

WCES 2012

Effects of preservice teachers' learning styles and field of study on computer-assisted instruction

Senol Dost ^{a*}, Yasemin Saglam ^a

^a*Hacettepe University, Department of Secondary Science and Mathematics Education Beytepe, Ankara 06800, Turkey*

Abstract

Computers, which are brought into our lives by technological developments, became an indispensable part of classroom environment, and they gave rise to emergence of the concept Computer- Assisted Instruction (CAI). In spite of the fact that CAI is an important part of the teaching process, attitudes of preservice teachers to carry out a teaching in that way can be affected by different variables. Thus, the purpose of this study is to investigate the relationship between preservice teachers' learning styles and their attitudes towards carrying out CAI. The sample of the study consists of preservice secondary school teachers who are in their third, fourth and fifth year at a state university in Ankara during the 2011-2012 fall semester. In the study, survey method was used. As data gathering tools, "Scale of Attitude towards the Computer- Assisted Instruction" and "The Kolb Learning Style Inventory" was used. Furthermore, preservice teachers' attitudes towards carrying out CAI were examined in terms of their field of study and learning styles.

© 2012 Published by Elsevier Ltd. Selection and/or peer review under responsibility of Prof. Dr. Hüseyin Uzunboylu
Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: Computer- Assisted Instruction, Attitude, Learning Styles, Pre-service Teachers;

1. Introduction

The use of computers in learning-teaching activities increases in parallel to the developments of technologies used in this area. Recently, the use of computers and their accompanying technologies in order to support teaching activities by field educators, in parallel with the increase in the software that can be used in class environment, have an accelerating potential. As has been stated in the re-constructed curriculum in Turkey, computer technology has the power to enrich teaching and learning environments in a positive way in our country. However, an important question awaits here. Are our preservice teachers' inclinations towards using computers in teaching activities in classrooms and the development of technology in parallel? While some teachers feel comfortable and willing to integrate technology into their courses, some of them disregard the benefits of computers and other technologies, and they feel reluctant to use them in their classes. This brings forth the question of factors that affect the teachers' integration of computers and accompanying technologies in their classes.

Computer-Assisted Instruction (CAI) has been defined in various ways. When these definitions are taken into consideration, it is seen that it provides a ground for learning activities to be realized in computer environment, and it is a kind of education that is used in order to aid the teacher as an educational tool during teaching activities. Because CAI increases success as well as the development of advanced thinking skills in students, and because it

* Şenol Dost. Tel.: +090-312-2976104
E-mail address: dost@hacettepe.edu.tr

encourages students to learn by comprehension instead of by memorizing (Renshaw & Taylor, 2000; Dost, Sağlam, & Altay Uğur, 2011), training preservice teachers who are capable of making full use of technology while realizing learning activities is, therefore, highly important (Çekbaş, Yakar, & Yıldırım, 2003). However, in order to do so, the attitudes of teachers as users and applicators of CAI should be positive. Attitudes are one of the most important designators of human behavior (Kan & Akbas, 2005), and with their cognitive, affective, and behavioral dimensions, they are a psychological structure which is an important and critical predictor of individual behavior (Anderson, 1988).

Ways to acquire and process information differ in each individual. Among these differences are focusing on events and algorithms, using theoretical and mathematical models, finding the visual figures of information, such as schemes, graphics and pictures more stimulating, preferring written or oral explanations. These qualities that change from one individual to another are the determiners of learning styles (Felder, 1996; cit. in Kılıç & Karadeniz, 2004). Hence, the main aim of this study is examine the effect of learning styles of preservice teachers and their departments on their attitudes towards CAI.

2. Method

In this study, survey model was used in order to describe the existing situation. In this model, “the event, individual or object are tried to be described in their own context and as they are. One does not try to change or affect them in any way” (Karasar, 2005).

2.1. Study Group

The participants of this study consist of a total of 193 preservice secondary school teachers (142 female, 51 male) who have been studying at a state university in Ankara during the Fall semester of 2011-2012 academic year. The study was conducted with preservice biology, physics, chemistry, and mathematics teachers who attend third, fourth, and fifth years. The reason for the selection of students from these classes is due to the fact that they have already been introduced to the concept of computer- assisted instruction and that they have already taken some or most of the pedagogical formation and computer classes which are included in their curricula.

2.2. Data Gathering Method

In this study, a “Scale for the Attitude towards Computer- Assisted Instruction,” developed by Arslan (2006), and a personal information inventory entitled “Kolb Learning Style Inventory,” developed by Kolb and translated into Turkish by Askar and Akkoyunlu (1993) were used as data gathering tool.

2.2.1. Learning Styles Inventory

Learning styles scale consists of 12 items with four options that include the four learning styles that students put in order. Each of the expressions in the scale represents one learning style. These are: 1. Abstract Conceptualization (AC), 2. Reflective Observation (RO), 3. Concrete Experience (CE), and 4. Active Experimentation (AE). As a result of the answers given to each option, the total score belonging to each option ranges between 12 and 48. Then, integrated scores are needed in order to determine the learning style. Integrated scores are calculated by subtracting (CE-AC) and (AE-RO). Scores obtained from these operations range between -36 and +36. Learning style is found by determining the conjunction points of integrated scores with the help of the coordinate axis. The Cronbach-alpha reliability co-efficient was found between 0,75 and 0,82 for each learning style.

2.2.2 Scale of Attitude Towards Having Computer- Assisted Instruction

This scale, which was prepared by Arslan (2006), is of 5 point Likert type, and it consists of 20 items 10 of which are positive and the other 10 of which are negative. The Cronbach-alpha reliability co-efficient was found 0,92.

2.3. Data Analysis

When calculating the attitude score, each option was graded as high attitude score represented the positive attitude towards having computer- assisted instruction. In the positive items, options such as “I absolutely agree,” “I agree,” “I am indecisive,” “I absolutely disagree,” were graded as 5-4-3-2-1, and these options were graded as 1-2-3-4-5 in negative items. In data analysis, frequencies and percentages, arithmetic average, standard deviation, and two-way variance analysis were used.

3. Findings

In this section, learning styles of preservice teachers and their attitudes towards having computer- assisted instruction were examined according to various variables. Moreover, data related to the effect of learning styles over the attitude towards having computer- assisted instruction were given as well.

In Table 1, information about preservice teachers’ having a computer or having taken a course related to computers is given.

Table 1. Preservice teachers’ personal data

Feature	Frequency
Those who have public computers	168
Those who do not have public computers	25
Those who take computer classes	186
Those who do not take computer classes	7

As can be seen in the table, preservice teachers mainly have computers and took computer classes.

Table 2. Distrubution of learning styles of preservice teachers

Learning Style	Biology Teaching		Physics Teaching		Chemistry Teaching		Mathematics Teaching		Total	
	F	%	F	%	F	%	F	%	F	%
	Converger	1	3,8	2	5,0	1	2,7	4	4,4	8
Accommodator	1	3,8	3	7,5	4	10,8	8	8,9	16	8,3
Diverger	15	57,7	26	65,0	23	62,2	57	63,3	121	62,7
Assimilator	9	34,6	9	22,5	9	24,3	21	23,3	48	24,9
Total	26	100,0	40	100,0	37	100,0	90	100,0	193	100

As can be seen in Table 2, prospective teachers prefer the diverger learning style in the first place (62,7%) and the assimilator learning style in the second place, regardless of the departments they are enrolled in. Accomodator (8,3%) and converger (4,1%) learning styles are preferred in the third and fourth place by preservice teachers.

Table 3. Distribution of the attitude scores of preservice teachers towards having CAI according to their departments

Department	N	Mean	\bar{X}	Min.	Max.	Sd
Biology teaching	26	83,80	4,19	66	98	8,74
Physics teaching	40	78,67	3,93	55	95	11,00
Chemistry teaching	37	72,70	3,63	44	98	12,24
Mathematics teaching	90	77,46	3,87	40	99	12,7

As can be seen in Table 3, the average of attitude scores of preservice teachers towards having CAI is 83,80 for preservice biology teachers, 78,67 for preservice physics teachers, 72,70 for preservice chemistry teachers, and 77,46 for preservice mathematics teachers.

Table 4. Distribution of the attitude scores of preservice teachers towards having CAI according to learning styles

Learning Style	N	Mean of attitude scores	\bar{X}	Min.	Max.	Sd
Converger	8	79	3,95	61	98	12,4
Accommodator	16	76,87	3,84	58	95	11,67
Diverger	121	78,33	3,91	40	99	12,43
Assimilator	48	75,97	3,79	48	98	11,86

When the distribution of the attitude scores of preservice teachers towards having CAI according to learning styles was examined, it was seen that the highest averages belong to converger and diverger learning styles, and the lowest average belongs to those who have the assimilator learning style.

Table 5. The ANOVA results of the attitude scores of preservice teachers according to their learning style and departments

	Sum of Squares	Mean Square	df	F	Sig.
Learning	1270,838	141,204	9	,997	,444
Style × Department	168,518	56,173	3	,398	,757
Learning Style	1142,271	380,757	3	2,693	,061
Department					

According to Table 5, it can be seen that the learning styles and departments of preservice teachers have no meaningful influence on their attitude towards having CAI ($F=0,398; 2,693, p=0,757; 0,061>0,05$). Moreover, the interaction between learning styles and the department of students have no meaningful effect on the attitudes of preservice teachers towards having CAI ($F=0,997, p=0,444>0,05$). In this case, it can be said that the attitudes of preservice teachers toward having CAI do not change according to their learning styles or the departments they are enrolled in.

4. Conclusion and Discussion

The aim of this study is to examine the changes in the attitudes of preservice secondary school (biology, physics, chemistry, and mathematics) teachers towards having CAI according their learning styles and the departments they are enrolled in. At the end of the analyses, it was seen that preservice teachers adopt mostly the diverger and converger learning styles. This finding is consistent with the results of another study (Baykara Pehlivan, 2010), which was conducted in order to determine the learning styles of preservice teachers, and which used preservice teachers as samples. When Kolb's learning style inventory (Kolb, 1981; Kolb, Boyatzis, & Mainemelis, 2000) is taken into consideration, it will be seen that those who use the converger and diverger learning styles use observation, give importance to systematic reasoning, enjoy working on abstract concepts, and are skillful in solving theoretical and applicable questions. Therefore, the fact that preservice teachers who study science and mathematics adopt the converger and diverger learning styles is an expected situation.

When the maximum score that can be gathered from the scale for the attitude towards having CAI is taken into consideration, it was seen that attitudes of preservice teachers towards having CAI is rather high (Mean of attitude scores=77,46; $\bar{X}=3,905$). This finding overlaps with the findings of Arslan's (2008) study. However, according to the department variable of preservice secondary school teachers, it was also seen that their attitudes towards CAI does not differentiate. In order to activate teaching and learning environments, it is inevitable to merge them with technology, especially with computers. Attitude is learned, and this learning process is determined by the processes of recalling, repetition, and imitation. Thus, the fact that there is a computer available for the constant use of preservice teachers and the presence of the use of technology may be the reason for the high scores of attitude towards having CAI.

The most important finding obtained from the study is that neither the departments of preservice teachers nor their learning styles cause a meaningful difference in their scores of attitude towards having CAI. Although learning styles may have been thought to be influential in the method of instruction, software in CAI makes the use of

different methods of instruction possible. Therefore, learning styles of preservice teachers may have hindered their attitudes towards having CAI to differentiate. On the other hand, as the applicators of technology in education environments, preservice teachers should be encouraged to develop activities related to CAI during their education, which would increase their positive attitudes even more.

References

- Anderson, L.W. (1988). Attitudes and their measurement. In Keeves, J.P. (Ed.). *Educational research, methodology and measurement: An international handbook*. New York: Pergamon Press.
- Arslan, A. (2006). Bilgisayar Destekli Eğitim Yapmaya İlişkin Tutum Ölçeği. *Yüzüncü Yıl Üniversitesi Elektronik Eğitim Fakültesi Dergisi*, 3,2.
- Arslan, A. (2008). Öğretmen Adaylarının Bilgisayar Destekli Eğitim Yapmaya Yönelik Tutumları İle Öz Yeterlik Algıları Arasındaki İlişki. *Elektronik Sosyal Bilimler Dergisi*, 7, 24, 101-109.
- Aşkar, P.,& Akkoyunlu, B. (1993). Kolb Öğrenme Stili Envanteri. *Eğitim ve Bilim*, 87, 37-47.
- Baykara Pehlivan, K. (2010). A Study on Prospective Teachers' Learning Styles and Their Attitudes Toward Teaching Profession. *Elementary Education Online*, 9, 2, 749-763.
- Çekbaş, Y., Yakar, H., & Yıldırım, B. (2003). Bilgisayar Destekli Eğitimin Öğrenciler Üzerine Etkisi. *TOJET*, 2, 4, 11.
- Dost, Ş., Sağlam Y., & Uğur Altay, A. (2011). Use of computer algebra systems in mathematics teaching at university: a teaching experiment. *H. U. Journal of Education*, 40, 140-151.
- Johnson, P. (2008). *Computer-assisted instruction for fourth grade statistics: Mean, median, mode, and range*. Dominguez Hills: California State University.
- Kan, A. ve Akbaş, A. (2005). Lise öğrencilerinin kimya dersine yönelik tutum ölçeği geliştirme çalışması. *Mersin University Journal of the Faculty of Education*, 1, 2, 227-237.
- Karasar, N. (2005). *Bilimsel Araştırma Yöntemi*. Ankara: Nobel Yayınları.
- Kılıç, E. & Karadeniz, Ş. (2004). Cinsiyet ve Öğrenme Stilinin Gezinme Stratejisi ve Başarıya Etkisi. *Gazi Eğitim Fakültesi Dergisi*, 24, 3, 129-146.
- Kolb, D. A.(1981). Experiential learning theory and the learning style inventory: a reply to freedman and stumpf. *The Academy of Management Review*, 6, 289-296.
- Kolb, D.A., Boyatzis, R. E., & Mainemelis, C. (2000). Experiential Learning Theory: Previous Research and New Directions. In R. J. Sternberg and L. F. Zhang (Eds.), *Perspectives on cognitive, learning, and thinking styles*. NJ: Lawrence Erlbaum.
- Renshaw, C. E, & Taylor, H. A (2000). The educational effectiveness of computer-based instruction. *Computers and Geosciences*, 26, 6, 677-682.