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THE RELATION BETWEEN SCIENCE STUDENT TEACHERS' EDUCATIONAL USE OF WEB 2.0 TECHNOLOGIES AND THEIR COMPUTER SELF-EFFICACY

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Abstract. *The rapid increase in the use of Web 2.0 technologies has led to changes in school curricula because they are a powerful tool for developing innovative ways of teaching and learning. These technologies have also changed how teacher education programmes prepare pre-service teachers. Thus, as a predictor, pre-service teachers' self-efficacy is important for the development of their computer skills. A descriptive research design was employed. The data were collected using a Web 2.0 technologies educational usage scale and a computer-related self-efficacy perception scale. The sample of the study involved 146 (F: 70, M: 76) student teachers in a teacher education course at Ziya Gökalp Education Faculty of Dicle University during the 2011-2012 academic year. The data were analysed using means, t-tests, and one-way ANOVAs. The study revealed that student teachers used Facebook the most frequently to communicate, access class material, hold discussions and form academic groups. Student teachers with Internet access at home used Web2.0 technologies more frequently than those without Internet access at home. The frequent use of Web 2.0 by student teachers provides teachers with the possibility for more student-centred learning activities in the classroom.*

Key words: *science student teachers, teacher education, Web 2.0 technologies.*

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Introduction

The concept of self-efficacy is prominent in Bandura's Social Learning Theory (Social Cognitive Theory) (Bandura, 1977). Bandura stated that a sense of self-efficacy is an effective quality for the formation of behaviour; it is the self-perception, belief and judgement of an individual about his capacity to address different situations and to plan the necessary activities to succeed in these situations (Bandura, 1986). Individuals have a sense of self-efficacy about many behaviours that they must perform in daily life. The concept of self-efficacy was primarily developed in social psychology but has been applied and used in several other disciplines (Maibach & Murphy, 1995; Lev, 1997; Kear, 2000). In this context, self-efficacy related to computer use can be considered to be a particular type of self-efficacy. A perceived specific self-efficacy is defined as "the belief of an individual to his (her) ability to activate motivation and resources of knowledge into behaviour according to the demands of given situation" p. 48 (Wood and Bandura, 1989). With reference to perceived computer self-efficacy, Namlu (2003) defined this concept as an individual's accepted perception of his (her) ability to use a computer to accomplish a task that needs to be completed on a computer.

Web 2.0 is the second generation of Internet based devices on the World Wide Web, namely social networking services, web-based free encyclopaedias, forums, podcasts and other online association and sharing media. These new technologies provide users with the ability to change how they create, use, share and proliferate documents more easily than in the past (Dearstyne, 2007). In its simplest form, Web 2.0 provides a user with the ability to create new content and to contribute to already existing content (Atıcı and Yıldırım, 2010). The primary feature of the Web 2.0 medium is that it creates applications that meet all user requirements and that do not demand any design knowledge from the user (Alikılıç & Onat, 2007). Atıcı and Yıldırım (2010)

suggested that the key features of Web 2.0 are the facility of its tools and the automatic nature of cooperation and social interaction. Web 2.0 technologies provide users with the ability to control data and information about themselves in addition to interactive services (Madden & Fox, 2006; Maloney, 2007). Anderson (2007) stated that Web 2.0 applications were created based on notions such as individual products and content created by the user, the utilization of the power and synergy of the crowd, open source code, participation structures, etc. The utilization of user-oriented web sites built using Web 2.0 techniques is increasing worldwide every day. Web 2.0 technologies provide rich information resources in coordination with the user and enable freedom of movement and ease of use for the users (Aslan, 2007).

Web 2.0 Applications: Web 2.0 refers to applications such as blogs, wikis, podcasts, video sharing sites, instant messaging and social networks. Below, the characteristics and educational use examples for these tools will be described.

Blogs are usually web pages consisting of content listed by date, starting with the most recent at the top of the page (Schroeder & Greenbowe, 2009). Blogs can be created by individuals or groups and may contain text, pictures, sound files and links (Horzum, 2010). A blog writer can easily create a blog and can create a new topic by writing a header and content text and sharing it with Internet users. Comment entries in blogs enable interaction between the author and readers, and readers can even share ideas with each other. Through blogs, collaborative and socially interactive environments can be created. Various contents such as pictures, videos, articles, or opinion polls can be added to blog entries (Joly, 2007; Horzum, 2010). In education, blogs have a variety of uses, from the progress of teachers to the product files of students. Blogs can also be used for personalized learning and software development, to access the writings of other students in the classroom, for reading information or as a platform for contributors to express their opinion (Cych, 2006). Teachers might inform their students about the subjects and then easily evaluate their products. Furthermore, the students' products would be available for inspection by all (Wyld, 2008). Thus, blogs can be used for self-expression, persuasion, discussion and demonstrating progress.

Wikis are websites that allow users to add, edit and delete content. In wikis, several authors contribute to maintain the web site. Wiki pages might make use of picture and text editing, tables, lists, links, archiving, formatting, spell checking, and emoticons. However, most wikis used today are text based (Schwartz, Clark, Cossarin & Rudolph, 2004). Wikis are simple and easy to use without any additional knowledge. The teamwork inherent in wiki production means that they are an important tool for transforming individuals from being a reader to being literate. The most renowned wiki, Wikipedia, is considered to be a worldwide encyclopaedia and has been translated into many languages. Wikipedia is an encyclopaedia created by users who add, delete or edit content (Joly, 2007). Wikis are extremely effective as an educational tool in projects, as a means for brainstorming in language education and as a creative writing tool (Cych, 2006). They also facilitate the archiving of information in an index, thus offering easy access to information (Schwartz, Clark, Cossarin & Rudolph, 2004). Wiki use is also effective for enhancing collaboration. Collaboration and interaction are valid qualities for both experts and students. Wikis relate to team writing, dynamic content and non-linear and multi-page structures (West & West, 2009).

Podcasting is broadcasting sound over the Web. The word podcast is formed by combining the words "iPod" and "broadcasting" (Cych, 2006). Podcasts are appropriate for students learning with audio material and are economical compared to verbal presentations. However, they cannot be used for interactive communication. Podcast technology is used extensively in education. Podcasting is not a simultaneous activity but still enables the students to relate to the learning environment by interacting with information. Students may create their own podcasts in some classes. Some tutors offer their students active collaboration and product sharing by offering them a topic based on the content and the class dynamics; they then direct the students to research in groups, to select information, to write a script and to record their show (Beldarrain, 2006). Students can broadcast their audio blogs, statements and writing results for listeners or can create a new interactive learning experience. Georghegan and Klas (2007) argued that podcasts have many benefits because they are automatic, easily controlled, portable, accessible and concise. Different podcasts based on audio and video can be broadcast.

Instant messaging relates to applications enabling cooperation and communication between two or more individuals in real time. The cooperation or communication can be in writing or via audio or video messaging. Chat and Internet phone or video conferencing are instant messaging media. These tools provide real-time communications, while e-mail, for example, is a non-real-time medium. These are usually free applications (Shank, 2008). Instant messaging has five fundamentals aspects. First, it guarantees that your correspondent is available. Second, it has multi-tasking capabilities. Instant messaging users can message multiple users simultaneously. As opposed to one-on-one communications, as in a phone conversation, users can discuss several subjects and tasks

with several people. Third, instant messaging keeps written records; you may reread and reuse everything you have written instead of rewriting everything when you need it. Fourth, it is less costly. Instant messaging can provide cheaper communications than real-time telephone. Fifth, it offers search capability. Instant messaging provides users with the capability to meet new people and share ideas on different subjects and tasks instead of limiting the user to a particular group (Teten & Allen, 2005).

Video sharing sites are sites that allow their participants to share videos on any subject with others. Video sharing is based on sharing and publishing content in any video format. Commonly used video sharing sites are Google Video and YouTube. Video sharing sites provide services to publish a variety of videos prepared for different purposes, including education, on the Internet; these allow educators to provide audiovisual learning facilities in an active manner. Both students and teachers utilize video sharing sites for educational purposes. One could publish an entire lesson or examples for a particular class, could see different stages of a project or could share information about a process using these tools.

Social networks are sites where individuals create personal profiles, which are either open to the public or semi-open to the public, in a recorded system. In this system, they share links or their likes or activities; see lists of other users and lists of their relations; send messages, e-mails, videos or files; or join in discussion groups or engage in voice chat with each other (Boyd & Ellison, 2007). Social networks allow users to express themselves, to let of steam and have fun, or to join others in a common cause or around common ideas. Facebook, one of the commonly used social networks is increasing its user base rapidly. It is the most preferred social network, especially among university students (Kobak & Biçer, 2008; Genç, 2010). Out of 30 million Facebook users in Turkey, 33% are young people of university age (Socialbakers, 2011). Jones, Blackey, Fitzgibbon and Chew (2010) stressed the benefits of social networks for students, academicians and institutions of higher learning through enriching learning and instruction experiences. The same study stated that social networks develop communication skills, enhance participation and social commitment, strengthen peer support and enable learning based on cooperation. According to Gülbahar, Kalelioğlu and Madran (2010), social network sites are easier to use than other education management sites because they are flexible and user friendly. Many students and researchers create a group by following simple steps, and sharing among the group members then facilitates communication and feedback. Facebook can be integrated into classes in different ways (Munoz & Towner, 2009).

A key feature of Web 2.0 applications is that they enable participating teachers and students to leave the class and share their knowledge from anywhere. Furthermore, material created using Web 2.0 tools are open source and accessible by everyone (Gülbahar, Kalelioğlu & Madran, 2010). Materials could also be developed in cooperation with different people and could immediately become instruction aids that are shared in social networks and contain text, pictures and video (Ally, 2008).

Teacher candidates intensively utilize Web 2.0 technologies such as Facebook, Twitter, podcasts, wiki and blogs. It is known that the Internet plays an important role in the academic and social lives of teacher candidates (Munoz and Towner, 2009). Social networks are increasingly becoming an indispensable part of the educational environment in supporting learning, providing intra-student and student-school interaction, increasing course satisfaction and improving writing skills (Kayri & Çakır, 2010). Learning and teaching activities supported by Web 2.0 technologies are being added to higher education programs worldwide. This growing popularity is in part because the young population is utilizing Web 2.0 services in their spare time (Jarvis, 2007). User-centric Web 2.0 activities support the learner under both formal and informal learning conditions. Furthermore, along with programs focusing on the active cooperation of students, Web 2.0 applications have didactic potential for participation-, production-, dialog- and cooperation-based individual or collaborative learning (Ravanelli & Serina, 2014). Web 2.0 technologies also play an important role in the acquisition of skills that will be vital in the students' future jobs (Dohn, 2009).

Web 2.0 applications help enable constructivist learning activities in education. These applications highlight personal differences and give meaning to cooperation (Anderson, 2008), thereby supporting constructivist learning. These benefits add to the importance of utilizing those tools. Teachers and students using Web 2.0 tools and applications can see that learning has occurred (Deans, 2009). A teacher might observe the entire process through which the students conceive, structure and solve a concept, an event or a learning problem using these tools. To see the process in its entirety makes it possible to control all aspects of learning. In a learning process where all aspects are known, the teacher can comfortably compensate for shortages and make corrections. Web 2.0 tools have changed old methods for learning and provided new ones. First, when individuals want to learn about a subject, their online search frequencies increase. In the past, printed resources such as encyclopaedias were referred to, but today, web resources have become the primary resource. Second, informal learning approaches have increased

along with formal learning approaches such as classes and special educational software. Individuals looking for information can reach experts via e-mail, instant messaging, wikis or web blogs and thereby obtain information. Third, because Web 2.0 applications are easy tools enabling online content sharing, individuals can assume the roles of both student and tutor (Shank, 2008).

The use of Web 2.0 technologies in education and instruction increases every day. Thus, teacher candidates, who will be the future users of Web 2.0 technologies, should be able to actively use them. Therefore, this study investigated the relation between the proficiency of teacher candidates in science departments in the learning-teaching processes of Web 2.0 technologies and their sense of computer self-efficacy. Thus, the following research questions were addressed:

1. What is the proficiency level of student teachers in science departments in the educational use of Web 2.0 technologies?
2. Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies based on gender?
3. Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies based on the availability of the Internet at their homes?
4. Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies based on the school department?
5. Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies based on their computer use frequency?

Research Methodology

Participants

This study was conducted with the participation of 146 fourth and fifth grade student science teachers (physics, chemistry, biology) in a preservice teacher education course at Dicle University, Ziya Gokalp Faculty of Education during the 2013-2014 spring semester. Fifty four point five percent of the participants (F: 76) were female and 45.5% (M: 70) were male. The demographic data showed that 29.7% of the participants attended the physics education department, 41.6% attended the chemistry education department and 28.7% attended the biology education department.

Data Collection Tools

Two different scales were used to determine the student teachers' use of and self-efficacy towards Web 2.0 technologies.

To identify teacher candidates' educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook), the "Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) Educational Use Scale" developed by Baran and Ata (2013) and consisting of 10 items was used. The five-point Likert-type scale invited student science teachers to respond to the items along a range of "never", "very rare", "sometimes", "often" and "always". The reliability of the scale was measured using Cronbach's alpha. The Cronbach's alpha value was .970 for the scale.

To investigate perception of computer self-efficacy, the "Computer-Related Self-efficacy Perception Scale" was applied. This 5-point Likert scale developed by Aşkar and Umay (2001) had 18 items. The scale has a Cronbach's Alpha reliability coefficient of .71. It was determined that the distinctiveness of most of the items in the scale was high (Aşkar & Umay, 2001). The Cronbach's Alpha value for the "Computer-Related Self-efficacy Perception Scale" was .890.

Analysis of the Data

Data were analysed using the SPSS (Statistical Package for Social Sciences) application. In the analysis of the data collected in the research, frequency, percentage distribution and means were used as well as t-tests and

one-way ANOVAs. The analysis of data after the application of the scale was digitized using a rating scale. Because there were five degrees for four intervals (5-1=4) in the scale, those were the calculated intervals for the interval coefficient (4/5=0.80): "never displays" 1.00-1.79, "rarely displays" 1.80-2.59, "sometimes displays" 2.60-3.39, "often displays" 3.40-4.19, and "always displays" 4.20-5.00.

Results of the Research

In this section, the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) for secondary education science teacher candidates is reported. Additionally, the educational usage of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) for secondary education science teacher candidates was determined based on their gender, Internet access at home, school department they attend, and computer use frequency. Furthermore, a statistically significant relationship was not identified between computer self-efficacy perception and gender, Internet access at home, the department in school, and computer use frequency for secondary education science teacher candidates. Table 1 demonstrates the educational use levels of Web 2.0 technologies of science teacher candidates. When Table 1 is examined, it is observed that science teacher candidates' educational use of blogs, wikis, podcasts and video sharing site technologies of Web 2.0 was at the level of "never." Further, science teacher candidates rarely use the Web 2.0 technologies of instant messaging or Facebook for educational purposes. It was observed that the educational use of blogs was at the lowest level and the educational use of Facebook was the highest among the Web 2.0 technologies.

Table 1. Educational use of Web 2.0 technologies for secondary education science teacher candidates.

	Web 2.0 Technology					
	Blog	**Wiki**	**Podcast**	**Video Sharing Sites**	**Instant Messaging**	**Facebook**
	$\overline{X}$	$\overline{X}$	$\overline{X}$	$\overline{X}$	$\overline{X}$	$\overline{X}$
To communicate with peers (student - student)	1.45	1.43	1.33	1.90	2.54	2.89
To communicate with teachers (student - teacher)	1.24	1.25	1.26	1.52	1.75	2.06
To access class material / to deceive related announcements	1.70	1.84	1.56	1.90	1.93	2.23
To conduct in-class discussions	1.27	1.21	1.23	1.33	1.51	1.77
Communication of class materials and resources	1.34	1.42	1.41	1.66	1.89	2.05
Announcement about school, class or lessons	1.34	1.23	1.34	1.50	1.96	2.32
Communication on assignments or classroom related tasks	1.37	1.27	1.28	1.55	1.75	2.01
Sharing information on classes or other educational studies	1.45	1.35	1.26	1.38	1.67	2.09
Forming/joining academic groups (societies) based on shared interests and needs	1.42	1.58	1.38	1.71	1.95	2.23
Access to rich resources and materials for learning	1.79	2.31	1.60	1.99	1.80	2.10
$\overline{X}$	1.36	1.49	1.37	1.64	1.87	2.18

Table 2 displays the results for a comparison of the averages for self-efficacy perception and the educational use of Web 2.0 technologies based on the gender variable for science teacher candidates. From the data, it is evident that there were no statistically significant differences between the science teacher candidates' perceived self-efficacy based on the gender variable (p>.05). Similarly, there was no statistically significant difference between the educational use of blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook for science teacher candidates based on the gender variable (p>.05). When the averages are examined, it appears that the perceived self-efficacy levels for male and female students were very close. Based on the averages, the educational use of blogs, instant messaging and Facebook was higher for female students, and the use of wiki, podcast and video sharing sites was higher for male students.

Table 2. Comparison of the averages for self-efficacy perception and educational use of Web 2.0 technologies based on gender variable.

		N	$\overline{X}$	SD	Result
Perceived computer self-efficacy	Female	55	3.2293	.63407	t:-.001 sig:.999 p>.05
	Male	46	3.2295	.74514	
Educational blog use	Female	55	1.3836	.57535	t:.305 sig:.761 p>.05
	Male	46	1.3478	.60396	
Educational wiki use	Female	55	1.4309	.51599	t:-1.000 sig:.320 p>.05
	Male	46	1.5717	.87981	
Educational podcast use	Female	55	1.3218	.47050	t:-.879 sig:.382 p>.05
	Male	46	1.4304	.75920	
Educational video sharing site use	Female	55	1.6091	.77848	t:.-476 sig:.635 p>.05
	Male	46	1.6935	1.00275	
Educational instant messaging use	Female	55	1.9345	.90046	t:.660 sig:.511 p>.05
	Male	46	1.8087	1.01430	
Educational Facebook use	Female	55	2.2200	1.14994	t:.353 sig:.725 p>.05
	Male	46	2.1370	1.20763	

Table 3 displays the results for the comparison of averages for self-efficacy perception and the educational use of Web 2.0 technologies based the availability of the Internet at home.

Table 3. Comparison of the averages for self-efficacy perception and educational use of Web 2.0 technologies based on ownership of Internet variable.

		N	$\overline{X}$	SD	Result
Perceived computer self-efficacy	Internet at home	65	3.3880	.63278	t:3.285 sig:.001* p<.05
	No Internet at home	36	2.9429	.68616	
Educational blog use	Internet at home	65	1.4077	.63892	t:.930 sig:.355 p>.05
	No Internet at home	36	1.2944	.47506	

		N	$\overline{X}$	SD	Result
Educational wiki use	Internet at home	65	1.5446	.71042	t:.949 sig:.345 p>.05
	No Internet at home	36	1.4056	.69609	
Educational podcast use	Internet at home	65	1.4323	.67687	t:1.339 sig:.184 p>.05
	No Internet at home	36	1.2611	.48360	
Educational video sharing site use	Internet at home	65	1.6631	.84697	t:.236 sig:.814 p>.05
	No Internet at home	36	1.6194	.95911	
Educational instant messaging use	Internet at home	65	2.0431	.96079	t:2.411 sig:.018* p<.05
	No Internet at home	36	1.5778	.86820	
Educational Facebook use	Internet at home	65	2.2815	1.16658	t:1.147 sig:.254 p>.05
	No Internet at home	36	2.0028	1.17485	

The data in Table 3 suggest that there was a significant difference in the perceived self-efficacy of secondary education science teacher candidates based on Internet ownership at home. In other words, secondary education science teacher candidates with access to the Internet at home had a higher perception of computer self-efficacy than teacher candidates without Internet access at home. It has also been determined that science teacher candidates with the Internet at home use instant messaging for educational purposes statistically significantly more frequently than teacher candidates without the Internet at home. However, Table 3 data show that there was no statistically significant difference in the educational use of blogs, wikis, podcasts, video sharing sites and Facebook based on Internet ownership at home (p<.05).

Table 4 displays the results for the one-way ANOVAs for self-efficacy perception and the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) for science teacher candidates based on the averages for the department attended.

Table 4. One-way variance analysis for self-efficacy perception and educational use of Web 2.0 technologies for science student teachers based on averages for department attended variable.

	Variance resource	Sum of Squares	df	Mean Square	F-value	p	Significant Difference (Tukey)
Perceived computer self-efficacy	Between group	3,342	2	1,671	3.777	.026*	Biology teaching – Chemistry teaching
	Within group	43,353	98	,442			
	Total	46,695	100				
Educational blog use	Between group	1,023	2	,512	1.506	.227	-
	Within group	33,299	98	,340			
	Total	34,322	100				
Educational wiki use	Between group	1,925	2	,962	1.974	.144	-
	Within group	47,783	98	,488			
	Total	49,708	100				
Educational podcast use	Between group	1,175	2	,587	1.555	.216	-
	Within group	37,012	98	,378			
	Total	38,187	100				

	Variance resource	Sum of Squares	df	Mean Square	F-value	p	Significant Difference (Tukey)
Educational video sharing site use	Between group	,617	2	,309	.390	.678	-
	Within group	77,534	98	,791			
	Total	78,152	100				
Educational instant messaging use	Between group	,538	2	,269	.293	.747	-
	Within group	89,940	98	,918			
	Total	90,478	100				
Educational Facebook use	Between group	2,696	2	1,348	.982	.378	-
	Within group	134,512	98	1,373			
	Total	137,208	100				

Table 4 shows a statistically significant relationship between the computer self-efficacy perceptions of secondary school science teacher candidates based on the department they attend ($F_{(2-98)}$=3.777, p<0.05). The Tukey HSD analysis findings indicate that the computer self-efficacy perceptions of biology teacher candidates ($\overline{X}$ = 3.42) were significantly higher than those of chemistry teacher candidates ($\overline{X}$ = 3.01). However, there was no statistically significant difference for secondary education science teacher candidates based on the departments they attend in the educational use of Web 2.0 technologies, with the following results: blogs (F(2-98)=1.506, p>.05), wikis (F(2-98)=1.974, p>.05), podcasts (F(2-98)=1.555, p>0.05), video sharing sites (F(2-98)=.390, p>0.05), instant messaging (F(2-98)=.293, p>0.05), and Facebook (F(2-98)=.982, p>0.05).

Table 5 displays the findings of the one-way ANOVAs for self-efficacy perception and the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) for science teacher candidates based on the averages for computer use frequency.

Table 5. One-way variance analysis for self-efficacy perception and educational use of Web 2.0 technologies for science teacher candidates based on averages for computer use frequency.

	Variance resource	Sum of Squares	df	Mean Square	F-value	p	Significant difference (Tukey)
Perceived computer self-efficacy	Between group	7,787	4	1,947	4.804	.001*	Always-Never Often-Never
	Within group	38,908	96	,405			
	Total	46,695	100				
Educational blog use	Between group	1,982	4	,496	1.471	.217	-
	Within group	32,340	96	,337			
	Total	34,322	100				
Educational wiki use	Between group	2,375	4	,594	1.204	.314	-
	Within group	47,333	96	,493			
	Total	49,708	100				
Educational podcast use	Between group	1,787	4	,447	1.178	.325	-
	Within group	36,400	96	,379			
	Total	38,187	100				
Educational video sharing site use	Between group	,783	4	,196	.243	.913	-
	Within group	77,369	96	,806			
	Total	78,152	100				

	Variance resource	Sum of Squares	df	Mean Square	F-value	p	Significant difference (Tukey)
Educational instant messaging use	Between group	4,955	4	1,239	1.390	.243	-
	Within group	85,523	96	,891			
	Total	90,478	100				
Educational Facebook use	Between group	3,272	4	,818	.586	.673	-
	Within group	133,936	96	1,395			
	Total	137,208	100				

Table 5 shows a statistically significant relationship between the computer self-efficacy perceptions of secondary school science teacher candidates based on computer use frequency ($F_{(4-96)}$=4.804, p<0.05). The Tukey HSD analysis findings imply that the computer self-efficacy perceptions of teacher candidates who use computers all of the time ($\overline{X}$ = 3.55) was significantly higher than the teacher candidates who never use computers ($\overline{X}$ = 2.44). Furthermore the computer self-efficacy perceptions of teacher candidates who use computers often ($\overline{X}$ =3.46) was significantly higher than the teacher candidates who said that they "never use" computers. However, there was no statistically significant difference for secondary education science teacher candidates based on computer use of frequency in the educational use of Web 2.0 technologies, with the following results: blogs (F(4-96)=1.471, p>.05), wikis (F(4-96)=1.204, p>.05), podcasts (F(4-96)=1.178, p>0.05), video sharing sites (F(4-96)=.243, p>0.05), instant messaging (F(4-96)=1.390, p>0.05), and Facebook (F(4-96)=.586, p>0.05

Discussion

This study aimed to analyse the computer self-efficacy perceptions of secondary education science teacher candidates with relation to their educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook). Five questions were posed and answered. A discussion of each of the questions follows below.

The findings pertaining to question 1, "What is the proficiency level of teaching candidates in science departments in the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook)?" suggests that secondary education science teacher candidates' educational use of blogs, wikis, podcasts and video sharing sites was at the level of "never," and their educational use of instant messaging and Facebook was at the level of "rarely." These results can probably be attributed to the low frequency of Web 2.0 technologies used by teacher educators and the rare opportunities provided for student teachers to use Web 2.0 during their teacher education courses. The low use frequency of Web 2.0 for educational purposes is also documented by previous research in the field. Hew's (2011) study in Singapore observed that only a few students utilized Facebook for educational purposes. Similarly, Baran and Ata (1013) found that college students "never" utilized the Web 2.0 technologies blogs and podcasts for educational purposes; "seldom" used wikis and video sharing sites; and "often" used instant messaging and Facebook.

The findings pertaining to question 2, "Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) based on gender?" suggest that gender is not a differentiating factor in student teachers' computer self-efficacy and educational utilization of Web 2.0 technologies. The findings support the previous research that did not find any statistically significant differences between male and female participants in terms of their computer self-efficacy (Akkoyunlu & Orhan, 2003; Usluel & Seferoğlu, 2003; Sam, Othman, & Nordin, 2005; Seferoğlu, 2005; Seferoğlu & Akbıyık, 2005; Yılmaz, Gerçek, Köseoğlu, & Soran, 2006; Özçelik & Kurt, 2007).

The present study supports the previous studies that find no significant differences in the educational use of Web 2.0 technologies in terms of gender (Kayri & Çakır, 2010; Mazman & Usluel, 2011). Akyıldız and Argan (2012), for example, reported that there was no significant difference between the two genders in terms of the use of Facebook to obtain information for assignments/projects, assignment/project sharing and communicating with teachers. The findings of the present study and the previous research in the field suggest that gender

is not an issue in terms of preparing student science teachers to use Web 2.0 technologies in their classroom or for external educational purposes. This finding is encouraging because it shows that complaints that the gender gap affects involvement in educational technology in the late 20th and at the beginning of the 21st century (Weber & Custer, 2005) are no longer relevant.

The findings pertaining to question 3, "Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) based on the availability of the Internet at home?" suggest that student teachers with Internet access at home had a higher computer self-efficacy perception compared to those without access to the Internet at home. This finding supports the previous research by Çetin and Güngör (2012) that reported that teachers with Internet access at home had significantly higher computer self-efficacy than those who did not have Internet access at home. The present study also found that student science teachers with Internet access at home had significantly higher use of instant messaging for educational purposes. The use of other Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites and Facebook) for educational purposes did not significantly differ based on Internet ownership at home. The availability of the Internet at home emerges as an important factor in higher computer self-efficacy and in the use of Web 2.0 technologies for educational purposes. Having Internet access is important because the Internet emerges as a major factor in teachers' ability to access content, resources, and materials for their teaching, share ideas with other teachers, and interact with parents and students (Purcell, Heaps, Buchanan & Friedrich, 2013).

The findings pertaining to question 4 "Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) based on the school department?" did not reveal any statistically significant differences in general apart from biology and chemistry student teachers in terms of computer self-efficacy. This difference may be due to the study sample rather than to a general tendency because departmental differences were not a major differentiating factor for using Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites and Facebook) for educational purposes. In the literature, there are few studies that investigate student teachers' differences in terms of computer self-efficacy and the use of Web 2.0 technologies based on departmental differences. A study by Gulten, Yaman, Deringol & Ozsari (2011) compared science students with mathematics, social sciences and classroom student teachers in terms of computer self-efficacy. This study found that student science teachers had higher computer self-efficacy. According to Morrell and Caroll (2003), student science teachers are involved in many science courses, which are more likely to use computers and thereby may result in enhanced computer self-efficacy.

The findings pertaining to question 5 "Is there a significant difference between the student teachers' perceptions of computer self-efficacy and their proficiency in the educational use of Web 2.0 technologies (blogs, wikis, podcasts, video sharing sites, instant messaging and Facebook) based on computer use frequency?" suggest that there was a significant difference between the computer self-efficacy perceptions of science teacher candidates based on the frequency of computer use. The difference favoured teacher candidates who use computers "always" or "often" versus those who said that they "never" use computers. The literature review shows similar results supporting the findings of this study (Çetin, 2008). Aşkar and Umay (2001), in their research on the computer self-efficacy perceptions of mathematics teacher candidates, determined that students who used computers more frequently had a significantly higher level of perceived computer self-efficacy. A study by Özçelik and Kurt (2007) reported that teachers who owned a computer and used it frequently had significantly higher perceptions of computer self-efficacy. The findings of this study showed, however, that there was no change in the educational use of Web 2.0 technologies based on the frequency of computer utilization.

Conclusions and Implications

This study focused on student science teachers' computer self-efficacy and their educational use of Web 2.0 technologies in terms of their level of proficiency, gender, having Internet access at home, school department and frequency of computer use. The study revealed that student science teachers' frequency of using Web 2.0 technologies for educational means was very low. Gender was not a differentiating factor among student science teachers in terms of their computer self-efficacy and their use of Web 2.0 technologies for educational purposes. Having access to the Internet at home was a major factor affecting student science teachers' computer self-efficacy but not an important factor in their using Web 2.0 technologies for educational reasons. Addition-

ally, departmental differences did not bear any major result in terms of student science teachers' computer self-efficacy and their use of Web 2.0 technologies for educational means.

With the daily increase in the use of technology in the classroom and the extensive use of Web 2.0 technologies by students, it is important to incorporate Web 2.0 technologies in science teacher education curriculums to (1) raise student teachers' awareness of the importance of Web 2.0 technologies (it is evident from the study that although student science teachers frequently use Web 2.0 technologies, they do not use them for educational purposes), (2) help student teachers enhance their Web 2.0 technology skills to achieve fluent use when they embark in the teaching profession. Additionally, teaching science with Web 2.0 technologies will help future teachers to design student-centred teaching and learning processes and will enhance social learning through student-teacher and student-student communications.

Although computers are currently an indispensable part of any teacher education program, providing opportunities for student science teachers to enhance their computer skills is essential, as the frequency of computer use increases student teachers' computer self-efficacy, which results in greater usage of Web 2.0 technologies for educational means.

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