Self-Directed Learning with Technology Scale for Young Students: A Validation Study

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Abstract

Self-directed learning concept has been studied a lot in the literature and different aspects of it have been investigated. Nonetheless, a few studies associated self-directed learning with technology. Moreover, there are in the literature, relatively limited number of studies investigating self-directed learning in terms of children and adolescents. That is why, in this study, self-directed learning with technology for young students scale developed by Teo, Tan, Lee, Chai and Koh (2010) was adapted to Turkish. Study group of the research consisted of 1051 primary and secondary school students. Data was collected from four schools located at Bursa and Ankara. Explanatory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted in order to prove the factorial validity of the scale. Discriminant and convergent validity methods were also used to prove the construct validity. For the linguistic equivalence and content validity of the scale, four experts for each were consulted and, according to feedbacks, required changes were done. In EFA, scale, in total, explained 59,316% of the variance of self-directed learning construct. Self-management factor accounts for 16,758% of the variance while intentional learning accounts for 42,874 % of the variance. KMO coefficient and Bartlett's test of sphericity value were found as .794, and .000 ($\chi2$=1098, 350) respectively. In CFA, the values of goodness of fit indices were sufficient to proceed. The final item-factor structure of Turkish form of the scale was found to be the same as original scale. Cronbach alpha internal consistency coefficient of the scale was calculated to be .729, reliability of the self-management and intentional learning factors were calculated to be .528 and .729 respectively. In sum, Turkish form of the self-directed learning with technology scale for young students was proved valid and reliable. Self-directed learning with technology scale for young students can be used by teacher as a handy measurement tool in order to determine the students' current level of self-directed learning with technology. According to result of the scale, teacher can use methods that fit to students' current level of self- directed learning. In this way, students may be more successful.

Keywords: Children, technology, self-directed learning, scale adaptation

INTRODUCTION

Self-directed learning, in its first appearance years, has been associated with andragogy incorporating adult education. Over time concept has been also started to be associated with students, thereby, it included pedagogy. Nevertheless, because of the difference of situations that adults and students in, self-directed learning concept has started to differ in these different situations.

The basic difference here is that students' continuation to a formal education institution is a statutory obligation. In formal education institutions, students mandatorily undergo a learning experience because of this learning experience, some learning occurs. However, learning experience in formal education institutions may not be constructed in the nature that supports self-directed learning. In such case, students learn in a self-directed way mostly at home or other places at the outside of formal education institutions by taking no or very little assistance from formal education institutions. Self-directed learning here turns into an educational approach, which supports the learning experiences in formal education institutions instead of a holistic one. For instance, in a formal education institution, a student may not understand pressure topic in a science course. In this case, students follow below stages respectively.

1. His/her realizing that he/she did not understand the topic.
✓ His/her having difficulty in completing given assignments.
2. His/her decide that he/she must understand the topic
✓ Teacher' giving much importance to topic
3. His/her decide about whether the topic is understood or not.
✓ His/her completion of given task
4. His/her determination of material, people and learning strategies that will be helpful to understand topic
✓ His/her identifying a science teacher to demand aid.
5. His / her decide that he/she understood the topic
✓ His/her completion of given assignments, and the comments of people who helped. Iwasiw (1987; as cited in O'Shea, 2003)

As it is seen above, after diagnosing his/her own learning deficiencies, students took necessary steps in order to overcome these deficiencies. Nonetheless, student did not thoroughly learn the topic just by himself/herself, on the contrary, he/she benefited both, in the first stages of learning, from formal education institution and from knowledgeable people who are from the outside of the formal education institutions.

On the other hand, with the accelerating development of Information and Communication Technologies (ICT), the amount of information circulating around people has reached to a massive size. Therefore, the usage of ICT technologies has started to take place among formal education objectives and, at the same time, life-long learning skills (Ananiadou and Claro, 2009). ICT technologies in education have been intensively started to be used particularly as; a) teaching material, b) learning environment, c) information reaching tool. This change also affected the profile of learners (Toprakci, 2007). While students, who are in a physical learning environment that is mostly teacher centered, are in a passive situation, in our present day learners are observed to be more active and autonomous particularly in the learning processes, which is based on ICT technologies. Autonomous learners can also be characterized as

59

individuals who have the ability to meet their own learning needs (Wang and Peverly, 1986; as cited in Dickinson, 1995). Whereas the characteristics of autonomous learners (self-directed learning ability) have been associated with andragogy concept particularly used in adult education, at the present day it has been also started to include pedagogy incorporating lower lover learning.

So as to meet their needs and interests, learners' fast reach to information, which learners perceive as beneficial, from different places and times is significant in terms of their self-directed learning. At this point, the possibility of technology's having direct effect on the self-directed learning was specified because technology has drastically facilitated the access to information sources and online experts (Teo, Tan, Lee, Chai and Koh, 2010). Thanks to capabilities of technology, Candy (2004) cited that displaying and storing information and communicating with other learners and experts all over the world without the barriers of formality are just a mouse click away.

In Turkey, in addition to increase of current information accumulation and developing ICT, self-directed learning has become even more important with the adoption of constructive education approach of National Ministry of Education beginning from 2005-2006 education-instruction years. In constructivist approach, individual's constructing information, guide position of teachers and student's taking his/her own learning responsibility are related process with self-directed learning (Brooks and Brooks, 1999).

For the first time, Houle (1961; as cited in Svedberg, 2010) mentioned about self-directed learning concept. In 1960s, self-directed learning concept was investigated for the purposes of adult education and answer to questions of why and how adults learn was searched. After a while, self-directed learning concept has changed and claims about the self-directed learning's being theoretically valid have been started to be uttered not only for adults but also for children (Merriam and Caffarella, 1999; as cited in Nor and Saeednia, 2009). This claim has also been supported by Nor and Saeednia (2009).

There are different points of views about self-directed learning in the literature. Some scientists advocate that self-directed learning is a process (Guglielmino, 1977; Knowles, 1975; as cited in Svedberg, 2010; Pilling-Cormich, 1996) whereas other group of scientists advocate that it is a learner characteristic (Chene, 1983; as cited in Svedberg, 2010; Oddi, 1984). In the related field, there are scientists who combine these two different approaches and come up with more comprehensive and holistic point of view (Brockett and Hiemstra, 1991; Long, 1989; as cited in Svedberg, 2010). With the approach that handles self-directed learning in terms of learner characteristic (psych-educational construct), scale development studies in the related literature have been started to be conducted (Oddi, 1984; Teo, Tan, Lee, Chai, and Koh, 2010).

60

A consensus about the definition of self-directed learning has not been arrived yet in the literature (O'Shea, 2003). Knowles (1975; as cited in O'Shea, 2003, s.18) approaches self-directed learning as a process and defines it as follows:

> *"A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goal, choosing and implementing appropriate learning strategies and evaluating learning outcomes"*

Pilling-Cormich (1996, p.2) who again handles self-directed learning as process defined self-directed learning as follows:

> *"Self-directed learning is an approach to learning in which individuals determine their priorities and choose from various resources available"*

Oddi (1986; as cited in Svedberg, 2010, p.98) characterized self-directed learning as follows by handling it as a characteristic of individuals:

> *"Initiative and persistence in learning over time through a variety of learning modes"*

It was seen that although there are different definitions of self-directed learning in the related literature as it can be seen above, the most accepted definition is that of Knowles (1975). Subsequently Iwasiw (1987; as cited in O'Shea, 2003) determined the five basic characteristics of self-directed learner by developing the work of Knowles (1975). These characteristics are as follows;

- Diagnosing their learning needs
- Identifying their learning purposes
- Deciding how to evaluate learning outcomes
- Following and determining learning resources and strategies
- Evaluating product of learning

Self-directed learning was analyzed into different components by different researchers. Fisher, King, Tague (2001) analyzed self-directed learning as *i*) self-management, *ii*) desire for learning and *iii*) self-control. Candy (1991; as cited in Pilling-Cormich, 1996) analyzed self-directed learning into four components. These are; *i*) personal autonomy, *ii*) self-management, *iii*) autodidaxy and *iv*) learner control. Finally; Teo, Tan, Lee, Chai and Koh (2010) analyzed self-directed learning into two components as *i*) intentional learning and *ii*) self-management. It was thought that because Teo et al. (2010) handled self-directed learning particularly at the level of middle and secondary school, components of self-directed learning are restricted.

In this research, the appropriateness of the self-directed learning with technology scale for young students (SDLTS), which was developed by Teo et al. (2010), to social-cultural structure of Turkey was studied. Therefore, in this research, because the components which are defined by Teo et al. (2010 were handled, self-management and intentional learning constructs were investigated. According to this, self-management was defined as one's ability

61

and willingness to manage his/her own learning by Candy (1991; as cited in Teo et al., 2010). One learning self directly can plan and manage his/her own time and work load without assistance. Self-directed learners decide by evaluating alternatives based on close reasoning (Teo et al., 2010). With regard to intentional learning, it was defined as individual's wholly own consent to reach information and to acquire it.

Significance and aim of the study: Grow (1991) emphasized that self-directed learning is not an "all or nothing" situation, it is an autonomy level that learners have in view of an instructional state. According to Grow, each learner is in different self-directed learning level and these levels can be classified into four categories in a hierarchic way. These categories are as follows:

1. Dependent learner,
2. Interested learner,
3. Involved learner,
4. Self-directed learner.

Grow (1991) pointed out that students who are in a different level of self-directed learning should be underdone learning experience with the appropriate methods which is defined for that level, otherwise, failure in learning is to be the case. For example, whereas more teacher-centered education can be provided to dependent students, more autonomy, and responsibility can be provided to self-directed learners. However, here, the problem of how to identify the category in which self-directed learners belong emerged. From this point of view, in order to determine the stages and levels of self-directed learning psych-educational construct, many scales were developed (Fisher, King and Tague, 2001; Nor and Saeednia, 2009; Oddi, 1984; Salaş, 2010; Teo et al., 2010). While these measurement tools are mainly aimed at adult education, despite of their being a few in number scales were also encountered which are developed in order to measure the self-directed learning levels of children (Nor and Saeednia, 2009; Teo et al., 2010). Moreover, when international literature was scanned, the only scale development study is the SDLTS, developed by Teo et al. (2010), which integrate technology into self-directed learning among other measurement tools in the literature. After national literature was scanned, it was seen that there is no measurement tool in the literature, which is developed for determining children's self-directed learning level with technology. Thus, to fill this gap in the literature, it was aimed to be adapted of the SDLTS, developed by Teo et al. (2010), to Turkish and socio- cultural structure of Turkey.

62

METHOD

In this study, basic steps of scale adaptation studies were followed (Deniz, 2007). Methods/stages followed regarding this process were detailed in this part.

Study group: The study group of this study consisted of 1051 middle and secondary school students who receive education in the 2012-2013 education-instruction years at five different schools located in Ankara and Bursa. Students participating to the study consisted of 517 (49.2%) male and 534(50.8%) female. The number of participants reached in this study exceeds the recommended number (Comrey and Lee, 1992), so results of the study are generalizable. Detailed demographic information about the study group is given in Table 1.

Table 1:
Details of the study group

	Frequency	Percentage
Gender		
Male	517	49.2
Female	534	50.8
Grade		
5.grade	61	5.8
6.grade	282	26.8
7.grade	244	23.2
8.grade	244	23.2
9.grade	69	6.6
10.grade	104	9.9
12.grade	47	4.5
Total	1051	100

Measurement tool: SDLTS used in the context of this research consisted of items including some demographic information of students and total six items in which SDLTS expressions are. Items existing in the original scale and devised with the purpose of measuring SDLTS construct were found to form two dimensions, which are a) intentional learning and b) self-management. In scale having six items in total; intentional learning dimension has four items and self-management dimension has two items. In the reliability and validity study of original scale, Cronbach alpha reliability coefficients of intentional learning and self-management were seen to be reported as .85 and .63 respectively (see: Teo et al., 2010).Again in the same report, it was seen that self-management dimension of the scale accounts for 21.43%, intentional learning dimension accounts for 41.79%, and lastly two dimensions together account for 63.22% of the total variance of construct. Items in the scale were scaled according to 5-likert type. Students were asked to fill the scale item expressions according to

their appropriateness level to them among alternatives of "Absolutely Agree"(6) and "Absolutely Disagree"(1). It was seen that the highest point of the scale is 30, and the lowest point of it is six. High point in the scale refers that students have high level of self-directed learning construct.

Transformation of original scale to Turkish: After required permission was taken via e-mail from Timoty Teo first writer of the original article to adapt SDLTS to Turkish, a commission was consisted of language and domain experts. In expert panel, there were four language experts and four domain experts. In accordance with feedbacks gotten by experts, required modifications were made. It was stressed that expressions need to be simple enough for the participants. After this process, by adding scaling options to Turkish expressions, first, each expression was transformed to scale item, then, items concerning demographic information and instructions were added.

Data collection process: Draft measurement tool was applied to 1051 students, who receive education in schools (middle and secondary schools) which are determined by convenient sampling, in paper-pencil form. Then, values were digitized and transferred to electronic environment.

FINDINGS

In this part, findings of study were given. In Table 2, findings regarding to items of the Turkish form of scale were given.

64

Table 2:
Findings about the items of the scale

Item	Mean	SD	Skewness	Kurtosis
1	2.73	1.326	.172	-1.130
2	3.18	1.449	-.215	-1.375
3	3.63	1.300	-.739	-.614
4	3.77	1.209	-.997	.105
5	3.52	1.276	-.595	-.717
6	3.35	1.343	-.453	-1.012

After Table 2 was investigated, it was seen that mean, standard deviation, skewness and kurtosity of items vary between 2.73 and 3.77; 1.21 and 1.45; .997 and .172; and lastly -1.375 and .105 respectively. In this study, univariate normal distribution was ensured (Kline, 2011, p.63).

1. Factorial and construct validity

In this part, factorial and construct validity of the scale were proved via EFA and CFA. In factor analysis, the purpose is to reduce variable number, by revealing the relations among variable, and to classify variables. On the other

hand, discriminant and convergent validity were also applied to prove the construct validity. Particularly average variance extracted (AVE) was tested.

For the convergent validity of the scale AVE value must be larger than .5 (Fornell and Larcker, 1981). From the Table 3, it was seen that this requirement is ensured.

Table 3:
AVE values and the correlations coefficient values among factors

Dimension	Self-management	Intentional learning
Self-management	**.611**	
Intentional learning	.650	**.625**

***Above diagonal elements of 2x2 correlation matrix among factors indicate square root of AVEs

Fornell and Larcker (1981) pointed out that larger AVE values than shared variance estimations support discriminant validity of the scale (Namely, square roots of AVEs must be larger than the correlation coefficients between latent variables). When Table 3 was investigated, it was seen the square root of AVE values (.61 and .63) were smaller than the correlation coefficient (.65) between the factors of the scale, nevertheless this difference was very small. In such a case, Farrell (2010) uttered that conducting EFA could be beneficial because of cross-loads in terms of ensuring discriminant validity. In accordance with Farrells' (2010) recommendations, after EFA was performed, correlation coefficients between the factors of the scale were calculated as .343. It was seen that this value was smaller than the square root of AVE value in the Table 3. As a result of these findings, discriminant validity of the SDLRS was ensured.

1.1. Explanatory factor analysis (EFA)

In this study, in order to check whether data is ready for EFA or not, KMO and Bartlett values were used. KMO value needs to be larger than the critical value .5 to be able to continue EFA (Kalaycı, 2010). As a result of EFA conducted in the context of the study, KMO and Bartlett values were found as .794 and .000 (χ^2=1098.350) respectively. It was seen that this values are sufficient. During EFA, as an extraction method, principal component analysis was preferred. Moreover, as a rotation method, varimax was preferred. Scale was found to account for 59.316% of the variance of the construct. Whereas intentional learning accounted for 42.874% of the variance, self-management factor accounted for 16.758 of the variance. Self-management factor consisted of two items, while intentional learning factor consisted of four items. The eigenvalue of self-management and intentional learning were calculated as 1.005 and 2.572 respectively.

65

1.2. Confirmatory factor analysis (CFA)

Sümer (2000) stated that CFA is used for scale development and validity analysis. In DFA, some goodness of fit indices (GFIs) were reported. These GFIs are: χ^2/df, RMSEA, NFI, NNFI, CFI and AGFI. Noar (2003) uttered that in CFA different models should be computed to be able to compare different conceptualizations of the scale structure. Therefore, in this study, one-factor, correlated two-factor, and hierarchical models were computed. Because correlated two-factor model gave best GFIs (see: Table 5), researchers continued with correlated two-factor model. The values of GFIs were seen to be sufficient according to findings of Schermelleh-Engel and Moosbrugger (2003) and Sümer (2000). GFIs were indicated in Table 4.

Table 4:
Goodness of fit indices (GFIs) values of different models

Model	χ^2/sd	RMSEA	NFI	NNFI	CFI	AGFI
One-factor	9.485	.090	.95	.92	.95	.94
Correlated Two-factor	3.185	.046	.98	.98	.99	.98
Hierarchical	5.147	.063	.96	.96	.97	.97

Standard solution screen of the scale taken from Lisrel 8.7 was given in Figure 1. As it can be seen in Figure 1, correlation coefficients of the scale were found to vary between .69 and .52. Thus, factorial validity of Turkish form of SDLRS was proved with two factors and six items as both theoretically and statistically.

2. Reliability

In this study, Cronbach Alpha internal consistency coefficient was calculated in order to determine if the scale is reliable or not. In Table 5, reliability coefficients were given.

Table 5:
Cronbach alpha reliability coefficients

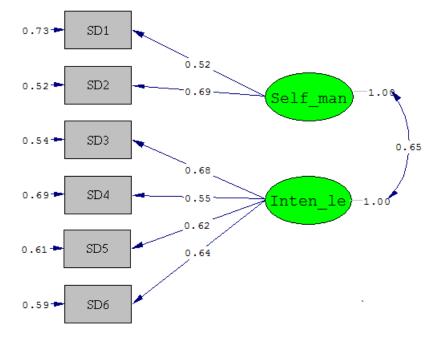| Factor	Number of items	Cronbach alpha
Self-management	2	.528
Intentional learning	4	.720
Total	6	.729

Nunnally and Bernstein (1994) advocated that reliability coefficient of a scale must be larger than .7 in order that it can be called a reliable one. However, in this study, the reliability coefficient of self-management factor of the scale consisting of two items was seen to be a little low. Gliem and Gliem (2003) stated that number of items of a scale have a partial impact on the

Cronbach alpha reliability coefficient of that scale. George and Malley (2003; as cited in Gliem and Gliem, 2003) expressed that Cronbach alpha coefficient between .5 and .6 is acceptable. That is why, when the reliability coefficients of SDLRS were investigated, they were seen to be at a sufficient level.

Chi-Square=25.48, df=8, P-value=0.00129, RMSEA=0.046

Figure 1:

Standardized solutions screen of correlated two-factor model

DISCUSSION AND SUGGESTIONS

In the context of this study, SDLRS developed by Teo et al. (2010) was adapted to Turkish. Intentional learning factor takes place in the scale means that individuals willingly demand to reach to information and their striving for this. When it comes to self- management, it means that individuals evaluates the alternatives based on close reasoning and their voluntariness and ability to make decision regarding their own learning by taking the responsibility of it with the ways such as time management and work plan without assistance. In order to ensure the reliability of the scale, various cautions were taken. Linguistic equivalence and content validity of the SDLRS were ensured with the assistance of language and domain experts. EFA and CFA were conducted for proving factorial validity of the scale. Scale was found to explain 59.316% of the variance in the construct after EFA. Self-management and intentional learning

67

factors were calculated to explain 16.627% and 42.688% of the variance respectively. In addition, factor loads of items in the scale were found to vary between .852 and .642. After CFA, it was seen that Turkish form of the scale is in complete harmony with the original scale in term of item number, factor number, and item-factor construct. It was found that scale, in total, consisted of six items, while self-management and intentional learning consisted of two and four items respectively. Values of GFIs were seen to be adequate. In this study, in order to prove the reliability of the Turkish form of the scale, Cronbach alpha internal consistency coefficient was calculated. The reliability of scale in total, self-management and finally intentional learning factors were calculated to be .729, .528 and .720 respectively. According to these findings, it was said that Turkish form of SDLRS is a valid and reliable measurement tool.

In this study, it was proved that SDLRS developed by Teo et al., 2010) and adapted to Turkish by researchers is a valid and reliable measurement tool. In the context of Grow's (1991) staged self-directed learning, this scale can be used as a handy and useful measurement tool so as to identify the self-directed learning stage in which middle and secondary school students are. In this way, teaching methods suitable for self-directed learning stages, which students are in, might be used.

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68

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69

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Appendix

Değerli Katılımcı,

Bu çalışmanın amacı çocukların teknolojiyle kendi kendine öğrenme seviyesini belirlemektir. Maddelere verilecek doğru veya yanlış cevap yoktur. Maddeleri size en uygun şekilde cevaplamanız ölçeğin geçerliliği için önemlidir. Maddelere vereceğiniz cevaplar "Kesinlikle Katılmıyorum" ile "Kesinlikle Katılıyorum" arasında değişmektedir. Cevaplamak için istediğiniz kutucuğa "X" işareti koyabilirsiniz. Ölçeği tamamlamak yaklaşık 5 dakikanızı alacaktır. Bilgileriniz gizli tutulacak olup bir araştırma kapsamında kullanılacaktır.

Değerli zamanınızı ayırdığınız için teşekkür ederiz.

Çocuklar için teknolojiyle kendi kendine öğrenme ölçeği

Orijinal madde	Türkçe madde	Kesinlikle katılmıyorum	Katılmıyorum	Fikrim yok	Katılıyorum	Kesinlikle katılıyorum
1) I go online to ask my teachers questions on my lessons when I am not in school.	Okulda olmadığım zaman dersle ilgili sorularımı internet üzerinden öğretmenime sorabilirim.					
2) I use the computer to share my thoughts and ideas about my schoolwork (e.g., through multimedia storytelling, voice-recording, blogs).	Ödevlerim hakkında düşüncelerimi ve fikirlerimi paylaşmak için bilgisayar kullanırım (e-posta, youtube ve facebook gibi.)					
3) I find out more information on the internet to help me understand my lessons better.	Derslerimi daha iyi anlamama yardımcı olsun diye internetten daha fazla bilgi bulurum.					
4) I use the computer to work with information for my learning.	Bilgisayarı, bir konuyu öğrenmemde yardımcı olacak bilgiye ulaşmak için kullanırım.					
5) I use the computer to become better at a skill that I am interested in (e.g., learn a language).	Bilgisayarı, istediğim becerilerimi geliştirmek için kullanırım.					
6) I use the computer to get ideas from different websites and people to learn more about a topic.	Bilgisayarı, bir konuyu daha fazla öğrenmek amacıyla farklı web sitelerinden ve kişilerden fikir almak için kullanırım.					

71

Çocukların Teknolojiyle Kendi Kendine Öğrenme Ölçeğinin Türkçe Uyarlanması: Bir Geçerlik Çalışması

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Genişletilmiş Özet

Problem: Kendi kendine öğrenme kavramı tüm Dünya'da ve Türkiye'de yoğun olarak çalışılan ve tartışılan bir kavramdır. Fakat ulusal alanyazın incelendiğinde bu çalışmaların kendi kendine öğrenmeyi teknoloji ile birleştirmedikleri ve kendi kendine öğrenmeye çocuklar açısından bakmadıkları görülmüştür. Bu nedenle bu çalışma kapsamında Teo ve diğ. (2010) tarafından geliştirilen çocukların teknoloji ile birlikte kendi kendine öğrenme ölçeği Türkçe'ye uyarlanmıştır.

Yöntem: Araştırmanın çalışma grubunu Bursa ve Ankara'daki 5 ortaokul veya lisede öğrenimine devam eden 1051 öğrenci (Kadın = %49.2, Erkek = %50,8) oluşturmaktadır. İlk olarak ölçeğin Türkçe formu araştırmacılar tarafından oluşturulmuştur. Daha sonra bu Türkçe form 4 uzmana gösterilerek alınan dönütler doğrultusunda gerekli düzenlemeler yapılarak ölçeğin dilsel eşdeğerliği sağlanmıştır. Kapsam geçerliğinin sağlanması için ise; ölçek 4 alan uzmanına gösterilerek gerekli düzenlemeler yapılmıştır. Ölçeğin factoriyel geçerliği için AFA (açıklayıcı faktör analizi) ve DFA (doğrulayıcı faktör analizi) uygulanmıştır. Ölçeğin AFA yapılmasa hazır olma durumunu tespit etmek için KMO ve Bartlett küresellik testlerinden yararlanılmıştır. DFA kapsmında uyum indisi olarak RMSEA, AGFI, NFI,NNFI ve χ^2/SD kullanılmıştır. En iyi modeli bulmak için DFA sırasında tek faktörlü, ilişkili iki faktörlü ve hiyerarşik modeler sınanmıştır. Ölçeğin yapı geçerliliğini sağlamak için ise ayırt edici (Discriminant) ve yakınsak (Convergent) geçerlik yöntemlerinden yararlanılmıştır. Yapı geçerliği kapsamında AVE (Average variance extracted) değerlerinin .5'ten ve faktörler arasındaki ilişki katsayılarından büyük olma durumu kontrol edilmiştir.

Bulgular: KMO sonucunun .794 ve Bartlett testi sonucunun .000 (χ^2=1098. 350) olarak bulunması nedeniyle ölçeğin faktör analizine uygun olduğuna karar verilmiştir. AFA sonucunda ölçeğin toplam varyansın %59,316'sını açıkladığı tespit edilmiştir. Ölçeğin; öz yönetim faktörünün yapıdaki varyansın %16.758'ini ve niyetli öğrenme faktörünün ise %42.874'ünü açıkladığı bulunmuştur. Yapılan DFA sonucunda uyum indislerinin yeterli seviyede oldukları belirlenmiştir. Sınanan modeller arasında ilişkili iki faktörlü modelin

en iyi uyum indislerini verdiği bulunmuştur Ayrıca bütün AVE değerlerinin .5'ten ve faktörler arasındaki ilişki katsayılarından büyük olduğu görülmüştür. Faktöriyel ve yapı geçerliği sonucunda, Teo ve diğ. (2010) tarafından geliştirilen orijinal ölçek ile ölçeğin Türkçe formunun madde-faktör yapısı açısından birebir aynı olduğu bulunmuştur. Yani, ölçek 2 ve 4 maddelik iki faktörden oluşmak üzere toplamda 6 maddeden oluşmuştur Ölçeğin Cronbach alfa iç tutarlılık katsayısı toplamda .729 olarak hesaplanmıştır. Öz yönetim ve niyetli öğrenme faktörlerinin güvenirlik katsayıları ise sırasıyla .528 ve .729 olarak hesaplanmıştır. Sonuç olarak çocukların teknoloji ile birlikte kendi kendine öğrenme ölçeğinin güvenir ve geçerli bir ölçme aracı olduğu tespit edilmiştir.

Sonuç ve öneriler: Bu ölçek, öğretmenlerin, ortaokul ve liselerdeki öğrencilerin bulundukları teknoloji ile birlikte kendi kendine öğrenme seviyelerini hızlı bir şekilde tespit edebilmeleri açısından pratik ve kullanışlı bir veri toplama aracıdır. Bu şekilde öğretmenler derste kullanılacak yöntemleri öğrencilerin bulundukları kendi kendine öğrenme seviyesine göre ayarlayabilirler.

Anahtar kelimeler: Ölçek uyarlama**,** kendi kendine öğrenme, teknoloji, çocuk