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ANALYSIS OF THE EFFECT OF WEB 2.0 TOOLS ON PRE-SERVICE CLASSROOM TEACHERS' SCIENCE TEACHING SELF-EFFICACY BELIEFS AND ATTITUDES TOWARDS SCIENCE TEACHING

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ABSTRACT

The changes and developments in science and technology around the world have resulted in changes in expectations from teachers, because new skills are added such as digitalization of instruction which teachers are expected to possess in the 21st century. The use of Web 2.0-based tools in the field of education offers an alternative to traditional classroom teaching-learning environments. Producing, modifying and sharing information paves the way for Web 2.0 tools to be used in the learning and teaching process. This research aims to analyze the effect of Web 2.0 tools on pre-service classroom teachers' science teaching self-efficacy beliefs and attitudes towards science teaching. This study is an experimental study and study group includes 79 pre-service teachers studying in Primary School Teaching Department in the 3rd grade during the 2018-2019 Fall Semester. Participants are included in the study by using purposeful sampling method. The first data collection tool is "Science Teaching Self-Efficacy Belief Scale" and second instrument used is "The Science Attitude Scale". Due to lack of normal distribution, statistical techniques such as Mann-Whitney U and Wilcoxon signed rank test have been used in the study. As a result of analysis, there is no distinction between groups in the beginning in terms of science teaching self-efficacy beliefs and attitude towards science teaching. There is observed an increase both in the control group and experimental group; however, there is a statistically significant difference in favor of experimental group in the post-test measurements. The use of Web 2.0 tools lead to more positive change in pre-service classroom teachers' science teaching self-efficacy beliefs and attitudes towards science teaching. In line with this result, it can be claimed that the instruction applied to the control group is also effective; but the use of Web 2.0 tools are more effective on science teaching self-efficacy beliefs and attitude towards science teaching.

Keywords: Web 2.0 tools, self-efficacy, attitude, pre-service classroom teachers.

INTRODUCTION

In the 21st century, rapid developments in science and technology leads to change in the societies' expectations from individuals. Among these expectations, one is that individuals should develop digital competence, in other words, the competence of using and producing technology effectively (Communiqué on Turkey Qualifications Framework, 2016). Considering the importance of education and training (preferred method-technique, material, tool-equipment, environments, etc.) to raise such individuals with the desired competencies, it comes out the necessity of integrating scientific and technological innovations into these activities. Yokuş ve Yanpar Yelken (2019) point out that approaches such as network learning and connected learning theory come to the importance from the beginning of the 21st century and educators have been trying to make the learning activity unique to individual and customizable via technology. They claim that social networks should not be left for arbitrary use, events in social network should be designed to allow meaningful experiences, and users should be guided on how to use it for academic and professional learning purposes.

Teachers - along with being a social entity- have a big role in shaping the future of societies and they should be able to use and produce technology effectively. In 1986, Koehler and Mishra added technological knowledge to the teacher competence after sixteen years from the expression of Shulman -Pedagogical Content Knowledge (PAB). These skills are also included in the General Competencies for Teaching Profession (MEB, 2017) and National Educational Technologies Standards (NETS-T) (ISTE, 2014). According to the document titled "European Framework for the Digital Competence of Educators: DigCompEdu" published by the European Union (EU) in 2017, teachers in the 21st century are expected to have the competence of using digital resources effectively. It is seen that the changes and developments in science and technology around the world have also resulted in changes in expectations from teachers, because new skills are added to the portfolio that individuals are required to possess in the 21st century.

Partnership for 21 Century Learning (P21) partnership lists the following skills "information, media and technology literacy" among the skills that people need for living in the current century (Battelle for Kids, 2019). In 2009, in the 21st World Forum on Learning and Technology, a project titled Assessment and Teaching of Century Skills (ACTS) was started by Microsoft, Cisco and Intel (Griffin et al., 2012). "Information and communication technologies literacy" is one of the skills of this project, in which many researchers attended from all over the world, this skill is presented in the Learning and Technology World Forum 2010 and is still visible on the project's website (https://atc21s.org/). Similar skill is expressed under the name of "digital age literacy" in the framework entitled EnGauge, prepared by the North Central Regional Educational Laboratory (NCREL, 2003).

Although certain institutions and organizations have used different concepts for 21st century skills, the common point of all of them is the digitalization of individuals of this century and digitalizations of teachers who are expected to train them, in other words, they should be equipped with technological knowledge and

skills. Necessary steps are being taken within this context in Turkey. Fatih Project has been put into practice in order to ensure equal opportunities in educational activities and enable the use of technology in schools (MEB, n.d.) so that information technologies can be used effectively in order to appeal to more sense organs. According to the General Competencies of Teaching Profession (MEB, 2017), considering the role of the teachers, who are expected to be competent in their fields, to have pedagogical competence and to use information and communication technologies effectively, it clearly comes out the importance of teachers' role in in the digitalization of educational activities. More emphasis is now put on the new generation teachers who can use technology effectively, produce and share their own designed content, with the addition of digital competence to teacher competencies. It would be appropriate to claim that teachers will benefit from the Internet in displaying these skills.

The Web 1.0 era has started with the World Wide Web developed by Dr. Tim Berners-Lee between the years of 1989-1991, which means "The Network that Surrounds the World" (Morkoç & Erdönmez, 2014). According to the sources (Allen, 2009; Joshi, 2008; Horzum, 2010; Işık, 2013; Morkoç & Erdönmez, 2014), this period -which lets static pages that are only suitable for reading, no connection between users or site-owner, one-way massage communication- left its place to Web 2.0 under the leadership of Tim O'Reilly. Although this aforementioned term was voiced by Darcy DiNucci in 1999 and by Joe Firmage in 2003, it was first introduced in 2004 in the study of Toledano (2013), where it was described in detail by Tim O'Reilly. O'Reilly first pronounced this term in his own media group and partner, Media Live at the conference which was held in 2004 and continued to use this term in his all articles later. It is observed that this term is preferred in other sources related to the subject.

The concept of Web 2.0 is generally related to the way how Web is used (O'Reilly, 2010) and includes practices with a simple interface where users can produce, modify, share contents, collaborate and interact with other users (O 'Reilly, 2007). Being able to both read and write, change, share, socialize and easily actualize all of these in collaboration and interaction with other users are among the qualities of Web 2.0 (Boulos & Wheeler, 2007; Jabamani & Senthilnathan, 2016; O'Reilly & Batelle, 2009; Ozer & Kıyıcı, 2017). Contrary to Web 1.0, it can be claimed that it is possible to give or get training by way of Web 2.0 tools where users are more effective.

Producing, modifying and sharing information; in other words, enabling communication and interaction paves the way for Web 2.0 tools to be used in the learning and teaching process. It can be interpreted that there will be need of qualified teachers who include these tools in this process. According to Cox and Graham (2009), it is important for teachers to know the effect of using pedagogical strategies and utilizing technological tools and presentations while conducting educational activities in their area of competence. It is considered that these tools should be integrated within the process with Web 2.0 tools in order to increase the academic achievements and enhance digital literacy skills of the new generation, who grow up and live with technological devices such as mobile phones, tablets, computers.

The use of Web 2.0-based tools in the field of education offers an alternative to traditional classroom teaching-learning environments. With the opportunity of these tools to allow users to share content, comment, like or change shared content; in other words allowing social interaction, it is made possible for teachers and students to share and discuss homework, exam etc.; and develop content together. Some examples of such tools are Google Classroom, Edmodo, Moodle, Ning, Elgg, ValuePulse and Zoom.

Mishra and Koehler (2006) express that Technological Pedagogical Content Knowledge focuses not only on technology but also on teachers' effective use of technology, pedagogy and field knowledge. Based on this knowledge, teachers should be able to use technology, pedagogy and field knowledge interactively for purpose of using technology effectively. It also matters that they should believe in this issue. As a matter of fact, it is thought that teachers and pre-service teachers can access and use Web 2.0 applications in their teaching-learning environments free of charge and easily used without the need for technical knowledge even though many of them are limited, and this situation may affect their Technological Pedagogical Content Knowledge self-efficacy beliefs and there may be a relationship between them (Elmas & Geban, 2012).

Teachers' beliefs -which they can exhibit the necessary behaviors in order to influence their students' performance and successfully perform their duties- have been conceptualized as "teacher self-efficacy" (Aston, 1984). In terms of science teaching, this concept means the judgment and beliefs that science teachers can teach science effectively and efficiently and increase their students' success (Ozkan et al., 2004). Teachers with high self-efficacy beliefs use different methods suitable for student-centered strategies in the teaching process and conduct research to develop these methods. Those with low self-efficacy beliefs prefer teacher-centered strategies and perform textbook-based teaching (Henson, 2001).

In addition to the self-efficacy belief of teachers or pre-service teachers, another important concept is the attitude towards science teaching. The attitude is being examined within context of affective domain and is defined by Demirel (1993) as the learned disposition that drives certain behaviors towards other people, objects and situations. İpek and Bayraktar (2004) define attitude as the positive or negative attitude of a person to any object, situation or event. Within the context of attitudes towards science teaching, it is included the interest and desire for subjects such as researching, understanding and evaluating and explaining the data obtained about animate and inanimate beings in nature. It is important for science teachers to have a positive attitude towards science and its teaching, who will prepare an effective and efficient learning environment for their students, as they stand for role models for their students. The positive or negative attitude that will occur in students will also affect their science learning (Sunbul et al., 2004). The positive feelings and achievements of students in science classes will enable them to develop positive attitude towards science, and they will enjoy learning and become interested in this area for the rest of their lives. Otherwise, developing negative attitude towards the field will lead them to experience lack of knowledge and avoid learning (Simpson & Oliver, 1990).

When literature is analyzed about the studies on the self-efficacy beliefs and attitudes of science teachers or pre-service teachers, it is seen that academic studies related to attitude are less. These studies on science teaching self-efficacy beliefs are conducted on variables such as gender, branch, seniority, etc. (Berkant & Ekici, 2007; Saracaloğlu & Yenice, 2009; Senemoğlu et al., 2009; Azar, 2010; Bal, 2010). Teaching science lessons is regarded as difficult to teach by most of the teachers at primary education level, and they underline that there are many difficulties to overcome in order to carry out science teaching effectively. It is claimed that the underlying reason for these difficulties is their belief in self-efficacy which they lack or hide (Mulholland et al., 2004). Studies examining teachers or pre-service teachers' attitudes towards science teaching aim to reveal the differences of attitudes in terms of various variables (Turkmen & Bonnstetter, 1999; Sönmez, 2007; Özden et al., 2008; Bahçeci Sansar, 2010). When the resources are reviewed, it is determined that very few studies have been conducted examining both self-efficacy beliefs and attitudes towards science teaching (Tekkaya et al., 2002; Denizoğlu, 2008).

The place of the classroom teachers in the primary education period, in which the knowledge and skills are acquired within a certain system that students will use throughout their life, cannot be denied in terms of teaching the concepts related to science and science-related skills. Classroom teachers' self-efficacy beliefs and attitudes towards science and education have the potential to affect the students' participation in the lesson, in other words, the effectiveness and efficiency of the teaching-learning process (Kutlu & Gökdere, 2012).

In the 21st century, where the world is becoming more digital, it is obvious that the accelerating scientific and technological developments should be integrated with education and instruction activities. This research aims to identify the effect of Web 2.0 tools on classroom teachers' self-efficacy beliefs and attitudes towards to science teaching.

Depending on this main purpose, this research seeks for answers to the following sub-questions:

1. Is there a statistically significant difference between pre-test and post-test measurements of pre-service teachers in the experimental and control groups in terms of Science Teaching Self-Efficacy Beliefs and Attitudes Towards Science Teaching?

2. Do Self-Efficacy Beliefs and Attitude Towards Science Teaching scores of pre-service science teachers in the experimental group (applied with Web 2.0 Tools) differ significantly considering their pre-test and post-test measurements?

3. Do Self-Efficacy Beliefs and Attitude Towards Science Teaching scores of pre-service science teachers in the control group differ significantly considering their pre-test and post-test measurements?

METHOD

Research Model

This study is an experimental study which examines whether classroom teachers' use of Web 2.0 tools has an effect (if so, to what degree) on their science teaching self-efficacy beliefs and attitudes towards science teaching. Experimental studies attempt to measure the variables and then reveal the cause-effect relationships between these variables (Creswell, 2009; Fraenkel et al., 2012). In order to achieve this goal, there is made intervention to a variable (independent variable) in an environment organized by the researcher and measurements are made on the variable (dependent variable) in which the main target of the research is to observe a change. It is attempted to prove that the observed change on the dependent variable is the result of the change in the independent variables (Creswell, 2009; Fraenkel et al., 2012; Can, 2016).

Participants of the Study

Study group includes 79 pre-service teachers studying in Primary School Teaching Department in the 3rd grade during the 2018-2019 Fall Semester. Participants are selected and included in the study by using purposeful sampling method. 39 of 79 pre-service teachers constitute the experimental group and 40 pre-service constitute the control group. In this process, it is paid attention to ensure that groups are as equivalent as possible. These participants are enrolled in state university in Mediterranean Region of Turkey.

Data Collection Tools

The first data collection tool is "Science Teaching Self-Efficacy Belief Scale" which was developed by Richs and Enochs in 1990 and adapted to Turkish culture by Bıkmaz (2002). Secondly, another instrument used is "The Science Attitude Scale" developed by Thompson and Shringley (1986) and adapted to Turkish by Tekkaya, Çakıroğlu and Özkan (2002).

The scale adapted by Bıkmaz consists of 21 items with two factors and has .85 reliability coefficient. The first factor, whose reliability coefficient is .89, measures the science teaching efficacy belief, and the second factor, whose reliability coefficient is .69, measures the expectations of result in science education. There are 13 items in the first factor, 5 positive and 8 negative; and 8 items in the second factor, 7 positive and 1 negative.

The scale adapted by Tekkaya, Çakıroğlu and Özkan is in the form of 5-point likert scale consisting of 21 items. Likert type positive questions include the following scoring "definitely agree = 5, agree = 4, undecided = 3, partially disagree = 2 and absolutely disagree = 1", the reversing process has been applied for scoring negative statements. Cronbach Alpha reliability value of the scale has been determined as 0.83 and it is found to be usable.

Application and Data Collection Process

Basic principles of research ethics have been assured in this study, especially in terms of obtaining informed consent, protecting anonymity and confidentiality. Scales have been applied as pre-tests to both control and experimental groups before intervention. Then, science and technology teaching 1 course has been taught to both groups in the same way by the researcher during the fall semester. Web 2.0 tools including Smartdraw, Imindmap, Glogster, Edrawmax, Creately, Pixton, Toondoo, Pawton, Kahoot, EDpuzzle, Pyzzle Maker, and Aurasma have been chosen by the researchers the way that the tools match for each week. Science and technology 1 course was taught for 12 weeks within the scope of the course program in the experimental group and the control group. Unlike the control group in the experimental group, an extra 1 hour of lesson was taught each week. During these lessons, students in the experimental group were told what the Web 2.0 tool of the week was and how it was used, and sample applications and activities related to the Web 2.0 tool were shown to the students. In the following week, students were asked to design an activity using the web 2.0 tool described in the previous week in accordance with their third or fourth grade science acquisition and place them in the lesson plan. Feedbacks were provided by the researcher to the designed activities and lesson plans, and corrections were requested from the students. In this way, the application process in the experimental group was completed. At the end of the period, the scales were applied to both groups as post-test and the process was completed.

Data Analysis

SPSS package program is used to analyze the data collected with measurement tools within the scope of the study. First of all, it is checked whether the data is normally distributed to determine the appropriate analysis technique. The normality test analysis results show that the research data do not display normal distribution. Findings related to normality test results are presented in Table 1.

Table 1 Normality Test Results

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Group		Statistic	df	Sig.	Statistic	df	Sig.
Experimental	Pre-test Efficacy	,156	39	,018	,957	39	**,137**
	Pre-test Outcome	,138	39	,059	,960	39	**,182**
	Pre-test Self-Efficacy	,107	39	,200*	,972	39	**,426**
	Pre-test Attitude	,200	39	,000	,899	39	,002
	Post-test Efficacy	,238	39	,000	,842	39	,000
	Post-test Outcome	,170	39	,006	,932	39	,021
	Post-test Self-Efficacy	,101	39	,200*	,972	39	**,423**
	Post-test Attitude	,235	39	,000	,923	39	,011
Control	Pre-test Efficacy	,143	40	,039	,924	40	,010
	Pre-test Outcome	,192	40	,001	,880	40	,001
	Pre-test Self-Efficacy	,131	40	,081	,936	40	,025
	Pre-test Attitude	,227	40	,000	,910	40	,004
	Post-test Efficacy	,135	40	,064	,866	40	,000
	Post-test Outcome	,269	40	,000	,892	40	,001
	Post-test Self-Efficacy	,101	40	,200*	,889	40	,001
	Post-test Attitude	,123	40	,128	,952	40	,088

When Table 1 is examined, the pre-result results show that there is normality in pretest outcome, pre-test self-efficacy, post-test self-efficacy in the experimental group; and the pre-test self-efficacy, post-test efficacy, post-test self-efficacy and post-test attitude scores in the control group. However, the other obtained data do not have a normal distribution. As a result of the normality test, it is decided to use nan-parametric analysis methods in the study. Accordingly, statistical techniques such as Mann-Whitney U and Wilcoxon signed rank test have been used in the study.

FINDINGS

In this study which is conducted on the effect of Web 2.0 Tools on pre-service teachers' Self-Efficacy Beliefs and Attitudes towards Science Teaching, the difference between the experimental and control groups for pre-test measurements is presented in Table 2.

Table 2. Mann-Whitney U Test Results for Pre-Test Measurement Differences Between Experiment and Control Groups

Variables	Group	N	Mean rank	Sum of ranks	U	P
Efficacy	Experimental	39	38,13	1487,00		
	Control	40	41,83	1673,00	707,000	,471
	Total	79				
Outcome	Experimental	39	37,95	1480,00		
	Control	40	42,00	1680,00	700,000	,427
	Total	79				
Self- efficacy	Experimental	39	37,42	1459,50		
	Control	40	42,51	1700,50	679,500	,322
	Total	79				
Attitude	Experimental	39	41,14	1604,50		
	Control	40	38,89	1555,50	735,500	,660
	Total	79				

When Table 2 is examined, it appears that there is no statistically significant difference between the experimental group and the control group in the pre-test measurements related to science teaching self-efficacy beliefs and science teaching attitude scores [(U = 707.00; 700.00; 679.500; 735.500; p> .05)]. These results show that there is no distinction between groups in the beginning in terms of science teaching self-efficacy beliefs and attitude towards science teaching.

Findings related to post-test measurement score differences between experimental and control groups are presented in Table 3.

Table 3. Mann-Whitney U Test Results for Post-Test Measurements Between Experimental and Control Groups

Variables	Group	N	Mean rank	Sum of ranks	U	P
Efficacy	Experimental	39	54,92	2142,00		
	Control	40	25,45	1018,00	198,000	.000*
	Total	79				
Outcome	Experimental	39	53,58	2089,50		
	Control	40	26,76	1070,50	250,500	.000*
	Total	79				
Self-efficacy	Experimental	39	58,22	2270,50		
	Control	40	22,24	889,50	69,500	.000*
	Total	79				
Attitude	Experimental	39	52,63	2052,50		
	Control	40	27,69	1107,50	287,500	.000*
	Total	79				

**p<.01*

When Table 3 is examined, it is found out that there is a statistically significant difference in favor of pre-service teachers in the experimental group in the post-test measurements of science teaching self-efficacy beliefs and attitude towards science teaching compared to control group pre-service teachers [(U = 198.00; 250.50; 69.50; 287.50; p <.01)]. When these results are analyzed, it comes out that the activities make a difference between the groups in terms of science teaching self-efficacy beliefs and attitudes towards science teaching and that the experimental group has made more progress in the desired direction.

In order to elaborate this difference, the change between the pre-test and post-test measurement score differences of the experimental group are shown in Table 4.

Table 4. Wilcoxon Test Results for Pre-Test and Post-Test Measurement of The Experimental Group

Variables		N	Mean rank	Sum of ranks	Z	P
Efficacy	Negative rank	0	,00	,00		.000*
	Positive rank	39	20,00	780,00	-5,445	
	Equal	0				
	Total	39				
Outcome	Negative rank	1	3,00	3,00		.000*
	Positive rank	37	19,95	738,00		
	Equal	1			-5,333	
	Total	39				
Self-efficacy	Negative rank	0	,00	,00		.000*
	Positive rank	39	20,00	780,00	-5,445	
	Equal	0				
	Total	39				
Attitude	Negative rank	0	,00	,00		.000*
	Positive rank	39	20,00	780,00	-5,446	
	Equal	0				
	Total	39				

**p<.01*

When Table 4 is examined, it is found out that there is a statistically significant difference between the pre-and post-test measurement scores of experimental group pre-service teachers' science teaching self-efficacy beliefs and attitudes towards science teaching (Z = -5.45; -5.33; -5.45; -5.45. p<.01). In line with these data, it is an indication of the effectiveness of applications.

The findings related to the pre-test and post-test score differences of the control group are presented in Table 5.

Table 5. Wilcoxon Test Results for Pre-Test and Post-Test Measurement of The Control Group

Variables		N	Mean rank	Sum of ranks	Z	P
Efficacy	Negative rank	1	19,50	19,50		.000*
	Positive rank	39	20,53	800,50	-5,253	
	Equal	0				
	Total	40				
Outcome	Negative rank	3	6,50	19,50		.000*
	Positive rank	36	21,13	760,50	-5,188	
	Equal	1				
	Total	40				
Self-efficacy	Negative rank	1	3,00	3,00		.000*
	Positive rank	39	20,95	817,00	-5,473	
	Equal	0				
	Total	40				
Attitude	Negative rank	2	2,75	5,50		.000*
	Positive rank	38	21,43	814,50	-5,440	
	Equal	0				
	Total	40				

**p<.01*

When Table 5 is examined, it is found out that there is a statistically significant difference between pre-test and post-test measurement scores of control group's science teaching self-efficacy beliefs and attitude towards science education (Z = -5.25; -5.18; -5.47; -5.40. p<.01).

CONCLUSION AND DISCUSSION

An experimental and a control group have been created in this experimental study -which is conducted for the purpose of examining pre-service teachers' science teaching self-efficacy beliefs and their attitudes towards science teaching. Experimental course process is carried out for the experimental group with the Web 2.0 tools which are planned by the researchers; on the other hand, a standard course process is done with control group in accordance with the curriculum determined by YÖK. The data obtained as a result of the study have been analyzed by statistical analysis techniques and the changes in the experimental and control groups have been compared between-groups and within-groups. The results related to the sub-problems of the study have been presented in the following paragraphs with making associations with other studies in the literature.

In the first sub-problem of the study, there is found no statistically significant difference between the pre-test scores of pre-service classroom teachers in the experimental and control groups related to science teaching

self-efficacy beliefs and their attitudes towards science teaching. When the scores obtained from the post-test -applied after the trainings- are measured, a statistically significant difference is found between the pre-service teachers' science teaching self-efficacy beliefs and attitude towards science teaching in favor of the experimental group. When these results are taken into consideration, it is seen that the experimental group has significantly differentiated in their self-efficacy beliefs and attitudes towards science teaching, which shows that the training has been successful with the Web 2.0 tools as both group did not differ in their pre-test results. Ata (2011) in his master thesis study also concludes that there is a linear relationship between information literacy self-efficacy and the frequency of use of Web 2.0 technologies. Krauskopf and Forssell (2013) state in their study that technological pedagogical content knowledge is associated with experience and attitude towards technology. Therefore, an applied training opportunity and an opportunity to learn by doing should be provided in order to increase pre-service teachers' self-efficacy beliefs and attitudes towards both their field and the use of technology.

As the second sub-problem of the study, it is examined whether there is a change in pre-service classroom teachers in experimental group in terms of science teaching self-efficacy beliefs and attitude towards science teaching. Looking at the data of the experimental group, it is seen that there is a statistically significant difference between the pre and post-test measurements which indicates the effect of training (Web 2.0 tools). In his master's thesis study, Durusoy (2011) examines the effect of Web 2.0 technologies on teaching self-efficacy in the course of teaching practice and finds out that an effect in a positive way has occurred as a result of his study. As a result, positive effect on pre-service teachers have been observed such as motivation, maintaining discipline, presenting alternative explanations and examples, applying different teaching methods, choosing the appropriate method and managing the classroom. In addition, when the study of Selewny (2007) is analyzed, it is seen that the students show progress in a positive way in terms of motivation, active learning and communication skills as a result of using social networks in educational activities, which are among the Web 2.0 tools.

As another sub-dimension of the study, it is examined whether there is a statistical significance in control group pre-service teachers' pre- and post-test measurements in terms of science teaching self-efficacy beliefs and attitude towards science teaching with whom standard course has been done during the process. As a result of analysis, there is found a statistically significant difference between the pre and post-test scores and there is observed an increase in the control group pre-service teachers' science teaching self-efficacy beliefs and attitudes towards science teaching. In line with this result, it can be claimed that the instruction applied to the control group is also effective in terms of science teaching self-efficacy beliefs and attitude towards science teaching. Bandura, Adams and Beyer (1977) point out that self-efficacy cannot be transformed into behavior alone, and therefore it is essential to acquire necessary skills, too. For this reason, teacher training programs should aim to make pre-service teachers gain Web 2.0-based necessary skills during their training process. Li, Guy, Baker and Holen (2006) emphasize that technology-oriented skill training should be used in the training of pre-service teachers in all fields and this should be done from a holistic perspective. Anderson and Maninger

(2007) also emphasize that a teacher education focusing on technology should be applied to different branches.

As a result, in line with the data obtained in the study, pre-service classroom teachers' science teaching self-efficacy beliefs and their attitudes towards science teaching significantly increased within-group measurements in both control group -where standard training process is applied- and experimental group -where training process is carried out with Web 2.0 tools-. Considering this situation, it is observed that there is made a positive development in both types of training in terms of science teaching self-efficacy beliefs and attitudes towards science teaching. As a result of comparing the pre-test and post-test scores of the experimental and control groups, it is seen that there is a significant difference in favor of the experimental group in the post-test scores of the pre-service classroom teachers who was quite similar in their pre-test scores. This result is an evidence of higher effectiveness of the training applied to the experimental group whose training process is carried out with Web 2.0 tools.

ETHICAL TEXT

In this article, journal writing rules, publishing principles, research and publishing ethics rules, journal ethics rules are followed. Responsibility belongs to the authors for any violations related to the article.

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