ACTA DIDACTICA NAPOCENSIA
Volume 15, Number 1, 2022 - DOI: 10.24193/adn.15.1.4

THE WEB 2.0 WORKSHOP FOR THE TEACHER CANDIDATES: A MIXED METHOD RESEARCH

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Abstract: The the study's aim was to find out the effect of the Web 2.0 workshop on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content. Besides, the teacher candidates' views were asked about the workshop. A research design of a mixed method was used. In the quantitative part, the pre- and post-test single group experimental design was used, and in the qualitative part, the case study design was used. The research group consisted of 33 teacher candidates enrolled in a faculty of education at a university in western Turkey. To gather the quantitative and qualitative data, two scales and one questionnaire with open-ended questions were applied. A workshop was organized to teach the Web 2.0 tools to the teacher candidates in the study. While the scales were used as the pre- and post-test, the teacher candidates' views regarding the workshop were collected with the questionnaire. For the quantitative data analysis, the paired samples t-test was used and for the qualitative data analysis the content analysis was used. The study results showed that the Web 2.0 workshop was effective in improving the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content. The teacher candidates expressed positive opinions about the workshop.

Key words: Web 2.0 tools, self-efficacy belief, technopedagogical education competency, workshop, teacher candidates

1. Introduction

Technology's usage in education has become inevitable because of the rapid developments in technology in recent years. Although there are main technology integration barriers including knowledge and skills, resources, beliefs and attitudes, institution, subject culture, and assessment, technology should be integrated to instruction in schools by using mobile devices, for instance desktop computers, laptops, software or Internet (Hew and Brush, 2007). Since its introduction in 1991, web technologies, regarded as equivalent to the Internet, have made significant progress. The usage practices have evolved and the impact on human life of these technologies steadily increased. The technologies and interaction level used in web pages were named as Web 1.0, Web 2.0, and Web 3.0 (Gyamfi, 2014). In the Web 1.0, data are presented on the Internet, and users can access this content via a single source on the Internet. The concept of the Web 2.0 was first introduced by O'Reilly at a conference in 2004 (O'Reilly, 2005). The Web 2.0 is defined as environments where users can produce, modify and share existing web content (Agir, 2013; Bartolomé, 2008; eTwinning and 2.0 web tools, n.d.). The user-centeredness of the Web 2.0 tools with sharing and social aspects have great potential for learning and teaching (Munoz and Towner, 2009). As for the Web 3.0, it is defined as a semantic web. This technology contributes to education in the fields of knowledge creation, the sustainability of the personal learning network, and the personal education management (Ohler, 2008).

Gyamfi (2014) examined the effect of information technologies on social connections. The developmental stages and social effects of the web technologies are demonstrated in Figure 1.

Received February 2021.

Cite as: Öztürk, G., Karamete, A., Çetin, G., & Korkusuz, M. E. (2021). The web 2.0 workshop for the teacher candidates: A mixed method research *Acta Didactica Napocensia,* 15(1), 38-51, https://doi.org/10.24193/adn.15.1.4

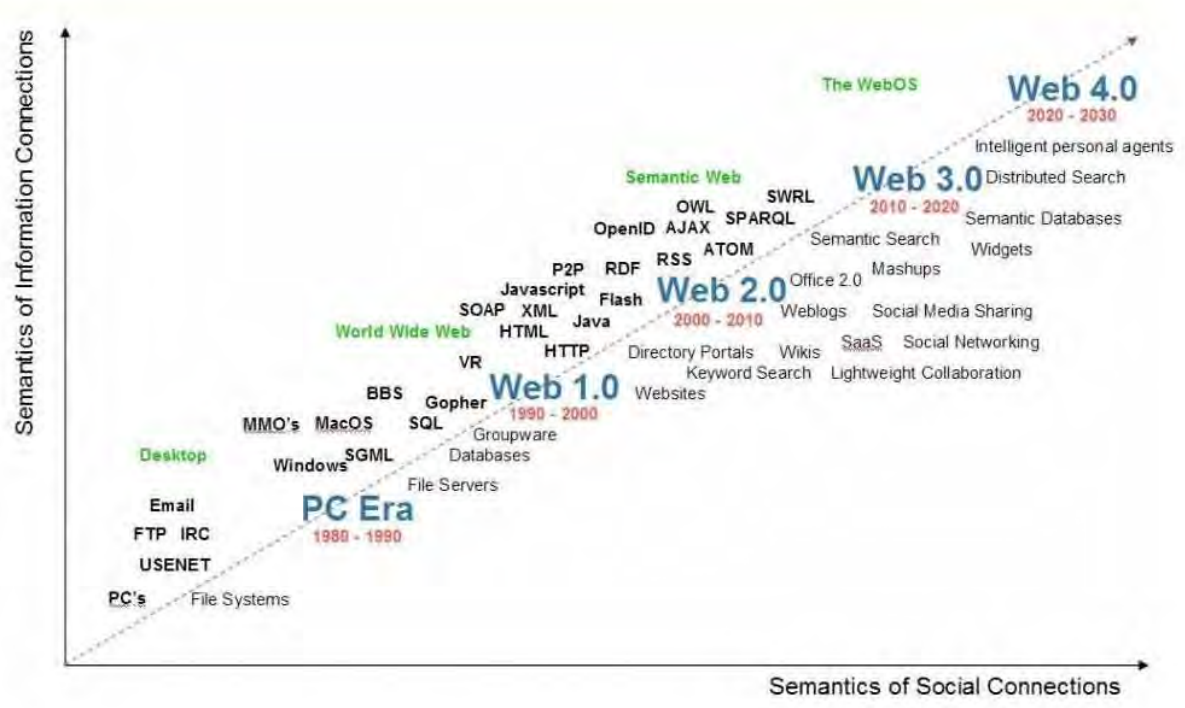

Figure 1. *Developmental stages and social effects of the web technologies (Gyamfi, 2014).*

In this context, the development of web technologies, especially the Web 2.0 tools, has led to the emergence of new tools that can be used in the teaching environment. Teachers need to have the necessary information about rapidly developing and diversifying the Web 2.0 tools to use them effectively. Also, teachers need to see examples of different practices in addition to the existing course materials regarding the course contents. In this respect, the Web 2.0 tools can be quite useful (Munoz and Towner, 2009).

The Movement for Increasing Opportunities and Technology Improvement [MIOTI], promoted by the Ministry of National Education [MoNE] in Turkey, is a project aimed at the integration of technology in education to ensure that every student has the best education, access to the highest quality education content and equal opportunities (FATIH project in education, n.d.). For that reason, the MoNE continues its efforts to improve the technological infrastructure in schools as well as the effective use of information technologies in the teaching-learning environment. Within the scope of this project, the Internet infrastructures in schools were improved and the interactive board was placed in classrooms. For example, the Education Information Network [EIN] (n.d.) can be used to make course content more effective. The Internet platforms such as EIN (n.d.) supported by the MoNE offer opportunities for teachers. There are tools that teachers can use such as books, videos, and animations (FATIH project in education, n.d.). Within the scope of the MIOTI Project, issues such as the use of technology, professional development, content development and distance education are given importance. Teachers need to see examples of different applications on the Internet, apart from the existing materials concerning the course content. Because our age can be called the information age, it is necessary to plan and develop when and how information can be used effectively. At this point, the Web 2.0 tools are useful. Tools that can be observed on platforms such as the EIN were first produced with the Web 1.0 technology, and today they are being produced with the help of the Web 2.0 tools.

The Web 2.0 tools for teaching purposes can be grouped in different ways (Web 2.0 tools, n.d.; Web 2.0 technology, 2020). Elmas and Geban (2012) classified the Web 2.0 tools into eight groups according to their characteristics and use in teaching:

- *The content management systems*: Ensures that content prepared for a specific purpose is regulated and controlled as desired. For example, Wikispaces and Edmodo.

- *The online meeting tools*: Tools that allow meeting and negotiating online. For example, Voki and Todaysmeet.
- *The online storage and file-sharing tools*: Tools that provide a file-sharing environment between people and groups online. For example, Dropbox and Screencast.
- *The interactive presentation tools*: Tools that allow preparing presentation templates in different styles. For example, Prezi and SlideRocket.
- *The online survey tools*: Tools to prepare surveys that individuals in the target group can fill out online on any topic. For example, Google Forms, Poll Everywhere and Survey Monkey.
- *The concept map and drawing tools*: Tools that facilitate the preparation of concept maps and drawings in different shapes. For example, Cacoo and MindMeister.
- *The animation and video preparation tools*: Practical and helpful tools in the preparation of animations. For example, Powtoon, GoAnimate and Creaza.
- *The word cloud preparation tools*: Tools for creating word clouds that increase the emphasis of the key points of the subject to be explained. For example, WordArt and TagCrowd.

With the frequent use of the Web 2.0 tools in instruction, there has been an increase in the number of communications, data sharing and social media tools. In addition, these tools contribute to making science and projects more viable and shareable on a global scale (eTwinning and 2.0 web tools, n.d.).

There are positive aspects of using the Web 2.0 tools in instruction. That is, using the Web 2.0 tools has educational advantages for students, teachers and classroom environment. The Web 2.0 tools can be used as course materials or assessment tools in education. These tools can be supportive, interactive and collaborative. The Web 2.0 tools can play a role in both creating and sharing information and content. Additionally, they may also be useful to contribute to traditional teaching; they can make lessons more fun. With the use of these tools, teachers can save time and interest in lessons can also increase. Thus, a more participatory classroom environment can be created for students. Activities designed with these tools can contribute to group work, high-level thinking skills, creativity, and critical thinking skills. They can also provide alternative for measurement and evaluation. Thus, teachers and students are given more freedom and flexibility in terms of time and space (Web 2.0 technology, 2020; eTwinning and 2.0 web tools, n.d). Although they provide benefits, disadvantages of the Web 2.0 tools can be mentioned. For instance, using the Web 2.0 tools can cause stress for some students. It may also be time-consuming for teachers to learn these tools, and most of these tools are in English. In addition, technical problems may arise when using these tools. Thus, it may lower students' motivation levels (Web 2.0 technology, 2020; eTwinning and 2.0 web tools, n.d.).

There are studies on the Web 2.0 tools in the related literature (Birisci, Kul, Aksu, Akaslan and Celik, 2018; Gursoy and Goksun, 2019; Korucu and Gundogdu, 2016; Yilmaz and Orhan, 2011). Some of these include attitude scales or self-efficacy scales related to the Web 2.0 tools. For example, Birisci et al. (2018) developed a five-point likert-type self-efficacy scale consisting of 36 items. The scale aims to measure the self-efficacy of individuals about how they benefit from the Web 2.0 tools during the planning stages of a lesson (preparation, presentation and evaluation), and a high score indicates that the individual has high self-efficacy about using the Web 2.0 tools. In their studies, Korucu and Gundogdu (2016) performed a content analysis of the articles addressing the Web 2.0 tools in Turkey between 2007-2015. The authors reported that the studies were mostly conducted at the undergraduate level and included the opinions on the educational practices related to the social networks and the use of the Web 2.0. In another study related to the use of the Web 2.0 tools, it was determined that the use of the Web 2.0 tools in university level was moderate, and it did not show a significant difference in terms of the years and departments (Abdelrahman, Arwa and Almabhouh, 2016). It was also stated that the Web 2.0 tools were mostly used in the studies on the science classes. Franklin and Harmelen (2007) compared the Web 2.0 tools at five different universities (the University of Warwick, Leeds, Brighton and Edinburgh in Britain and the University of Klagenfurt in Austria) and concluded that the Web 2.0 tools in the higher education were still at an early level and the tools involved some risks in

terms of the mental features and safety. Thus, it is recommended that the higher education institutions use the Web 2.0 tools at the basic level by making the necessary adaptations. Gursoy and Goksun (2019) in their mixed study method with empirical and phenomenological aspects, the teacher candidates developed the content using the Web 2.0 tools, Quizizz, Kahoot, Powtoon, MindMeister, Emaze, Toondoo and etc., then shared the content with their class using Edmodo. They concluded that the teacher candidates' self-efficacy beliefs in developing Web 2.0 content improved and had fun while developing the content. According to Yilmaz and Orhan (2011), the instructors working in the education faculties tend to know Facebook and instant messaging programs more than the wikies, blogs and podcasts. They mostly use Facebook while they use the podcasts the least. Additionally, while the faculty members use the Web 2.0 tools mostly to reach course materials, they use these tools to share course materials at least. Doung-In (2018) examined the use of and level of awareness the Web 2.0 tools of the first-year students at the Department of Information Technology at a university in Thailand. The students were found to be more familiar with the Web 2.0 tools such as the blogs, YouTube, social networking sites, wikis and instant messaging programs than other Web 2.0 tools such as Flickr, the RSS feeds and podcasts. Accordingly, the author proposed the development of a program involving the use of the Web 2.0 tools in the social networkin sites to enhance the skills of information technology students in their professional lives. Eyyam, Menevis and Dogruer (2011) measured the Web 2.0 attitudes of the teacher candidates studying in a faculty of educational sciences using the Web 2.0 Attitude Scale. They found that the teacher candidates mostly used the Web 2.0 tools such as social networking sites, wikis and instant messaging programs. However, the teacher candidates did not know other Web 2.0 tools well and they did not prefer to use them in the classroom environments or academic studies. In the study, it was concluded that the teacher candidates did not have enough knowledge about the Web 2.0 tools and how to use them in their classes. Their attitudes towards the Web 2.0 tools were positive, and they favored to use them in their classrooms, and it was recommended to design various courses including different Web 2.0 tools in their courses.

It is important for teacher candidates to adopt the role of technology in education and increase its use when they begin teaching profession as they are expected to instruct a group of students who are intertwined with technology (Erdemir, Bakirci and Eyduran, 2009). For this reason, both teachers and teacher candidates should follow the technological developments as well as the professional knowledge and skills and continuously improve their competence to use the technological tools (Akgun, 2013). The technopedagogical content knowledge (TPACK) model was formed by adding the "technology" dimension to the pedagogical content knowledge which was developed by Shulman (1986). In short, the TPACK model includes the pedagogy, technology, and content knowledge (Kabakci Yurdakul, 2011). Regarding the subject, in a study analyzing the studies on technopedagogical content knowledge in Turkey between 2005-2013, Baran and Bilici (2015) reported that the scales were more widely used as the data source, studied with the teacher candidates as the sample group and studied on the science and mathematics as the study topics. Kiray (2016) developed a TPACK self-efficacy scale, which consisted of 55 items and seven sub-dimensions with reliability of .969 for the pre-service science teachers. Haciomeroglu, Sahin and Arcagok (2014) conducted a study with 225 teacher candidates regarding the adaptation of a TPACK scale to Turkish. The five-point likert type scale includes 46 items with nine sub-dimensions. The reliability coefficient of the scale was .94.

In the study by Kabakci Yurdakul (2011) conducted with 3105 teacher candidates, it was concluded that the teacher candidates perceived themselves as advanced in terms of the technopedagogical education competencies, that they considered themselves sufficiently advanced in the design, exertion and ethics sub-dimensions of the technopedagogical education competency, and that they considered themselves moderately sufficient in the proficiency dimension. It was concluded that technopedagogical education competencies of the teacher candidates varied according to their ICT usage levels. In the study of Akgun (2013), it was reported that 214 teacher candidates' teaching self-efficacy perceptions and web pedagogical content knowledge were high, and there was no significant relationship between the web pedagogical content knowledge and gender variable. However, there was a significant relationship between the department and the frequency of the Internet use in education and there was a positive relationship between the teaching self-efficacy perception and web pedagogical content knowledge. Cuhadar, Bulbul and Ilgaz (2013) found that 389 teacher candidates

were questioning in terms of the innovation characteristics and technopedagogical education competencies were advanced; a positive and medium level relationship was found between the teacher candidates' innovation characteristics and technopedagogical education competencies.

As a result, one of the biggest advantages of the Web 2.0 tools is that it speeds up the information sharing. For instance, they provide practical solutions such as recording, storing and using information when needed, in line with the software used. The Web 2.0 tools are rapidly taking place in education. However, the students of education faculties are not familiar with the Web 2.0 tools and how to integrate them into courses is not well-known (Eyyam et al., 2011). For this reason, it was planned to organize a workshop on the introduction and implementation of the Web 2.0 tools for the teacher candidates studying in a faculty of education at a university in the westernTurkey. Thus, it was aimed that the teachers of the future would be more aware of the technological applications so that they could use them in their courses. To help the teacher candidates to plan their courses according to different learning approaches, the Web 2.0 tools supporting various approaches such as cooperative learning were introduced and applications were made to use these tools. The workshop was expected to help the teacher candidates integrate the Web 2.0 tools into their courses while performing the teaching profession. The results of the study were thought to contribute to the literature and become a guide for new studies.

This study aimed to investigate the effects of the Web 2.0 workshop on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content and to determine their views on the Web 2.0 workshop. For this purpose, the following research questions were asked:

1. What is the effect of the Web 2.0 workshop on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content?

2. What are the teacher candidates' views on the Web 2.0 workshop?

2. Method

The study was a mixed research model including the quantitative and qualitative research designs (Creswell, 2009). A single group pre- and post-test experimental design were utilized in the study's quantitative part, and in the qualitative part, the case study design was used (Buyukozturk, Kilic Cakmak, Akgun, Karadeniz and Demirel, 2014).

A workshop was organized for the teacher candidates in the study. The workshop was about introducing and applying the Web 2.0 tools. In the study, the pre- and post-test scales were applied to the teacher candidates before and after the workshop. In addition, the teacher candidates' views about the workshop were asked after the workshop.

2. 1. Study Group

The study group consisted of 33 teacher candidates from different departments of the faculty of education at a university in western Turkey. The study group was determined according to the convenience and criterion sampling methods (Buyukozturk et al., 2014).

The convenience sampling method was chosen because it was easy to reach the teacher candidates. In the study, the Web 2.0 workshop was planned for the teacher candidates studying in all departments of the faculty, and 33 teacher candidates were selected as the study group. For this purpose, the criterion sampling method was used. The criterion was determined to be a teacher candidate in the faculty, to have a computer with the Internet connection outside the school and to be interested in the Web 2.0 tools. A workshop announcement was made to all teacher candidates in the faculty. A questionnaire was prepared on the Google form to choose the participants. Then, a workshop poster including the data matrix to the survey link was prepared. The printout was hung on various places at the faculty. The interested teacher candidates were expected to read this QR code and complete the questionnaire online. While determining the participants of the workshop, attention was paid to the presence of the

teacher candidates from different departments. Accordingly, 33 teacher candidates were selected according to the determined criteria among the teacher candidates who completed the questionnaire. 2. 2. Implementation of the Web 2.0 Workshop

Teachers of the future need to benefit from different educational approaches and technologies to design their courses effectively. To raise awareness on the issue, a workshop was organized by the researchers for the teacher candidates studying at different departments of the faculty of education. In the workshop, the teacher candidates were trained about the introduction and application of the Web 2.0 tools.

The workshop program included the following topics: Educational social networking (Edmodo), presentation preparation (Prezi, Amaze, Powtoon), poster preparation (Padlet, Canva, Publisher), augmented reality (HP Reveal, Quiver, DataMatrix), online storage and file sharing (Dropbox, Google Drive), activity paper preparation (LearningApps.), word cloud, concept map and mind map preparation (WordArt, Inspiration, iMindMap) and assessment (Kahoot, Socrative, Quiziz) tools.

The workshop was held in a computer laboratory and a hall arranged for group work. The groups of the teacher candidates from different departments were formed. However, most of the activities were conducted individually.

In the workshop, firstly, the teacher candidates were briefly informed about the workshop flow and the Web 2.0 tools. A virtual classroom was created in the Edmodo educational social networking environment for document sharing. In each session of the workshop, first, information was given about the use of the related the Web 2.0 tools, and it was ensured that the teacher candidates became a member of these tools. Then, they were asked to prepare an activity related to their major subjects relevant to these tools. In addition, they were given the extracurricular tasks to be evaluated in the next class. In the last session, the overall course of the workshop was evaluated, and the attendance documents were given to the participants.

2. 3. Data collection, and validity and reliability of the data

Three data collection tools were used in the study: Web 2.0 Practical Content Development Self-Efficacy Belief Scale, Technopedagogical Education Competency Scale, and Web 2.0 Workshop Questionnaire.

The Web 2.0 Practical Content Development Self-Efficacy Belief Scale [W2SEBS]: The first data collection tool was developed by Birisci et al. (2018). The 21-item scale has a three-factor structure: preparation, presentation and evaluation. The scale was prepared in a five-point likert type: I am very proficient (5), I am proficient (4), I am moderately proficient (3), I am not proficient (2) and I am definitely not proficient (1). The scores to be obtained from the scale vary between 21 and 85. Birisci et al. (2018) calculated Cronbach's alpha coefficient for the scale as .955. In this study, Cronbach's alpha coefficient for the pre-test was found to be .966; for the post-test was calculated as .940.

The Technopedagogical Education Competency Scale [TPACK]: TPACK, which was developed by Kabakci Yurdakul, Odabasi, Kilicer, Coklar, Birinci and Kurt (2012) was used as the second data collection tool. The 33-item scale has a four-factor structure: design, exertion, ethics and proficiency. The scale was prepared in a five-point likert type: I can easily do it (5), I can do it (4), I can partially do it (3), I can not do it (2), I can definitely not do it (1). The scores to be obtained from the scale vary between 33-165. Kabakci Yurdakul et al. (2012) found the alpha coefficient of the scale as .95. In the present study, Cronbach's alpha coefficient for the pre-test was .976; for the post-test was calculated as .972. According to Buyukozrturk et al. (2014), values of .70 and above indicate high levels of reliability.

The Web 2.0 Workshop Questionnaire: The questionnaire with open-ended questions were developed by the researchers. Two expert opinions were sought on whether each question in the developed draft form measured the teacher candidates' views about the Web 2.0 tools and whether they were compatible with item writing techniques. In line with the experts' opinions, the items were corrected, and the draft form was finalized. Thus, the form was checked in terms of level, scope, content and language. The questionnaire was then piloted to two teacher candidates. The questionnaire consists of

seven open-ended questions. The data obtained from the questionnaire were encoded and checked during the content analysis process to confirm the reliability of qualitative data. The data obtained from three pre-service randomly selected teachers were encoded by the second researcher to confirm intercoder reliability. Intercoder reliability was calculated as .94 using Miles and Huberman's (1994) formula. Also, for the internal consistency of the coding, the data obtained from three teacher candidates randomly selected were re-coded two months later by the same researcher who had encoded all the data before. Using the same formula, the reliability was calculated as .98. Acording to Miles and Huberman (1994), the reliability coefficient of around .90 is sufficient for the reliability of the data.

The W2SEBS and TPACK were applied as the pre- and post-test before and after the workshop. The Web 2.0 Workshop Questionnaire was applied after the workshop. Scales and questionnaires were administered online via Google forms. The completion time of the scales and the questionnaire is 10 minutes. The participation in all scales was voluntary.

2. 4. Data analysis

The data analysis was performed using the quantitative and qualitative methods. The quantitative data of the study were analyzed using SPSS 24.0 package program. In data analysis, to determine which parametric and non-parametric tests could be used, the skewness and kurtosis values of the pre- and post-test total scores of both scales and Kolmogorov-Smirnov test results were examined. The normality tests of the data obtained from the scales is given in the Table 1.

Table 1. *Normality tests of the data obtained from the scales*

		Skewness		Kurtosis		Kolmogorov-Smirnov		
Scale		Value	SE	Value	SE	Statistics	Sd	p
W2SEBS	Pre-test	.219	.409	.015	.798	.128	33	.190
	Post-test	-.746	.409	-.569	.798	.144	33	.080
TPACK	Pre-test	.350	.409	-.093	.798	.105	33	.200
	Post-test	-.216	.409	-1.474	.798	.139	33	.103

Note. W2SEBS: Web 2.0 practical content development self-efficacy belief scale; TPACK: Technopedagogical education competency scale; SE: standard error

The pre- and post-test total scores of both scales had skewness and kurtosis values between -1.5 and 1.5, and the Kolmogorov-Smirnov test results were $p > .05$ in Table 1. These results indicate that the data show normal distribution. Since the data showed normal distribution, it was decided to use the paired sample t-test (Buyukozturk, 2017).

The qualitative data obtained from the Web 2.0 workshop questionnaire were analyzed using the content analysis method. When analyzing the data, the teacher candidates were coded as S.1, S.2. In the content analysis, the answers to the questions were categorized into the themes and sub-themes (Balci, 2004). An analysis table was prepared for each question. The total number of answers to each question in the study sometimes exceeded 33. This is because a teacher candidate's answer to a question can sometimes be grouped under more than one sub-theme. In addition, interesting answers of the teacher candidates are quoted in quotation marks, for example "…" (S.1).

3. Findings

The results related to the first sub-problem of the study "What is the effect of the Web 2.0 workshop on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content?" are presented below. Descriptive statistics regarding the scales are presented in the Table 2.

Table 2. *Descriptive statistics*

Scale		N	Min.	Max.	x̄	SD
W2SEBS	Pre-test	33	39	105	70.18	14.647
	Post-test	33	76	105	95.61	8.846
TPACK	Pre-test	33	81	165	118.91	20.024
	Post-test	33	127	165	148.03	13.149

Note. W2SEBS: Web 2.0 practical content development self-efficacy belief scale; TPACK: Technopedagogical education competency scale; x̄: mean; SD: standard deviation.

According to the Table 2, the mean of the post-test total scores in both scales is higher than the mean of the pre-test total scores. To determine whether the difference was significant, the paired samples t-test was used. The results are given in the Table 3.

Table 3. *Paired samples t-test scores*

Scale		N	x̄	SD	df	t	P
W2SEBS	Pre-test	33	70.18	14.647	31	10.659	.000
	Post-test	33	95.61	8.846	31		
TPACK	Pre-test	33	118.91	20.024	31	9.266	.000
	Post-test	33	148.03	13.149	31		

Note. W2SEBS: Web 2.0 practical content development self-efficacy belief scale; TPACK: Technopedagogical education competency scale: x̄: mean; SD: standard deviation; df: degree of freedom.

When the Table 3 was examined, a statistically significant difference was found in favor of the post-test between the pre- and post-test total scores of the W2SEBS and TPACK ($t(32)=10.659$, $p<.05$; $t(32)=9.266$, $p<.05$). According to the findings, it could be concluded that the Web 2.0 workshop positively affected the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content.

The Web 2.0 Workshop Questionnaire consisting of seven open-ended questions was applied to the participants to find the answer to the second sub-problem of the study "What are the teacher candidates' views on the Web 2.0 workshop?" The findings are presented below as question headings:

Question 1: When the teacher candidates were asked about the use of the Web 2.0 tools in the courses before the workshop; 29 out of 33 teacher candidates stated that they used similar technologies before the workshop.

Question 2: When the teacher candidates' participation goals to the workshop were examined, the obtained data were collected under two themes: Using technology and the Web 2.0 tools when they become in-service teachers (N = 19); Self-development in technology (N = 18). Examples of the views of the teacher candidates about participation goals to the workshop are presented below:

"*To enrich the learning of my students by learning the use of the Web 2.0 tools effectively and to integrate these tools into mathematics education in my professional life*." (S.1)

"*I joined the workshop to become a technologically equipped teacher who has 21st-century skills, can improve students technologically, and has analytical thinking skills.*" (S.11)

"*To learn the new Web 2.0 tools*." (S.25)

"*To improve my insufficient knowledge in terms of information and technology*." (S.24)

"*To learn current information about technology tools that can be used in education and apply them to my students in my classrooms during the teaching*." (S.23)

Question 3: The extent to which the teacher candidates achieved their participation goals to the workshop were grouped under three themes: high (N = 31), moderate (N = 1) and low (N = 1). The teacher candidates' views regarding the "high" theme are as follows:

"*I think I have reached 99 percent. I can compensate for my gaps with my own work*." (S.3)

"*I have achieved my goal in general. I have learned a lot and now I have new horizons in my mind. Now I have a wider mind. I feel that I overcome my fears*." (S.21)

The teacher candidate with the code S.8 stated that "*I could not reach it because I had wider targets*", and his expectations were not met.

Question 4: When the teacher candidates were asked to evaluate the workshop under five headings, the following results were obtained:

The teacher candidates' views on workshop organization were grouped under four themes: good (N = 29), moderate (N = 2), insufficient (N = 1), and no answer, not understanding the content of the question, misunderstanding (N = 1).

The important teacher answers about the workshop organization are given below:

"*The organization was successful. Enough participation was provided, the teachers were well-equipped and trained us to this extent."* (S.11)

"I think that great efforts were spent for the organization in general and those efforts were really reflected on us." (S.12)

"The workshop proceeded rapidly and exhibited a dynamic narrative that did not remain in the same order. The introduction of the Web 2.0 tools was supported with the presentations of experts in the field and the information was shared without being tedious." (S.28)

S.26 expressed moderate opinions about the organization of the workshop by saying *"... We were 4 people in the group and 2 plugs were not enough for us. Apart from that, I did not encounter any problems."*

The teacher candidates' views about the workshop content were grouped under three themes: Sufficient (N = 21), moderate (N = 5), no answer, not understanding the content of the question, misunderstanding (N = 7). Examples of the answers of the teacher candidates who described the content of the workshop as sufficient, and moderate are given below:

"The content was very convenient and useful to me, and I developed different perspectives about my profession. Our instructors were very interested and gave explanations without leaving any question marks." (S.15)

"I think placing the applications from different areas every day minimized monotony and confusion. At the same time, taking care of each participant was proof that it was very efficient." (S.31)

"It was shown in practice that there was such an easy practice, and we were taught to learn that easily." (S.2)

The teacher candidates' views on the workshop time were grouped under three themes: Sufficient (N = 28), moderate (N = 3) and insufficient (N = 2). Some important answers are given below:

"As the number of the Web 2.0 tools was so high, the time had to be adjusted according to the content of the program, and our instructors set it well. According to our schedule, the time was nicely arranged. We were neither bored nor experienced troubles." (S.26)

"It was for 4 days. It was used very effectively." (S.3)

"It could have been a little longer." (S.6)

"The duration was short; it could have been extended. More Web 2.0 tools could have been introduced." (S.32)

The teacher candidates' views about activities in the workshop were grouped under three themes: Sufficient (N = 21), moderate (N = 3), no answers, not understanding the content of the question, misunderstanding (N = 9). Interesting answers about the workshop content are given below:

"The activities were generally nice. Appropriate tools to be used in classrooms were studied." (S.3)

"We prepared presentation, exam, and video preparation activities such as Actionbound, Edmodo, Prezi, I-mindmap, Quizizz, and Kahoot and it was fun and educational." (S.23*)*

"Our teachers prepared a project about the tools we saw in Edmodo. And everyone submitted their work there. After that, it was very nice that the teachers opened these tools and showed them to us. The Quiver event was fun." (S.25)

"I liked the activities in which teachers played the role of demonstrators rather than instructors. That is, instead of the activities in which teachers taught directly through a presentation, I enjoyed the works in which we directly implemented, and did the same job at the same time." (S.33)

"In spite of some inconvenience, the activities were efficient." (S.29)

When the teacher candidates were asked to express their views about the contributions of the workshop, the answers were collected under five themes. These themes are expressed as new knowledge / point of view (N = 24), contribution of technology to classes (N = 10), self-confidence (N = 8), satisfaction (N = 6) and socialization (N = 3). Here are some comments:

"I also learned some unfamiliar applications such as WordArt and Actionbound." (S.2)

"I learned a lot of Web 2.0 tools, but I also learned a lot about artificial intelligence, industry 4.0, storage areas, the historical development of technology, Web 1.0, Web 3.0, and Web 4.0." (S.10)

"We learned what we need to use them in education, which would be necessary and would contribute to us when we become in-service teachers." (S.6)

"In addition to the tools we learned, I also saw how we could teach effectively. I also realized that there are tools that I do not know." (S.13)

"I could use the Web 2.0 tools effectively and overcome my prejudice against such activities" (S.19)

"I realized that I need to focus more on technology. I also realized I should not fear. I learned about new practices."(S.21)

"I learned many new practices that I could use when I become an in-service teacher. I feel very happy." (S.18)

" It enabled me to use many web tools effectively. I interacted with many different people." (S.29)

Question 5: When the teacher candidates' views about the problematic situations during the workshop were asked, the data were categorized under three themes: No (N = 20), partially (N = 12), yes (N = 1). The teacher candidates experienced some problems such as forgetting Gmail password, problems with mind map installation to the computer, and losing the Internet connection, etc. Some of the teacher candidates' responses to problems are as follows:

"No, I did not. On the contrary, I did not foresee that it would be so successful and enjoyable. I believe that the necessary attention and relevance were given." (S.27)

"We had some download or application problems, but they were all solved." (S.8)

"Sometimes I had problems with the Internet connection, but it was solved in a short time." (S.23)

As it is understood from the answers, the teacher candidates stated that even if some problems were experienced in this process, they were solved in a short time.

Question 6: When the teacher candidates were asked about the suggestions regarding the workshop, 9 of them did not make any suggestions and stated that they were satisfied with the workshop. Other teacher candidates made some suggestions such as "changing the hours", "longer workshop time", "repetition of workshops", and "being more frequent". These recommendations were categorized under six themes: duration (N = 13), group work (N = 5), instructor (N = 4), content (N = 4), and other (N = 2). Examples of suggestions for the workshop are presented below:

"One of the options of the scale would have been that I am not competent enough right now, but I could be in a short time. And more time could have spent on 3d printers." (S.8)

"It should be done every year." (S.9)

"I hope everyone could participate in this entertaining and educational workshop." (S.10)

"The overall structure of the workshop was satisfactory without needing any suggestions." (S.15)

"It could have been a certificate instead of an attendance document." (S.21)

"There were problems with time management. However, it was possible to prepare activities by giving importance to this issue." (S.29)

Question 7: When the teacher candidates' views about using the Web 2.0 tools in their future courses, they all stated that they would use these tools in their courses. Examples of these views are:

"I was very excited to use them. I could use them all because my field covered physics, chemistry and biology and it is both numerical and verbal based. Therefore, I could use all applications very effectively." (S.10)

"Considering the student level and the period we were addressing, I thought it was very necessary to use them. I often used them. During the instruction of these technologies, information was already given on which stages and how to use them." (S.12)

"Technology should be used actively in the courses. That is why I planned to use such practices in my teaching life. I would use the applications effectively in my classes. As I observed during the school experience, the students' curiosity and interest in such technologies were quite great." (S.22)

"I thought they were necessary, before this workshop, I certainly did not have that perspective. I was not telling all my courses should be based on these activities. Instead of working with virtual cards, for example, I prefered to use real word cards, but in the meantime, it was very effective to amaze students! I thought giving homework through these tools was definitely a more practical solution. " (S.33).

4. Discussion and Conclusion

In this study, the effects of the Web 2.0 workshop on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content were examined and a significant difference was found between the pre- and post-test scores of both scales in favor of the post-test. According to this result, it could be concluded that the Web 2.0 workshop has a positive effect on the teacher candidates' technopedagogical education competencies and self-efficacy beliefs in developing Web 2.0 content.

A workshop introducing the Web 2.0 tools that could be used for teaching purposes may be useful for teacher candidates to integrate technology in their future course. If the teacher candidates become more aware of how they could use the Web 2.0 tools in their courses, their ability to use technology in those courses may also increase.

When the teacher candidates' views about the Web 2.0 workshop were examined, it was concluded that the teacher candidates reported positive opinions about the workshop and that they would like to use the Web 2.0 tools in their professional lives. The teacher candidates stated that they already used some of the Web 2.0 tools in their courses and they mostly achieved their goals by participating in the workshop. They also expressed their appreciation about the organization, content, duration and contribution of the workshop and the workshop activities. In addition, the teacher candidates stated that the problems during the workshop were quickly solved even though there were short-term problems. The teacher candidates made suggestions about the workshop. These recommendations focused on repeating and increasing the duration of the workshop. All teacher candidates expressed positive opinions about using these technologies in their courses. As a result, it could be said that the teacher candidates have positive opinions about the Web 2.0 workshop. In parallel to our study, in their study of Gursoy and Goksun (2019), teacher candidates developed content using Web 2.0 tools. While the teacher candidates had so happy to attend the implementation of the study, their self-

efficacy beliefs in self-efficacy beliefs in developing Web 2.0 content increased. Contrary to these results, Eyyam et al. (2011) reported that the teacher candidates did not use the Web 2.0 tools in classroom settings or academic studies because they did not know much about it. However, it was stated that the teacher candidates' attitudes towards the Web 2.0 tools were high, and they wanted to use them in their classrooms. In addition, various courses including the Web 2.0 tools were suggested. The second part of that study and the results of the present study are compatible in terms of the teacher candidates' desire to use the Web 2.0 tools in their courses. Lopez (2019) said that "if educators are expected to be able to effectively integrate technology in their instruction, they need to receive both instruction in technology integration and practice in teaching preparation programs". As a result of this study, it can be suggested that the teacher candidates should integrate the Web 2.0 tools into their courses and share their experiences in environments such as the EIN.

The four-day workshop may be planned for a longer period in future studies. In addition, the same study may be repeated on larger samples to test the reliability of the study. In subsequent studies, similar the Web 2.0 workshops could be organized for teachers and instructors. It should be noted that "the use of technology by instructors of the faculty of education in a way to create a model for the teacher candidates is important in terms of spreading it to lower levels. In this respect, it is important to investigate the instructors' awareness, use and integration of the Web 2.0 tools in their courses. (Yilmaz and Orhan, 2011, p.1465). In addition, a mixed design of a study that including experimental and phenomenological methods can be applied in future studies (Gursoy and Goksun, 2019). A mixed method related to quantitative surveys and interviews could be also conducted to investigate teacher candidates' use of Web 2.0 tools and their perceptions of using Web 2.0 as a personal learning environment (Lim and Newby, 2020).

References

Abdelrahman, A., Arwa, A., & Almabhouh, A. A. (2016). The current use of web 2.0 tools in university teaching from the perspective of faculty members at the college of education. *International Journal of Instruction, 9*(1), 179-194.

Agir, A. (2013). *Web 2.0 ve bilisim teknolojileri ogretimi [Teaching of web 2.0 and information technologies]*. In S. Sahin (Ed.), Bilgisayar ve ogretim teknolojileri egitimi ozel ogretim yontemleri I-II, [Computer and instructional technology education special teaching methods I-II] (pp. 173-224). Ankara: Pegem A Yayıncılık.

Akgun, F. (2013). Preservice teachers' web pedagogical content knowledge and relationship between teachers' perceptions of self efficacy. *Trakya University Journal of Education*, *3*(1), 48-58.

Balci, A. (2004). *Sosyal bilimlerde arastırma: Yontem teknik ve ilkeler [Research in social sciences: Method techniques and principles]*. *Ankara*: Pegem A Yayıncılık.

Baran, E., & Bilici, S. C. (2015). A review of the research on technological pedagogical content knowledge: The case of Turkey. *Hacettepe University Journal of Education*, *30*(1), 15-32.

Bartolomé, A. (2008). Web 2.0 and new learning paradigms. *Elearning papers*, *8*, 1-10. Retrived from https://www.researchgate.net/publication/28215647_Web_20_and_New_Learning_Paradigms

Birisci, S., Kul, U., Aksu, Z., Akaslan, D., & Celik, S. (2018). A scale development study to determine web 2.0 practical content development self-efficacy belief (W2SEBS). *Educational Technology Theory and Practice, 8*(1), 187-208.

Buyukozturk, S. (2017). *Sosyal bilimler icin veri analizi el kitabi istatistik, arastirma deseni SPSS uygulamalari ve yorum [Data analysis handbook for social sciences statistics, research design SPSS applications and interpretation]*. (23th ed.) Ankara: Pegem A Yayıncılık.

Buyukozturk, S., Kilic Cakmak, E., Akgun, O. E., Karadeniz, S., & Demirel, F. (2014). *Bilimsel arastirma yontemleri [Scientific research methods]* (17th ed.). Ankara: Pegem A Yayıncılık.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd Ed.). Thousand Oaks, CA: Sage.

Cuhadar, C., Bulbul, T., & Ilgaz, G. (2013). Exploring of the relationship between individual innovativeness and techno-pedagogical education competencies of pre-service teachers. *Elementary Education Online*, *12*(3), 797-807. Retrived from http://ilkogretim-online.org.tr/index.php/io/article/view/1393

Doung-In, S. (2018). Exploring the awareness and use of web 2.0 tools by the first year information science students, Walailak University, Thailand. *International Journal of Information and Education Technology, 8*(4), 279-284. Retrieved from www.ijiet.org/vol8/1048-ET006.pdf

Education information network [EIN] [Egitim Bilisim Agi [EBA]] (n.d.). Retrived from https://www.eba.gov.tr/

FATIH project in education (n.d.). *Egitimde Firsatlari Artirma ve Teknolojiyi İyilestirme Hareketi [FATİH]* projesi *[(Movement for Increasing Opportunities and Technology Improvement [MIOTI]) in education project*]. Retrived from http://fatihprojesi.meb.gov.tr

Elmas, R., & Geban, O. (2012). Web 2.0 tools for 21st century teachers. *International Online Journal of Educational Sciences, 4*(1), 243-254.

Erdemir, N., Bakirci, H., & Eyduran, E. (2009). Determining of student teachers' self-confidence using technology in instruction. *Journal of Turkish Science Education*, *6*(3), 99-108.

eTwinning and 2.0 web tools [eTwinning ve 2.0 web araclari] (n.d.). Retrived from http://etwinningonline.eba.gov.tr/lesson/modul-1-2-0-web-araclari-nedir/

Eyyam, R., Menevis, I., & Dogruer, N. (2011). Perceptions of teacher candidates towards Web 2.0 technologies. *Procedia Social and Behavioral Sciences 15*, 2663-2666.

Gyamfi, N. K. (2014). Security challenges in implementing semantic web-unifying logic. IJCSN - *International Journal of Computer Science and Network, 3*(6), 536-544.

Gursoy, G., & Goksun, D. O. (2019). The experiences of pre-service science teachers in educational content development using web 2.0 tools. *Contemporary Educational Technology, 10*(4), 338-357.

Haciomeroglu, G., Sahin, C., & Arcagok, S. (2014). Turkish adaptation of preservice teachers' technological pedagogical content knowledge assessment instrument. *Journal of Theory and Practice in Education*, *10*(2), 297-315.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55,* 223-252.

Kabakci Yurdakul, I., Odabasi, H. F., Kilicer, K., Coklar, A. N., Birinci, G., & Kurt, A. A. (2012). The development, validity and reliability of TPACK-deep: A technological pedagogical content knowledge scale. *Computers & Education*, 58(3), 964-977.

Kabakci Yurdakul, I. (2011). Examining technopedagogical knowledge competencies of preservice teachers based on ICT usage. *Hacettepe University Journal of Education*, *40*, 397-408.

Kiray, S. A. (2016). Development of a TPACK self-efficacy scale for preservice science teachers. *International Journal of Research in Education and Science (IJRES), 2*(2), 527-541.

Korucu, A. T., & Gundogdu, M. M . (2016). The use of WEB 2.0 technologies in education – a literature review 2007-2015 period. *Journal of Turkish Science Education 13*(1), 56-62.

Lim, J., & Newby, T. J. (2020). Preservice teachers' Web 2.0 experiences and perceptions on Web 2.0 as a personal learning environment. *Journal of Computing in Higher Education, 32,* 234-260.

Lopez, A. (2019). *The impact of teacher preparation in the integration of technology for the teaching of English as a second language in future classroom practice: A comparative case study.* Doctoral thesis. New Mexico State University, New Mexico.

Munoz, C., & Towner, T. (2009, March 2). Opening facebook: How to use facebook in the college classroom. *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 2623-2627). Chesapeake, VA: AACE.

O'Reilly, T. (2005). *What is web 2.0. Design patterns and business models for the next generation of software.* Retrieved from https://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html

Ohler, J. (2008). The semantic web in education. *EDUCAUSE quarterly*, *31*(4), 7-9.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, *15*(2), 4-14.

Web 2.0 tools [Web 2.0 araclari] (n.d.). Retrived from http://www.web2araclari.com/anasayfa.php

Web 2.0 technology [Web 2.0 teknolojisi] (2020, January 13). Retrived from https://www.webegitimaraclari.com/web-2-0-teknolojisi/

Yilmaz, M. B., & Orhan, S. F. (2011, May 25-27). Investigating academic use of web2.0 tools by instructors and faculty members at educational faculties in terms of different variables. *International Educational Technology Conference (IETC 2011)* (pp. 1464-1470), Istanbul, Turkey.

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Acknowledgement

This study was supported by Balıkesir University Scientific Research Unit through the research grant (2018/098) under the title of "Web 2.0 Tools Training for Teacher Candidates". The university requires publication of articles within the scope of the project.