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Development of "Learner Roles in Constructive Learning Environment" Scale

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Abstract

Introduction. This study aims to develop a scale to determine learner roles in constructive learning environment.

Method. This study was conducted with 126 teacher candidates who study in Foreign Languages Department. For this study the teacher candidates were distributed into two groups. In the first group learning environments based on social constructivist approach, and in the second group learning environments based on traditional approach was constructed. After the learning processes both groups were administered a scale.

Results. After the exploratory factor analysis the first factor was named active learner, the second factor was named social learner and the third factor was named autonomous learner. The explanation ratio of the total variance is 51,60%. The common factor variances of the scale items range between .353-.729; the item factor loadings range between .510-.858. The reliability coefficients of the factors range between .73 and .91. The internal consistency coefficient of the total scale is .92; split half reliability coefficient was found .85.

Conclusion. Finally, it can be said that this scale, which is developed to determine the learner roles in constructive learning environments, can be utilized.

Key words: Social constructivist approach, learner roles, scale developments, teacher candidates

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Elaboración de la Escala "Papeles del aprendiz en un entorno de aprendizaje constructivista"

Resumen

Introduction. Este estudio tiene como objetivo desarrollar una escala para determinar los roles del alumnado en contextos de aprendizaje constructivo.

Metodo. Este estudio se realizó con 126 candidatos a maestros que estudian en el Departamento de Lenguas Extranjeras. Para este estudio los candidatos a maestros se distribuyeron en dos grupos. En el primer grupo hubo una ambiente de aprendizaje basado en el enfoque constructivista social, y en el segundo grupo el entorno de aprendizaje estuvo basado en el enfoque tradicional. Después de que el aprendizaje proceso de aprendizaje de ambos grupos hubira terminado se les administró la escala.

Resultados. Tras el análisis factorial exploratorio, el primer factor fue denominado estudiante activo, el segundo factor fue nombrado estudiante social y el tercer factor fue nombrado estudiante autónomo. La relación de explicación de la varianza total fue del 51,60%. El factor común de las variaciones de los ítems de la escala oscila entre los 0.353 y .729, el factor de carga elemento oscila entre los 0.510 y .858. Los coeficientes de fiabilidad de los factores que oscilan entre 0,73 y 0,91. El coeficiente de consistencia interna de la escala total es de 0,92;. El coeficiente de confiabilidad dividida fue de 0.85.

Conclusión. Finalmente, se puede concluir que esta escala, que se desarrolla para determinar las funciones de aprendizaje constructivo de los ambientes de aprendizaje, puede ser utilizada.

Key words: Enfoque constructivista social, roles de los estudiantes, evaluación de escala, formación de maestros

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Introduction

In traditional learning environments, which are based on behavioral approach, students are passive contributors while getting all the information from their teachers and textbooks. Learners learn how to give correct answers instead of constructing knowledge and solving problems. Besides, in such environment learners are not active as they are in constructive learning environments (Al-Weher, 2004; Ülgen, 1994; Yaşar, 1998).

In constructive learning approach the emphasis is placed more on learners than teachers, and this has changed the roles of the traditional learners (Gündoğdu, 2010; Ozden, 2003; Thanasoulas, 2001). According to social constructivist approach knowledge is constructed socially and learning eventuates in a social and cultural context (Derry, 1999: McMahon, 1997, Sivan, 1986; Terwel, 1999). This learning environment supports collaborative learning through social interaction instead of student competition (Abdal-Haqq, 1998; Demirhan & Demirel, 2002; Oğuz, 2005; Terhart, 2003). This way learners can improve their viewpoints, learn how to analyze problems from different perspectives, and produce multiple solutions (Hsiao, 2004). In this process when contributors are allowed to express themselves, construction of new ideas reaches higher level (Saban, 2004). This situation reflects the "shared understanding" which is one of the most important dimensions of the social constructivist approach.

In constructive learning environment another issue that draws attention is the collaborative work of learners. Within this collaborative learning process learners work in harmony with their peers that they choose, support ideas that can positively affect their learning processes, participate in decisions, take different roles and enjoy working together (Kaye, 1992). Participants are expected to fulfill their responsibilities and build "shared understandings."

Another characteristic of constructivist learning environments is the encouragement of learners, who construct their own learning, to take individual accountability and have a voice (Brooks & Brooks, 1993; Erdem &Demirel, 2002; Şaşan, 2002; Weher, 2004). Learners have independence and control over their own learning. Teachers play the role of a facilitator who

helps learners determine their learning goals. Learners decide which learning approach is most appropriate in accordance with their own learning pace and study methods (Demirhan & Demirel, 2002; Kesal &Aksu, 2005; Moallem, 2001; Özden, 2003).

Constructivist approach gives students active roles. In such environment learners are like scientists in their classrooms. Students are active learners who possess creative, reflective and critical thinking abilities. Students should be struggler, curious, promoter and patient. They should learn how to express them, communicate, criticize, solve problems, make plans, ask different questions and practice what they learn in real life (Alesandrini &Larson, 2002; Erdem &Demirel, 2002; Lin, Bransford, Hmeloi, 1996; Marlowe &Page, 1998; Murphy, 1997; Terhart, 2003; Tynjala, 1999; Yaşar, 1998).

Marlowe and Page (1998) state that constructive learning promotes learners' critical thinking and planning abilities and helps them understand the learning processes. It also improves teacher-learner relations, increases motivation and encourages learners to express themselves. In such learning environments learners create original problems, categorize questions and build project groups. They also search answers for questions, collect data, organize information, meet people, who are the sources of information, combine their findings and summarize. They produce and make performances. They reflect what they learn into their work (Demirhan & Demirel, 2002). Jonassen, Peck and Wilsom (1999) stated that learners should be conscious researchers who know how and from where they have obtained the information. They should also be able to produce their own technologies.

Constructive learning encourages students to be creative, reflective and develop the critical thinking abilities. Learners are allowed to express themselves in the learning process. Their ideas are always considered and students are always encouraged. Teaching strategies and content can be changed based on the learner responses (Honebein, 1996; Kesal & Aksu, 2005; Moallem, 2001; Özden, 2003; Savaş, 2007). Constructive learning environments improve learner independence and self-regulatory skills. They encourage a learner, who constructs their knowledge based on their previous experiences, to have a voice and gain individual responsibilities (Brooks & Brooks, 1993; Erdem & Demirel, 2002; Şaşan, 2002; Weher, 2004). Learners have control and responsibility over their own learning. Teachers play a leading role to help learners determine their learning targets (Honebein, 1996). Learners de-

cide what is most suited for their learning pace and aptitude; choose their problem solving methods, and the subjects that they are going to study (Demirhan & Demirel, 2002; Kesal & Aksu, 2005; Moallem, 2001; Özden, 2003). Lin, Bransford and Hmeloi (1996) state that learners should have constructive and analytical roles in order to take active roles in the learning processes. Besides, learners should have social roles and build communication with other students and teachers, and discuss their ideas with them.

Another characteristic of constructivist learning environments is that students play an active role in the evaluation process (Gündoğdu, 2010). Students evaluate their own products and become aware of what they have learnt and what experiences they have gained. Students are given the opportunity to express themselves in the learning process. Student ideas are always taken into consideration and are always encouraged. Teaching strategies and content are revised based on student responses (Kesal & Aksu, 2005: Moallem, 2001; Özden, 2003). In the related literature there are various research studies on what type of roles learners have in constructive learning environments. For insance Hay and Barab (2001) found that learners in constructive learning environments have different roles. The authors classified these roles as *supervisor, creator and constructor.* Philips (1995; cited in Perkins, 1999) classifies learners in constructive learning approach as *active, social and creative*.

Finally, learners in constuctive learning environments are reflectors, creators, critical thinkers, and also independent and social learners. Effectiveness of constructive learning depends on teacher roles, learner roles and the currículum. Therefore, this study aims to develop a scale to determine the learner roles in constructive learning environments. With this scale the researcher aims to find out if the learners could play their learner roles based on constructive learning approach. Besides, learner roles are not specifically mentioned in the literature. This study also aims to contribute to the classification of the learner roles in constructive learning environments.

The Aim of the Study

The aim of this study is to develop a scale to determine the learner roles in constructive learning environments.

Method

Participants

The sample of the study includes 126 teacher candidates who study in the Department of Foreign Languages in Ataturk University, Kazım Karabekir Faculty of Education and attend the course called "Instruction Principles and Methods"

Procedure

In this study there are two different learning groups. In the first group (students of French and English Teaching Departments) learning environments based on social constructivist approach were established and learners were encouraged to implement their roles based on constructive learning approach. As indicated in the literature, in this group the aim was to help learners implement their learning roles as critical thinkers, creative, social and autonomous learners. In the other group (students of German Teaching Department) learning environments based on subject-based learning. Learners were encouraged to maintain their traditional roles and their ideas were sought at the end of these processes.

The first stage of scale development involves literature review. At the end of this stage a 35-item pool based on learner roles in constructivist learning environment was formed. A five-point Likert scale along the lines of "I totally agree (5) ----------I totally disagree (1)" was used. For content validity the draft scale was analyed by the experts from the Educational Sciences Department. The language of the scale was edited by the experts from the Turkish Language Department. After these procedures, (4) four items which were thought inappropriate were eliminated from the scale. The numbers of the items in the scale were reduced to 31. Finally the scale was administered to the participants.

Data analysis

Next explanatory factor analysis conducted in order to determine the learner roles in constructive learning environments. Factor analysis is a technique that explains patterns of relationships which are difficult to be analyzed and combines items that has correlations into

meaningful factors. Factor analysis aims to reach a number of new meaningful factors from a large number of variables (Buyukozturk, 2006; Özdamar 2002; Tatlidil, 1992).

In the process of factor analysis Kaiser-Meyer-Olkin measure of sampling adequacy test was used to determine whether or not the scale is suitable for factor analysis. Barlett test was used to determine the correlation among the items. Besides, anti-image scores, item-variance scores were calculated to determine the suitability of the scale items for factor analysis. Total variance explained ratio and factor loading value of each item were calculated separately. "Pearson Moments Correlation" confident was also calculated to find the correlations between the factors in the scale. At the end of the processes "Cronbach Alpha" was calculated to determine the internal consistency, and "split-half" was calculated to test the reliability of the scale.

Results

The findings related to the reliability and the validity analysis of the "Learner Roles in Constructive Learning Environment" scale is as follows:

Findings Related to the Validity

In this study factor analysis technique was applied to measure the construct validity of the scale. Factor analysis was carried out in two stages.

First Stage

At the first stage Kaiser-Meyer-Olkin Sample adequecy test was done to determine whether or not the sample size is suitable for Factor analysis. Barlett test was applied to determine the correlation between the variables. In literature it is stated that KMO score should be 0,50 and above. 0,50 is "low"; 0,60 is "average"; and 0,70 is "good"; 0,80 is "very good" and 0,90 is "excellent" (Buyukozturk, 2006; Süzülmüş, 2005). The data (KMO=0,86) show that the sample is adequate for factor analysis.

In factor analysis a high correlation between the variables is expected. For this purpose Barlett Test of Sphericity is used. The score at the table (x^2=1898,3; p<0,01) shows that Bar-

lett test score is meaningful. These scores show that the data are suitable for factor analysis. Another test to be used in factor analysis is the "anti-image" technique which is used to determine whether or not each item is suitable for factor analysis. Anti-image scores of the items are expected to be above 0,50. The anti-image scores of "Item 10", "Item 22" and "Item 25" are found to be below 0.50, therefore they are eliminated from the scale. The anti-image scores of the other items range between 0-746-0,938 which show that they were sutiable for factor analysis. The pooled variance of the items range between .387 and .7686. This shows that major factors explain the great portion of the total variance in the scale.

In the first factor analysis made after the above-mentioned processes, unrotated method was used to find maximum factor loadings. A 7-factor structure was obtained from the eigenvalues of the items. The total variance score that the 7-factor structure explains is found to be 66,55%. These findings show that the scale is suitable for factor analysis.

Second Stage

In the process of scale development the researchers constructed the items based on the three basic dimensions. With the basic component technique *f*actor analysis results were limited to 3 factors. The ratio of total variance explanation for the three factors is 51,608%. The first factor explains 24.37%, the second factor explains 14,42% and the third factor explains 12,18% of total variance.

According to Buyukozturk (2006) loading values of the factors should be high. Factor loading value which is 0,45 and above is accepted as "good criteria". Besides items should have high loading value in one factor. The difference between the highest loading value of an item in factors and the second highest loading value should be very high. This difference between the two high values should be minimum 0,10. In this study item factor loading was taken as 0.40. At this stage because the factor loading values of the "Item 3", "Item 11" and "Item 17" are below 0.40, and "Item 15"has close scores in two factors, these items were taken out from the scale. After these processes the scale was left with total 24 items.

Rotation technique identified the groupings of items in factors. Loading values and common factor variances are presented in Table 4. Item loading which is 0.40 and above was taken as criteria for the determination of item loadings. It was found that the item factor loading values range between .510 and .858. Comrey and Lee (1992; cited in: Suzulmus, 2005) suggest that if the item factor loading is above 0.71 (covers 50% of the variance) it is "excellent"; if it is above 0.63 (covers 40% of the variance) it is "very good"; and if it is above 0.55 (covers 30% of the variance) it is "good"; if it is above 0.45 (covers 20% of the variance) it is "average"; and if it is above 0.32 (covers 10% of the variance) it is "low".

The factor loadings of the three items (item20-item1-item5) in the 24-item scale are above 0,70, and are therefore "excellent"; the factor loadings of the 13 items are above 0,63 and are therefore "very good" , the factor loadings of the three items are above 0.55 and are therefore "good" , and the factor loadings of the other 5 items are above 0,45 and are therefore "average." See Table 1.

***Table 1*: Factors in which items are grouped, loading values and the variance ratio that each factor explained**

	Item No	Factor Loadings	Variance
Factor 1: Active Learner	i15	.802	.649
	i23	.725	.531
	i16	.713	.523
	i11	.768	.615
	i24	.707	.510
	i18	.759	.601
	i17	.719	.530
	i9	.731	.534
	i14	.695	.492
	i22	.633	.372
	i19	.620	,366
	i10	.616	.401
	i21	.510	.260
	i20	.535	.353
Factor 2: Social Learner	i4	.858	.729
	i1	.782	.612
	i3	.728	.570
	i12	.632	.534
	i2	.687	.399
Factor 3: Autonomous Learner	i6	.745	.609
	i13	.673	.495
	i5	.709	.551
	i 7	.676	.432
	i 8	.651	.392

It is stated that although the common factor loadings of the items are suggested to be close to 1.00 or above 0,66, it is very difficult to reach that level (Buyukozturk, 2006). In this study it is seen that common factor variances of the items range between .353-.729. At the end of these processes the first factor was named "active learner," the second factor was named "social learner" and the third factor "autonomous learner." Table 2 shows under which factor each item was grouped. As can be seen in the Table 2 above after the factor analysis total number of items in 3 factors were determined as 24.

Table 2: **Items and the factors in which they are grouped**

	Number of Items	**Item Numbers**
Active Learner	14	9-10-11-14-15-16-17-18-19-20-21-22-23-24
Social Learner	5	1-2-3-4-12
Autonomous Learner	5	5-6-7-8-13
General total	**24**	

"Pearson Moments Correlation" coefficients were calculated to determine whether or not there is correlation between the factors in the scale. The findings are presented in Table 3.

Table 3: Correlations between factors

	Active	**Social**	**Autonomous**	**Total**
ActiveLearner	**-**	,594**	,520**	,945**
Social Learner	**-**	**-**	,425**	,750**
Autonomous Learner	**-**	**-**	**-**	,718**

** p<0,01

As can be seen in the Table, there is a positive and a meaningful correlation between the subfactors. This situation supports the construct validity of the scale. It also shows that there is a meaningful combination between the items in the scale. After these stages, a comparison between the constructivist approach and the responses of the teacher candidates to the scale were compared. The findings obtained from this analysis were presented as follows, in the Table 4.

Table 4: **Scores related to the learner roles of the teacher candidates**

	Constructivist		**Traditional**			
Active Learners	**$\bar{x}$**	**SS**	**$\bar{x}$**	**SS**	**t**	**P**
24. are encouraged to be active learners	5.00	.000	4.18	1.017	4.61	.000*
23. have active roles	4.87	.331	4.04	1.033	4.45	.000*
22. have creative learner roles	4.84	.712	3.93	.873	4.92	.000*
21. are like scientists who are active in class	4.39	.966	3.47	.848	4.41	.000*
20. find solutions to problems	4.81	.391	3.88	.969	5.20	.000*
19. construct the knowledge	4.57	.662	3.93	.899	3.46	.001*
18. make their own decisions about their learning.	4.84	.364	3.43	1.065	7.31	.000*
17. they apply what they have learned to real-life situations	4.87	.331	3.47	1.130	6.89	.000*
16. are strugglers	4.78	.599	3.77	1.117	4.72	.000*
15. can express themselves	4.96	.174	3.88	.969	6.33	.000*
14. produce ideas	4.81	.527	3.86	.929	5.28	.000*
11. try to benefit from various opportunities from the environment which may contribute to their development	4.87	.331	3.68	.982	6.70	.000*
10. avoid being obsessive and decisive	4.54	.971	3.29	1.268	4.71	.000*
9.are remote from memorization	4.93	.242	3.45	1.088	7.68	.000*
General	**4.79**	**.237**	**3.73**	**.596**	**9.65**	**.000***
Social Learner	**$\bar{x}$**	**SS**	**$\bar{x}$**	**SS**	**T**	**p**
12. take responsibilities within groups	4.84	.565	3.84	1.256	4.28	.000*
3 share their knowledge and experiences	4.81	.391	4.04	1.180	3.60	.001*
4.interact with each other	4.78	.739	3.77	1.008	4.87	.000*
1. co-operate with the group members	4.69	.683	4.04	1.010	3.19	.001*
2.build a common idea with group members	4.63	.652	3.75	.918	4.71	.000*
General	**4.75**	**.511**	**3.89**	**.770**	**5.59**	**.000***
Autonomous Learner	**$\bar{x}$**	**SS**	**$\bar{x}$**	**SS**	**T**	**p**
5. choose the recourses related to their subject of study	4.60	.658	3.63	1.101	4.48	.000*
6. define the roles related to their subject of study.	4.69	.466	3.77	1.096	4.53	.000*
7. can autonomously do research on their subject of study	4.42	.902	3.65	1.119	3.21	.002*
8. can autonomously choose their subject of study	3.90	1.40	2.90	1.272	3.26	.002*
13. do the evaluations of their own learning	4.39	.747	3.63	1.259	3.07	.003*
General	**4.40**	**.525**	**3.52**	**.757**	**5.74**	**.000***

In the Table above, it can be seen that there is a meaningful difference between the teacher candidates' opinions concerning constructivist and traditional learning environments. The findings showed that the constructivist learning environments helped the learners gain active, social and autonomous learner roles. If the scale has a distinctive characteristic that means it is valid. The findings of this study showed that the scale has a distinctive characteristic in measuring the learner roles in constructivist learning environments.

Findings related to Reliability

Reliability coefficient of the scale was calculated in accordance with the items determined at the final stage of the factor analysis. Cronbach Alpha internal consistency coefficient

with regard to active learner dimension was .91; social learner dimension was .81, and autonomous learner dimension was calculated as .73. The internal consistency coefficient of the total scale is .92; split half reliability coefficient was found .85.

Internal consistency coefficients above .60 for the scales are considered adequate (Kulaksızoglu, Dilmac, Eksi and Otrar, 2003). It can be seen that the reliability coefficients of the factors range between .73-.91. Item-total test correlation explains the correlation between the scores obtained from the test items and the total score of the test. In other words, this shows that each item of the scale exemplifies similar behaviors. For this reason the item-total test correlation is expected to be positive and high (Fraenkel & Wallen, 2000). In this study correlations were made in order to find the correlations between each item and the total score. The correlation scores of each item with the total score range between .407-.742 and are meaningful. These findings show that the scale has adequate reliability.

Discussion and Conclusions

In this study it was aimed to develop a scale that can measure the learning roles in social constructivist environments. With this regard, the scale, whose validity was tested, was found suitable for factor analysis in terms of sample size. The items of the scale explain 66% of the variance and were transformed into 7 factors whose eingenvalue is above 1. Data obtained from the application of the scale showed that data come from multivariate normal distribution and there is a high correlation between the items. The first factor (active learner) explains 24.71% of the total variance, the second factor (social learner) explains 12.30% of the total variance and last factor explains 11.36% of the total variance. At the first stage there was 35 items in this scale, and at the last stage the scale was reduced to 24 items. It was found that the common variances and the factor loading values of the scale are convenient.

In the process of scale development the responses of the teacher candidates on constructivist and traditional learning environments were compared in order to determine whether or not the scale is distinctive in nature. The responses of the teacher candidates in the constructivist group differ from those in the traditional group. This situation shows the distinctive nature of the scale. The reliability coefficient of the scale was found to be .92. This finding may show that the scale is adequately reliable. In formal education situations, curriculum,

teacher role and learner role are accepted as the three main components of the learning and teaching processes (De la Fuente, Sander, Justicia, Pichardo and Garcia-Berben, 2010). Deficiency in one of these components may cause these processes to fail. Effectiveness of constructive learning depends on teacher roles, learner roles and the currículum. In this study the emphasis is on learner roles in a constructivist learning environment.

Although there are many views on learner roles, these roles are not classified in the relevant literature. In this study there are three classifications of learner roles: active, independent and social learners. The results of the study are parallel with the literature. The classification (active, independent, social) derived from this study is thought to be beneficial for educators. Teachers may systematically plan the learner roles if they want to build a constructivist learning environment. They can also apply the scale used in this study at the end of the learning processes in order to evaluate whether the learning environment is suitable for the constructive learner roles. In this way teachers will be able to get a feedback on the quality of the learning processes. Also the learners should know what roles they should take in constructive learning environments. Explicit learner roles may also affect the quality of the learning processes in a positive way. Finally, it could be said that the scale of this study, whose reliability and validity are tested could also be utilized to determine and evaluate the learner roles in constructivist learning environments.

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