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An Investigation of Pre-service Visual Arts Teachers' Perceptions of Computer Self-Efficacy and Attitudes Towards Web-based Instruction

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Abstract

This study aimed to examine the pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction studying at the Faculties of Education. Their perceptions of computer self-efficacy and attitudes towards web-based instruction were compared by the variables of gender, class and academic success based on causal comparison method. The participants of the study consisted of 250 pre-service teachers who received visual arts education at the Faculties of Education at Marmara, Necmettin Erbakan, Atatürk and Gazi Universities. Data were collected through Perceptions of Computer Self-efficacy Scale and Attitudes Towards Web-based Instruction Scale. The findings showed that the pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction were high. In addition, pre-service teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction differed by gender and year of study. There were significant positive correlations between pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction.

Introduction

Pre-service visual arts teachers should have pedagogical and technological competencies as well as leading personal and professional lives that are enriched with visual arts. A successful art education student should have competencies in arts and arts education, teamwork, actively dealing with children and young people, effective classroom and workshop management skills, instructional technologies and approaches (Day, 1997). National Art Education Association (NAEA) addresses a comprehensive approach to teaching and learning in arts in visual arts education. According to NAEA, pre-service arts teachers' art knowledge and skills include knowledge for students, curriculum development, assessment of teaching and student learning outcomes, translating teaching programs into practice, having field-specific and general teaching competencies, using modern teaching technologies effectively (National Art Education Association, 1999). The way each student acquires art knowledge and skills may differ. For this reason, it is recommended to use modern technologies, different methods and techniques in visual art education (Dorfman, 2006).

In today's world where the impact and importance of computer products in learning and teaching processes are constantly increasing, it is believed that it is important to train teachers who are key in the system as people who change and improve behavior so that these technologies can be used correctly in the education system and their possible benefits are realized at a high level (Apeanti, 2016; Baş, Kubiatko & Sünbül, 2016; Demirer, Özdinç, & Şahin, 2009). Therefore, visual arts teachers' skills, competencies of computer self-efficacy and attitudes towards online education appear as an important factor.

When the literature is examined, it is seen that teacher competence is considered as an important concept representing the professional identity of teachers and prospective teachers (Sünbül, 1996; Ünlü, Sünbül & Aydos, 2009; Yeşilyurt, 2011). Bandura (1997) states that self-efficacy belief is fed from four basic sources: enactive mastery experience, verbal persuasion, vicarious experience, and physiological and affective state. Personal experiences are the most effective source that creates the self-efficacy belief. While the successful experiences of the person provide the self-efficacy belief to be formed and strengthened, the unsuccessful experiences cause the self-efficacy belief to weaken (Ünlü, H., Aydos & Sünbül, 2008). A teacher can work on a specific teaching method, practice the method and gain successful experiences. At the end of a certain process, a high self-efficacy belief will be developed for the teacher to apply the relevant teaching method. The individual is reconstructing his self-efficacy belief by evaluating the results of his performance. In this regard, the establishment of a belief of high self-efficacy in any field is directly related to the successful experience in that

field (Sünbül & Arslan, 2006; Yurt & Sünbül, 2014). It is stated that teachers' professional self-efficacy beliefs alone are not sufficient for teaching profession to instruct on a subject (Gülebağlan, 2003).

It has become necessary for prospective teachers to have competencies in the field of information and communication technologies. Higher education institutions that train teachers need to use and develop instructional technologies and employ innovative technologies in educational activities in order to provide teacher candidates with qualified education (Brown, 2006; Şahin, Aktürk & Schmidt, 2009; Stosic, 2015). In addition, distance and online education approaches mean using innovative methods in interactive education applications, reducing traditional education methods, using new modern methods such as project-based learning with information and communication technologies and problem-based learning (Harms and Wlash, 2015; Robinson et al., 2016; Suciu & Platis, 2009).

The last application where developments in computer and internet technologies are used in higher education is web-based education. With the simplest definition, web-based education is a hypermedia-based learning program that uses resources on www to create a meaningful learning environment where learning is encouraged and supported. Web-based education is similar to computer-based education. The difference is that it is done via the internet, using a web browser or other tools. With this education system, it is possible to provide education to individuals with different geographical location, age, profession and culture in equal conditions in a virtual environment (Alan and Sünbül, 2010; Clark-Wilson, A. & Hoyles, 2019; Sahin & Shelley, 2008; Yıldız et al., 2004).

There are some necessary factors in order to benefit from computers in education and teacher education is the leading one. The efficiency of education will increase to the extent that teachers, who are implementers of education programs, can use information technologies effectively in education. In order to obtain effective results from computer training in educational institutions, it is important to know the characteristics of pre-service teachers, such as attitudes and anxiety towards computers, for the effective use of computers in the learning-teaching process (Karataş, Alci & Karabıyık, 2015).

In addition, the ability of pre-service teachers to deliver web-based and computer-supported courses successfully depends on the fact that they feel comfortable in the technology they use, and that they have solved the problems and difficulties associated with it. Teachers' and students' approaches are important to take advantage of web-based learning and the opportunities brought by web-based instruction (WBI). Approaches to the use of computers in the educational environment have a significant effect on the effective use of this device. Web-based instruction is on the way to become one of the important learning environments that provides new and rich learning experiences for students. The web environment can provide a global and democratic learning opportunity to students who have different cultures in different regions and speak different languages, regardless of gender (Kurubacak, 2000; Wasim et al, 2914).

Whether students' attitudes towards web-based instruction is positive or negative affects learning to a great extent (Alomyan & Au, 2004; Rhema & Miliszewska, 2014). Although there is a big tendency towards the use of web technologies in teaching today, there is not enough research investigating student attitudes towards this new learning environment. Pre-service teachers' attitudes towards web-based instruction also change their education programs, learning and teaching methods, and student and teacher roles. Therefore, pre-service teachers should make this environment a part of their learning culture by developing positive attitudes towards this new electronic environment. Research to be carried out in this area will give clues about how all these stages can be implemented (Erdoğan, Bayram & Deniz, 2007; Kurubacak, 2000).

It is known that teachers acquire most of the cognitive, affective and psychomotor behaviors required in their professional life in their pre-service education. Thus, it is important to know their computer self-efficacy and attitudes towards web-based instruction in order to obtain effective results from computer-assisted and web-based instruction in education-training activities. Knowing students' attitudes towards web-based instruction helps students to organize and use web-based learning environments effectively. For this reason, it is very important to take the affective characteristics of students such as interest, expectation and attitude into account in order to obtain effective results in web-based instruction in higher education institutions (Erdoğan, 2005). However, there are limited number of studies on pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction (Kara, 2020). Therefore, this study aimed to determine pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction. Answers to the following questions were sought in the research:

Research Problems

1. What is the level of attitudes of the participants towards computer self-efficacy and web-based instruction?
2. Is there a significant difference in the computer self-efficacy of the participants based on gender?
3. Is there a significant difference between the participants' attitudes towards web-based instruction based on gender?
4. Is there a significant difference between the participants' perceptions of computer self-efficacy based on the year of study?
5. Is there a significant difference between the participants' attitudes towards web-based instruction based on the year of study?
6. Is there a significant difference between the participants' perceptions of computer self-efficacy based on academic success?
7. Is there a significant difference between the participants' attitudes towards web-based instruction based on academic success?

Method

This research used causal-comparative research design. In this method, it is aimed to reveal the causes of an existing situation or an event, and the variables or effective outcomes that influence the reasons (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2015). In this study, pre-service visual arts teachers' computer self-efficacy and attitudes towards web-based instruction were compared based on the variables of gender, year of study and academic success, using causal-comparative method.

Participants

The participants of this study were students in department of visual arts at Marmara, Necmettin Erbakan, Atatürk and Gazi Universities. Reaching all students target population at the selected universities requires high amount of time, workload and financial resources. Thus, convenience sampling method was adopted. 250 pre-service teachers who received visual arts education at Marmara, Necmettin Erbakan, Atatürk and Gazi Universities were randomly selected and included in the study. Voluntary participation was used. Students were informed about the purpose of the study. Demographic variables and distribution of the participants according to these variables are shown in Table 1.

Table 1. Distribution of Pre-service Visual Arts Teachers based on Demographic Features

Gender	n	%
Female	151	60.4
Male	99	39.6
Total	250	100.0
Year of Study	n	%
1st year	57	22.8
2nd year	67	26.8
3rd year	56	22.4
4th year	70	28.0
Academic Success	n	%
High	87	34.8
Medium	109	43.6
Low	54	21.16

Data Collection Tools

Perception of Computer Self-Efficacy Scale:

The scale developed by Işıksal and Paykoç (2011) consists of two sub-dimensions (general information about computer and special computer skills). Total score is obtained from the scale and participants' perceptions of computer self-efficacy are determined. A high score in the subscale indicates that the participants' perception of competence in that subscale is high. There are 10 items in the five-item Likert type scale. Items are scored

within the range of 1 as "strongly disagree" and 5 as "strongly agree". Cronbach Alpha coefficient of the scale was .82 for the sub-dimension "general information about the computer" and .87 for the sub-dimension "special computer skills". These values show that the measurement tool is valid and reliable in measuring the pre-service visual arts teachers' perceptions of computer self-efficacy.

Attitude towards Web-based Instruction Scale

The scale developed by Erdoğan, Bayram and Deniz (2007) aims to determine the participants' attitudes towards web-based instruction. The scale consists of 26 items and is scored in Likert type scale. The Attitude towards Web-based Instruction Scale can also be used by higher education institutions that offer undergraduate and postgraduate education. Cronbach Alpha coefficient was 0.92 for the entire scale, whose necessary validity and reliability studies were completed. In the reliability analysis conducted for this research, the scale was found to have 0.90 Cronbach Alpha Coefficient. High scores obtained from the scale show that the participants' attitudes towards web-based instruction are positive.

Data Analysis

In this study, data were analyzed using independent sample t-test and one-way analysis of variance. Coefficient of skewness and kurtosis were calculated and the distribution of the scores obtained from the measurement tools was examined. In order to meet the assumption of normal distribution, the coefficient of skewness must be less than 2 and the coefficient of kurtosis must be less than 7 (Finney & DiStefano, 2006). The values found revealed that the scores in the scale showed a normal distribution. Tukey test was used to determine the source of the difference which was found as a result of variance analysis.

Findings

When Table 2 is examined, it is seen that the pre-service visual arts teachers' attitudes towards web-based instruction have the highest mean value (M=4.05). The lowest mean is the participants' perceptions of self-efficacy in special computer skills (M=3.41). It was found that the participants' general computer skills, total computer self-efficacy and attitudes towards web-based instruction were high. However, the participants' special computer skills were moderate. Profiles of the pre-service visual arts teachers regarding computer self-efficacy and attitudes towards web-based instruction are shown in the table below.

Table 2. Descriptive Values of Scores Obtained from Computer Self-Efficacy and Attitude towards Web-based Instruction Scale

	n	Minimum	Maximum	Mean	Std. Deviation	Weighted Average
General Computer Skills	250	9	30	22.84	4.95	3.80
Special Computer Skills	250	4	20	13.64	4.63	3.41
Computer Self-efficacy Total Score	250	15	50	36.48	8.96	3.64
Attitude Towards Web-based Instruction	250	28	128	105.30	11.41	4.05

Table 3 shows the comparison of pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction based on gender. According to independent sample t-test analysis, no significant gender difference was found between special computer skills and the attitudes towards web-based instruction ($p>0.05$). However, a significant difference was found in participants' general computer skills and total computer self-efficacy. When the groups' mean values were analyzed, it was seen that male pre-service teachers obtained higher levels compared to female. The scores regarding pre-service visual arts teachers' self-efficacy and attitudes towards web-based instruction based on gender are shown below.

Table 3. Comparison of Values Obtained from Measurement Tools by Gender

	Gender	n	Mean	Std. Deviation	t	p
General Computer skills	Female	151	22.17	5.212	-2.68	0.01
	Male	99	23.87	4.353		
Special Computer Skills	Female	151	13.32	4.618	-1.33	0.18
	Male	99	14.12	4.630		
Total Computer Self-efficacy	Female	151	35.50	9.139	-2.17	0.03
	Male	99	37.99	8.516		
Attitudes towards Web-based Instruction	Female	151	106.17	9.075	1.48	0.14
	Male	99	103.99	14.214		

In Table 4, pre-service visual arts teachers' computer self-efficacy and attitudes towards web-based instruction are compared according to the year of study. The results of one-way variance analysis showed that there was no significant difference in pre-service teachers' computer self-efficacy mean scores based the year of study ($p>0.05$). However, the F value calculated for the attitudes towards web-based instruction revealed a significant difference. According to the advanced analysis conducted with the Tukey test, it was found that first year students had a positive attitude towards the web-based instruction significantly higher than the participants in the fourth year.

Table 4. Comparison of the Scores based on Year of Study

	Year of Study	N	Mean	Std. Deviation	F	Sig.
General Computer skills	1	57	24.11	5.08	2.342	.074
	2	67	22.99	5.04		
	3	56	22.70	4.37		
	4	70	21.80	5.04		
Special Computer Skills	1	57	14.63	4.10	2.412	.067
	2	67	14.22	4.89		
	3	56	12.98	4.93		
	4	70	12.80	4.39		
Total Computer Self-efficacy	1	57	38.74	8.20	2.576	.054
	2	67	37.21	9.24		
	3	56	35.68	8.89		
	4	70	34.60	9.05		
Attitudes towards Web-based Instruction	1	57	107.91	8.23	2.901	.036
	2	67	106.96	10.28		
	3	56	103.45	16.55		
	4	70	103.09	8.92		

In Table 5, pre-service visual arts teachers' computer self-efficacy and attitudes towards web-based instruction are compared according to academic success. The results of one-way variance analysis showed that there was no significant difference in pre-service teachers' computer self-efficacy mean scores based on academic success ($p>0.05$).

Table 5. Comparison of scores based on academic success

		N	Mean	Std. Deviation	F	p
General Computer skills	1	87	22.87	5.01	0.02	0.98
	2	109	22.82	5.20		
	3	54	22.85	4.41		
Special Computer Skills	1	87	13.14	5.14	1.83	0.16
	2	109	14.28	4.23		
	3	54	13.17	4.47		
Total Computer Self-efficacy	1	87	36.01	9.77	0.44	0.64
	2	109	37.09	8.59		
	3	54	36.02	8.44		
Attitudes towards Web-based Instruction	1	87	103.94	11.81	1.56	0.21
	2	109	106.72	9.74		
	3	54	104.63	13.60		

Table 6 shows that the regression model developed to determine the effect of computer self-efficacy perception on attitude towards web-based instruction was significant (R=0.42; F=27.29; p<0.01). Approximately 18% of the change in attitude towards web-based instruction could be explained by computer self-efficacy. Perception of computer self-efficacy had a positive effect on attitude towards web-based instruction (β=0.74; p<0.01).

Table 6. Results of regression analysis to determine the effect of perceptions of computer self-efficacy on attitude towards web-based instruction

Variable	R^2	Std. Error	β	t	p
(Constant)	97.37	3.14		16.20	0.00
Computer Self-efficacy	0.18	0.38	0.74	4.75	0.00
R=0.42	R^2=0.18		F=27.29		*p*<0.01

Discussion

In this study, where pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction were examined, participants' mean scores regarding the relevant variables were moderate. In Turkey, most of the research conducted on teacher candidates shows that computer self-efficacy is low while teaching interests and attitudes are high. However, attitudes towards web-based learning are mostly positive (Arslan, 2008; Pektaş et al., 2008). Accordingly, it can be said that pre-service teachers find computer-assisted instruction positive and useful. The findings of this research can be evaluated as an indication that prospective teachers will benefit from computer-assisted instruction when they start working. In Turkey, the technology education in the faculties of education is usually limited to knowledge and skills, and these skills are offered in technology lessons which are not embedded to other subject lessons or courses. Thus, pre-service teachers cannot gain the skills of using technologies related to their subject areas and they don't develop an understanding of where and how the technology will be used (Öksüz et al., 2009). All these situations adversely affect the pre-service visual arts teachers' competencies related to computers and technology, in particular and all teacher candidates in general.

Another of the findings of this study is about the pre-service teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction based on gender and the year of study. According to the results of the analysis, male teacher candidates' perceptions of computer self-efficacy were higher than their female peers. In addition, first year students' attitudes towards web-based instruction were higher than third and fourth year students. These findings are similar to the findings of the studies carried out by Corston and Colman (1996), Erdoğan, Bayram and Deniz (2007), Işıksal and Paykaç, (2011), Margrett and Marsiske (2002), and Sieverding and Koch (2009). According to Tasner, Žveglic and Mencin (2017), gender should be handled with its cultural and social context as well as its physiological features. Thus, it is stated in most of the research that females perceive themselves as more prone to teaching profession than males, while males exhibit a high level of competence in technology (Asimaki & Vergidis, 2013). However, according to Schunk and Zimmerman (2006), the development of cognitive, affective and psychomotor competencies of individuals affects self-efficacy during the development of field-specific competencies. Therefore, applications for the development of pre-service visual arts teachers' awareness in basic skills and competencies related to computer self-efficacy are important.

The other finding in the study is related to the relationship between academic success, perceptions of computer self-efficacy and attitudes towards web-based instruction. The analysis revealed that there was no significant relationship between these variables. In the literature, pre-service visual arts teachers with high academic success had a higher level of perception of self-efficacy (Galleguillos & Olmedo, 2017; Kara, 2020). However, there is no study on the relationship between pre-service visual arts teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction and their academic success. In this regard, Schunk and Pajares (2009), Stankov et al. (2012) found that self-efficacy is related to high levels of academic participation and has a close and positive relationships with the academic success.

Pre-service teachers' attitudes towards web-based learning and scores of adaptation attitude increase depending on their levels of perception of computer proficiency levels. Pre-service teachers' attitudes towards web-based instruction are significantly higher when they have experienced computer skills. In addition, as the pre-service teachers' beliefs about using technology in education increase, their attitudes towards teaching profession also increase.

Conclusion

As a result, this study showed that pre-service visual arts teachers' perceptions of the use of special technology in education were medium, whereas their general computer skills and attitudes towards web-based instruction were high. In addition, pre-service teachers' perceptions of computer self-efficacy and attitudes towards web-based instruction differ based on gender and year of study. Male participants had higher computer self-efficacy than female peers. In terms of attitudes towards web-based instruction, first year pre-service teachers had a significantly higher and positive attitude. There were significant positive relationships between the participants' perceptions of computer self-efficacy and attitudes towards web-based instruction. The perception level of self-efficacy especially in general computer skills positively affects the affective characteristics related to web-based instruction, and it can be argued that as the participants' competence in technology increases, positive attitude towards the use of web-based technology also increases.

Recommendations

Based on the results of this study, which is carried out with quantitative methods, a number of suggestions for the application and research of visual arts education could be presented. Firstly, in visual arts education, programs should be organized to provide pre-service teachers not only professional knowledge, techniques to apply the learned knowledge, professional behavior, but also competence and skills in computer and instructional technologies. It is recommended to develop the capacity of the departments of visual arts education to support students with computer self-efficacy and web-based learning skills on an innovative and technological basis. There is research on variables related to pre-service teachers' computer self-efficacy and attitudes towards web-based instruction. However, no research was found to reflect the effect of pre-service teachers' self-efficacy on the teaching process. Therefore, longitudinal studies can be conducted to monitor the visual arts teachers' computer and web-based instruction competencies during their teaching profession.

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