Araştırma Makalesi
Research Article

https://doi.org/10.21764/maeuefd.1627718

Learner engagement within MOOCs: Scale adaptation and an exploration regarding gender

KAÇD' lerde öğrenci katılımı: Ölçek uyarlaması ve cinsiyete ilişkin bir araştırma

Nehir YASAN-AK [1*] **İbrahim ARPACI** [2]

[1] Akdeniz University, Antalya, Türkiye

[2] Bandirma Onyedi Eylul University, Balikesir, Türkiye

Abstract: With the COVID-19 outbreak, now more than ever, minimizing human interaction and social distancing are of great importance. Since everyone is obligated to study remotely, attention to distance learning systems, specifically massive open online courses (MOOCs), has risen exponentially. The present study aimed to adapt and validate the MOOC Engagement Scale (MES), developed by Deng et al. (2020a), into Turkish, based on data collected from 258 participants in Türkiye enrolled in various MOOC courses to enhance their skills for future career development. The results indicated that the MES has adequate evidence of internal consistency reliability (ranging between .68 and .90) and factorial, discriminant, and convergent validity. Confirmatory factor analysis results supported the four-factor structure of the MES (i.e., behavioral, emotional, cognitive, and social). The MANOVA results indicated a statistically significant difference in MOOC engagement between genders, where males scored higher than females. The findings provided evidence that the Turkish MES has promising validity and reliability properties; therefore, it can be used to measure learner engagement in MOOCs.

Keywords: *Distance learning, Massive open online course, Learner engagement, MOOC engagement scale, Scale adaptation, Scale validation*

Özet: COVID-19 salgını ile birlikte, insan etkileşiminin minimize edilmesi ve sosyal mesafenin korunması her zamankinden daha büyük bir önem taşımaktadır. Herkesin uzaktan eğitime yönlendirilmesi, özellikle kitlesel çevrimiçi açık derslere (KAÇD) olan ilgi katlanarak artmıştır. Bu çalışma, gelecekteki kariyer gelişimleri için çeşitli KAÇD kurslarına kaydolan Türkiye'den 258 katılımcıdan toplanan verilere dayanarak Deng ve arkadaşları (2020a) tarafından geliştirilen KAÇD Katılım Ölçeği'ni (KKÖ) Türkçeye uyarlamayı ve geçerliliğini doğrulamayı amaçlamıştır. Sonuçlar, KKÖ'nün iç tutarlılık güvenilirliğine (.68 ile .90 arasında) ve faktöriyel, ayırıcı ve yakınsak geçerliliğe yeterli kanıt sağladığını göstermiştir. Doğrulayıcı faktör analizi sonuçları, MES'in dört faktörlü yapısını (davranışsal, duygusal, bilişsel ve sosyal katılım) desteklemiştir. MANOVA sonuçları, cinsiyetler arasında KAÇD katılımında istatistiksel olarak anlamlı bir fark olduğunu, erkeklerin kadınlardan daha yüksek puan aldığını göstermiştir. Elde edilen bulgular, KAÇD'nin Türkçe versiyonunun umut verici geçerlilik ve güvenilirlik özelliklerine sahip olduğunu ve bu nedenle KAÇD'de öğrenenlerin katılımını ölçmek için kullanılabileceğini ortaya koymuştur.

Anahtar Kelimeler: *Uzaktan eğitim, Kitlesel açık çevrimiçi dersler, öğrenen katılımı, KAÇD katılım ölçeği, ölçek uyarlama, ölçek doğrulama*

1. Introduction

Online learning has become a widespread and accepted approach in educational settings in both developed and developing countries. The technological advancements of the past era have inevitably given rise to a reform of the learning mode, resulting in an increasing number of people seeking ways to improve their skills, self-train, and pursue lifelong learning. Massive open online courses (MOOCs), an innovative educational approach, have proven to be an excellent alternative to traditional learning methods by offering a broad scope of available online courses to a large

Corresponding author: nehiryasanak@akdeniz.edu.tr
Received: *07.01.2025*
Revised: *20.04.2025*
Accepted: *12.05.2025*

number of people. MOOCs also differ from conventional remote distance education in that they enable students to begin learning whenever and wherever they want without requiring any commitment (Solorzano-García et al., 2020). By its global and open-access nature, MOOC platforms represent free or cost-effective education, asynchronous sessions, self-paced learning, and high-quality instructional materials, including (prerecorded) video lectures, discussion boards, and peer assessments (Baturay, 2015; Kala & Chaubey, 2022).

Since 2012, named "the year of the MOOC", a steady linear increase in the number of courses offered has been observed according to the ClassCentral statistical report (Shah, 2021). A more dramatic increase is observed in the number of learners, particularly after the COVID-19 pandemic outbreak. ClassCentral reported 120 million learners at the end of 2019, which increased to 220 million learners by the end of 2021. Despite the exponential growth of MOOCs, the low completion rates surfaced as a challenge of this educational innovation (Lee & Choi, 2011; Hew & Cheung, 2014; Hone & El Said, 2016; Eriksson et al., 2017; Goopio & Cheung, 2021), and the dropout problem had never come to a considerable solution over 6 years (Reich & Ruip´erez-Valiente, 2019). By reviewing 24 articles, Bazerra and da Silva (2017) categorized the reasons for low dropout rates in MOOCs into two groups. The first group was related to course design issues, and the second group entailed personal factors. Engagement was one of the personal factors mentioned as crucial for reducing low completion rates (Bazerra & da Silva, 2017). Some scholars argue that there is a correlation between engagement and the course completion rate (Yang et al., 2017; Xing & Du, 2019; Lan & Hew, 2020). Likewise, the study by Wang et al. (2019) revealed that students with a low engagement level were more prone to drop out of the course compared to those with a high engagement level. Consequently, these studies underscore the need for further investigation to elucidate engagement issues in MOOCs.

In recent years, student engagement has received high consideration by various researchers due to its crucial implications for teaching and learning (Trowler & Trowler, 2010; Lam et al., 2012; Lan & Hew, 2020; Alemayehu & Chen, 2021; Liu et al., 2022; Li et al., 2022). Engagement is not a novel concept; indeed, it has been a prominent topic in education and has been investigated since the 1980s (Appleton et al., 2006). Although several definitions of student engagement have been proposed over the years, a consensus exists that it refers to students' involvement in academic or school-related activities (Kuh, 2001; Appleton et al., 2006; York et al., 2015). Several previous studies have highlighted the strong correlation between student engagement and positive academic outcomes (Reyes et al., 2012; Lee, 2014; Henrie et al., 2015). As mentioned by Reschly and Christenson (2012), the term "student engagement" has various uses, namely, school engagement, academic engagement, and learner engagement. Learner engagement is a key concept in MOOCs, as it encompasses both formal and informal educational settings (Deng et al., 2020a) and is significantly associated with lower dropout rates and improved learning outcomes (Barba et al., 2016; Kuo et al., 2021).

Deng et al. (2020a) identify four intertwined components of learner engagement in MOOCs: behavioral, emotional, cognitive, and social engagement. The present study covers these four dimensions. Behavioral engagement refers to being actively involved in classroom and educational activities, such as attending classes, completing assigned tasks, taking quizzes, or taking notes (Fredricks et al., 2004; Veletsianos et al., 2015). Cognitive engagement is related to learners' mental involvement in the learning process and understanding of the target subject (Furlong et al., 2003), which encompasses "attention, concentration, focus, absorption, 'heads-on' participation, and a willingness to go beyond what is required" (Skinner & Pitzer, 2012, p.24). The third dimension, emotional engagement, highlights learners' psychological presence in the learning environment and their emotional reactions to it, including educational materials, courses, students, teachers, and course content (Jimerson et al., 2003). The last dimension of learner

engagement is social engagement, which primarily concerns peer-to-peer and student-teacher interactions (Deng et al., 2020a). It is essential to evaluate all dimensions together to gain a better understanding of MOOC learning processes.

1.1. The Purpose of the Study

Recognizing the significance of this, the present study aims to adapt and validate the MOOC Engagement Scale (MES) developed by Deng et al. (2020a) in Turkish. While Ağır (2023) previously translated the MES into Turkish, the focus was primarily on undergraduate students within an education faculty. However, considering the dynamic nature of MOOCs and the diverse backgrounds of learners who seek to enhance their skills for future career development, it becomes evident that learners' educational levels vary considerably. Thus, the current research aims to expand the scope of MES applications by involving a more diverse sample, encompassing MOOC participants from secondary school students to those with Ph.D. degrees.

This broader inclusivity is essential, as it enables the MES to be applicable and relevant across the entire academic spectrum, rather than limiting its utility to a specific education level or field. Including such a varied participant base ensures that the MES can accurately reflect the engagement levels of individuals, regardless of their academic standing. By doing this, our study not only enriches the applicability of MES but also contributes significantly to the MOOC literature on engagement, shedding light on further studies by identifying the dimensions of engagement. The present research addressed the following two research questions:

1. Is the adapted version of the MES a reliable and valid instrument to measure Turkish learners' engagement in MOOCs?

2. Does gender influence the MES dimensions?

1.2. Related Works

There are various scales to measure students' engagement in classes and learning activities. For example, most recently, Kim and Song (2023) developed a scale to measure agentic engagement in self-paced MOOCs. They followed a three-phase scale development process that included a Delphi study, exploratory structural equation modeling (ESEM), and CFA with two different samples (N1 = 163 and N2 = 243). The resulting scale consisted of 7 items and three factors**:** agentic support request*,* agentic learning strategy*,* and agentic learning construction*.* The study highlighted the distinct characteristics of agentic engagement in MOOCs, emphasizing learners' proactive role in shaping their learning paths.

Öz and Boyacı (2021) developed a scale to measure the role of student engagement in student outcomes in higher education. They conducted EFA and CFA based on data collected from 618 and 406 university students, respectively. They validated the engagement scale, which has 37 items and seven factors. In another study, Zhoc et al. (2019) developed a scale to measure the engagement of higher education students. They conducted CFA based on data collected from 560 higher education students. They validated the Higher Education Student Engagement Scale (HESES), a 28-item scale with five factors. In a similar study, Siddiqi et al. (2021) developed a scale to measure the engagement of higher education students. They conducted EFA and CFA based on data collected from 400 and 150 higher education students, respectively. They validated the Student Engagement Scale (SES), a 59-item instrument with six factors.

Lin and Huang (2018) developed a scale to measure college students' course engagement. They conducted EFA and CFA based on data collected from 543 and 893 college students, respectively. They validated the Student Course Engagement Scale (SCES), a 20-item scale with five factors. More recently, Barghaus et al. (2021) developed a scale to

measure kindergarten students' course engagement. They conducted an EFA and a CFA based on data collected from 11,734 and 9,055 kindergarten students, respectively. They validated the Classroom Engagement Scale (CES), a 14-item scale with two factors.

Lan and Hew (2018) developed a scale to measure the engagement and motivation of MOOC learners. They conducted CFA based on data collected from 872 MOOC learners. They validated the MOOC Learner Engagement and Motivation Scale, which has 11 items and three factors for each component (i.e., motivation and engagement). Finally, Kuo et al. (2021) developed a scale to measure self-efficacy and learning engagement in MOOCs. They conducted CFA based on data collected from 608 undergraduate students. They validated the Online Learning Engagement Scale (OLE), which has 13 items and three factors (i.e., behavioral, cognitive, and emotional engagement).

Dixson (2015) developed the Online Student Engagement Scale (OSE) to measure multiple dimensions of engagement in online learning environments. The scale was constructed through a rigorous, multi-phase process that included item generation based on focus group input, pilot testing, and validation using behavioral data obtained from course management systems. Confirmatory factor analysis (CFA) was conducted based on data collected from 251 online learners to validate the factor structure of the scale. The final version of the OSE consists of 19 items across four factors: skills, emotional engagement, participation/interaction, and performance. The study reported strong internal reliability (α = .91) and significant correlations with application-based learning behaviors, providing both theoretical support and behavioral evidence for the scale's validity in measuring student engagement in online courses.

Sun and Rueda (2012) developed an engagement scale to examine the relationship between motivational and learning variables and student engagement in distance education. The scale, adapted from Fredricks et al. (2004), aimed to measure behavioral, emotional, and cognitive engagement. EFA was conducted based on data collected from 203 graduate students. The validated version of the scale consists of 15 items and three factors. The reliability coefficients were reported as α = .88 for emotional engagement, α = .75 for cognitive engagement, and α = .63 for behavioral engagement. Table 1 summarizes the previous studies on scale development for student engagement in courses and learning activities.

Table 1

Prior Studies on Scale Development

Reference	Scale	Sample	Method	Results
Kim & Song (2023)	Agentic Engagement Scale (AES) in MOOCs	N1= 163 N2= 243	ESEM/ CFA	7-item/three factors
Öz & Boyacı (2021)	Engagement Scale	N1= 618 N2= 406	EFA/ CFA	37-item/seven factors
Barghaus et al. (2021)	Classroom Engagement Scale (CES)	N1= 11734 N2= 9055	EFA/ CFA	14-item/two factors
Kuo et al. (2021)	Online Learning Engagement Scale (OLE)	N= 608	CFA	13-item/three factors
Siddiqi et al. (2021).	Student Engagement Scale (SES)	N1= 400 N2= 150	EFA/ CFA	59-item/six factors
Lin & Huang (2018).	Student Course Engagement Scale (SCES)	N1= 543 N2= 893	EFA/CFA	20-item/five factors
Lan and Hew (2018)	MOOC Learner Engagement and Motivation Scale	N= 872	CFA	Motivation component: 11-item/three factors Engagement component: 11-item/three factors

Zhoc et al. (2019)	Higher education student engagement scale (HESES)	N= 560	CFA	28-item/five factors
Dixson (2015)	Online Student Engagement Scale (OSE)	N = 186	CFA + Behavioral validation	19-item/four factors
Sun & Rueda (2012)	Online Learning Engagement Scale (OLE)	N = 203	EFA	15-item/three factors

In addition to the individual studies summarized above, a recent systematic review by Wang et al. (2022) provided a comprehensive synthesis of 30 empirical studies on learning engagement in MOOCs from 2015 to 2022. This review identified three primary self-report instruments used to assess learner engagement in MOOCs: the Online Learning Engagement Scale (OLE) (Sun & Rueda, 2012), the Online Student Engagement Questionnaire (OSE) (Dixson, 2015), and the MOOC Engagement Scale (MES) (Deng et al., 2020a). These scales were compared in terms of dimensions (behavioral, emotional, cognitive, and social engagement), item distribution, and scale specificity. The MES was noted for being tailored explicitly to MOOC contexts and for encompassing all four engagement dimensions. In contrast, the OLE and OSE were designed more broadly for online learning environments and featured different factor structures. This review underscored the growing importance of multimodal and automatic analysis methods in engagement measurement. It highlighted the need for more robust instruments capable of capturing the nuanced nature of learner engagement in diverse MOOC settings.

2. Methodology

2.1. Sample and Procedure

This study employs a descriptive and cross-sectional design. The data were gathered using a convenience sampling method from several MOOC courses, where participants aimed to improve their skills for their future career development. The sample of the study included 258 Turkish participants (138 men, 53.5%, and 120 women, 46.5%) with a mean age of 30.24 years (*SD* = 7.87, range: 17-49 years). The descriptive statistics for this sample are presented in Table 2.

Table 2

Descriptive Statistics of the Participants

		f	%
Gender	Female	120	46.5
	Male	138	53.5
Education Level	Secondary School	6	2.3
	High School	76	29.5
	Undergraduate	2	.8
	Graduate	104	40.3
	MSc	54	20.9
	PhD	16	6.2
Learning Preferences	Printed Materials	124	48.1
	Internet Video	152	58.9
	Online Course	76	29.5
	Others	44	17.1
Are educational videos helpful for your learning experience?	Extremely useful	150	58.1
	Useful	104	40.3
	Neutral	2	.8
	Slightly useful	2	.8
Which MOOC providers did you use?	Udemy	108	41.9
	Khan Academy	76	29.2
	Coursera	38	14.7
	edX	34	13.2

	Udacity	12	4.7
	Others	34	13.2
Did you receive a certificate for completing a MOOC?	Yes	54	20.9
	No	204	79.1

In addition to gender and age, participants varied in terms of educational background and learning preferences. Most participants held a graduate degree (40.3%) or a master's degree (20.9%), followed by those with a high school education (29.5%). In comparison, a smaller proportion held a PhD (6.2%), a secondary school education (2.3%), or an undergraduate-level education (0.8%). Regarding learning preferences, the majority reported using internet videos (58.9%) and printed materials (48.1%), followed by online courses (29.5%) and other sources (17.1%). When asked about the usefulness of educational videos, 58.1% found them extremely useful and 40.3% found them helpful, indicating a strong positive perception. As for MOOC platforms, the most frequently used was Udemy (41.9%), followed by Khan Academy (29.2%), Coursera (14.7%), edX (13.2%), and Udacity (4.7%). Lastly, 20.9% of the participants reported receiving a certificate for completing a MOOC.

Informed consent was obtained before the data collection through Qualtrics. The participants were informed about the purpose of the study and asked to reflect on any MOOCs they had enrolled in, indicating their level of agreement with each statement.

2.2. Instruments

Personal Information Form

This form encompassed questions about the participants' characteristics, such as gender, age, and educational level. Additionally, the form included specific questions such as individual learning preferences and participants' previous experiences with MOOCs.

MOOC Engagement Scale (MES)

The MES is a self-report instrument developed and validated by Deng et al. (2020a) to measure learner engagement in MOOCs. The MES has 12 items with four dimensions: "Behavioral engagement, cognitive engagement, emotional engagement, and social engagement." The items were rated on a six-point Likert-type scale from "strongly disagree (1)" to "strongly agree (6)." The scores range from 12 to 72, and higher scores indicate a higher level of engagement. Cronbach's alpha values for the four dimensions range from .66 to .85 in the original scale.

2.3. Translation Procedure

Translation of the instrument was performed by following Merenda's (2006) three basic steps. First, the scale items were reviewed from etic and emic perspectives before translation. Second, two translators independently translated the original questionnaire into Turkish. Next, another two translators performed a back-translation. The translators were proficient in both languages, and the target language was their mother tongue. The back-translated and original scales were compared, and the translators reached an agreement on a final Turkish version. The translated items were independently reviewed by three specialists (i.e., one linguist and two psychometricians) for content validity. Specialists' recommendations were considered in revising the items. Revised items commonly accepted by specialists are evaluated to have adequate content validity.

2.4. Data Analysis

In the study, descriptive statistics were utilized to characterize the sample population comprehensively. To ensure the study's validity, a multi-faceted approach was adopted, focusing on construct, convergent, and discriminant validity. The heart of the construct validity assessment was the Confirmatory Factor Analysis (CFA), which necessitated a preliminary check on several assumptions, including the adequacy of the sample size, the normal distribution of the data, and the presence of outliers. The appropriateness of the sample size was evaluated based on Hatcher's (1994) recommendation of the 5:1 rule. This suggests that there should be five cases for each item, or more than 100 cases in total, to run CFA effectively. For the 12 items in this study, 258 cases met this guideline. Normality test results indicated that the skewness and kurtosis ranged within the threshold of ±3; therefore, the data can be considered normally distributed (see Table 3). Furthermore, the data were examined for outliers. Initially, every item was transformed into standardized z-scores. According to Tabachnick and Fidell (2013), any value that exceeds an absolute value of 3.29 would be considered an outlier. In line with this, two outliers were detected and subsequently removed from the dataset. The reliability of the Turkish version of the MES scale was assessed using Cronbach's alpha coefficient, ensuring the scale's consistency and internal coherence of the items. In this research, a one-way Multivariate Analysis of Variance (MANOVA) was utilized to investigate gender differences in the MES and its four dimensions: emotional, behavioral, cognitive, and social engagement prior to analysis, it was crucial to ensure that the data met the necessary assumptions for MANOVA, including checks for the normality and homogeneity of variance across compared groups. The data successfully met these assumptions without any violations. All detailed statistical analyses were conducted using IBM SPSS 28 and IBM AMOS 20.

3. Results

3.1. Internal Consistency

Cronbach's alpha coefficients of the dimensions were calculated to assess the instrument's reliability, which ranged between .68 and .90. As suggested by Field (2009) and Kline (1999), the rule for adequate reliable coefficients is set above .70. Nevertheless, Nunnally (1967) initially suggested that a reliability coefficient of .60 was acceptable. However, this standard was subsequently raised to 0.70 in Nunnally's (1978) later study. Other researchers, including Kalaycı (2008), Akgül and Çevik (2003), and Özdamar (1997), have suggested that coefficients falling between 0.60 and 0.80 can be considered "somewhat reliable." Furthermore, both Peterson (1994) and Cortina (1993) noted that the number of items can influence the Cronbach's alpha coefficients, where fewer items can result in lower reliability. Therefore, it can be inferred that the subscales demonstrate acceptable internal consistency.

Table 3

Descriptive Statistics and Reliability

Factors	$\bar{X}$	*SD*	Skewness (*SE=.152*)	Kurtosis (*SE=.302*)	Cronbach Alpha
Behavioral	3.69	.87	-.34	-.37	.75
Cognitive	3.83	.76	-.90	2.00	.68
Emotional	4.15	.76	-.92	.81	.90
Social	2.84	.95	.14	-.67	.75

Note. *p <.05

3.2. Discriminant and Convergent Validity

The average variance extracted (AVE) and composite reliability (CR) are used to check convergent validity. Fornell and Larcker (1981) recommended threshold values of .70 and .50 for the CR and AVE, respectively. The results indicated that each dimension was significantly correlated with the others ($p < .01$). The square roots of the AVE values were greater than the cross-correlations and above .50, suggesting that discriminant validity was supported (Fornell & Larcker, 1981). Table 4 indicates the correlation matrix along with discriminant and convergent validity coefficients.

Table 4

Convergent and Discriminant Validity

	Number of Items	*L*	*CR*	*AVE*	Emotional	Behavioral	Cognitive	Social
Emotional	3	.85 – .93	.90	.75	(.87)			
Behavioral	3	.68 – .85	.79	.56	.57**	(.75)		
Cognitive	3	.65 – .79	.75	.50	.56**	.49**	(.71)	
Social	3	.49 – .84	.77	.54	.26**	.45**	.24**	(.73)

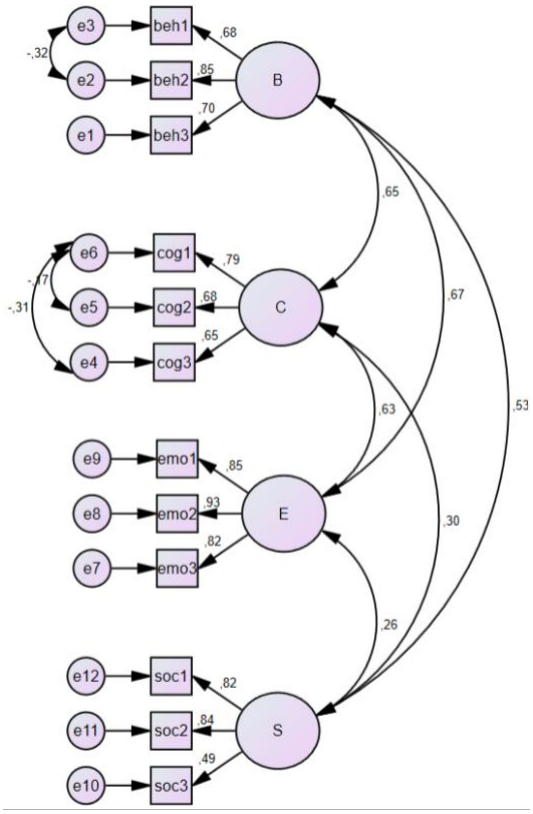
Note. *p <.05 L: Factor Loadings, AVE: Average Variance *Extracted, CR: Composite Reliability. The values in parentheses are the square roots of AVE*

3.3. Construct Validity

Confirmatory factor analysis (CFA) was performed using SPSS-AMOS to test how well the four-factor structure fits the data. Because some indices showed a poor-fitting model, modification indices were examined. As seen in Figure 1, three error covariances (ε_2-ε_3, ε_4-ε_6, and ε_5-ε_6) exhibited high relative values and were thus permitted to covary within the model. Three experts from Computer Education and Instructional Technology reviewed the pertinent items to determine whether to allow covarying. The experts agreed to this due to the evident relation between each item pair.

Figure 1

The Measurement Model



The results suggested an adequate model fit in the second run of CFA. The model's fit indices were listed as: CFI = .93, NFI = .90, NNFI = .90, IFI = .93, GFI = .91, SRMR = .05, RMR = .06, and RMSEA = .09. Chi-square value was found significant $\chi 2$ (45, n = 256) = 141.86, p = .00. Owing to its sensitivity to sample size, as highlighted by Tabachnick & Fidell (2007), it is essential to consider alternative fit indices. The $\chi 2$/df ratio was measured at 3.15, indicating a moderate model fit, as it is below the thresholds of 3.0 or 5.0 (Hu & Bentler, 1999). CFI, NFI, IFI, GFI, NNFI results, which ranged between .90 and .95, also signaled a moderate fit to the model (Tabachnick & Fidell, 2013; Jöreskog & Sörbom, 1993; Kline, 2011). Furthermore, RMR and SRMR, both fluctuating between .05 and .08, showed a moderate fit (Browne & Cudeck, 1993; Hu & Bentler, 1999). The RMSEA value ranging from .8 to .10 suggests a moderate fit as well (Browne & Cudeck, 1993; Kline, 2015). Table 5 presents the chosen fit indices for this study, along with their respective references, which are also annotated within the table.

Table 5

The Model Fit Indices Used for Confirmatory Factor Analysis

Model Fit Index	Acceptable Fit		Sample Statistics	Decision	References
	Moderate Fit	Good Fit			
NNFI (TLI)	.95 - .97	.97 – 1.00	.90	Moderate	1, 2, 5, 7
CFI	.90 - .95	.95 – 1.00	.92	Moderate	1, 2, 4, 5, 8,
GFI	.90 - .95	.95 – 1.00	.91	Moderate	6, 4, 8
SRMR	.05 - .08	≤ .05	.05	Moderate	3, 4
RMR	.05 - .08	≤ .05	.05	Moderate	3, 4
RMSEA	.05 - .08	≤ .05	.093	Moderate	3, 6, 8

Note. [1]Tabachnick and Fidell (2013), [2]Jöreskog and Sörbom (1993), [3]Browne and Cudeck (1993), [4]Hu and Bentler (1999), [5]Kline (2011), [6]Hooper, Coughlan, and Mullen (2008), [7]Thompson (2008), [8]Hair et al. (2010)

Considering all fit indices together, the results reported in this study—most of which fall between the acceptable and ideal thresholds—indicate a moderate model fit. Specifically, values between .90 and .95 for CFI, NFI, IFI, GFI, and NNFI are commonly interpreted as an acceptable yet not excellent fit (Hu & Bentler, 1999; Kline, 2011), and RMSEA values approaching .08 to .10 typically reflect a moderate level of fit (Browne & Cudeck, 1993). Therefore, based on these established cut-off criteria, the model in the second CFA run can be classified as demonstrating a moderate overall fit.

3.4. Gender Differences

A one-way MANOVA was conducted to determine whether there was a significant difference in learner engagement between males and females. The results indicated that there is a statistically significant difference in MOOC engagement between genders, F(4, 253) = 2324.441, p = .001; Wilk's Λ = .026, partial η2 = .974, power = .10. Furthermore, there were significant differences in the behavioral factor, F(1) = 31577.718, p < .001, partial η2 = .948, cognitive factor, F(1) = 33971.537, p < .001, partial η2 =.962, emotional factor, F(1) = 39230.525, p < .001, partial η2 = .963, and social factor, F(1) = 18716.186, p < .01, partial η2 = .900 between genders, where males scored higher than females.

4. Discussion

In the present study, our primary objective was to translate and adapt the MES–MOOC Engagement Scale (Deng et al., 2020a) into Turkish and then investigate whether MOOC engagement differs based on gender. Specific steps were taken to adapt the scale, ensuring a valid and reliable measurement instrument (Merenda, 2006; Karaguven, 2012). Initially, translations from English to Turkish and back-translation were made. Following this, the translated scale was reviewed by the experts for content validity. Once these steps were completed, EFA was run to determine the structure of the

measurement tool. In addition, discriminant and convergent validity were assessed to support the obtained factor structure. Then, confirmation factor analysis was performed to supply evidence for the four-dimensional structure of the MES. As a final step, Cronbach's alpha coefficients of each factor were calculated to ascertain the reliability of the scale. To identify gender differences in MOOC engagement, a one-way MANOVA was employed.

The CFA results revealed a moderate fit for the four-structure model of the MES, as indicated by the following fit indices: χ2/df, GFI, NFI, IFI, TLI, CFI, SRMR, and RMSEA. According to Hair et al. (2014), adequate reliability coefficients were obtained in the range of .68 to .90, which is consistent with the original scale. Consequently, the present study proposed the same structure model as the original scale, namely, the MES, which had a four-factor structure with 12 items as follows: (1) behavioral engagement (3 items), (2) cognitive engagement (3 items), (3) emotional engagement (3 items), and (4) social engagement (3 items).

Our study also aimed to investigate gender differences in learner engagement. The results indicated that males had higher scores compared to females in all engagement dimensions of the MES, namely, behavioral, cognitive, emotional, and social. The findings of the present study were consistent with those of some previous studies, which found that males' engagement levels scored significantly higher than those of females in MOOCs (Deng et al., 2020b; Williams, 2018). Nevertheless, various studies have reported that female learners tend to score higher on engagement than male learners in traditional learning environments (Lietaert et al., 2015; Wang et al., 2011). One reason that accounts for this gender difference is the greater tendency of males to use technological tools, such as computers, mobile devices, and the Internet, in most regions of the world, notably in developing countries (Kennedy et al., 2003; Antonio et al., 2014). Moreover, research has shown that males may exhibit higher self-confidence and autonomy in technology-mediated learning environments, which could lead to increased participation and engagement in MOOCs (Venkatesh & Morris, 2000; Ong & Lai, 2006). Furthermore, sociocultural norms and gendered expectations surrounding technology use may exacerbate these differences, particularly in online contexts that necessitate self-regulated learning skills (Zhang et al., 2020). In recent years, a growing body of research has focused on promoting gender equity in the field of information technology and online learning. Scholars have emphasized the importance of inclusive instructional design, digital literacy training for underrepresented groups, and policy interventions to reduce gendered barriers in technology-mediated education (Cohoon & Aspray, 2006; UNESCO, 2020; Stoet & Geary, 2018). In this context, international initiatives such as the COST Action 19122 – EUGAIN (European Network For Gender Balance in Informatics) have also been actively working to promote gender equity in computing and related fields through research, policy dialogue, and educational reform (EUGAIN, 2023).

5. Conclusion & Implications

The culture- and context-specific features of each nation necessitate the use and adaptation of valid and reliable instruments or scales. Therefore, in educational research, adaptation studies are significantly valued due to their contributions to further studies. However, procedures such as translation, adaptation, and validation require time, and meticulous planning and methodological design are necessary. In the Turkish educational context, Ağır (2023) previously developed an adapted version of the MES scale to measure the MOOC engagement level of undergraduate students within the Faculty of Education. However, considering the dynamic nature of MOOCs and the diverse educational backgrounds of learners who seek to enhance their skills for future career progression, it becomes apparent that educational levels among learners vary significantly. Consequently, we decided to adapt the MES to broaden its scope

of application. This scale is unique in that it focuses on a more diverse range of Turkish learners, including MOOC participants from secondary school students to those with Ph.D. degrees. Based on the results of the current study, it is possible to claim that the Turkish version of the MES is acceptable and in harmony with the Australian version.

Over the last decade, MOOCs have gained increasing popularity, with this trend accelerating during the coronavirus pandemic. However, it is essential to emphasize that learner engagement is a crucial element in achieving success in the learning process. Numerous instruments exist for measuring learner engagement in the traditional learning environment, while only one instrument has been developed specifically for MOOCs (Lan & Hew, 2018). Hence, this adapted scale will make a significant contribution to the literature by providing a valid and reliable measurement. The present research provided preliminary evidence for the adaptation and validation of the Turkish version of the MES. The findings revealed that the MES proposed a four-factor structure model with 12 items, as in the original scale (see Table A1 in Appendix A). As we also discussed in the previous sections, there has been a substantial increase in the number of MOOC learners; however, a low completion rate has emerged as a significant challenge (Eriksson et al., 2017; Goopio & Cheung, 2021). One of the key factors affecting this rate is engagement, which also has a close connection to learning outcomes (Barba et al., 2016; Kuo et al., 2021). Considering all these issues, the availability of the Turkish adaptation of the scale is significant since it enriches the relevant research on the concept of engagement and its role in online educational settings. Moreover, as Karagüven (2012) stated, research into adaptation studies is gaining substantial attention within the educational field, as it offers a solid foundation for gathering reliable and valid data for emerging investigations.

In light of these findings, educators, instructional designers, and policymakers may benefit from utilizing the Turkish version of the MES to evaluate and enhance learner engagement in MOOCs and other online learning environments. The scale can serve as a valuable tool to identify learners with lower engagement levels and develop strategies to improve their participation and retention. In addition, institutions offering MOOCs may use this instrument to inform course design, strengthen learner support systems, and make content more responsive to learners' engagement needs. These practical implications underscore the broader value of the adapted scale and its potential to contribute to enhancing online education practices in Türkiye.

5.1. Future Research and Limitations

Despite the promising validity and reliability of the MES in Turkish, our research has certain limitations. First, the adapted MES scale proposed a four-factor structure, with each factor comprising three items per engagement component, which may have compromised the factor structure of the instrument. However, the original scale was designed in this way, so we could not modify the structure of the adapted scale. In future studies, a scale with more items could be adapted to achieve a higher factor structure and reliability.

In terms of data collection, a convenience sampling method was employed, which introduced sampling bias, thereby negatively affecting the generalizability of the results. Specifically, the sample consisted of Turkish adult learners with varying educational backgrounds. Therefore, caution should be exercised when attempting to generalize the results to the broader adult learner population in Türkiye. Future studies are encouraged to use larger and more diverse samples, ideally selected through systematic methods such as stratified sampling, to represent the target population better and enhance the validity of the results.

Another limitation of the study was that, although content and construct validity were checked, criterion-based validity could not be assessed due to the absence of a Turkish MOOC engagement scale that could be used as a criterion. To eliminate this limitation, additional research could be conducted to examine the criterion-based validity of the present study. Furthermore, the study could be replicated in different contexts to evaluate the factor structure and psychometric properties of the instrument, as well as to obtain further evidence of its validity and reliability. Although the adapted MES retained the original four-factor model with three items per factor, this minimal item structure may have limited the scale's factorial validity in the Turkish context. Future research should consider applying the scale to broader and more heterogeneous samples, and if necessary, revising or expanding the number of items per factor to enhance its psychometric strength and ensure a more robust factor structure**.**

One additional limitation of the study was that it only targeted gender differences in MOOC engagement due to practicality and time constraints. The role of other variables, such as psychological conditions, socioeconomic status, educational background, study habits, self-efficacy beliefs, and general attitudes toward learning, can be investigated in further research. Last, this study focuses on the narrower question of gender differences in learner engagement in MOOCs. We suggest that further studies be conducted to elucidate the factors that account for gender differences in online learning environments. To this end, qualitative studies could be conducted to gain a deeper understanding of learners' engagement levels and their decision-making processes.

Conflicts of interest/Competing interests

Authors declare none.

Declaration of Generative AI Use

No generative AI tools (e.g., ChatGPT, Bard, Claude, Copilot, etc.) were used in the preparation of this manuscript. All content, including analysis and writing, was produced solely by the author(s). Although no AI assistance was employed, the authors bear full responsibility for any ethical implications arising from the manuscript content.

Ethics Approval

This study involved collecting data from human participants through surveys. The research was approved by the Social and Human Sciences Ethics Committee of Akdeniz University (Ethics Approval Number: 886065 / Date: 26 March 2024). Informed consent was obtained online from all participants. The research process was conducted in accordance with the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments.

Authors' contributions

Conceptualization: (Nehir Yasan-Ak); Methodology: (İbrahim Arpacı); Analysis: (İbrahim Arpacı); Discussion: (Nehir Yasan-Ak); Reporting – original draft: (İbrahim Arpacı), (Nehir Yasan-Ak); Reporting – review and editing: (Nehir Yasan-Ak), (İbrahim Arpacı).

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Data availability and sharing policy

The data are available upon reasonable request.

Funding

There are no sources of funding.

References

Ağır, A. (2023). Kitlesel Açık Çevrimiçi Dersler (KAÇD) Bağlılık Ölçeği'nin Türkçeye uyarlanması, geçerlik ve güvenirlik çalışması. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi, 25*(2), 325-339. https://doi.org/10.17556/erziefd.1097405

Alemayehu, L., & Chen, H. L. (2021). Learner and instructor-related challenges for learners' engagement in MOOCs: A review of 2014–2020 publications in selected SSCI indexed journals. *Interactive Learning Environments*, 1-23. https://doi.org/10.1080/10494820.2021.1920430

Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. *Future Internet*, *6*(4), 673-687. https://doi.org/10.3390/fi6040673

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*(5), 369–386. https://doi.org/10.1002/pits.20303

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology*, *44*(2006), 427–445. https://doi.org/10.1016/j.jsp.2006.04.002

Barba, P. D., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC motivation and participation in MOOCs. *Journal of Computer Assisted Learning*, 32, 218–231. https://doi.org/10.1111/jcal.12130

Barghaus, K. M., Henderson, C. M., Fantuzzo, J. W., Brumley, B., Coe, K., LeBoeuf, W. A., & Weiss, E. M. (2021). Classroom engagement scale: Validation of a teacher-report assessment used to scale in the kindergarten report card of a large urban school district. *Early Education and Development*, 1-23. https://doi.org/10.1080/10409289.2021.1985047

Baturay, M. H. (2015). An overview of the world of MOOCs. *Procedia - Social and Behavioral Sciences, 174*, 427–433. https://doi.org/10.1016/j.sbspro.2015.01.685

Bezerra, L. N. M., & da Silva, M. T. (2017). A review of literature on the reasons that cause the high dropout rates in the MOOCS. *Register Espacios, 38*(5), 11. http://www.revistaesacios.com/a17v38n05/a17v38n05p11.pdf

Carmines, E.G. and Zeller, R.A., (1979). *Reliability and Validity assessment*. Sage. Beverly Hills, CA.

Cohoon, J. M., & Aspray, W. (Eds.). (2006). *Women and information technology: Research on underrepresentation*. MIT Press.

Deng, R., Benckendorff, P., & Gannaway, D. (2020a). Learner engagement in MOOCs: Scale development and validation. *British Journal of Educational Technology, 51*(1), 245-262. https://doi.org/10.1111/bjet.12810

Deng, R., Benckendorff, P., & Gannaway, D. (2020b). Linking learner factors, teaching context, and engagement patterns with MOOC learning outcomes. *Journal of Computer Assisted Learning*, *36*(5), 688-708. https://doi.org/10.1111/jcal.12437

Dixson, M. D. (2015). Measuring student engagement in the online course: The Online Student Engagement Scale (OSE). *Online Learning, 19*(4), 1–15. https://doi.org/10.24059/olj.v19i4.561

Eriksson, T., Adawi, T., & Stöhr, C. (2017). "Time is the bottleneck": A qualitative study exploring why learners drop out of MOOCs. *Journal of Computing in Higher Education*, *29*(1), 133–146. https://doi.org/10.1007/s12528-016-9127-8

EUGAIN. (2023). *European Network for Gender Balance in Informatics (CA19122)*. Retrieved from https://eugain.eu

Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Goopio, J., & Cheung, C. (2021). The MOOC dropout phenomenon and retention strategies. *Journal of Teaching in Travel & Tourism*, *21*(2), 177–197. https://doi.org/10.1080/15313220.2020.1809050

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis: Pearson new international edition*. Harlow, Essex: Pearson.

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education*, 90, 36–53. https://doi.org/10.1016/j.compedu.2015.09.005

Kala, D., & Chaubey, D. S. (2022). Examination of relationships among technology acceptance, student engagement, and perceived learning on tourism-related MOOCs. *Journal of Teaching in Travel & Tourism*, 1-18. https://doi.org/10.1080/15313220.2022.2038342

Karaguven, M. (2012). The Adaptation of Academic Motivation Scale to Turkish. *Educational Sciences: Theory and Practice*, *12*(4), 2611-2618. https://eric.ed.gov/?id=EJ1002866

Kennedy, T., Wellman, B., & Klement, K. (2003). Gendering the digital divide. *IT & society*, *1*(5), 72-96. http://www.ifs.tuwien.ac.at/~dieter/teaching/GmA/Kennedy2003.pdf

Kim, R., & Song, H.-D. (2023). Developing an agentic engagement scale in a self-paced MOOC. *Distance Education, 44*(1), 120–136. https://doi.org/10.1080/01587919.2022.2155619

Kuh, G.D (2001). Assessing what really matters to student learning: Inside the National Survey of Student Engagement. *Change*, *33*(3), 10-17,66. https://doi.org/10.1080/00091380109601795

Kuo, T. M., Tsai, C. C., & Wang, J. C. (2021). Linking web-based learning self-efficacy and learning engagement in MOOCs: The role of online academic hardiness. *The Internet and Higher Education, 51*, 100819. https://doi.org/10.1016/j.iheduc.2021.100819

Lam, L. W. (2012). Impact of competitiveness on salespeople's commitment and performance. *Journal of Business Research*, *65*(9), 1328-1334. https://doi.org/10.1016/j.jbusres.2011.10.026

Lam, S.-F., Wong, B. P. H., Yang, H., & Liu, Y. (2012). Understanding student engagement with a contextual model. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149–172). Springer. https://doi.org/10.1007/978-1-4614-2018-7_19

Lan, M., & Hew, K. F. (2018). The validation of the MOOC learner engagement and motivation scale. In T. Bastiaens, J. Van Braak, M. Brown, L. Cantoni, M. Castro, R. Christensen, ... O. Zawacki-Richter (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 1625-1636). Association for the Advancement of Computing in Education (AACE). Retrieved April 15, 2024, from https://www.learntechlib.org/primary/p/184389/

Lan, M., & Hew, K. F. (2020). Examining learning engagement in MOOCs: A self-determination theoretical perspective using mixed method. *International Journal of Educational Technology in Higher Education*, *17*(1), 1-24. https://doi.org/10.1186/s41239-020-0179-5

Lee, J.-S. (2014). The relationship between student engagement and academic performance: Is it a myth or reality? *The Journal of Educational Research*, *107*(3), 177–185. https://doi.org/10.1080/00220671.2013.807491

Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. *Educational Technology Research and Development*, *59*(5), 593–618. https://doi.org/10.1007/s11423-010-9177-y

Li, S., Du, J., & Sun, J. (2022). Unfolding the learning behaviour patterns of MOOC learners with different levels of achievement. *International Journal of Educational Technology in Higher Education*, *19*(1), 1-20. https://doi.org/10.1186/s41239-022-00328-8

Lietaert, S., Roorda, D., Laevers, F., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. *British Journal of Educational Psychology*, *85*(4), 498-518. https://doi.org/10.1111/bjep.12095

Lin, S. H., & Huang, Y. C. (2018). Assessing college student engagement: Development and validation of the student course engagement scale. *Journal of Psychoeducational Assessment, 36*(7), 694-708. https://doi.org/10.1177/0734282917697618

Liu, Y., Zhang, M., Qi, D., & Zhang, Y. (2022). Understanding the role of learner engagement in determining MOOCs satisfaction: A self-determination theory perspective. *Interactive Learning Environments*, 1-15. https://doi.org/10.1080/10494820.2022.2028853

Merenda, P. F. (2006). An overview of adapting educational and psychological assessment instruments: Past and present. *Psychological Reports, 99*, 307–314. https://doi.org/10.2466/pr0.99.2.307-314

Ong, C. S., & Lai, J. Y. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior, 22*(5), 816–829. https://doi.org/10.1016/j.chb.2004.03.006

Öz, Y., & Boyacı, A. (2021). The role of student engagement in student outcomes in higher education: Implications from a developing country. *International Journal of Educational Research, 110*, 101880. https://doi.org/10.1016/j.ijer.2021.101880

Reschly, A. L., & Christenson, S. L. (2012). *Jingle, jangle, and conceptual haziness: evolution and future directions of the engagement construct*. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), Handbook of research on student engagement (pp. 3e20). New York, NY: Springer. http://dx.doi.org/10.1007/978-1-4614-2018-7_1

Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology*, *104*, 700–712. https://psycnet.apa.org/doi/10.1037/a0027268

Shah, D. (2021). *By the numbers: MOOCs in 2021*. https://www.classcentral.com/report/mooc-stats-2021/

Siddiqi, A.F., Shabbir, M.S., Abbas, M., Mahmood, A. and Salman, R. (2022). Developing and testing student engagement scale for higher educational students. *Journal of Applied Research in Higher Education. 14*(1), 424-439. https://doi.org/10.1108/JARHE-11-2020-0388

Skinner, E.A., & Pitzer, J.R. (2012). Developmental Dynamics of Student Engagement, Coping, and Everyday Resilience. In: Christenson, S., Reschly, A., Wylie, C. (Eds) *Handbook of Research on Student Engagement* (pp. 21–44). Springer, Boston, MA. https://doi.org/10.1007/978-1-4614-2018-7_2

Solorzano-García, M., Navio-Marco, J., & Laguia, A. (2020). The influence of intrinsic motivation and contextual factors on mooc students' social entrepreneurial intentions. *Interactive Learning Environments*, *29*, 1–13. https://doi.org/10.1080/10494820.2020.1769680

Stoet, G., & Geary, D. C. (2018). The gender-equality paradox in STEM education. *Psychological Science, 29*(4), 581–593. https://doi.org/10.1177/0956797617741719

Sun, J. C. Y., & Rueda, R. (2012). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology, 43*(2), 191–204. https://doi.org/10.1111/j.1467-8535.2010.01157.x

Tabachnick, B. G., & Fidell, L. S., (2007). *Using multivariate statistics* (6th ed.). Pearson.

Trowler, V., & Trowler, P. (2010). *Student engagement evidence summary.* York, England: Higher Education Academy.

UNESCO. (2020). *I'd blush if I could: Closing gender divides in digital skills through education*. https://unesdoc.unesco.org/ark:/48223/pf0000367416

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender and technology acceptance. *MIS Quarterly, 24*(1), 115–139. https://doi.org/10.2307/3250981

Veletsianos, G., Collier, A., & Schneider, E. (2015). Digging deeper into learners' experiences in MOOCs: Participation in social networks outside of MOOCs, notetaking and contexts surrounding content consumption. *British Journal of Educational Technology*, *46*(3), 570–587. https://doi.org/10.1111/bjet.12297

Wan, L., Xie, S., & Shu, A. (2020). Toward an understanding of university students' continued intention to use MOOCS: When UTAUT model meets TTF model. *SAGE Open*, *10*(3). https://doi.org/10.1177/2158244020941858

Wang, M. T., Fredricks, J. A., Ye, F., Hofkens, T. L., & Linn, J. S. (2016). The Math and Science Engagement Scales: Scale Development, Validation, and Psychometric Properties. *Learning and Instruction*, *43*, 16-26. https://doi.org/10.1016/j.learninstruc.2016.01.008

Wang, Y., Chen, H., & Li, K. C. (2022). A systematic review of empirical research on learning engagement in MOOCs: 2015–2022. *Frontiers in Education, 7*, 1074435. https://doi.org/10.3389/feduc.2022.1074435

Weber, E. Weippl & O. Zawacki-Richter (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 1625-1636). Amsterdam, Netherlands: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/184389/.

Williams, K. M., Stafford, R. E., Corliss, S. B., & Reilly, E. D. (2018). Examining student characteristics, goals, and engagement in Massive Open Online Courses. *Computers & Education*, *126*, 433-442. https://doi.org/10.1016/j.compedu.2018.08.014

Xing, W., & Du, D. (2019). Dropout prediction in MOOCs: Using deep learning for personalized intervention. *Journal of Educational Computing Research*, *57*(3), 547–570. https://doi.org/10.1177/0735633118757015

Yang, M., Shao, Z., Liu, Q., & Liu, C. (2017). Understanding the quality factors that influence the continuance intention of students toward participation in MOOCs. *Educational Technology Research and Development*, *65*(5), 1195–1214. https://doi.org/10.1007/s11423-017-9513-6

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success. *Practical Assessment, Research, and Evaluation. 20*, 1-20. https://doi.org/10.7275/hz5x-tx03

Zhang, Y., Wang, L., & Zhang, L. (2020). Gender differences in self-regulated online learning during the COVID-19 lockdown. *Frontiers in Psychology, 11*, 752131. https://doi.org/10.3389/fpsyg.2021.752131

Zhoc, K. C., Webster, B. J., King, R. B., Li, J. C., & Chung, T. S. (2019). Higher education student engagement scale (HESES): Development and psychometric evidence. *Research in Higher Education, 60*(2), 219-244. https://doi.org/10.1007/s11162-018-9510-6

Appendix A

Table A1.

The MES Items

Original Items	Turkish Items
Behavioral Engagement	Davranışsal Katılım
I set aside a regular time each week to work on the MOOC.	Her hafta KAÇD'de çalışmak için düzenli zaman ayırdım.
I took notes while studying the MOOC.	KAÇD'de çalışıyorken notlar aldım.
I revisited my notes when preparing for MOOC assessment tasks.	KAÇD'de değerlendirme görevlerine hazırlanırken notlarımı tekrar gözden geçirdim.
Cognitive Engagement	Bilişsel Katılım
I often searched for further information when I encountered something in the MOOC that puzzled me.	KAÇD'de kafamı karıştıran bir şeyle karşılaştığımda daha fazla bilgi için sık sık araştırma yaptım.
When I had trouble understanding a concept or an example, I went over it again until I understood it.	Bir kavram ya da örneği anlamakta zorluk yaşadığımda, anlayana kadar onu tekrar gözden geçirdim.
If I watched a video lecture that I did not understand at first, I would watch it again to make sure I understood the content.	İlk seferde anlamadığım bir ders videosu izlediğimde, içeriği anladığıma emin olmak için onu tekrar izledim.
Emotional Engagement	Duygusal Katılım
I was inspired to expand my knowledge in the MOOC.	KAÇD'de bilgimi artırmak bana ilham verdi.
I found the MOOC interesting.	KAÇD'yi ilgi çekici buldum.
I enjoyed watching video lectures in the MOOC.	KAÇD'de ders videolarını izlerken keyif aldım.
Social Engagement	Sosyal Katılım
I often responded to other learners' questions.	Diğer öğrencilerin sorularına sıklıkla cevap verdim.
I contributed regularly to course discussions.	Derste geçen tartışmalara düzenli olarak katkı sağladım.
I shared learning materials (e.g., notes, multimedia, links) with other classmates in the MOOC.	Öğrenme materyallerini (video, resim, ders notları gibi) KAÇD'deki diğer sınıf arkadaşlarımla paylaştım.