Vol. 14(5), pp. 162-167, 10 March, 2019
DOI: 10.5897/ERR2019.3687
Article Number: 79BC41E60287
ISSN: 1990-3839

http://www.academicjournals.org/ERR

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Educational Research and Reviews

Full Length Research Paper

An investigation of pre-service basic education teachers' learning styles in terms of different variables

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Received 14 January, 2019; Accepted 19 February, 2019

Learning process varies from student to student. In a related research, it is argued that one of the basic elements for this variation is due to student's distinct learning styles. Planning learning situations based on the knowledge of learners' learning styles can be more effective and efficient. With the learning-teaching process designed in accordance with the learning styles of students, it is possible to develop positive attitudes towards the courses and to increase academic success. Pre-service teachers' awareness of their own learning styles can be effective both for their own development during their pre-service training and for the development of their students during their in-service professional career. The purpose of the current study is to determine the learning styles of the pre-service basic education teachers and to examine the relationships between their learning styles and gender, age, program type, grade level and grade point average. In data collection, the Kolb Learning Style Inventory was used. The current study was conducted on 493 pre-service teachers randomly selected from among the 1st, 2nd and 3rd year students attending the Basic Education Departments of Classroom Teaching and Pre-school Teacher Education in the Education Faculty of Necmettin Erbakan University, in 2017/2018 academic year. In the analysis of the collected data, SPSS 24 program package was used. The pre-service teachers' learning styles are presented through descriptive statistics, frequencies (f) and percentages (%). Whether the pre-service teachers' learning styles vary significantly depending on the variables of gender, age, program type, grade level and grade point average was tested with Chi-Square Test. Of the participating pre-service teachers, 398 (80.7%) are females and 95 (19.3%) are males; 250 (50.7%) are from the department of classroom teaching and 243 (49.3%) are from the department of pre-school teacher education. The results of the current study have revealed that the participating pre-service teachers have adopted the "Diverging" learning style to the greatest extent and the "Converging" learning style to the smallest extent.

Key words: Basic education, student, learning styles, variables, evaluation.

INTRODUCTION

The learning process has always been one of the research subjects in terms of both individual development and social development. Research has led to the development of behavioral, cognitive or social-cognitive theories and yielded many attempts to explain the learning process in terms of these theories. Despite many differences existing among these theories, the common aspect of all is that learning process occurs through the

experiences of an individual (Başbay et al., 2018). When these experiences are examined, it is seen that these experiences can vary depending on factors such as individuals' cultural backgrounds, societal roles, socio-cultural and economic conditions, epistemological beliefs; in this regard, individual differences are seen to be a variable directly affecting learning.

Individual differences cause learners to develop different responses to the same learning process. One of the reasons for this differentiation is the learning style of the learner (Ekici, 2002; Genç and Kocaarslan, 2013; Yazıcı and Kaya, 2010). Learning style refers to the learner's approach to learning process, his / her preferences in having access to and processing information. Learning styles are defined as ways followed by the individual to receive and process information (Kolb, 1976).

Scientists such as Carl Jung, Felder and Silverman, Gregorc, Kolb have developed various learning style models. In the current study, the learning style model developed by Kolb has been adopted. According to this model, one of the following ways is more strongly adopted to find a solution to a problem encountered; concrete experience, reflective observation, abstract conceptualization and active experimentation. The learner designs the learning process by feeling or touching in a concrete experience, watching in a reflective observation, thinking in an abstract conceptualization, and directly doing in an active experimentation. From these four modes of learning, one of the learning styles determines the dominant learning style of the learner: Accommodating, Diverging, Converging and Assimilating (Kolb et al., 2001).

Knowing which learning style the individual has will enable academic success to increase by providing easier and more effective solutions to the problems encountered in daily life, while leading to success in business and social life. Determination of the learning styles of the pre-service basic education teachers who will work in pre-school institutions and elementary schools, which make up the first level of education, is important for both their academic achievement and daily life. It is important to determine pre-service teachers' learning styles and strategies for them to develop their qualifications (Ünal et al., 2013). Thus, it is thought that pre-service teachers will be supported to acquire the required cognitive, affective and psychomotor basic skills.

In the current study, it is aimed to determine the learning styles of the pre-service basic education teachers. To this end, answers to the following questions were sought:

(i) What are the learning styles of the pre-service basic education teachers?
(ii) Do the pre-service basic education teachers' learning styles vary depending on gender, age, program type, grade level, grade point average?

METHODS

Research model

This study employed the survey model to determine the pre-service basic education teachers' learning styles. The survey model aims to describe a past or a present situation as it was, or is. The event, individual or object that is the subject of research is described as it is (Karasar, 2014). This model is preferred in the current study as it is aimed to reach a description by surveying the collected quantitative data.

Study group

The current study was conducted on 493 pre-service teachers randomly selected from among the 1st, 2nd and 3rd year students attending the Basic Education Departments of Classroom Teaching and Pre-school Teacher Education in the Education Faculty of Necmettin Erbakan University in 2017-2018 academic year. Of the participating pre-service teachers, 398 (80.7%) are females 95 (19.3%) are males; 250 (50.7%) are from the Department of Classroom Teaching and 243 (49.3%) are from the Department of Pre-school Teacher Education; 177 (35.9%) are 1st year students, 186 (37.7%) are 2nd year students and 130 (26.4%) are 3rd year students.

Data collection instruments

In data collection, a personal information form and the Kolb Learning Style Inventory developed by David Kolb in 1971, revised in 1985 and adapted to Turkish by Aşkar and Akkoyunlu in 1993 were used. The inventory consists of 12 items and each item has four statements defining Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (SK) and Active Experimentation (AE). For each item, the respondent is asked to order these statements from 1 to 4. Thus, the total score to be taken for each component can vary between 12 and 48. Yet, in order to determine the learner's learning style, combined scores are needed. The combined scores are calculated by taking the difference between Abstract Conceptualization (AC) and Concrete Experience (CE) and the difference between Active

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[1] It was presented as a verbal presentation in the 2nd International Education and Evaluation Symposium (ISOEVA) held in Antalya Turkey on 17-20 October 2018.

Table 1. Learning styles of the pre-service basic education teachers.

Learning styles	*f*	%
Diverging	220	44.6
Assimilating	115	23.3
Converging	74	15.0
Accommodating	84	17.0
Total	493	100.0

Table 2. Correlations between learning styles and gender.

Gender	Learning styles				Total *f* (%)
	Diverging *f* (%)	Assimilating *f* (%)	Converging *f* (%)	Accommodating *f* (%)	
Female	175 (44.0)	94 (23.6)	63 (15.8)	66 (16.6)	398 (100.0)
Male	45 (47.4)	21 (22.1)	11 (11.6)	18 (18.9)	95 (100.0)
Total	220 (44.6)	115 (23.3)	74 (15.0)	84 (17.0)	493 (100.0)

X2=1.448; sd=3; p=0.694; p>0.05.

Experimentation (AE) and Reflective Observation (RO). The scores to be obtained in this way can vary between -36 and +36. If the score obtained by combining AC and CE is positive, it means that learning is abstract; if it is negative, it means that learning is concrete. Similarly, if the score obtained by combining AE and RO is positive, it means that learning is active; if it is negative, it means that learning is reflective. By determining the intersection point of the combined scores, the dominant learning style of the learner is found. The pre-service teachers were informed about the inventory and then the inventory was administered to the ones who were voluntary to participate. The administration of the inventory lasted for 15-20 min. Within the context of the current study, Cronbach Alpha reliability coefficient was calculated for four dimensions of the inventory and the coefficients were found to be ranging from 0.76 to 0.85. These values show that the inventory is a reliable instrument to be administered to the study group of the current research.

Data analysis

In the analysis of the collected data, SPSS 24 program package was used. The pre-service teachers' learning styles are presented through descriptive statistics; frequencies (*f*) and percentages (%). Whether there are significant correlations between the participants' learning styles and their gender, age, program type, grade level and grade point average was tested with Chi-square test. This is because of the calculation of the combined scores obtained from the Learning Style Inventory. It was found that the students' learning styles are Diverging, Accommodating, Converging and Assimilating.

FINDINGS

The findings related to the first sub-problem of the current study "What are the learning styles of the pre-service basic education teachers?" are presented in Table 1. As can be seen in Table 1, 44.6% (220) of the pre-service basic education teachers have the Diverging learning style, 23.3% (115) have the Assimilating learning style, 15% (74) have the converging and 17% (84) have the accommodating learning style. Thus, it seems that the pre-service basic education teachers have the Diverging learning style to the greatest extent and the Converging learning style to the smallest extent.

Findings related to the second sub-problem of the study "Do the pre-service basic education teachers' learning styles vary depending on gender, age, program type, grade level, grade point average?" are presented in Tables 2, 3, 4, 5 and 6 respectively. As can be seen in Table 2, no significant correlation was found between the pre-service basic education teachers' learning styles and gender ($X^2_{(3)}$=1.448; p>0.05). Both the female and pre-service teachers were found to have the Divergent and then the Assimilating learning styles the most while they have the Accommodating learning style the least.

As can be seen in Table 3, no significant correlation was found between the pre-service basic education teachers' learning styles and age ($X^2_{(3)}$= 7.149; p>0.05). The highest number of the pre-service teachers in the age group "19 years and under" have the Diverging learning style with 41.3% and the smallest number of them have the Accommodating learning style with 19%. The highest number of pre-service teachers in the age group "20-21 years old" have the Diverging learning style with 44.6% and the smallest number of them have the Converging learning style with 16.6%. The highest number of pre-service teachers in the age group "22 years old and under" have the Diverging learning style

Table 3. Correlations between the pre-service teachers' learning styles and age.

Age	Learning styles				Total *f* (%)
	Diverging *f* (%)	Assimilating *f* (%)	Converging *f* (%)	Accommodating *f* (%)	
19 years old and under	50 (41.3)	24 (19.8)	24 (19.8)	23 (19.0)	121 (100.0)
20-21 years old	129 (44.6)	76 (26.3)	36 (12.5)	48 (16.6)	289 (100.0)
22 years old and over	41 (49.4)	15 (18.1)	14 (16.9)	13 (15.7)	95 (100.0)
Total	220 (44.6)	115 (23.3)	74 (15.0)	84 (17.0)	493 (100.0)

X^2=7.149; sd=6; p=0.307; p>0.05.

Table 4. Correlations between the pre-service teachers' learning styles and program type.

Program type	Learning styles				Total *f* (%)
	Diverging *f* (%)	Assimilating *f* (%)	Converging *f* (%)	Accommodating *f* (%)	
Classroom teaching	116 (46.4)	45 (18.0)	48 (19.2)	41 (16.4)	250 (100.0)
Pre-school teacher education	104 (42.8)	70 (28.8)	26 (10.7)	43 (17.7)	243 (100.0)
Total	220 (44.6)	115 (23.3)	74 (15.0)	84 (17.0)	493 (100.0)

X^2=12.581; sd=3; p=0.006; p<0.05.

Table 5. Correlations between the pre-service teachers' learning styles and grade level.

Grade level	Learning styles				Total *f* (%)
	Diverging *f* (%)	Assimilating *f* (%)	Converging *f* (%)	Accommodating *f* (%)	
1st year	75 (42.4)	35 (19.8)	30 (16.9)	37 (20.9)	177 (100.0)
2nd year	86 (46.2)	49 (26.3)	21 (11.3)	30 (16.1)	186 (100.0)
3rd year	59 (45.4)	31 (23.8)	23 (17.7)	17 (13.1)	130 (100.0)
Total	220 (44.6)	115 (23.3)	74 (15.0)	84 (17.0)	493 (100.0)

X^2= 7.646; sd=6; p=0.265; p>0.05

Table 6. Correlations between the pre-service teachers' learning styles and grade point average.

Grade point average	Learning styles				Total *f* (%)
	Diverging *f* (%)	Assimilating *f* (%)	Converging *f* (%)	Accommodating *f* (%)	
2.99 and lower	44 (51.2)	17 (19.8)	12 (14.0)	13 (15.1)	86 (100.0)
3.00 and higher	176 (43.2)	98 (24.1)	62 (15.2)	71 (17.4)	407 (100.0)
Total	220 (44.6)	115 (23.3)	74 (15.0)	84 (17.0)	493 (100.0)

X2=1.867; sd=3; p=0.600; p>0.05.

with 49.4% and the smallest number of them have Accommodating learning style with 15.7%.

As can be seen in Table 4, there is a significant correlation between the pre-service basic education teachers' learning styles and the department they are attending ($X^2_{(3)}$ = 12.581; p<0.05). Both the pre-service

classroom teachers and pre-school teachers were found to have the Diverging learning style the most. While the pre-service classroom teachers have the Accommodating learning style the least, the pre-service pre-school teachers have the Converging learning style the least. As can be seen in Table 5, no significant correlation was found between the pre-service basic education teachers' learning styles and grade level ($X^2_{(3)}$=7.646; p>0.05). The first year students have the Diverging learning style the most with 42.4% and the Converging learning style the least with 16.9%. The second year students were found to have Diverging learning style the most with 46.2% and the Converging learning style the least with 11.3%. The third year students were found to have the Diverging learning style the most with 45.4% and the Accommodating learning style the least with 13.1%.

As can be seen, there is no significant correlation between the pre-service basic education teachers' learning styles and general point average ($X^2_{(3)}$=1.867; p>0.05). The pre-service teachers with a grade point average was "2.99 and lower" and the pre-service teachers with a grade point average "3.00 and higher" have the Diverging learning style the most. In addition, the pre-service teachers with a grade point average "2.99 and lower" and the pre-service teachers with a grade point average "3.00 and higher" have the Converging learning style the least.

DISCUSSION

In the current study conducted on the pre-service basic education teachers, it was found that the learning style possessed by the highest percentage of the pre-service teachers (44.6%) is the Diverging learning style. Other studies conducted on learning styles (Kılıç, 2002; Karakış, 2006; Kaf-Hasırcı, 2006; Can, 2011; Genç and Kocaarslan, 2013; Bahar and Yıldırım, 2017; Dikmen et al., 2018), found that the "*Assimilating"* learning style is the one most adopted by students. In the literature, there are some other studies reporting that the converging learning style is the most possessed one (Mutlu, 2008; Bahar et al., 2009). In the current study, the Diverging learning style was found to be possessed by more pre-service teachers than the others are. Not much research has been found in current literature supporting this finding. The individuals having the diverging learning style have advanced skills of concentrating on the ideas of others and relating ideas to each other. They mostly focus on abstract concepts and ideas while creating products (Can, 2011). The individuals having this learning style tend to appreciate course materials depending on their experiences, interests and professional careers of future. These individuals ask the "Why" question more often (Kolb, 1976; Felder, 1996). Thus, the instructional environments for the pre-service basic education teachers should be organized in such a way as to provide opportunities to ask more "Why" questions. Moreover, the course materials to be offered to these pre-service teachers should reflect their experiences and interests. For these reasons, pre-service basic education teachers should be provided with learning environments where they can express their opinions and establish relationships between these ideas through brainstorming.

CONCLUSION AND RECOMMENDATIONS

In the current study, it was found that the pre-service basic education teachers' learning styles do not vary significantly depending on gender. Both the female and male pre-service teachers have the Diverging learning style the most and the Accommodating learning style the least. This result does not concur with the findings reported by Arslan and Babadoğan (2005), Mutlu (2008), Can (2011), Ünal et al. (2013), Bahar and Yıldırım (2017) as well as Dikmen et al. (2018). Though in these studies, it was also revealed that the learning styles do not vary significantly by gender, they showed that both the female and male participants have the assimilating and converging learning styles the most. In this connection, it can be argued that gender is a variable not influential on the learning style possessed.

It was also concluded that there is no significant correlation between the pre-service basic education teachers' learning styles and age. This finding is similar to the findings reported by Arslan and Babadoğan (2005) and Eskici (2008) but differs from the findings reported by Ergür (2010) and Can (2011). It can be argued that students' being in different age groups is not an influential factor in the development of their preferred learning styles. In light of the findings of the current study, it can be argued that across all the age groups, the most dominant learning style is Diverging and the least dominant ones are Accommodating and Converging.

In the current study, it was found that there is a significant correlation between the pre-service basic education teachers' learning style and the department attended. This finding is similar to the finding reported by Gürsoy (2008) yet differs from the findings reported by Mutlu (2008), Bahar et al. (2009), Genç and Kocaarslan (2013), as well as Zengin and Alşahan (2011). The reason for the pre-service teachers from different departments having different learning styles may be because they are accepted to these programs based on different kinds of university entrance exam points and different curriculums and courses taught in different programs. Another reason for this difference may be that the pre-service teachers from different departments will teach different student groups in the future; thus, they can condition themselves differently in their learning. Another finding of the current study is that the pre-service

basic education teachers' learning styles do not vary depending on their grade level. This finding is similar to the findings reported by Kaf-Hasırcı (2006) as well as Arsal and Özen (2007) yet differs from the findings reported by Hamurcu (2002), Karademir and Tezel (2010) as well as Çelikkaya (2012). When the pre-service teachers' learning styles are examined, it is seen that the dominant learning style in three of the groups is Diverging.

Another finding of the current study is that the pre-service basic education teachers' learning styles do not vary significantly depending on grade point average. This finding concurs with the findings reported by Yenice and Saracaloğlu (2009) as well as Dikmen et al. (2018) yet differs from the findings reported by Snyder (2000) and She (2005). This might be because there are many other factors affecting the grade point average.

In light of the findings of the current study, following suggestions can be made for researchers and practitioners.

(i) Instructional processes that can affect different learning styles should be developed.
(ii) More specific research to be conducted by keeping some demographic features fixed will be important in terms of determining the variables leading to changes on learning styles.
(iii) As there is a large amount of quantitative research in the literature, qualitative research and meta-analysis studies are needed more.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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