

## Using Web 2.0 technologies to support teacher candidates' content development skills

**Erhan Unal\***, Department of Computer Education & Instructional Technology, Faculty of Education, Afyon Kocatepe University, 03200 Afyonkarahisar, Turkey

**Ahmet Murat Uzun**, Department of Educational Sciences, Faculty of Education, Afyon Kocatepe University, 03200 Afyonkarahisar, Turkey

### Suggested Citation:

Unal, E. & Uzun, A. M. (2019). Using Web 2.0 technologies to support teacher candidates' content development skills. *Cypriot Journal of Educational Science*. 14(4), 694-705. <https://doi.org/10.18844/cjes.v11i4.3737>

Received July 12, 2019; revised from October 11, 2019; accepted from December 6, 2019.

Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu, Near East University, Cyprus.

©2019 United World Center of Research Innovation and Publication. All rights reserved.

### Abstract

The purpose of this study is to explore the effect of Instructional Technology and Material Development (ITMD) course on the perceptions of teacher candidates' content development competencies with web 2.0 tools and the necessities of these tools. The embedded design, which is a type of mixed-method research design, was used in the study. The study was conducted within the scope of the ITMD course. In the course, teacher candidates were taught theoretical knowledge about instructional technology as well as practice including producing contents with web 2.0 tools. The participants of the study were 54 teacher candidates in a public university in the Department of Elementary Mathematics Teaching in Turkey. Results indicated that teacher candidates' content development competencies differed significantly between their pre- and posttest scores. However, although the pre-post difference in the score of their perceived necessities was in the expected direction, it was not significant. Results were discussed, and some implications were provided.

**Keywords:** Teacher candidates; web 2.0; competency; material development; content development.

---

\* ADDRESS FOR CORRESPONDENCE: **Erhan Unal**, Department of Computer Education & Instructional Technology, Faculty of Education, Afyon Kocatepe University, 03200 Afyonkarahisar, Turkey. *E-mail address:* [eunal@aku.edu.tr](mailto:eunal@aku.edu.tr) / Tel.: +90 2722281326

## 1. Introduction

Rapid developments in information and communication technologies have accelerated the use of digital contents and materials in learning environments. Digital contents and materials that can be used in different phases of the teaching and learning process can be in different formats such as video, presentation, animation, concept map and e-book. In the process of designing and developing such digital contents and materials, not only desktop software but also free web 2.0 tools that anyone can access over the Internet can be used. Web 2.0 tools are technologies that enable users to actively create new contents. From this point of view, rather than using for personal purposes, it has become significant for teachers to know how they will use web 2.0 tools to support and enrich learning in today's learning environments (Jimoyiannis, Tsiotakis, Roussinos & Sioenta, 2013). Therefore, it is necessary to acquire the necessary knowledge and skills about how to use these technologies in order to enable teacher candidates to produce digital materials using web 2.0 technologies in education faculties. Thus, it is necessary for prospective teachers to acquire the necessary knowledge and skills about how to use these technologies in order to help teacher candidates produce digital materials using web 2.0 technologies.

Qualifications that today's teachers should have are classified by the Turkish Ministry of National Education as professional knowledge, professional skills and attitudes and moral values. When these qualifications are examined, it is observed in the professional skills and attitudes classification that teachers need to prepare teaching materials in accordance with the learning objectives (General Directorate of Teacher Training and Education, 2017). In addition, the Turkish Ministry of National Education announced the FATİH (Increasing Opportunities and Improvement of Technology Movement) Project in 2010, and the aim of the project was to enhance student achievement by using technology effectively. In this project, teachers are expected to have some skills to integrate technology into the teaching and learning process effectively and efficiently (Kayaduman, Sarıkaya & Seferoglu, 2011). One of the five components of the FATİH project is the provision and management of educational e-content (Turkish Ministry of Education, 2018). Within the scope of the project, in-service training is provided to teachers in order to acquire knowledge and skills related to the design and development of e-contents and materials that teachers can use in the classroom. Thus, it is aimed that the teachers have competencies to design and develop e-contents. As a result, the successful implementation of this project requires teachers to have the ability of producing digital contents and materials. The International Society for Technology in Education (ISTE; 2017) has declared that today's teachers need to design appropriate learning environments by selecting appropriate technologies according to their target audience characteristics and thus have the ability to support the learning process. Therefore, in the learning-teaching process, not only the field and pedagogical knowledge but also technology knowledge is required for teachers to produce digital materials and use them in the class. In line with this requirement, teacher candidates should be trained on how to use technologies they need when they become teachers. One of these technologies that can be taught to teacher candidates is web 2.0 technologies, which are mostly free, open to use by everyone and accessible from anywhere at any time by means of the Internet. Web 2.0 technologies are technologies that allow users to dynamically create, publish and share knowledge by means of collaboration and communication (Kale, 2014). Due to Web 2.0 technologies, users have moved into the position of generating information as active participants. Because users in Web 1.0 technologies were in a position of consuming information passively, they have become active participants in processes such as collaboration, sharing and development provided by web 2.0 technologies (Thomas & Li, 2008). Given the benefits provided by Web 2.0 technologies, researchers have come to the point of using these technologies in teaching and learning environments. Through Web 2.0 technologies, student-centred, participatory, interactive learning environments have begun to be designed (Jimoyiannis et al., 2013). From this point of view, it seems important to design learning environments using contents and materials supported by web 2.0 technologies in today's learning environments. Therefore, it is needed to equip trained teacher candidates having the ability to use these technologies. In addition, it may be useful to identify teacher candidates' views on the necessity of web 2.0 technologies. Because

it can be assumed that there is a relationship between teacher candidates' views on the use of web 2.0 technologies in the learning environments and their learning achievements (Ertmer, 1999; Hew & Brush, 2007).

The necessary information and skills related to the process of designing contents and materials with the help of web 2.0 technologies can be given to prospective teachers within the scope of Instructional Technology and Material Development (ITMD) course. In Turkey, ITMD is one of the courses related to the professional knowledge dimension of the qualifications that today's teachers should have. According to teacher education curriculum of the Higher Education Council, the course includes a 2-hour theoretical lecture and a 2-hour application of the theory. In the course, theoretical knowledge related to the Educational Technology, principles of material design and development, information with respect to the different materials and how to use those materials is provided to the teacher candidates (Turkish Council of Higher Education, 2006). From this point of view, it could be argued that the ITMD course is an appropriate course for helping teacher candidates to the process of producing content and materials through web 2.0 technologies. Given this rationale, this study includes the research question: "what is the impact of the ITMD course on the perceptions of teacher candidates' content development competencies with web 2.0 tools and the necessity of these tools?"

### **1.1. Related studies**

The web 2.0 technologies, which come to the forefront with the features such as communication, interaction and collaboration, could be used in the learning environments for different purposes. Different kinds of 3D educational materials or other materials which require complex technical computer skills can be easily designed and developed with web 2.0 technologies. These potentials of web 2.0 technologies have led to the new concepts in the literature such as pedagogy 2.0 (Jimoyiannis et al., 2013) and teacher 2.0 (Thomas & Li, 2008). Affordances of web 2.0 technologies could be listed as allowing students to create their own contents, stimulating engagement, supporting collaborative learning, enhancing communication and interaction among students, and enabling learning outside the classroom (Jimoyiannis et al., 2013). As one can see, web 2.0 technologies allow teachers to use these technologies at different stages of the courses and to create interactive and rich learning environments (Kim & Jang, 2015; Richardson, 2009).

When the studies in the literature are investigated, it has been found that there are descriptive and experimental studies focusing on the current state of the students' competencies on the use of various information and communication technology skills and the development of these skills. For example, in one experimental study, Gokdas and Torun (2017) investigated the effect of ITMD course on teacher candidates' Technological Pedagogical and Content Knowledge (TPACK) competencies. In addition to the theoretical knowledge, students were exposed to the practical knowledge regarding the design and development of educational video, presentation, concept map and mind map. At the end of the intervention, it was found that students' TPACK competencies increased significantly. Eren, Avci and Kapucu (2015) investigated teacher candidates' competencies and necessity perceptions regarding the use of practical tools for content development after taking the Computer II course. In the course, the teacher candidates learned to use different web 2.0 tools and designed various materials. In the end, the researchers found that teacher candidates' competencies regarding the use of practical tools for content development increased, whereas the perception of the necessities of these tools slightly decreased. In a more recent study, Tatli, Akbulut and Isik (2016) explored the effect of instructional material development through web 2.0 technologies on the teacher candidates' TPACK self-confidence levels. Adopting the single group pre- and posttest design, the teacher candidates were shown various web 2.0 tools by which they could create a concept map, mind map, animation and puzzles. At the end of the intervention, it was found that teacher candidates' TPACK self-confidence levels increased significantly. Tokmak, Yelken and Konakman (2013) examined the influence of the ITMD course, which is based on the TPACK framework, on teacher candidates' perceived instructional material design competencies. In the course, students required to perform

some activities regarding instructional message design, 3D material design, development of presentations, development of web site and evaluation of the educational software. At the end of the course, teacher candidates declared that they gained competencies of the instructional material development and supported their views by the materials that they developed. In a study, Coutinho (2009) examined experiences of integrating web 2.0 technologies into the teaching-learning process of teacher candidates in a course of Educational Technology that they attended. Teacher candidates were introduced different web 2.0 tools and they were asked to show how they could use these tools in their lessons with lesson plans or projects that they were supposed to prepare. At the end of the process, teacher candidates stated that they had the abilities to use web 2.0 technologies in learning and teaching processes, they were confident in this issue and that the educational use of web 2.0 technologies was beneficial.

The literature also focused on descriptive studies related to the teachers'/teacher candidates' competencies on the use of various information and communication technology. For example, Polat and Tekin (2017) conducted a study in which teacher candidates' e-content development competencies were examined. By adopting the survey design, researchers found that teacher candidates were found to have moderate levels of e-content development competencies. In another study, Keles and Turan (2015) explored teachers' views on the FATİH project. It was found that, in particular, teachers complained that the educational contents and in-service training were insufficient. Kim and Jang (2015) investigated factors affecting teacher candidates' web 2.0 tools. Results indicated that perceived enjoyment in using the tools was found to be a strong predictor of web 2.0 integration. Cakir, Yukselturk and Top (2015) investigated the views of pre-service and in-service ICT teachers on the educational technologies and their awareness of the use of web 2.0 tools in education. According to the results of the study, it was found that the views of pre-service and in-service ICT teachers on the educational technologies are positive and the awareness of the integration of the web 2.0 technologies into education is high. Tatli and Akbulut (2017) conducted a study to identify teacher candidates' use of technologies in the areas where they study. In the study, students' material development competencies by using educational technologies and barriers they encountered while using technologies were also explored. Teacher candidates have stated that they are inadequate in integrating technology into the learning process. Besides, they especially declared that they should be taught about the use of web 2.0 tools and other useful software. Sadaf, Newby, and Ertmer (2012) investigated the factors that affect teacher candidates' use of web 2.0 technologies in the future. It was found that teacher candidates intended to use blogs, wikis and social networks in order to increase their student' performance, support collaborative learning, enhance teacher-student interaction and share contents. In addition, it was found that attitudes towards web 2.0 tools and perceived usability about the tools were the most important factors explaining their intention to use those tools in the future. Palaigeorgiou and Grammatikopoulou (2016) conducted a study to reveal the advantages and disadvantages of web 2.0 tools used by teachers who had experiences in using web 2.0 tools. On the benefits, teachers reported that web 2.0 tools facilitated learner-centred approach, helped students figure out how to cooperate and create electronic content, enable them to review their thinking and establish trust between teachers and students. On the other side, some concerns were expressed by the teachers regarding the disadvantages of the web 2.0, which could be listed as teacher and parent attitudes, educational environment, time-consuming activities, curriculum limitations, misjudgement of the student skills and inadequacy of in-service training of teachers. Boks (2012) conducted a study to investigate teachers' effort to change their pedagogy by means of web 2.0. Results indicated that the most frequent technologies adopted by the teachers are Prezi, wiki and podcast. In addition, teachers expressed the usefulness of the tools such as supporting cooperation, providing students to exert more effort and ensuring deep learning.

Considering the related studies, it could be seen that pre-service and in-service teachers generally possess positive views regarding the educational use of web 2.0. In particular, as in-service teachers are aware of the educational benefits of the web 2.0, they are eager to learn these technologies and use them in their class (Cakir, Yukselturk, & Top, 2015; Keles & Turan, 2015; Palaigeorgiou &

Grammatikopoulou, 2016). In addition, it was found in the studies that pre-service teachers were positively influenced by a variety of interventions to enable them to use web 2.0 technologies and other information and communication technologies in their lessons in the future. That is, as indicated earlier, it was supported by the studies that integration of web2.0 tools into different courses was found to increase teacher candidates' capabilities of integrating and using web 2.0 tools for various purposes. Given this rationale, in the current study, the purpose of this study is to explore the effect of ITMD course on the perceptions of teacher candidates' content development competencies with web 2.0 tools and the necessity of these tools.

### **1.2. Significance of the study**

One affordance of web 2.0 technologies in education is that it contributes to the development of powerful and rich learning environments (Kim & Jang, 2015; Richardson, 2009). Therefore, it is important for teacher candidates to have opportunities of gaining various content and material development skills by means of using web 2.0 technologies. By doing so, teacher candidates can design and develop active learning environments enabled by web 2.0 technologies. In addition, considering the qualifications which are expected from today's teachers, it could be realised that both in national and international scales, the ability to design learning material comes into prominence. For example, in the national scale, teachers are expected to prepare teaching materials in accordance with the learning objectives (General Directorate of Teacher Training and Education, 2017). On the other side, in the international scale, they are expected to select the appropriate technology and design appropriate learning environments by selecting appropriate technologies according to their target audience characteristics (ISTE, 2017). Furthermore, within the scope of the FATIH Project carried out in Turkey, teachers are expected to have some skills to integrate technology into the teaching and learning process effectively and efficiently. However, research has indicated that technological competences of in-service teachers are not at the expected level (Altin & Kalelioglu, 2015; Ayvaci, Bakirci & Basak, 2014; Ciftci, Taskaya & Alemdar, 2013). Developing content development skills of teacher candidates by means of web 2.0 technologies may not only enable teacher candidates to gain qualifications that are expected from them but also it may contribute to the effective implementation of nation-wide projects (e.g., FATIH).

### **1.3. Purpose of the study and research questions**

Given the rationale above, the purpose of this study is to explore the effect of the ITMD course on the perceptions of teacher candidates' content development competencies with web 2.0 tools and the necessity of these tools. Based on the purpose, the following research questions are posed:

*Research Question 1:* Is there a significant difference with respect to teacher candidates' pre and posttest scores of content development competencies with web 2.0 technologies?

*Research Question 2:* Is there a significant difference with respect to teacher candidates' pre and posttest scores of perceived necessity of the web 2.0 technologies?

*Research Question 3:* What are the teacher candidates' views on the benefits and drawbacks of developing contents with web 2.0 technologies?

## **2. Method**

### **2.1. Design of the study**

In the current study, a mixed-method research design was used. More specifically, the embedded design, which is a type of a mixed-method research design, was adopted. In embedded design, researchers dominantly use one type of data to answer the research questions and apply to the second type of the data to enhance or intensify the results of the primary type of the data (Creswell,

2012). For the current study, quantitative data were the dominant data source, whereas the researchers used qualitative data to support the results of the quantitative data. In the quantitative part of the study, one group pre- and posttest experimental design was used. Researchers embedded qualitative data within the quantitative data to take a better perspective regarding the research questions. In the qualitative part of the study, students answered a set of open-ended questions, in which the responses were collected in written form.

## **2.2. Participants**

The participants of the study were teacher candidates, who are educated in a public university in Turkey. They study elementary mathematics teaching of the faculty of education. Totally, 54 teacher candidates participated in the study. Of the participants, 8 were male (15%) and 46 were female (85%). As could be seen, the majority of the teacher candidates were female, whereas the male students were the minorities. Only the data of those students, who voluntarily participated in the study, were included in the study. In the qualitative part of the study, a convenient sampling procedure was used. All students, who participated in the quantitative part of the study, also participated in the qualitative phase.

## **2.3. Data collection instruments**

As a quantitative data collection tool, 'Competencies and Perceptions of Necessity About Using Practical Tools for Content Development Scale', which was developed by Eren, Avci and Kapucu (2014), was used. The scale consists of 26 Likert-type questions which are about both competencies in and necessities of using practical tools for content development. The scale consists of items related to different web 2.0 practical tools such as preparing static and interactive presentations, recording voice, creating animations, concept mapping, and educational games (Eren et al., 2014). Only some competencies that were appropriate for the context of the ITMD were included in the study, whereas the remaining ones were excluded. As a result, there were 19 items in the final form of the scale. In order to measure teacher candidates' competencies, items that range from 1 (I am not competent at all) to 5 (I am very competent) were used. To measure teacher candidates' opinions regarding the necessities of the use of practical tools for content development with web 2.0 technologies, the same questions were asked to the teacher candidates, but this time, teacher candidates rated their views regarding the necessities of such technologies ranging from 1 (not at all necessary) to 5 (very necessary). The original form of the scale was found to be highly reliable, indicating Cronbach's reliability values of 0.96 for the competency dimension and 0.94 for the necessity dimension. In this study, for both competency and necessity dimensions, the reliability value was found to be 0.93.

In the qualitative part of the study, open-ended questions were used, for which the responses were collected in written form. The form was developed by the researchers and included questions regarding the benefits and drawbacks of web 2.0 technologies. The form was filled out by the students at the end of the semester. Students were asked to report their views on using web 2.0 technologies in education (i.e., benefits and drawbacks).

## **2.4. Procedure of the study**

The study was conducted within the scope of the ITMD course in the spring semester of the 2017–2018 academic year. The ITMD course is one of the courses related to the professional knowledge dimension of the qualifications that today's teachers should have. The ITMD course is included in the teacher education curriculum declared by the Turkish Higher Education Council. The ITMD is a 4-hour course, involving 2-hour theory and 2-hour practice. In the theory part of the course, teacher candidates were taught theoretical knowledge regarding the basics of instructional design and technology, communication theory and the principles of material design and development. They were introduced to choose, design and prepare appropriate instructional materials. In the practice part of

the study, teacher candidates were asked to put theoretical knowledge into the practice. For example, they created concept maps with Cmap and Mind42 program, dynamic presentations with Prezi and Google Slides, educational games with Scratch and questionnaires with Google Forms, and educational animations and cartoons with Toondoo and Powtoon. They learnt to form interactive quizzes with tools such as Kahoots. The study was conducted in the computer laboratory, where each teacher candidate used one computer. Before the intervention, pretest content development competencies with web 2.0 technologies and perceived necessities of content development with web 2.0 technologies scales were applied to the teacher candidates. After the end of the semester, the same scales were applied as posttests. In the end, teacher candidates' beliefs about using practical web 2.0 tools within the scope of the ITMD course were asked, in which the responses were collected in written form.

### 2.5. Data analysis

In the quantitative part of the study, in order to reveal whether there a significant difference with respect to teacher candidates' perceived pre and posttest scores of content development competencies in and necessities of web 2.0 technologies scores, paired sample t-test was applied. In the qualitative part of the study, content analysis was used to reveal 'patterns, themes and categories' in the data. 'Content analysis is used to refer to any qualitative data reduction and sense making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings' (Patton, 2002, p. 453). In order to ensure the validity of the analysis, the researchers used the inter-coder reliability value suggested by (Miles & Huberman, 1994). The qualitative data were analysed separately by the two researchers. After this, the researchers came together to discuss the agreed and disagreed codes. Inter-coder reliability was calculated based on the following formula: [(number of agreements / number of agreements + number of disagreements) \*100]. Results revealed that the researcher obtained a quite sufficient reliability value (.90), based on the criteria suggested by (Miles & Huberman, 1994).

### 3. Results

To test whether there is a significant difference with respect to teacher candidates' pre- and posttest scores of content development competencies with web 2.0 technologies scores (*Research Question 1*), a paired sample t-test was conducted. The results are given as follows:

**Table 1. Descriptive statistics and t-test results for web 2.0 content development competencies**

Outcome	Pretest		Posttest		N	t	Df
	M	SD	M	SD			
Web 2.0 content development competencies	2.62	0.68	3.10	0.62	54	-6.56*	53

\* $p < 0.01$ .

As can be seen from Table 1, it was found that teacher candidates' content development competencies with web 2.0 technologies increased significantly from pre- to posttest  $t(53) = -6.56, p < 0.01$ . More specifically, when the mean of pretest score of teacher candidates content development competency was 2.62 (SD = 0.68), it was found that posttest mean content competency score was found to be 3.10 (SD = 0.62).

To test whether there is a significant difference with respect to teacher candidates' pre- and posttest scores of perceived necessities of the web 2.0 technologies (*Research Question 2*), again, a paired sample t-test was conducted. The results are given in Table 2.

**Table 2. Descriptive statistics and t-test results for perceived necessities of content development with web 2.0**

Outcome	Pretest		Posttest		N	t	Df
	M	SD	M	SD			
Perceived necessities of content development with Web 2.0	3.56	0.53	3.67	0.57	54	-1.38	53

As shown in Table 2, although the difference was in the expected direction, there was no significant difference between teacher candidates' pre- and posttest scores of perceived necessities of content development with web 2.0 technologies  $t(53) = 1.38, p > 0.05$ .

For the analysis of teacher candidates' views about the benefits and drawbacks of web 2.0 technologies (*Research Question 3*), content analysis was used. Research showed that two main categories emerged from the analysis of the data: *Benefits* and *Drawbacks* of using practical web 2.0 technologies (Table 3).

**Table 3. Codes and coding frequencies**

Theme	Code	f
Benefits	Supporting multimedia learning environment	13
	Facilitating learning	13
	Interestingness	10
	Time saving	8
Disadvantages	Logistical issues	8
	Teacher competency	3
	Difficulty in use	2

Codes, frequency of the codes, themes and direct quotations of teacher candidates' responses are detailed in the following. The first theme was *benefits* of web 2.0 technologies (practical tools) in the development of electronic content. The most repetitive code was '*supporting multimedia learning environment*' ( $f = 13$ ). In this code, students taught that practical tools of web 2.0 technologies can address multiple senses as they include visual and auditory elements. For example, students reported:

*The visual features offered by these tools make learning easier. For example, the concept map we prepared with Mind42 enables us to see all the concepts related to the subject; this enables more learning of the subject (S21).*

*Web 2.0 tools we see in the course are very effective in terms of learning and teaching. Because these tools are visually appealing to people and so it enhances retention (S15).*

Another most repetitive code was "*facilitating learning*" ( $f = 13$ ). In this code, teacher candidates believed that practical tools of web 2.0 technologies facilitate learning as they concretise abstract knowledge. For example, they reported:

*I see these technologies as extremely useful to concretise what is being taught in the lesson. I believe that lecturing with these technologies will be easier and more understandable [for the students] (S29).*

*I believe that these tools will also facilitate teaching and make it easier for students to understand [the contents of the course] (S5).*

Ten teacher candidates referred to the feature of electronic contents created by practical web 2.0 tools as *being interesting*. They thought that contents created by web 2.0 technologies capture students' attention to learning.

*In my opinion, it has a positive contribution to education. First of all, it draws students' attention to classes more and goes beyond the traditional understanding of education enriching the way of teaching (S44).*



*Lessons can become more fun with these tools. We can use these tools to help students focus more easily on the lesson (S18)*

As a final code, students expressed that developing practical electronic contents with 2.0 technologies are *time-saving*. For instance, they argued:

*I think web 2.0 tools can be useful to save time in learning (S13).*

*Thanks to these tools, we can explain the subject in a shorter time (S50).*

In addition to benefits, teacher candidates also expressed some concerns regarding creating electronic contents with web 2.0 tools. These beliefs were categorised under the theme of *drawbacks*, in which students mostly referred to the limitations of using such tools. The most repetitive code under this category was the *logistical issues* ( $f = 8$ ). In this code, teacher candidates reported that in the process of creating or using electronic contents, it may be possible that they may face some obstacles regarding the technical infrastructure of the school, where the contents to be used. They also believed that some advanced features of web 2.0 technologies, which are not free, may affect the content development and usage process negatively. For example, they state:

*Web 2.0 tools are running over the Internet. In this case, I sometimes see the lack of internet access as an important limitation. (S50)*

*The fact that some of the features of these technologies are paid is another negative aspect (S41)*

Another code was the *teacher competency* ( $f = 3$ ). Teacher candidates stated that pre- and in-service teachers should be well aware of using these tools since the use of such devices necessitates some technical skills. For example, they state:

*Teachers may have difficulty in preparing materials with these technologies. Therefore, I think teachers should learn [how to use] these tools properly (S33).*

*Teachers should learn how to use these tools in order that these tools would be truly useful for students. Because sometimes using these tools may not be easy (S26)*

The last code was *difficulty in use* ( $f = 2$ ) of web 2.0. Teacher candidates stated that they sometimes had difficulties in developing electronic contents with web 2.0 tools, as they did not know any prerequisite knowledge regarding the use of such devices. For example, they said:

*The first thing that comes into my mind regarding the drawbacks of web 2.0 technologies is that they are a bit complicated to use. Especially, when using PowToon, I had difficulties to use some of the features such as creating the stage or a character and publishing what I created (S47).*

*The only problem is that some programs are a bit confused. For example, the interface of Toondoo came to me a little complicated (S19).*

#### **4. Discussion and conclusion**

The purpose of this study was to explore the effect of the ITMD course on the perceptions of teacher candidates' content development competencies with web 2.0 tools and the necessity of these tools. Teacher candidates' views regarding the use of practical web 2.0 tools in education were also investigated.

Considering the content development competencies of teacher candidates with web 2.0 tools, the current study demonstrated that teacher candidates' content development competencies differed significantly between their pre and posttest scores. From this result, it may be argued that web 2.0 tools demonstrated in the course positively affected teacher candidates' content development competencies. This finding is consistent with the previous research, which found that effective ICT implementation in different courses was beneficial for teacher candidates to enhance their ICT

integration competencies (Arnold, Padilla & Tunhikorn, 2009; Gokdas & Torun, 2017; Kale, 2014; Sancar-Tokmak, Yanpar-Yelken & Yavuz-Konakman, 2013; Smith, & Greene, 2013; Tatli et al., 2016).

As mentioned earlier, teacher candidates created different instructional materials with the help of web 2.0 technologies such as concept maps with Cmap and Mind42, presentations with Prezi and Google Slides, interactive quizzes with Kahoot, educational games with Scratch and questionnaire with Google Forms. By this way, within the concept of IDMT course, teacher candidates increased not only theoretical knowledge base but also their content development competencies with the help of web 2.0 technologies.

As a second research question, teacher candidates were asked to report their beliefs on the perceived necessities of practical web 2.0 tools. Results demonstrated that although the pre-post difference in the necessity score was in the expected direction, it was not significant. That is, teacher candidates' beliefs regarding the necessities of such tools did not change at the end of the course. On the other side, when teacher candidates' mean necessity scores are explored, it could be seen that teacher candidates possessed higher levels of scores with respect to the necessities of such tools. This result is consistent with the findings of other studies that reveal the benefits of using web 2.0 tools in education (Cakir, Yukselturk & Top, 2015; Sadaf, Newby & Ertmer, 2012; Tatli & Akbulut, 2017). The insignificant result with respect to necessity scores may be attributed to various factors. First of all, in the current study, teacher candidates were taught to use different technologies on a weekly basis within the scope of the IDMT course. They reported that the use of some technologies is a bit complicated. Maybe, it is probable that they did not give their best to learn how to use some of the technologies due to the time limitation or the complexity of the use of certain technologies. Thus, they might have not adequately realised the prominence or necessities of such technologies based on their benefits. Furthermore, some candidates did not consider certain web 2.0 tools sufficient to develop content in their own fields.

Finally, teacher candidates were asked to report their views with respect to web 2.0 technologies. Teacher candidates believed that content development with practical web 2.0 tools provide learning with multimedia and facilitate learning. Such tools were also evaluated by the candidates as being interesting and time-saving. Results of the similar studies are in line with these findings (Avci-Yucel, 2017; Baltaci, Goktalay & Ozdilek, 2010; Sadaf, Newby & Ertmer, 2012). On the other hand, teacher candidates also expressed their concerns with respect to such tools, which could be listed as logistical issues (hardware and/or internet connections), adequate and necessary web 2.0 technology integration knowledge and difficulty in use that is confronted when using for the first time of that technology. Similar concerns were also reported by previous studies (Grosbeck, 2009; Malhiwsky, 2010). As a result, although practical web 2.0 tools may have some drawbacks to implement in education, they have also affordances that make teacher candidates adopt such technologies in their future careers.

Based on the results, some suggestion could be given. For example, it may be beneficial for teacher candidates to learn how to use specific web 2.0 technologies related to their subject domains. Use of various technologies may be presented to the teacher candidates within the scope of compulsory and elective courses such as ITMD, Foundations of Instructional Technologies, Information and Communication Technologies in Education. Having knowledge about using such technologies may also be helpful for teacher candidates for their future careers, as they will involve in nationwide technology-oriented projects (e.g., FATİH).

The current study is not without some limitations. First, the participants in this study were mostly female. Therefore, future studies may be conducted with a more balanced study group. Another limitation was about the design of the study. Instead of one group pretest–posttest design, experimental designs, which are more sophisticated, would be preferred for future studies.

## References

- Altin, H. M. & Kalelioglu, F. (2015). Perceptions of students and teachers about FATIH project. *Baskent University Journal of Education*, 2(1), 89–105. Retrieved from <http://buje.baskent.edu.tr/index.php/buje/article/view/27/56>
- Arnold, S. R., Padilla, M. J. & Tunhikorn, B. (2009). The development of pre-service science teachers' professional knowledge in utilizing ICT to support professional lives. *EURASIA Journal of Mathematics, Science & Technology Education*, 5(2), 91–101. doi:10.12973/ejmste/75261
- Avci-Yucel, U. (2017). Perceptions of pedagogical formation students about Web 2.0 tools and educational practices. *Education and Information Technologies*, 22(4), 1571–1585. doi:10.1007/s10639-016-9508-7
- Ayvaci, H. S., Bakirci, H. & Basak, M. H. (2014). The evaluation of problems emerging during the implementation process of FATIH project by administrators, teachers and students. *Yuzuncu Yil University Journal of Education Faculty*, 11(1), 20–46. Retrieved from <http://efdergi.yyu.edu.tr/uploads/ebbyuefd21122012y-1542224792.pdf>
- Baltaci-Goktalay, S. & Ozdilek, Z. (2010). Pre-service teachers' perceptions about web 2.0 technologies. *Procedia-Social and Behavioral Sciences*, 2(2), 4737–4741. doi:10.1016/j.sbspro.2010.03.760
- Boksz, B. A. (2012). *An examination of teachers' integration of web 2.0 technologies in secondary classrooms: a phenomenological research study* (Unpublished doctoral dissertation). Nova Southeastern University, Florida.
- Ciftci, S., Taskaya, S. M. & Alemdar, M. (2013). The opinions of classroom teachers about FATIH Project. *Elementary Education Online*, 12(1), 227–240. <http://dergipark.ulakbim.gov.tr/ilkonline/article/view/5000037816>
- Coutinho, C. (2009). Web 2.0 technologies as cognitive tools: preparing future k-12 teachers. In *Society for Information Technology & Teacher Education International Conference* (pp. 3112–3119). Morgantown: Association for the Advancement of Computing in Education (AACE).
- Cakir, R., Yukselturk, E. & Top, E. (2015). Pre-service and in-service teachers' perceptions about using Web 2.0 in education. *Participatory Educational Research*, 2(2), 70–83. doi:10.17275/per.15.10.2.2
- Creswell, J. W. (2012). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. Boston, MA: Pearson.
- Eren, E., Yurtseven Avci, Z. & Seckin Kapucu, M. (2014). Developing a scale for competencies and perceptions of necessity about using practical tools for content development. *Journal of Theory & Practice in Education*, 10(5), 1177–1189. Retrieved from <https://dergipark.org.tr/tr/download/article-file/63439>
- Eren, E., Yurtseven Avci, Z. & Seckin Kapucu, M. (2015). Pre-service teachers' competencies and perceptions of necessity about practical tools for content development. *International Journal of Education*, 8(1), 91–104. Retrieved from [http://www.e-iji.net/dosyalar/iji\\_2015\\_1\\_7.pdf](http://www.e-iji.net/dosyalar/iji_2015_1_7.pdf)
- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47–61. doi:10.1007/BF02299597
- General Directorate of Teacher Training and Education (2017). General competencies for teaching profession. Retrieved April 10, 2018, from [https://oygm.meb.gov.tr/meb\\_iys\\_dosyalar/2018\\_06/29111119\\_TeachersGeneralCompetencies.pdf](https://oygm.meb.gov.tr/meb_iys_dosyalar/2018_06/29111119_TeachersGeneralCompetencies.pdf)
- Gokdas, I. & Torun, F. (2017). Examining the impact of instructional technology and material design courses on technopedagogical education competency acquisition according to different variables. *Educational Sciences: Theory & Practice*, 17(5), 1733–1758. doi:10.12738/estp.2017.5.0322
- Grosseck, G. (2009). To use or not to use web 2.0 in higher education? *Procedia-Social and Behavioral Sciences*, 1(1), 478–482. doi:10.1016/j.sbspro.2009.01.087
- Hew, K. F. & Brush, T. (2007). Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research. *Education Technology Research & Development*, 55, 223–252. <https://doi.org/10.1007/s11423-006-9022-5>
- International Society for Technology in Education (2017). *ISTE standards for educators*. Retrieved August 8, 2018, from <https://www.iste.org/standards/for-educators#startstandards>

- Jimoyiannis, A., Tsiotakis, P., Roussinos, D. & Siorenta, A. (2013). Preparing teachers to integrate Web 2.0 in school practice: toward a framework for Pedagogy 2.0. *Australasian Journal of Educational Technology*, 29(2), 248–267. doi:10.14742/ajet.157
- Kale, U. (2014). Can they plan to teach with Web 2.0? Future teachers' potential use of the emerging web. *Technology, Pedagogy and Education*, 23(4), 471–489. doi:10.1080/1475939X.2013.813408
- Kayaduman, H., Sirakaya, M. & Seferoğlu, S. S. (2011). *Investigation of "increasing opportunities and improvement of technology" project in terms of teacher competencies*. (pp 123–129). Paper presented at the Proceedings of the VIII. Academic Informatics, Pamukkale University, Denizli, Turkey.
- Keles, E. & Turan, E. (2015). Teachers' opinions on increasing opportunities and improving technology movement (FATİH). *Turkish Journal of Education*, 4(2), 17–28. doi:10.19128/turje.90195
- Kim, H. J. & Jang, H. Y. (2015). Motivating pre-service teachers in technology integration of Web 2.0 for teaching internships. *International Education Studies*, 8(8), 21–32. doi:10.5539/ies.v8n8p21
- Malhiwsky, D. R. (2010). *Student achievement using web 2.0 technologies: A mixed methods study* (Unpublished doctoral dissertation). University of Nebraska, Faculty of The Graduate College, Nebraska.
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: an expanded sourcebook* (2nd ed.). California: SAGE.
- Palaigeorgiou, G. & Grammatikopoulou, A. (2016). Benefits, barriers and prerequisites for Web 2.0 learning activities in the classroom: the view of Greek pioneer teachers. *Interactive Technology and Smart Education*, 13(1), 2–18. doi:10.1108/ITSE-09-2015-0028
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage.
- Polat, E. & Tekin, A. (2017). Analysis of preservice teachers' e-content development skills. *Kastamonu Journal of Education*, 25(5), 1753–1770. Retrieved from <https://kefdergi.kastamonu.edu.tr/index.php/Kefdergi/article/view/1199/590>
- Richardson, W. (2009). *Blogs, wikis, podcasts, and other powerful web tools for classrooms* (2nd ed.). Thousand Oaks, CA: Corwin Press.
- Sadaf, A., Newby, T. J. & Ertmer, P. A. (2012). Exploring factors that predict preservice teachers' intentions to use Web 2.0 technologies using decomposed theory of planned behavior. *Journal of Research on Technology in Education*, 45(2), 171–196. doi:10.1080/15391523.2012.10782602
- Smith, J. J. & Greene, H. C. (2013). Pre-service teachers use e-learning technologies to enhance their learning. *Journal of Information Technology Education: Research*, 12, 121–140. Retrieved from <https://www.learntechlib.org/p/111353/>
- Tatli, Z., Akbulut, H. I. & Altinisik, D. (2016). The impact of Web 2.0 tools on pre-service teachers' self confidence levels about TPCK. *Turkish Journal of Computer and Mathematics Education*, 7(3), 659–678. doi:10.16949/turkbilmat.277878
- Tatli, Z., & Akbulut, H. I. (2017). Teacher candidates technology using competence in the field. *Ege Journal of Education*, 18(1), 31–55. doi:10.12984/egeefd.328375
- Thomas, D. A. & Li, Q. (2008). From Web 2.0 to Teacher 2.0. *Computers in the Schools*, 25(3–4), 199–210. doi:10.1080/07380560802371037
- Tokmak, H. S., Yelken, T. Y & Konokman, G. Y. (2013). Pre-service teachers' perceptions on development of their IMD competencies through TPACK-based activities. *Educational Technology & Society*, 16(2), 243–256. Retrieved from [https://www.j-ets.net/ETS/journals/16\\_2/20.pdf](https://www.j-ets.net/ETS/journals/16_2/20.pdf)
- Turkish Council of Higher Education (2006). *Egitim fakultesi ogretmen yetistirme lisans programları [Teacher preparation programs of faculty of education]*. Retrieved May 4, 2018, from [http://www.yok.gov.tr/documents/10279/49665/ilkogretim\\_matematik/cca48fad-63d7-4b70-898c-dd2eb7afbaf5](http://www.yok.gov.tr/documents/10279/49665/ilkogretim_matematik/cca48fad-63d7-4b70-898c-dd2eb7afbaf5)
- Turkish Ministry of Education (2018). *Egitimde FATİH projesi [FATİH Project in education]*. Retrieved April 12, 2018, from <http://fatihprojesi.meb.gov.tr/proje-hakkinda/>