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Online authentic learning self-efficacy: a scale development

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Abstract In the study, it is aimed to develop a valid and reliable scale that can be used to determine the online authentic learning self-efficacy of the prospective teachers. The validity and reliability studies of the scale were made with the participation of 225 students from Near East University Atatürk Faculty of Education in Fall Semester of 2016–2017. Expert opinions were obtained for the scope and content validity of the scale. Exploratory Factor Analysis (EFA) was used to test construct validity. As a result of the study, a nine dimensional scale was developed that consists of 66 items that explains the 64.1% of the total variance (problem-solving skills and bonding, supra-cognitive skills and persistence in learning, interaction with real-world environments and interaction in the online environment, interaction and learning experiences with the real world, social bonding in online collaborative learning environments, structured support for internalizing effective learning and knowledge, multiple evaluation and feedback, collaborative work skills and product development). The internal consistency reliability of the scale is calculated with Cronbach Alpha and determined as 0.97. In addition, one can be said that students have good "self-efficacy" for online authentic learning.

Keywords Multimedia · Sufficiency · Real life learning · Blended learning · Factor analysis

1 Introduction

The authentic learning approach is integrated with technology to make it possible to integrate it to the multimedia applications. (Güngören and Horzum 2014). If we take a look at the literature, we can see different definitions of the multimedia. Horton (2000) defined multimedia as; gathering of texts, pictures, audio and moving pictures in the same page;

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and Trollip and Alessi (2001) states that the multimedia includes texts, verbal expressions, photographs, drawings, music, animations, videos with audio and/or without audio. As the multimedia is considered with its learning dimension, the "Multimedia Learning" concept was formed in the literature. Multimedia learning is the collective usage of multiple environments in the materials developed to provide learning (Lombardi 2007). In a way, multimedia is the technology supported environments and the learning in these technology supported areas are defined as multimedia learning. "Authenticity" and "authentic learning" have important roles in learning in technology supported environments. Thus, as the authentic learning focuses on the real life environment, problems and solutions, in the technology supported learning environments the focus is on learning close to real life. Also, in order to increase the learning and concentration and develop the transfer skills of the learners, the authentic, and real, close to real multimedia learning environments can be used (Pellegrino 2017).

Based on the integration of authentic learning approach to the multimedia, it is estimated that it will be possible to start to apply the courses designed with this approach completely online or blended learning environment. In a lot of courses and programs in all sectors of education, the authentic learning activities are becoming more common and with the effect of the constructivist and new learning technologies, the authentic activities are frequently used as the basis of learning (Marshall et al. 2001; Bennet et al. 2002; Challis 2002). Therefore, the blended learning environments are accepted as ideal environments for providing courses or lessons based on authentic activities (Oliver and Herrington 2000). Blended learning environments have a structure that provides supportive opportunities and flexibility both to the learner and the teacher during the learning/educating process. It is possible to get the maximum benefit out of the technological support and the existence of the blended learning that has the best features of the face-to-face learning in order to support the authentic activities in learning designs (Kantor et al. 2000). Also, the blended learning approach has an important role in motivating the student and the teacher, encouraging their participation in the learning and dealing with the problems. However, studying on computers can be an unpleasant experience for the majority of the students and can cause inefficiency. At this point, it is difficult to acquire the opportunity to only work at their pace or only with the interventions of the teacher. Both of the two forms of learning support are included in the structure of the authentic learning; however, each one of them supports the learning styles that are preferred by the students. Blended learning, takes the roles of the teachers like face-to-face, remote communication and participation by means of learning support. Therefore; blended learning has a lot more efficient structure compared to the completely online learning. In a lot of online learning courses, because of the face-to-face communication deficiencies, there are difficulties related with the learning styles between the learner and the teacher.

Broadbent (2017), in his study which he compared the self-organisation strategies and academic performances of learners who are educated in online and blended environments, found that the online environment learners use motivating strategies more frequently compared to the blended environment learners, except the peer education and seeking help. Also, the findings of the study show that time management, preparation strategies and rehearsal strategies are related with the academic performances in both learning environments.

It is also possible to integrate the authentic learning approach to the completely online learning environments in the scope of authentic multimedia learning. In the related literature, it can be seen that, in the scope of online learning, there are studies in which the authentic learning approach is designed in the frame of lesson or course activities with

Learning Management Systems. The study of Smirnova et al. (2016) is one of them. With this study the subject "Authentic Learning with Moodle" was analysed and as a result, it has been stressed that Moodle is an appropriate platform for authentic learning and pedagogy. In addition, it also has been revealed that rich learning experiences can be acquired by surfing on the Moodle, these experiences can be used in daily life, the related videos can be beneficial, it is possible to create personal profiles and to log into online discussion forms. At this point, it is considered to be important to determine the self-efficacy of the users to be included in the online authentic learning environment, before the studies and applications carried into effect.

Bandura (1994) defines self-efficacy as; the confidence of individuals in their success on how well they will do by organizing the necessary activities in the scope of problems they can face during their lives. If we analyse self-efficacy concept by means of theory, it is based on the "Social Learning Theory" which supports the idea that the individuals need to trust their efficacy in the related field or subject in order to use their knowledge and skills efficiently and productively (Pajares and Schunk 2001).

According to the conducted studies, the first study that the self-efficacy concept is used integrated with online technologies was the study of Miltiadou and Yu (2000) and a scale [The Scale of Perception of Self-Efficacy with Online Technologies (SPSOT)] was developed. This scale is important as it is the first scale that is developed related with the subject. The SPSOT scale that consists of 29 materials is used with a single factored structure in the studies. The analysis of the validity of the structure of scale shows that the scale has seven sub-actors with a genuine form. These sub-factors are named as online technologies, internet and browser, e-mail, agenda and discussion board, chat, general and academic self-efficacy.

It is clear that development of a valid and reliable measuring tool that determines the Online Authentic Learning Self-Efficacy will be very supportive by means of filling the gaps in the related literature and determining the needs and efficacies of the users for the future studies and applications to develop environments based on these needs and efficacies. Thus, it is important for the teachers to determine the skills and deficiencies of their students, before starting online or blended lessons, as they will be interacting with these environments.

In the study, it is aimed to develop a valid and reliable scale that can be used to determine the Online Authentic Learning self-efficacy of the prospective teachers. In this study, the ten dimensions of the authentic learning while developing the scale in the aim; authentic context, authentic activity, specialist performance, multiple perspectives, cooperation, reflection, clear expression, self-cultivation and structured support, authentic evaluation and professional learning which also Herrington and Kervin (2007) pointed out, have been used.

2 Method

This study is a scale development study. In order to serve its purpose, a literature study was made and the theoretical frame of the scale was specified. The information and followed processes related with the participants and the development process of the scale were given below.

3 Participants

The participants of the study consist of prospective teachers from Near East University Faculty of Education. In order to make it appropriate and easily reachable the purposive sampling method was used. Purposive sampling is the selection of information rich conditions in order to make a detailed study (Büyüköztürk 2013). The participants of the study consist of 225 prospective teachers who are students at the Near East University, Faculty of Education, Class Teaching and Elementary School Teaching Departments. The 54.6% of the participants consists of (N = 123) female and the remaining 45.3% consists of (N = 102) male students.

4 Data collection tools

4.1 Development of the scale

A detailed literature scanning was performed while developing the Online Authentic Learning Self-Efficacy Scale (OALSS). A pool that consists of 66 items that is based on theoretical foundations for the scale was established as the first step. In addition to these items, 8 items were added to the personal information form in the pool, in order to specify the demographic features of the prospective teachers.

Opinions of three field specialists, one assessment and evaluation specialist, one language specialist and one Psychological Counselling and Guidance specialist about the pool were collected. After getting the opinions of the specialists, necessary regulations were made and a form was developed for the pilot application. In the pilot application, with a group of 225 students have worked which is equivalent to the real application. At the end of the pilot application, the items on the form that were not understood by the students were amended and they were presented to the specialists again. Therefore, after considering the opinions of the specialists, the real from were developed.

Validity and reliability tests were made in order to research the effects of the real form of the OALS scale on the working group. We got the opinions of the specialists in order to provide the scope and image validity of the scale. Opinions of three field specialists, one assessment and evaluation specialist, one language specialist and one Psychological Counselling and Guidance specialist were collected.

We made Exploratory Factor Analysis (EFA) in order to reveal the structural validity and to see the distribution of the scale items on the samplings. Before EFA, we also checked the KMO and Bartlett's Test of Sphericity values. The factor loading and communality values that were collected after the EFA analysis were reported. Finally, the Cronbach Alpha for internal consistency reliability value was used for the reliability of the scale.

According to the collected data, it has been revealed by the conducted analysis studies the scale has a 9 factor structure with 66 items. The scale has a five point Likert type structure. Student responses were taken according to: 5 = I absolutely agree, 4 = I agree, 3 = I am neutral, 2 = I do not agree, 1 = I totally disagree.

5 Data analysis

The scale that consists of 66 items was applied to the first, second, third and fourth class students of Near East University Faculty of Education, Class Teaching and Elementary School Teaching departments. In the scope of the validity and reliability studies of the scale, all analysis in the study were made with the SPSS 23 package program and the significance level found to be 0.05 in the test.

6 Findings

6.1 Validity

As the validity study of the OALS scale, we checked the face, content and structure validities. Opinions of three field specialists, one assessment and evaluation specialist, one language specialist and one Psychological Counselling and Guidance specialist were collected for the face and content validities.

For the structure validity, EFA test was made. According to the results of the EFA test, the 66 item and 9 factor structure of the scale more than the eigenvalue 1 found to be 64.51% of the total variance. Having this explained variance rate higher than 30% is considered to be sufficient for sciences (Büyüköztürk 2013).

6.2 Exploratory factor analysis and reliability

Oblique rotation method was used for the data set in the study. If we take a look at the literature; we can see the following statement: if the researcher is going to apply oblique rotation method, in order to make the results more applicable in the future for the oblique rotation, they can be advised to use "Promax" (Renzulli and Reis 1997). On the contrary to the rotation techniques that are based on the assumption that the factors like varimax and quartimax are not in relation between themselves, promax is a rotation technique that considers the relation between factors (Tabachnick and Fidell 2013).

The measurement of the sampling that the factor analysis will be applied was made with Kaiser–Meyer–Olkin (KMO) measurement. As this value gets close to 1, that means that the application of factor analysis on the data group is applicable. If the KMO value is lower than 0.60, factor analysis cannot be applied on the data group. In order for the factor analysis to be suitable, having the KMO value higher than 0.60 is very important by means of validity and meaningfulness of the Bartlett's test results (Büyüköztürk 2013). The determination of the scale elements was based on having minimum of factor load of Varimax rotation analysis results as 0.30 and having it under one factor (if the item is under two different factors with high factor load, the minimum difference must be 0.10). These values vary in the literature and usually 0.30 and 0.40 values are accepted as limits (Tuan et al. 2000; Johnson and McClure 2004; Tsai and Liu 2005; Gürbüztürk and Şad 2010). In this study, the sampling adequacy factor of KMO was calculated as 0.86. According to a lot of researchers, when the reliability factor gets close to 1, reliability increases. According to Fraenkel and Wallen (2006), if the reliability number is lower than 0.60, this shows that the scale is too weak, if it is between 0.60 and 0.70, the scale is between acceptable limits and if it is higher than 0.80, the scale reliability is very good. The Chi square value of Bartlett's test is 6494.642 and the p value is $0.001 < 0.05$. As a result, KMO and Bartlett's tests

show that the data is suitable for the factor analysis. The total item correlations are between 0.311 and 0.944 for the 66 items. Also, the results of the reliability and validity studies proved that the scale has a consistent structure within itself.

As it can be seen in Table 1, the KMO value is 0.857. If we take a look at the result of the Bartlett's test, the result ($X^2 = 6780.597$, $df = 2145$, $p < 0.001$) is significant. As the results prove, the data is suitable for the exploratory factor analysis.

6.3 The analysis of structure validity of the scale

Finally, in order to explain the meaning of the scale that consists of 66 items; processes of specifying the number of factors, factor variance and naming the factors were conducted.

If we take a look at Table 2 and the scree plot in Fig. 1, it can be seen that the scale consists of a 9 factored structure. The factor in the scale explains the 64.51% of the total variance. The values that the items have under the factors and the total variance explained indicates that the scale explains the Online Learning Self-Efficacy well.

The scale items, the rotated factor loading values for each item, the average and standard deviation values are included in Table 3. As it can be seen in the Table 3, the total item correlations calculated for 66 items and 9 factors are between 0.306 and 0.944.

When Table 3 is examined, it has been revealed that the averages for all the expressions ranged from 4.40 to 3.73. Since the general average of all the items for the OALS scale is 4.07, that indicates students are generally at the level of "Agree" level then it can be said that the self-efficacy of the students is good.

7 Discussion and comments

If we take a look at the similar scale studies in the literature; Horzum and Çakır (2009) conducted the Turkish version of the Miltiadou and Yu's (2000) study called "Self-Efficacy Perception Scale Based on Online Technologies". The pilot study of the scale was made with 30 post graduate students, Faculty of Education, Department of Computer and Teaching Technologies by filling the English and Turkish forms with a 2 weeks break.

Randall (2001), in his study, examined the variants that revealed and related the perception of self-efficacy towards online learning. In this study, he developed a scale that consists of 3 factors and 32 items to determine the online learning self-efficacy perception.

Table 1 Results related with KMO and Bartlett's tests

Kaiser–Meyer–Olkin measure of sampling adequacy		0.857
Bartlett's test of sphericity	Approx. Chi Square	6780.597
	df	2145
	Sig. (P)	0.001

Table 2 Results of the factor analysis

Component	Initial eigen values			Extraction sums of squared loadings			Rotation sums of squared loadings
	Total	% of variance	Cumulative (%)	Total	% of variance	Cumulative (%)	Total
1	23.367	36.512	36.512	23.367	36.512	36.512	13.664
2	4.106	6.415	42.927	4.106	6.415	42.927	15.106
3	2.896	4.525	47.452	2.896	4.525	47.452	13.771
4	2.313	3.613	51.065	2.313	3.613	51.065	10.963
5	2.155	3.368	54.433	2.155	3.368	54.433	14.359
6	1.787	2.792	57.225	1.787	2.792	57.225	11.210
7	1.632	2.550	59.774	1.632	2.550	59.774	3.647
8	1.557	2.433	62.207	1.557	2.433	62.207	7.960
9	1.478	2.309	64.516	1.478	2.309	64.516	5.972
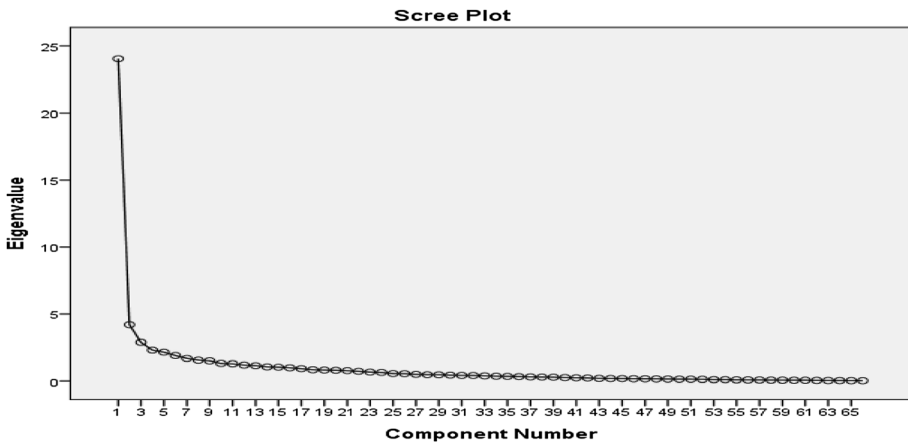
Fig. 1 Scree plot of OALSS

8 Conclusion

In the study, we developed the OALS scale to determine the online authentic learning self-efficacies of the prospective teachers. We have conducted EFA for the OALS and discovered that the scale has 9 factors. EFA results show that the scale has a valid structure. Also, the face and content validity of the scale was made with specialists' opinion. All these results show that the scale is valid. As a result of the study, we developed a nine dimensional scale that consists of 66 items that explains the 64.1 of the total variants (problem-solving skills and bonding, supra-cognitive skills and persistence in learning, interaction with real-world environments and interaction in the online environment, interaction and learning experiences with the real world, social bonding in online collaborative learning environments, structured support for internalizing effective learning and knowledge, multiple evaluation and feedback, collaborative work skills and product development).

Table 3 Scale items and factors

Items and factor dimensions	Rotated factor load values	$\bar{X}$	SD
Dimension I: problem solving skills and bonding		3.9	0.948
I can produce alternative solutions to real problems	0.869	3.97	0.979
I can present the real life problems	0.815	3.73	1056
I can improve my problem solving skills	0.711	3.91	0.898
I can be motivated	0.699	3.96	0.932
I can relate the knowledge I acquired with real life	0.68	4.06	0.839
I can find an opportunity to express myself to others	0.628	3.96	0.983
I can make applications to different subject fields	0.61	3.88	0.966
I can relate my new information with my old knowledge	0.605	3.96	0.949
I can take different roles in learning environments	0.417	3.85	0.877
I can easily and openly attend to learning activities	0.334	3.78	1004
Dimension II: metacognitive skills and permanence in learning		3.98	0.929
I can interact with the students or teachers in the classroom or in my environment	0.681	3.94	0.978
I can acquire metacognitive skills (problem solving, critical thinking)	0.676	3.85	0.922
I can acquire independent working skills (learning on my own, individual working, taking responsibility)	0.643	4	0.95
I can acquire the quality of responsibility developing in tasks	0.635	3.98	1062
I can understand the subject in different point of views with the used printed an digital sources	0.615	4.02	0.846
I can benefit from the skills and knowledge of the learners and the teachers and can discover multiple point of views	0.588	4.08	0.74
I can develop alternative opinions by communicating with people with different opinions	0.557	3.92	0.943
By communicating with people who have different opinions on the subject and respect their different opinions	0.537	4.08	0.876
With my multiple opinions and roles, I can provide permanence in learning	0.498	3.89	0.998
With the collaborative learning environments to be created, I can develop multiple opinions and roles in the learning process	0.465	4.19	0.82
I can acquire the advantages of sharing experiences and information, opinion presentation and feedback with collaborative environments	0.459	4.09	0.97
I can transform the information I acquired with examples in real life to opportunities after the graduation	0.417	3.94	0.952
I can determine if I acquired the real knowledge and skills with multiple evaluations	0.369	3.82	1020
With different evaluations distributed to a wide range of time, I can provide permanence in learning	0.36	4.03	0.941
Dimension III: relation with real life environments and interaction in online environments		4.07	0.871
I can understand where and how to use the information related with the subject	0.774	4.2	0.864
With the help of modules (lessons, home works, quiz, wiki, forum), I can reflect what I have learned to daily life	0.728	4.06	0.858
I can openly speak and discuss on the knowledge I acquired	0.667	4.24	0.758

Table 3 continued

Items and factor dimensions	Rotated factor load values	$\bar{X}$	SD
I can openly express the knowledge I acquired with videos, written expressions or online discussion tools	0.604	4.02	0.856
I can openly transfer the knowledge I acquired to the class or real life environments	0.494	4	0.906
I can openly express my opinions and suggestions on created platforms (form, blog, wiki, daily and social networks)	0.453	4.08	0.829
I can acquire the skill to persuade in order to express the information and make them accepted	0.423	3.89	1068
I can keep up with the new technological advancements by using social network (Facebook, twitter, Whatsapp, etc.)	0.405	4.13	0.836
Dimension IV: interaction with real life and learning experiences		3.99	0.871
I can learn better by interacting with the real life	0.994	4.01	1077
I can understand how the information is used in real life	0.814	4.05	0.909
I can apply the skills and knowledge I acquired in real life	0.792	4.15	0.933
I can face with complex tasks (extreme, student centred and with social participation, interesting and related with real life)	0.742	3.94	0.826
I can come up with solutions to complex tasks	0.588	3.88	0.955
I can acquire rich learning experiences	0.405	3.93	0.939
Dimension V: creating social bonds in online collaborative learning environments		4.18	0.855
I can construct the information by cooperating with other learners	0.803	4.33	0.75
I can create a social bond with people around me (friend, teacher, specialist)	0.717	4.27	0.796
I can define myself as a member of the group I am in	0.708	4.16	0.8
I can carry out collaborative studies with tools like social networks, forms, blogs and wiki	0.605	4.11	0.834
I can work in harmony with my group friends	0.537	4.16	0.91
I can acquire advantages like brain storming, discussion on ideas in collaborative environments	0.442	4.15	0.967
I can develop a material at the end of the lesson as a mutual group product	0.441	4.1	0.931
Dimension VI: structured support in effective learning and internalising information		4.07	0.906
I can reflect the information I internalised to different situation, environment and new social circles	0.761	4.12	0.903
I can reach to specialist opinion and skills	0.752	4	0.933
I can get support from the environment or teachers for effective learning	0.623	4.09	0.836
With clear instructions, I can easily reach to the goals related with the subject field	0.466	4.09	0.953
Dimension VII: keeping up with technological advancements		4.34	0.803
I can keep up with the new technological advancements by using social network (YouTube, Wikipedia, Facebook, etc.)	0.809	4.31	0.766
I can keep up with the new technological advancements by using online communication tools (Yahoo, Skype, Gmail, etc.)	0.806	4.32	0.849
I can keep up with the new technological advancements by using social network Facebook, twitter, WhatsApp, etc.)	0.792	4.4	0.794
Dimension VIII: multiple evaluation and feedback		4.13	0.85

Table 3 continued

Items and factor dimensions	Rotated factor load values	$\bar{X}$	SD
I can take support from internet or other technologies (video, audio or written documents) while I am sharing my opinions or ides with the class	0.578	4.17	0.852
I can acquire complex communication skills (persuasion, explanation, negotiation, trust earning, agreeing)	0.543	3.89	0.974
I can take helpful feedbacks from specialists on time	0.496	4.05	0.952
I can get the necessary structured support and guidance on how I will proceed in the subject field	0.485	4.15	0.823
I can improve my knowledge and skills	0.429	4.32	0.79
I can share the knowledge and skills I acquired with my environment	0.411	4.27	0.711
I can acquire advanced knowledge and skills with multiple evaluation methods (product, process, performance, self-evaluation)	0.405	4.11	0.89
I can get creative thinking opportunities with multiple evaluation methods	0.398	4.06	0.81
I can acquire practical and realist knowledge and skills with multiple evaluation methods	0.386	4.02	0.945
I can make self-evaluation on my learning performance	0.34	4.29	0.762
Dimension IX: collaborative working skills and product development		3.99	0.911
I can develop an exclusive product/service	0.632	3.8	0.898
I can participate in activities that I can present original and creative	0.441	3.86	1018
I can solve the problems more easily when I work with other learners	0.425	4.23	0.89
I can reflect what I have learned both individually and collaboratively with activities	0.363	4.08	0.848
Total		4.07	0.89

Also, the results of the reliability and validity studies proved that the developed scale has an inter-consistent structure. In addition, one can be said that students have good "self-efficacy" for online authentic learning.

As a result, the OALS scale is deemed to be a valid and reliable scale and it will contribute to the literature as an up to date, referring to a target group, open to development and adaptation, flexible, efficient and usable measurement tool. In addition to this, before the other studies and applications are realised, it is thought that this scale will be important for specifying the self-efficacies of the users to be included in the online authentic learning environment.

9 Recommendations

For the other studies to be conducted, it is considered that the scale in question can present supportive proofs about the structural validate by applying it to different samples. Also, as the OALS scale can be used to determine if the online authentic learning self-efficacies vary depending on the demographic factors, it can also be beneficial for determining the user needs and efficacies and to develop environments based on these skills and needs for future studies and applications.

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