Kişiselleştirilebilir Öğrenme Ortamlarina Yönelik Geçerli ve Güvenilir Bir Ölçek Geliştirme Çalışması[1]

Developing a Valid and Reliable Attitude Scale towards Personalized Learning

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Abstract

The purpose of this study is to develop a valid and reliable attitude scale towards personalized learning in education. To develop an attitude scale, firstly, the item pool has been formed and presented to the experts opinion. The final form was prepared according to the expert opinion, the test form has been conducted on 481 junior and senior students at the Computer Education and Instructional Technologies Education department from six different universities. According to the analyses, exploratory factor analysis have resulted in KMO value .95 and Bartlett Sphericity (x^2 =6367.9, .000). Confirmatory factor analysis result has also measured up for the acquired form. The value of Cronbach alpha has been calculated as .95. As a result of the analyses, a valid and reliable personalized learning education attitude scale that consists of one sized and 27 items have been developed.

Keywords: Personalized learning environments, attitude scale, scale development.

Özet

Bu araştırmanın amacı, kişiselleştirilebilir öğrenme ortamlarına yönelik geçerli ve güvenilir bir tutum ölçeği geliştirmektir. Tutum ölçeği geliştirebilmek için ilk olarak madde havuzu oluşturulmuş ve uzman görüşüne sunulmuştur. Uzman görüşlerine göre son hali verilen pilot form, altı farklı üniversiteden 481 Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü üçüncü ve dördüncü sınıf öğrencisi ile uygulanmıştır. Yapılan analizlere göre; açımlayıcı faktör analizi sonucu; KMO değeri .95, Bartlett Sphericity (x^2 =6367.9, .000) sonucu da anlamlı çıkmıştır. Doğrulayıcı faktör analizi sonucu da elde edilen yapıyı destekler nitelikte bulunmuştur. Cronbach alpha değeri ise .95 olarak bulunmuştur. Yapılan analizler sonucunda; tek boyuttan ve 27 maddeden oluşan geçerli ve güvenilir kişiselleştirilebilir öğrenme ortamları tutum ölçeği geliştirilmiştir.

Anahtar kelimeler: Kişiselleştirilebilir öğrenme ortamları, tutum ölçeği, ölçek geliştirme.

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1. This study is a part of the master thesis which name is analysis of the university students' attitudes towards the personalized learning environment.

1. Introduction

Web technologies have been affecting many fields in recent years. One of them is the field of education. The learning environments such as computer-aided learning environment, computer-based learning environment, and e-learning environment have been developed in the field of education by using web technologies. E- learning has been defined as an education technique in which a teacher and student are not the same as physical environments (Altıparmak, Kurt, ve Kapıdere, 2011).

Most e-learning bases are aimed at being developed in a way that the learners will focus on learning and be satisfied with the learning experiences (Costello, 2012). So many e-learning environments have been developed in order to increase the motivation of the learners and enable that the learning is both permanent and more efficient. On the other hand students have different learning styles and information processing (Soflano, Connolly and Hainey, 2015). E-learning doesn't work on these features (Kim et al., 2014). Current e-learning environments have fallen behind with providing personal characteristics of the learners, their learning style and learning rate with suitable environment (Martinez, 2001). The environments should be personalized in order to resolve these inadequacies. Personalization is a very important concept for the new e-learning. (Popescu and Badica, 2009).

Personalized learning environments are the environments in which learners are trained without let or hindrance of time, space etc. and that environment can be updated continuously according to the needs, necessities, personal characteristics, background knowledge level, interest and abilities of the learners (Sampson, Karagiannidis and Cardinali, 2002). Kara and Sevim (2013) have defined personalized systems as the environments in which the learner controls his/her learning process and is able to reach the sources s/he needs and learns depending on his/her own speed.

Learners would like to be one part of the resolution processes of the problems related to themselves (Dimitrova, 2003). Learners want to learn in a way that they can direct their learning process depending on themselves. Personalized learning environments contribute to understanding their own learning and realization of learning in more rapid, efficient and qualified way (Halim, Ali and Yahaya, 2010). Thus, the learner both becomes the active part of learning process and learns much better (Park & Lee, 2003).

Until today, so many personalized learning environments have been designed. ELM-ART (Schwarz, Brusilovsky and Weber, 1996), AHA (De Bra and Calvi, 1998), SKILL (Neumann and Zirvas, 1998), WebClass RAPSODY (Ninomiya, Taira and Okamoto, 2007), IDEAL (Wang, 2008) and PSSEM (Zhang, 2008) can be given as reformed examples for these environments.

Recently, there have been many studies about personalized learning environments. In these studies, the environment has been developed, the features of the environment

have been clarified and the implementation of the environment has been conducted together with the students and studies related to the efficiency of the environment or how and in what aspects the environment affects student success have been conducted. There have also been the literature review studies about this subject. There are a few number of the studies related to the students' attitude towards personalized learning environments. The examples as to the students' attitude towards personalized learning environment are given below.

Among the studies as to personalized learning environment, the first one that an adaptable environment design named as STyLE OLM (Scientific Terminology Learning Environment Interactive Open Leraning Modeling) developed by Dimitrova (2003). 7 students who are good at English and the topic about financial marketing for finance class have been selected. Research data have been collected by surveys and interviews. The obtained data showed, that the environment can be structured easily. Besides communication, interaction and diagrams are helpful.

Another study that is a content management system that enables web-based personalized learning named as Wang (2008) IDEAL. The developed system has been implemented with 65 undergraduates who can take XML programming class and it has been concluded that it affects student success positively. Additionally, the performance evaluation has been carried out with the test and control group of 80 people and it has been concluded that it affects student performance positively.

One of the long-term studies about this topic is the Personalized environment design providing cooperation named as ''Ultraversity'' and developed by Powell, Tindal and Millwood. This system practice has been designed completely as online and conducted as a study with undergraduate students having lasted for three years. The data have been collected from the ones having joined in the practice by conducting measurement, survey, interview, phone calls and face to face meeting. According to the obtained data, it has been concluded that carrying out the evaluation with e-portfolio affects the critical thinking skills positively. The fact that the practice affects career developments and work-study-life balance positively has been expressed by the ones having joined the practice. Besides, they have indicated that the environment given to them has enabled personalization highly and increased their motivation.

Another study is the system named as WELSA (Web based Educational system with Learning Style Adaptation) by Popescu and Badica (2009). The system with dynamic adaptation mechanism has been carried out with 64 undergraduate students studying in computer sciences. According to the results, it has been concluded that the guidance the system made is influential, enables to spend the time more efficiently and increases student motivation.

Another study is the private education platform named as ''LessonTutor'' conducted by Bahçeci (2011). 56 students have participated in the study, of which 28

students constitute experimental group and 28 students constitute control group. An achievement test has been conducted on both groups as pre and post by the researcher. Then, it has been found that there is a significant difference between these two groups for the good of the experimental group. It has seen that the experimental group has developed an attitude towards the environment after using learning environment. It has been concluded that the education platform unique to the developed individual has made student success increase and affected students' attitude positively.

The last study to be analyzed is an environment that can integrate web-based personalized activity named as AMASE (A Framework for Composing Adaptive and Personalized Learning Activities on the Web) made by O'keeffe et al. (2012). In this study, there have been personalized activities and lectures containing SQL class and subjects at undergraduate level. The implementation of the developed system has lasted for 16 weeks with 69 undergraduate students. For the purpose of examining the efficiency and usefulness of the system, the students 'opinion has been taken via the scale method. According to the results obtained from the data, the point of view of the students to the system has been positive but, on the other hand, some students have mentioned that the content is insufficient. Besides, it has been concluded that the environment is appropriate in terms of personalization and is inefficient in terms of the usage of the activities.

The purpose of this study was to develop a valid and reliable attitude scale towards personalized learning environment. The detailed information as to the scale planned to be developed is given in Methodology part and the statistics obtained from the studies is given in Findings part.

2. Methodology

In this chapter, the detailed information as to the participants, development process, data collection, analysis of data of Personalized Learning Environments Attitude Scale (PLEAS) is given.

Participants

The participants of the research consists of 481 junior and senior CEIT (Computer Education and Instructional Technologies) students studying in 2012-2013 Academic Year Spring Term in Anadolu University, Dokuz Eylul University, Ege University, Gazi University, Karadeniz Technical University and Pamukkale University. The reason why only the junior and senior students CEIT students have been selected for the participants is that they are considered to have knowledge about personalized learning environment. Because they took the ''Basics of Distance Learning" class in their fifth semester. The demographic information about the students that form the participants is given in Table 1.

Table 1. The demographic information about the students having participated in scale development implementation.

The Name of University	Sex		Grade		Total
	Male	Female	3.Grade	4.Grade	
Anadolu University	30	21	42	9	51
	6,23%	4,36%	8,73%	1,87%	
Dokuz Eylul University	49	17	30	36	66
	10,18%	3,53%	6,23%	7,48%	
Ege University	71	42	67	46	113
	14,76%	8,73%	13,92%	9,56%	
Gazi University	18	22	33	7	40
	3,74%	4,57%	6,86%	1,45%	
Karadeniz Technical University	103	48	70	81	151
	21,41%	9,97%	14,55%	16,83%	
Pamukkale University	36	24	60	-	60
	7,48%	4,98%	12,47%		
Total	307	174	302	179	481

As seen in Table 1, 63,8 %of the participants are male and 36,2% of them are female students. Of all the students, 62,7% is III. Grade, 37,3% is IV. Grade students. The participants consist of 10,6% from Anadolu University, 13,7% from Dokuz Eylul University, 23,4% from Ege University, 8,3% Gazi University, 31,3% from Karadeniz Technical University and 12,4% from Pamukkale University students from Faculty of Education Department of CEIT.

Development of PLEAS

Scale development process is a dynamic process including many factors. The studies and stages as to the development of PLEAS have been stated in Figure 1.
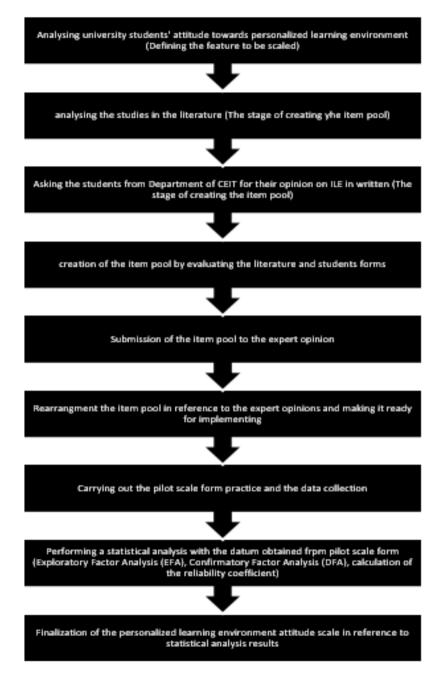
Figure 1. Scale development stages

The first step of the scale development is that the feature to be measured should be determined and identified (Devellis, 1991). Studies and practices as to the literature about personalized learning environment to define the feature to be measured have been examined. After this stage, they have proceeded to the item pool stage. While creating the item pool, the studies as to the subject have been examined, and also 59 Department of CEIT students studying in Ege University Faculty of Education in 2011-2012 Academic Year, Spring Term were asked about what they thought as to personalized learning environment with a form consisting of four open-ended questions. A test form consisting of 123 questions has been made by examining relevant literature and students form. The form has been submitted to the expert opinion.

Content validity

The content validity of the developed test form has been provided with the expert opinion. Among those experts from different universities, 11 of them are the domain experts of this subject, two of them are assessment and evaluation experts and one of them is grammarian. In the form submitted to the expert opinion, they should mark one of the ''Appropriate'', ''Should be rearranged'', ''Inappropriate'' options. Should they mark ''Should be rearranged'', there is also an ''Explanation'' column for them to inform of what sort of rearrangement should be done. The test form, whose questions have been reduced to 43 questions in accordance with the feedbacks of the experts, has been made ready for practice by making it confirmed by the grammarian for its grammar. The detailed information as to the instructors consulted for their expert opinion have been shown in Table 2.

Table 2. Information on the academicians consulted for the expert opinion

Degree	University	The Number of the Experts
Prof. Dr.	Ege University	1
Assoc.Prof. Dr	Ege University	2
Assist.Prof. Dr	Ankara University	1
	Ege University	5
Inst. Dr.	Ege University	1
Res. Asst. Dr.	Uşak University	1
	Georgia State University	1
Res. Asst.	Anadolu University	2
Total		14

Data Collection for PLEAS

Survey data have been selected during April and May of 2012-2013 Academic Year Spring Semester. It has been asked to read the instruction as to the scale before carrying out the scale and then the students have been asked to answer the questions in the test scale form. It has taken about 8-10 minutes to carry out the scale form. It is thought that the students have given frank and sincere answers to the questions in the scale form. Detailed information as to data collection process for the scale has been given in Table 2.

Table 3. Data collection process for development of the scale

University Name	First Day of Data Collection	Last Day of Data Collection	Total Number of the Students
Anadolu University	04.03.2013	25.03.2013	51
Dokuz Eylul University	11.03.2013	18.03.2013	66
Ege University	04.03.2013	08.03.2013	113
Gazi University	04.03.2013	18.03.2013	40
Karadeniz Technical University	04.03.2013	08.04.2013	151
Pamukkale University	04.03.2013	18.03.2013	60
Total			481

As it can be seen in Table 2, the test scale application has been started in 2012-2013 Academic Year Spring Semester and the data collection process for the scale carried out in six universities has been completed within 35 days.

Analysis of PLEAS data

SPSS 17.0 and LISREL 8.72 software packages have been utilized for data analysis. Cronbach Alpha internal consistency coefficient has been calculated with relation to the reliability of the scale. Explanatory factor analysis (EFA) and confirmatory factor analysis (CFA) have been conducted for the construct validity of the scale.

3. Findings

Exploratory factor analysis (EFA)

Exploratory factor analysis has been conducted in order to determine the factor loadings of the scale and manifest the construct validity. Before conducting the factor analysis, the negative 1, 3, 6, 9, 12, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43. items have been coded reversly. KMO coefficient and Bartlett Sphericity test have been calculated in order to determine data conformance. KMO .95 value has resulted in Bartlett Sphericity (x^2 x^2 =6367.9, .000). As a result of the exploratory factor analysis, the scale has 6 factors of which Eigen value is higher than 1. The variance of

these items accounts for 54.71%.

16 items whose factor loads are below .40 and which cannot be loaded to any factor and whose interlacing values are around 0.1 have been excluded. And this reason Items 1, 6, 9, 12, 19, 20, 21, 25, 27, 29, 31, 33, 35, 37, 39, 43 have been removed from the test as a result of EFA analysis. EFA has been repeated with the rest 27 items. As a result of the analysis, it has been seen that the items have come under one extent. The result of the exploratory factor analysis shown in Table 4.

Table 4. Item factor loadings as to exploratory factor analysis

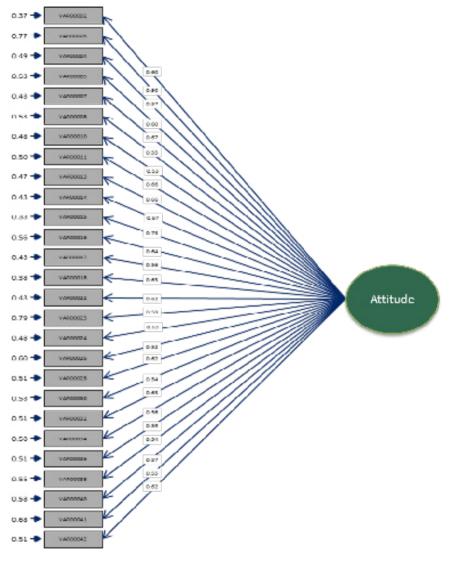| Item	Factor 1	Item	Factor 1
2	.718	22	.700
3	.515	23	.564
4	.650	24	.687
5	.650	26	.580
7	.726	28	.671
8	.622	30	.611
10	.629	32	.677
11	.700	34	.612
13	.708	36	.652
14	.726	38	.605
15	.791	40	.621
16	.669	41	.575
17	.666	42	.672
18	.733		

The scale form consists of 27 items whose factor loadings range from .515 to .791 and one factor. This factor accounts for 43.47% of the total variance.

Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) has been conducted for the purpose of examining that the items predict the factor. Information as to CFA is given in Table 5.

Table 5. Statistical values as to confirmatory factor analysis

X^2/df	RMSEA	S-RMR	GFI	AGFI	CFI
3.13	0.067	0.044	0.99	0.99	0.99

The path diagram as to the confirmatory factor analysis is given in Figure 2.

Chi-Square=1014.27, df=324, P-value=0.00000, RMSEA=0.067

Figure 2. Path Diagram as to CFA

The fact that GFI, AFGI and CFI values are higher than .90 and RMSEA and SRMR values are lower than .08 means in CFA that the model is acceptable (Scher-melleh-Engel, Moosbrugger and Müller, 2003; Kline, 2005; Hooper, Coughlan and

Mullen, 2008). This fit index shows that the model is valid. In Table 6, there are factor loadings and R^2 values from each variable.

Table 6. Factor loadings of the variables and explained variance

Item No	λ_I	R^2
I2	0.60	0.50
I3	0.50	0.24
I4	0.57	0.40
I5	0.60	0.40
I7	0.67	0.51
I8	0.55	0.36
I10	0.53	0.37
I11	0.66	0.47
I13	0.66	0.48
I14	0.67	0.51
I15	0.73	0.62
I16	0.64	0.42
I17	0.56	0.42
I18	0.63	0.52
I22	0.62	0.47
I23	0.58	0.30
I24	0.63	0.45
I26	0.52	0.31
I28	0.62	0.43
I30	0.54	0.35
I32	0.63	0.44
I34	0.56	0.35
I36	0.59	0.40
I38	0.54	0.34
I40	0.57	0.36
I41	0.55	0.31
I42	0.62	0.43

Personalized Learning Environment Attitude Scale has been concluded as one-dimensional. The results of the confirmatory factor analysis support construct validity of the developed scale.

Cronbach alpha internal consistency coefficient

Cronbach alpha internal consistency coefficient has been calculated to detect PLE-AS' internal reliability. The scale's cronbach alpha value has been found as .95. That cronbach alpha value is .70 and higher than .70 is sufficient for reliability of scale credits (Büyüköztürk, 2011). Therefore, this value shows that the internal reliability of the scale is at a good level.

Grading the scale

The most appropriate one is the rating system with five options in Likert-type attitude scales (Tezbaşaran, 2008). The scale has ranked as a quintet Likert format: "Strongly agree" (5), "Agree" (4), "Neutral" (3), "Disagree" (2), "Strongly Disagree" (1).

PLEAS Items

Some items of PLEAS are given in this title.

Table 7. Examples of PLEAS items

Item No	Item PLE (Personal Learning Environment)
2	I can learn comfortable with PLE
3	I think the learning will not be effective with PLE
5	It's important that offer time material diversity to students with PLE
36	I developed my own special learning methods in PLE
40	I use time more effective through PLE

4. Conclusion and Recommendation

Personalized Learning Environment Attitude Scale (PLEAS) has been developed in this study. The scale has been scaled as quintet Likert format. The study of scale application has been conducted with 481 junior and senior students from six different universities in Turkey studying in the Department of Computer Education and Instructional Technology. As a result of the obtained data analysis, the scale consists of 27 items whose factor loadings range from .515 to .791 and only one sub-dimension. These items account for 43.47% of total variance. In consequence of confirmatory factor analysis carried out to determine whether the items are appropriate for the scale pattern, it has been concluded that the items promote construct validity of the scale. The content validity of the scale has been stated with the expert opinion. Cronbach alpha internal consistency coefficient has been calculated as .95. In the light of the data, a valid and reliable attitude scale has been developed.

Researchers may conduct studies on how and in what aspects individuals' attitude

towards personalized learning environment is affected by what sort of variables. The attitude scale developed in this study is directory for the researchers who want to conduct a study on personalized learning environment attitude.

In addition to the studies in which the attitudes of the individuals related to the personalized learning environments can be examined, studies having more ability of personalizing as to the quality of the personalized learning environments can be conducted. Moreover, studies as to how much the personalized learning environments are necessary and what kind of benefits it provides to the individual can be conducted.

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