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Identifying distance learners' learning styles[1]

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Abstract. This study aimed to identify the learning styles of distance learners studying for an associate's degree in computer programming and child development and to determine whether there is a difference between the departments. Accordingly the survey model was used in this study. The sample consisted of 261 associate's degree students enrolled in two distance education programs. The data were collected using the E-Learning Styles Scale. In the data analysis, categories were formed using the mean scores on the E-Learning Styles Scale to identify the dominant -e-learning styles of the students and the nonparametric Mann-Whitney U test was used because the data were not normally distributed. The analysis results showed that the most preferred learning style of computer programming and child development students was the independent e-learning style. The preferred learning styles of computer programming and child development students differed in active learning, social learning, and logical learning styles.

Keywords: Learning style, e-learning style, distance education

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INTRODUCTION

Changes and advances in technology have led to innovations in education and training. Developments in information and communication, in particular, have closed distances and ensured quick access to information. These developments have led to the restructuring of education and training and the revision of education programs. Distance education is one of the outcomes of this update on education. The adventure of distance education started in 1728 and have today been made more effective and accessible internet-based technologies (Holmberg, 2005). Moore and Kearsley (2012) define distance education as a process of teaching and planned learning in which teaching and learning normally occur in different places, thereby requiring communication through technologies and a special institutional organization.

Distance education provides educational opportunities to individuals in different geographical locations and under different conditions so that individuals can access information anytime and anywhere. Thus, individuals perform their learning depending on their characteristics (interest, ability, learning speed, learning style, intelligence, etc.). Because it is incumbent on learners to learn within the context of distance education, the teaching and learning process has to be planned with this fact in mind. A more effective learning experience can be achieved in distance education by taking into account learners' characteristics (interest, ability, learning speed, learning style, intelligence, etc.). Therefore, learning in distance education takes place within the bounds of possibility of distance education, in different learning styles, and especially at learners' learning speeds (Bayrak, Aydemir & Karaman, 2017; Moore & Kearsley, 2012). Under this perspective, learning styles are of major importance in distance education (Bayrak et al., 2017; Jahanbakhsh, 2012; Omar, Mohamad & Paimin, 2015; Tulbure, 2011). Previous research into distance education has also emphasized the importance of the design of learning environments according to learning styles (Chen, 2019; Hamada, Rashad & Darwesh, 2011; Kinshuk, Liu & Graf, 2009; Kurilovas, Kubilinskiene & Dagiene, 2014; Laine, Myllymäki & Hakala, 2015; Li, Yin, Zhang & David, 2019).

[1] This study was presented at the IVSS 2018 International Vocational Science Symposium.

Learning style, according to Felder and Silverman (1988), is learners' characteristic strengths and preferences in the process of acquiring, retaining and processing information. Each individual engages in learning in a different way depending on their characteristics. In this regard, learning style is not concerned with what learners learn, but with how they perform learning (Kurnaz & Ergün, 2019). Changing variable roles in classroom and distance learning environments can also cause differences in individuals' learning styles (Badge, Saunders & Cann, 2012). In distance education in which the responsibility of learning falls on learners, learning environments can be enriched so that individuals can learn at their discretion in line with to their learning styles (Akdemir & Koszalka, 2008; Silva, Pereira & Oliveira Neto, 2015). In other words, identifying learning styles helps explore learners' weaknesses and strengths regarding their learning experience and make learners inclined to learn in an easy and permanent way (Dağ & Geçer, 2009; Santo, Soares, Silveira & Costa Oliveria, 2015). In short, it is seen that content should be enriched according to students' learning styles and preferences in distance education (Graf, Kinshuk & Liu, 2009; Manochehri & Young 2006).

When learning styles are identified and taken into consideration in the course planning, it facilitates learning and makes the learning and teaching process more effective and efficient (Dağ & Geçer, 2009; Terrel & Dringus, 2000; Usta, 2019). This study aimed to identify the learning styles of distance learners studying for an associate's degree in computer programming or child development and to determine whether there is a difference between the departments.

METHODS

The study used a survey research design. Survey research aims to describe a past or present situation as it exists. The event, individual, or object that is the subject of the research is tried to be defined within its conditions and as it is. (Karasar, 2009).

Sampling

The sample consisted of 261 associate's degree students enrolled in two distance education programs. Table 1 shows the distribution of the students across the departments.

Table 1. *The distribution of students across the departments*

Departments	Number of Students
Computer Programming	122
Child Development	139
TOTAL	**261**

Data Collection

The data were collected using the E-Learning Styles Scale developed by Gülbahar and Alper (2014). The scale was prepared electronically using google forms to collect data. The scale link prepared was sent to the students via their platform and volunteer students were asked to fill in the form. Table 2 summarizes the properties of the scale consisting of 7 factors and 38 items.

Gülbahar and Alper (2014) found the Cronbach's α coefficient of the total E-Learning Styles Scale as 0.94. They reported that the reliability coefficients of the seven factors varied from 0.72 to 0.87. In the present study, the Cronbach's α coefficient of the total scale was found to be 0.91.

Data Analysis

In the data analysis, categories were formed using the mean scores on the E-Learning Styles Scale to identify the dominant -e-learning styles of the students. First, the normality of the data was tested to determine whether there is a significant difference in preferred e-learning styles between the computer programming students and child development students. The normality of the data was analyzed using skewness and kurtosis measures and the Kolmogorov-Smirnov test. The data were not normally distributed because the skewness and kurtosis values

were not within the acceptable range and the Kolmogorov-Smirnov values were less than 0.05 for each factor. Thus, the nonparametric Mann-Whitney U test was used.

Table 2. *An overview of the e-learning styles scale*

Factors	Number of Items	Description
Independent Learning	4	Independent learners prefer to study on their own and take responsibility for their learning. They wish to participate in group work after individual preparation.
Social Learning	6	Social learners think that learning is the shared responsibility of the teacher and the learner. They give importance to interaction in their learning process and prefer to participate in activities and projects that require group work.
Audiovisual Learning	8	Audiovisual learners think they best learn by hearing and seeing and favour teachers who explain subjects in detail. They are more interested in courses such as mathematics, science, and technology and prefer visuals such as images, paintings, and cartoons for course documents.
Active Learning	6	Active learners think that they best learn by experiencing. They enjoy handiwork, learning through games and simulations, exploring, and researching.
Verbal Learning	7	Verbal learners think that they best learn by reading. They favor argumentation over critical thinking and problem-solving. They prefer studying subjects such as literature, history, and foreign languages.
Logical Learning	3	Logical learners like to solve puzzles and play logic games. They prefer to study step by step following a plan and best learn by reflection.
Intuitive Learning	4	Intuitive learners use their intuition to solve problems and best learn by connecting with their feelings. Intuitive learners are very creative and do not like the learning process to be planned by others.

RESULTS

Table 3 displays the findings on students' e-learning styles according to the departments.

Table 3. *Statistics (Means) on students' e-learning styles according to the departments*

Factors	Computer Programming	Child Development
Independent Learning	4.24	4.15
Social Learning	3.49	3.52
Audio-visual Learning	2.88	3.25
Active Learning	3.63	3.83
Verbal Learning	4.05	4.03
Logical Learning	3.71	2.79
Intuitive Learning	3.42	3.51

With respect to students' e-learning styles according to the departments, the most preferred e-learning style of computer programming students was independent learning (X=4.24). Independent learning was followed by verbal learning (X=4.05) and logical learning

(X=3.71) styles. The most preferred e-learning style of child development students was also an independent learning style (X=4.15). Independent learning was followed by verbal learning (X=4.03) and active learning (X=3.83) styles. Table 4 presents the findings on the differentiation of students' e-learning styles according to the departments.

Table 4. *Statistics on the differentiation of students' e-learning styles by the departments*

Learning Styles	Gender	N	Mean Ranks	Sum of Ranks	Z	P
Audio-visual	Computer Programming	122	82.18	4931.00	-1.416	.157
	Child Development	139	71.92	6545.00		
Verbal	Computer Programming	122	73.60	4416.00	-.549	.583
	Child Development	139	77.58	7060.00		
Active	Computer Programming	122	61.84	3710.50	-3.241	.001
	Child Development	139	85.34	7765.50		
Social	Computer Programming	122	67.15	4029.00	-2.023	.043
	Child Development	139	81.84	7447.00		
Independent	Computer Programming	122	77.95	4677.00	-.448	.654
	Child Development	139	74.71	6799.00		
Logical	Computer Programming	122	98.48	5908.50	-5.148	.000
	Child Development	139	61.18	5567.50		
Intuitive	Computer Programming	122	73.04	4382.50	-.679	.497
	Child Development	139	77.95	7093.50		

The e-learning styles of computer programming students and those of child development students differed in active learning ($p < 0.05$), social learning ($p < 0.05$), and logical learning ($p < 0.05$) styles. This difference was in favor of the child development students in terms of the active learning and social learning styles, while it was in favor of the computer programming students in terms of the logical learning style.

DISCUSSION and CONCLUSIONS

The study set out to identify the learning styles of distance learners. The analysis results showed that the most preferred learning style of computer programming and child development students was the independent e-learning style. Independent learners prefer to study on their own and engage in group work after individual preparation (Gülbahar & Alper, 2014). In distance education, learners located in different geographical locations get access to information whenever and wherever they choose. Therefore, they are responsible for their own learning and have to study on their own. Given the very nature of distance education, distance learners necessarily have to choose an independent learning style. This idea corroborates the finding of previous research on distance learners' learning styles that reports independent learning as the most preferred learning style (Gülbahar & Alper, 2014). The fact that the participating students preferred an independent learning style the most shows that they ac on the philosophy of distance education and choose the educational model that best fits their learning style. It is thought that the agreement between the educational model in which students are involved and their preferred learning style might increase their academic achievement. Recent research into e-learning styles has found that the independent learning style predicts academic achievement in e-learning environments (Kurnaz & Ergün, 2019).

The preferred learning styles of computer programming and child development students differed in active learning, social learning, and logical learning styles. This difference was in

favor of the child development students in terms of the active learning and social learning styles, while it was in favor of the computer programming students in terms of the logical learning style. Social learners think that learning is the shared responsibility of the teacher and the learner, attach importance to interaction in their learning process and prefer to participate in group activities and projects. Active learners best learn through experience and enjoy handiwork, learning through games and simulations, exploring, and researching. Logical learners enjoy solving puzzles and playing logic games, prefer to study step by step following a plan, and best learn through reflection (Gülbahar & Alper, 2014). Considering the characteristics of learning styles and of the programs that the students were enrolled in, child development students mostly preferred active and social learning styles, while computer programming students mostly preferred and logical learning styles. A possible interpretation might be that the students preferred a learning style that best matches their department. The harmony between the preferred learning style and the department of study contribute positively to many factors that are effective in achieving the desired level of learning, such as academic achievement, motivation, attendance, and attitude. This idea is supported by evidence from previous observations (Jahanbakhsh, 2012; Omar et al., 2015; Tulbure, 2011; Veznedaroğlu & Özgür, 2005).

This study identified distance learners' learning styles. With the advancing technology, the increasing distances, and the growing value of time, distance education has become more common. It is of key importance to investigate the characteristics of distance learners to design more effective e-learning environments and achieve learning outcomes. The exploration of individual differences in education and the organization of learning activities in consideration of these differences have been discussed openly in recent years; therefore, learning style preferences should not be overlooked. Buerck, Malstrom and Peppers (2003) confirmed that it would be a fault not to examine learning styles as a variable in a study on learner characteristics. Cook (1991) noted that identifying learning styles provides learners with an awareness of the characteristics of their preferred learning style and that this awareness makes a positive contribution to academic achievement.

It is of great importance for educators to identify the preferred learning styles of the group that they teach and accordingly plan learning activities so that learners can be made aware of their weaknesses and strengths regarding their own learning. This study identified the preferred learning styles of the students enrolled in distance education programs and the academics working in the relevant programs were informed of the findings of the study. The effects of learning styles on the learning process are still debated. Future studies on this topic are therefore recommended.

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