education technology use goal-orientation) did not differ significantly with respect to the variable of gender. Parallel to this finding, there were several research results in related literature demonstrating that self-efficacy perception does not change depending on gender (Torkzadeh, Pflughoeft & Hall, 1999; Akkoyunlu & Orhan, 2003; Usluel & Seferoğlu, 2003; Şensoy, 2004; Sam, Othman & Nordin, 2005; Seferoğlu & Akbıyık, 2005; Kuş, 2005; Yılmaz, Gerçek, Köseoğlu & Soran, 2006; Özçelik & Kurt, 2007; Arslan, 2008; İmer & Yürekli, 2009; Pamuk & Peker, 2009; Özder, Konedralı & Sabancıgil, 2010; Kutluca & Ekici, 2010; Tuncer & Tanaş, 2011; Tuti, 2005; Yazlık, Çetin & Erdoğan, 2012; Yenice & Özden, 2015). In addition, the results of other studies revealing that self-efficacy perception differs significantly in favor of male participants (Miura, 1987; Pintrich and De Groot, 1990; Leung & Chan, 1998; Neber et al., 2008; İpek & Acuner, 2011) are consistent with the related result obtained in the present study.

The results of this study also revealed no significant difference between the variable of gender and any of the sub-dimensions regarding the science teachers' self-regulation for education technology use (triggering self-regulation through education technologies and self-regulation implementation through education technologies). Considering the sub-dimensions of self-regulation with respect to gender, the male teachers' mean scores regarding the sub-dimension of self-regulation could be said to be higher than those of the female teachers. In addition, it was seen that the participants had moderate mean scores regarding the sub-dimension of self-regulation. When the related literature is examined, it is seen that the related finding obtained in the present study is consistent with the results of other studies which reported that female participants have higher mean scores regarding some of the sub-dimensions of self-regulation (meta-cognition, setting goals, monitoring skills) than male participants (Pajares, Britner & Valiante, 2000; Pajares & Valiante, 2001; Zimmerman & Martinez-Pons, 1990; Canca, 2005; Alcı & Altun, 2007). In literature, there are several studies demonstrating that self-regulation differs significantly with respect to gender (Alcı & Altun, 2007; Demirel, Erdoğan & Aydın, 2014) besides other studies revealing that the sub-dimension of self-regulation implementation does not differ significantly depending on the variable of gender (Çalışkan and Selçuk, 2010; Liou and Kuo, 2014).

In the present study, the results demonstrated that among the sub-dimensions of the science teachers' motivation for education technology use, the sub-dimensions of education technology use self-efficacy, education technology use value, strategies for active use of education technologies and encouragement in the education technology use environment did not differ significantly with respect to the variable of educational background and that the sub-dimension of education technology use goal-orientation differed significantly with respect to the variable of educational background in favor of those who had a post-graduate degree. In addition, regarding all the sub-dimensions of motivation, the teachers with a post-graduate degree were found to have higher mean scores. The finding of a study carried out with 224 undergraduate students by Torkzadeh and Koufteros (1994) who reported that computer self-efficacy perception increases in line with the educational background is parallel to the related finding obtained in the present study. The finding of another study conducted by Dadlı (2015) who revealed that students' self-efficacy beliefs regarding the course of Science and Technology differ significantly in line with their parents' educational backgrounds does not support the related finding obtained in the present study. In one other study examining science preservice teachers' computer self-efficacy beliefs and their attitudes towards computer-aided teaching, Yenice, Özden and Balcı (2015) pointed out that senior preservice teachers had higher mean scores regarding self-efficacy perception when compared to those in lower class grades. Similarly, Akkoyunlu and Kurbanoğlu (2003) found that students' self-efficacy perception increases in higher class grades. When the related literature is examined, it is seen that there are several studies demonstrating that preservice teachers' self-efficacy beliefs do not differ depending on the class grade (Yılmaz et al., 2006; İpek & Acuner, 2011; Sezer, Yıldırım & Pınar, 2010; Tuncer & Tanaş, 2011) besides one other study revealing that computer self-efficacy perceptions differ significantly in line with the class grade (Çetin, 2008).

In addition, the results of the present study demonstrated that there was no significant difference in any of the sub-dimensions regarding the science teachers' self-regulation for education technology use with respect to the variable of educational background. On the other hand, the participants with a post-graduate degree were found to have higher mean scores regarding self-regulation implementation. This finding is consistent with the finding of a study carried out by Alcı and Altun (2007), who reported a significant difference between self-regulation and class grade. In addition, the finding obtained in the same study that self-regulation mean scores decreased as the participants' class grades increased does not support the related finding obtained in the present study.

When the results of the present study were examined, it was seen that all the sub-dimensions regarding the science teachers' motivation for education technology use did not differ significantly with respect to the variable of years of experience.

The results of the present study also revealed that all the sub-dimensions regarding the science teachers' self-regulation for education technology use did not differ significantly depending on the variable of years of experience. However, it was found that the mean scores regarding all the sub-dimensions of self-regulation increased as the participants' professional experience increased. This finding is parallel to the finding of a study carried out by Turan and Demirel (2010), who reported that gaining experience is influential on self-regulation though limited and time-taking.

When the results obtained in the present study were examined, it was seen that among the sub-dimensions of the science teachers' motivation for education technology use, the sub-dimensions of education technology use self-efficacy, education technology use value, strategies for active use of education technologies and education technology use goal-orientation did not differ with respect to the variable of age. This finding is consistent with the finding of another study conducted by Tuncer and Tanaş (2011), who examined education faculty students' computer self-efficacies and reported that the participants' self-efficacy mean scores did not significantly differ depending on the variable of age. In addition, it was found in the present study that the participants' mean scores regarding all the sub-dimensions of motivation decreased at older ages.

This finding is supported by the finding of a study carried out by Özçelik and Aşkım Kurt (2007), who reported that elementary school teachers' computer self-efficacy beliefs had a negative relationship with the variable of age. On the other hand, the related finding obtained in the present study is not consistent with the finding of another study conducted by Akkoyunlu and Orhan (2003), who reported that students' self-efficacy beliefs increase at older ages. Mayer (1987) classified learning strategies as early period, transitional period and late period. In this classification, the researcher pointed out that individuals' acquisition and use of strategies increase in line with their ages. However, in the present study, when the participants' mean scores regarding the sub-dimension of strategies for active use of education technologies were examined in terms of the variable of age, it was seen that the participants' mean scores decreased at older ages. On the other hand, a significant difference was found between the variable of age and the sub-dimension of encouragement in the education technology use environment. This significant difference was in favor of the participants aged between 41 and 50.

The results obtained in the present study also demonstrated that among the sub-dimensions of self-regulation for the science teachers' education technology use, the

sub-dimension of triggering self-regulation through education technologies did not differ significantly with respect to the variable of age. On the other hand, a significant difference was found between the variable of age and the sub-dimension of self-regulation implementation through education technologies in favor of the participants aged between 41 and 50.

In addition, the research results revealed that all the sub-dimensions regarding the science teachers' self-regulation and motivation for education technology use did not differ significantly with respect to the variable of foreign language level. However, it was found that the sub-dimension mean scores increased in line with higher foreign language levels.

When the results obtained in the present study were examined, it was seen that all the sub-dimensions regarding the science teachers' motivation for education technology use did not differ significantly depending on the variable of computer use time. On the other hand, it was found that the mean scores regarding all the sub-dimensions of motivation increased in line with longer computer use time. When the related literature is examined, it is seen that the related finding obtained in the present study is consistent with the results of several other studies which reported that self-efficacy perception increases in line with the increasing computer use time (Aşkar & Umay, 2001; Seferoğlu & Akbıyık, 2005; Çetin, 2008; Kutluca & Ekici, 2010; Çetin & Güngör, 2012; Yenice et al., 2015). In addition, the related finding of the present study is also supported by another study conducted with biology preservice teachers by Yılmaz and colleagues (2006), who reported that the participants' self-efficacy mean scores did not differ significantly with respect to their computer experience.

The results of the present study also revealed that among the sub-dimensions of the science teachers' self-regulation for education technology use, the sub-dimensions of triggering self-regulation through education technologies and self-regulation implementation through education technologies did not differ significantly with respect to the variable of computer use time. However, it was found that the participants' mean scores regarding the sub-dimensions of self-regulation increased in line with longer computer time.

5. Suggestions

Today, effective use of technology in education has increased the importance of teachers' levels of self-regulation and motivation for technology use. In this respect, considering the results of the present study, the following suggestions could be put

forward to increase science teachers' levels of self-regulation and motivation for education technology use:

- The research results revealed that science teachers have moderate and high levels of self-regulation and motivation for education technology use. In order to increase science teachers' levels of self-regulation and motivation for education technology use, in-service trainings could be organized in relation to the use of education technologies with the cooperation of MNE and Education Faculties.
- Today, considering the rapid development of technology, seminars could be organized to inform science teachers about recent renovations related to education technologies.
- Science teachers could be encouraged to use education technologies in their classes.
- The findings obtained in the present study demonstrate that educational background may have positive influence on the sub-dimensions of self-regulation and motivation. In this respect, with the cooperation of MNE and universities, teachers could be encouraged to take post-graduate education.
- The research findings also revealed that foreign language level is likely to have positive influence on self-regulation and motivation. Depending on this, teachers could be encouraged to learn a foreign language to examine technological renovations in other countries as well as to interact with their colleagues abroad.

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