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Science Teacher Candidates' Attitudes towards Distance Education

T. KIŞLA*

ABSTRACT: The popularity and importance of distance education (DE) have increased along with advances in information and communication technologies. Many educational institutions now use DE applications. Today, as the importance of scientific literacy rises, the integration of DE into science education has become obligatory. At this point, this study seeks to shed a light about the attitudes of stakeholders towards DE implementation in teaching and learning of science. One important stakeholders is the science teacher candidates who will play a key future role in science education. The main aim of this study is to examine science teacher candidates' attitudes towards DE, based on selected independent variables (i.e., gender, major, time spent on the Internet, computer experience, participation in DE). The study consists of 181 science teacher candidates. The results show that participants' attitudes towards DE are close to indecisive. Moreover, while their attitudes do not differ according to gender or major, they differ in a statistically significant manner depending on time spent on the Internet, computer experience and participation in DE.

KEY WORDS: Attitude, distance education, science teacher candidates, science education

INTRODUCTION

Education has been affected significantly by the increase in accessibility and availability of information and communication technologies. Various innovations and facilities in education have emerged through the development of mobile technologies and advancement of communication technologies (Boling, et al., 2012). Most especially, distance education (DE) has benefited from these improvements. DE conducted over the Internet enables educational institutions and companies to expand their educational services to the global market. DE offers lifelong learning opportunities to individuals interested in self- improvement all over the World. Furthermore, DE features can be integrated into traditional educational contexts in different ways. Numerous educational institutions,

* Ege University, Faculty of Education, CEIT Department, tarik.kisla@ege.edu.tr

even those that do not have DE programmes, enhance their formal education programmes with DE applications. These days, DE programmes, instructional content and material are used wordwide. Many research findings reveal that DE, with proper content and usage, is acceptable for different levels and disciplines. Based on these results, DE programmes take an important place in educational policies in many countries.

DE has become a viable option for both individual and cooperative learning pursuits by offering alternatives to the time, location and financial barriers of traditional learning. It also boasts tools tailoring education to different learning styles. In addition to meeting the expectations of learners, DE also offers several instructional alternatives to support lesson quality.

The significance of scientific literacy is understood by modern societies and the needs of new generations inspire innovative and flexible approaches in science education. The limitations of traditional approaches are made apparent within these perspectives. Improvements in DE also have an influence on science education. DE practices are mostly seen in undergraduate and graduate programmes, rather than at lower levels of science education (Lennex, 2012). Teaching and learning of science requires not only laboratory practices to teach complicated and abstract concepts but also the use of rich instructional materials. Other prominent explanations for lower uptake of DE practices in science education include negative attitudes towards DE, science teachers' lack of technological skills, insufficient technological support and pedagogical shortcomings regarded as shortcomings of DE (Lennex, 2012). It should be clear that educators need training in information and communication technologies (ICT) and DE to overcome these problems (Annetta and Shymansky, 2008; Cavas, et al., 2009). Three-dimensional (3D) virtual reality applications are growing in number and quality, enabling an increase of DE practices in science education (Boling, et al., 2012). Some types of instructional materials and contexts offered by DE systems include: instructional texts, web-based learning systems, video records, animations, two and three dimensional simulations, virtual reality applications, virtual laboratories, virtual worlds (e.g., Second Life), social media tools, online conferencing environments and offline communications media.

Ultimately, the success of DE programmes is dependent on students' and teachers' efforts, needs, interests, attitudes, motivations and levels of interactivity with instructional materials and contexts, students' learning styles, educators' techno-pedagogical knowledge, society's perspective on DE and the harmony between the programme and its instructional

purposes (Şahin, 2006; Boling, et al., 2012). The aim of this study is to examine the attitudes of science teacher (ST) candidates towards DE in terms of some variables such as gender, major, daily Internet usage, computer use experience, knowledge about DE and participation in DE. It is important to understand ST candidates' attitudes towards DE because they are the ones who will shape the future of distance science education through the design and implementation of their online courses.

LITERATURE REVIEW

Here, related studies focusing on university students' attitudes towards DE will be presented hierarchically. Bisciglia (2002) analysed differences in the attitudes of students' who were educated through online and offline websites. According to the research results, students' attitudes were generally found to be positive. This study also revealed that offline-educated students were more optimistic in their attitudes and motivations. Hannay and Newvine (2006) examined 217 students' attitudes in their study. The results showed that students' attitudes towards DE were positive and most of the students preferred DE to traditional education. Additionally, participants stated that DE was more appropriate for undergraduate, graduate and working people. Some of the participants also supported the idea of hybrid learning environments.

El-Deghaidy and Nouby (2008) described the effectiveness of a blended e-learning cooperative approach on preservice STs' attitudes towards e-learning. Quantitative and qualitative methodologies were used with 26 preservice STs. The findings suggested that preservice teachers in the experimental group had more positive attitudes towards e-learning environments, as compared to those in the control group. Isık et al. (2010) analysed 64 postgraduate students' attitudes towards web-based DE. The study results revealed that overall, participants' attitudes towards DE were positive. Further, attitudes of females towards web-based DE were significantly more positive than males. Additionally, most of the students said they were more comfortable in DE.

Egbo et al. (2011) studied the views and attitudes of 415 students towards DE. The study results showed that participants' attitudes were indecisive towards the DE environment. However, attitudes of females were found to be more positive than those of males. In another study, Thomas (2011) investigated 34 preservice teachers' perceptions of online science learning after completing an elementary science methods course. According to the results of the study, preservice teachers valued and wanted more online experiences, but didn't want a total replacement of

traditional methods. Additionally, they indicated that online contents and environments could enhance interaction and help focus content.

In general, these studies show that attitudes towards DE are almost entirely positive. The literature review also, however, indicates a dearth of studies focusing on the attitudes of teachers, students and teacher candidates in the field of science education, specifically.

METHODOLOGY

This study examined the attitudes of ST candidates towards DE using survey methods. The data collection tool was administered to 195 ST candidates majoring in the following fields: science education (n=43), physics (n=51), chemistry (n=57), and biology (n=44). Fourteen participants who stated that they had no information about DE were excluded from the study upon examination of the collected data. The participants from the physics, chemistry and biology departments in the Faculty of Science were studying a pedagogical formation certificate programme. A two-part data collection tool was used for the study. The first part includes a form to collect participants' demographic characteristics about gender, field, time spent on the Internet, computer use experience, knowledge about DE and participation in DE. The second part contained the Scale for Attitude towards DE (SATD) developed by Kışla (2005). SATD contained a total of 35 items gathered under a single factor. The scale was prepared based on a five-point Likert scale. Kışla reported the reliability value of the scale as 0.89. The reliability value of the scale based on the analysis of the data obtained from the sample in this study was found to be 0.90.

FINDINGS

The attitudes of the ST candidates were calculated based on their answers to each item on the questionnaire. Some values are presented in table 1.

Table 1. Average points, median and standard derivation (SD), range, minimum and maximum values of attitudes towards DE.

Mean	Median	SD	Range	Min.m	Max.	Skewness	Kurtosis
114.79	115	15.89	87	72	159	0.023	-0.122

Based on the data, it can be stated that the attitudes of the ST candidates towards DE is close to the indecisive value (mean=3.28). Moreover the fact that skewness (0.023) and kurtosis (-0.122) values are in the [-1.5, 1.5] range shows that the data are normally distributed.

An independent t-test was used to find out the effects of gender on attitudes towards DE. As seen in Table 2, there is no significant difference between the participants' attitudes towards DE based on the genders.

Another sub-question of the study was the variance of the participants' attitudes towards DE based on their previous participation in DE applications. T-test results for this variable are also presented in table 2. The results of the analysis show that the attitudes of the participants display significant variance based on their previous DE experience. The attitudes of ST candidates with previous DE experience were more positive ($t=6.66$; $p<0.05$).

Table 2. The t-test results for gender and participation in DE.

Variables		N	$\bar{x}$	SS	SD	t	p*
Gender	Male	84	113.74 (3.25)	13.54	151.29	-0.94	0.35
	Female	97	116.00 (3.31)	18.24			
Participation	Yes	61	124.44 (3.56)	13.54	132.247	6.66	0.00
in DE	No	120	109.89 (3.14)	18.24			

*p> .05

The variance of attitudes of ST candidates based on their majors, their time spent on the Internet and their computer experience was examined using one-way analysis of variance (ANOVA). Table 3 presents the standard deviation and mean value of ST candidates' attitudes according to variables. The results of the one-way ANOVA are shown in Table 4.

Table 3. Descriptive statistics for the majors, time spent on the Internet and computer experience variables.

	Variables	N	X	SD
Majors	Science Education	42	114.36 (3.27)	16.60
	Physics	47	119.77 (3.42)	16.20
	Chemistry	52	112.80 (3.22)	17.33
	Biology	40	112.00 (3.22)	11.45
The time spent on the Internet	Less than 1 hour (TS_1)	54	100.43 (2.86)	18.15
	Between 1-3 hours (TS_2)	82	114.80 (3.28)	14.12
	More than 3 hours (TS_3)	45	120.02 (3.43)	14.78
Computer Experience	Less than 3 years (CE_1)	24	103.00 (2.94)	19.01
	Between 3-6 years (CE_2)	54	112.98 (3.23)	14.05
	More than 6 years (CE_3)	103	118.50 (3.39)	14.61

Tablo 4. Results of the one-way ANOVA for variables.

Variables		Sum of squares	df	Mean Square	F	p	differences
Majors	Between groups	1687.29	3	562.43	2.27	0.08	
	Within groups	43796.15	177	247.44			
	Total	45483.44	180				
The time spent on the Internet	Between groups	2260.38	2	1130.18	4.65	0.01*	TS_1–TS_3
	Within groups	43223.06	178	242.83			
	Total	45483.44	180				
Computer Experience	Between groups	4926.70	2	2463.35	10.81	0.00*	CE_1-CE_2 CE_1-CE_3
	Within groups	40556,73	178	227.85			
	Total	45483,44	180				

*p<0.05

Examination of the analysis results suggests that the attitudes of participants do not vary according to their majors. The participants' attitudes do, however, differ based on their Internet usage. To determine which groups present the difference the Tukey test was applied, since the variances were homogenously distributed. According to the test results, the attitudes of the participants with more than three hours of Internet usage presented a statistically significant divergence from the attitudes of participants with less than one hour of Internet usage. Furthermore, the participants' attitudes differed significantly based on their computer experience. Again, the Tukey test was applied since the variances were homogenously distributed. According to the test results, the attitudes of participants with three to six, or more than six years of computer experience, differed significantly from the attitudes of participants with less than three years of experience.

CONCLUSION AND DISCUSSION

According to the results of the study, the attitudes of ST candidates were close to the indecisive level. In the related literature, while some studies are supporting of our findings (Egbo, et al., 2011; Birişçi, 2013), many studies show that teacher candidates' attitudes towards DE are found to be positive (Bisciglia, 2002; Thomas, 2011). ST candidates' undecisive attitude towards DE thought to be caused by a lack of knowledge and experience DE.

There was no significant difference between the attitudes of participants based on gender or major. The fact that the ST candidates' attitudes towards DE do not differ based on gender may be interpreted as DE not producing a gender-based advantage or disadvantage. Although there are many studies supporting this result in the literature (Cavas and Kesercioglu, 2003; Birişçi, 2013; Rhema and Miliszewska, 2014), there are also studies that find significant differences between genders (Isık, et al., 2010; Egbo, et al., 2011). The attitudes of teacher candidates who participated in DE differed positively from the others. Logically, the relationship between experience and attitude could be a mutual relationship. This result is generally consistent with the study in the literature (Saadé and Kira, 2009).

Moreover, the attitudes of participants with more than three hours of Internet usage differed in a statistically significant and positive way from the participants with less than one hour of Internet usage. This is in line with findings from many earlier studies (Liaw and Huang, 2011; Rhema and Miliszewska, 2014). Our results revealed that there is also a connection between computer use experience and ST candidates' attitudes towards DE. Attitudes of participants with more than three years of experience with computers are more positive than the attitudes of other participants. In this study, approximately 85% of ST candidates have computer experience of more than three years. In many studies, computer experience has been found as an important factor in influencing attitudes toward DE (Saadé and Kira, 2009; Liaw and Huang, 2011; Rhema and Miliszewska, 2014). According to the results, most ST candidates have enough Internet and computer experience that they can be expected to easily adopt DE.

As a result, DE can meet new generations' needs and provides new opportunities to access information. The development of DE is dependent on the stakeholders' attitudes towards DE and willingness to adopt it. For future research, the attitudes of all stakeholders towards DE should be investigated. In order to shape the attitudes towards DE, stakeholders' knowledge and experience in DE and skills in ICT are very important. Therefore, it is suggested that conducting courses, workshops and conferences to improve ICT skills and to raise knowledge distance education in science.

REFERENCES

Annetta, L., & Shymansky, J. A. (2008). A comparison of rural elementary school teacher attitudes toward three modes of distance education for science professional development. *Journal of Science Teacher Education*, *19*(3), 255-267.

Birişçi, S. (2013). Video konferans tabanlı uzaktan eğitime ilişkin öğrenci tutumları ve görüşleri. *Journal of Instructional Technologies & Teacher Education*, 2(1), 24-40.

Bisciglia, M. G. (2002). Differences in attitudes between on-site and distance-site students in group teleconference courses. *American Journal of Distance Education*, 16(1), 37-52.

Boling, E. C., Hough, M., Krinsky, H., Saleem, H., & Stevens, M. (2012). Cutting the distance in distance education: Perspectives on what promotes positive, online learning experiences. *The Internet and Higher Education*, 15(2), 118-126.

Cavas, B., & Kesercioğlu, T. (2003). Primary science teachers attitudes toward computer assisted learning. *Ege Eğitim Dergisi*, 3(2), 35-43.

Cavas, B., Cavas, P., Karaoglan, B., & Kisla, T. (2009). A study on science teachers' attitudes toward ICT in education. *TOJET: The Turkish Online Journal of Educational Technology*, 8(2), 20-32.

Egbo, O. P., Okoyeuzu, C. R., Ifeanacho, I. C., & Onwumere, J. U. (2011). Gender perception and attitude towards e-learning: A case of business students, University of Nigeria. *International Journal of Computer Application*, 1(2), 135-148.

El-Deghaidy, H., & Nouby, A. (2008). Effectiveness of a blended e-learning cooperative approach in an Egyptian teacher education programme. *Computers & Education*, 51(3), 988-1006.

Hannay, M., & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. *Journal of Online Learning and Teaching*, 2(1), 1-11.

Isik, A. H., Karakis, R., & Güler, G. (2010). *Postgraduate students' attitudes towards distance learning.* Procedia-Social and Behavioral Sciences, 9, 218-222.

Kışla, T. (2005). Üniversite öğrencilerinin uzaktan eğitime yönelik tutumları. *Unpublished Master's Thesis. Ege University, İzmir*.

Lennex, L. (Ed.). (2012). *Cases on Inquiry Through Instructional Technology in Math and Science*. IGI Global.

Liaw, S. S., & Huang, H. M. (2011). A study of investigating learners' attitudes toward e-learning. *5th International Conference on Distance Learning and Education,* IACSIT Press, Singapore.

Rhema, A., & Miliszewska, I. (2014). Analysis of student attitudes towards e-learning: The case of engineering students in Libya. *Issues in Informing Science and Information Technology*, 11, 169-190

Saadé, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of IT Education*, 8, 177-191.

Sahin, S. (2006). Computer Simulations in Science Education: Implications for DE. *Turkish Online Journal of Distance Education,* 7(4), 132-146.

Thomas, J. (2011). Preservice teachers' perceptions of learning science methods through hybridizing asynchronous and traditional experiences. *Contemporary Issues in Technology and Teacher Education*, 11(3), 271-281.