

# Students' disengagement in online courses: validity and reliability of an instrument

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## ABSTRACT

Disengagement is considered a significant component that affects the success, participation, and activity of the students in the online course. Reviewing the literature revealed the lack of a measurement tool for assessing students' disengagement in online courses. This study aimed to develop a scale that examines student disengagement in online courses through validation and reliability studies. The study was conducted with 772 undergraduate students who took an online course during the study. Exploratory factor analyses revealed that nine items were extracted under one factor with an eigenvalue  $>1$ . Confirmatory factor analysis (CFA) validated the one-factor model, showing significant factor loadings, and adequate fit indices. As a result, the scale of disengagement in online courses met the validity and reliability criteria. The disengagement in online courses scale can be used to examine the precedents and antecedents of disengagement in a variety of online learning settings.

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## 1. INTRODUCTION

Keeping students engaged and motivated in the course has long been one of the most difficult challenges for educators. More particularly, with the rapid increase in the number of online courses, it has actually become a big challenge to retain students connected and engaged in the distance education environment as well as having them involved in the process (socially, cognitively, and emotionally). Although online training such as online diploma programs, online certificate programs, or in-service training seminars has been widespread, with the onset of COVID-19, online education has been switched to emergency remote education from primary school to bachelor's. For this reason, the elements of success and failure in online education have begun to be investigated a lot.

Since the beginning of distance education, there have been studies examining variables like success, dropout, motivation, attitude, and satisfaction in distance learning. However, especially in recent years, studies examining the engagement of students in distance education and online learning have attracted attention. Fredricks *et al.* [1] stated that due to the primary issues with the online learning environment, such as low achievement, the feeling of isolation, high degrees of boredom, alienation, and unavoidable dropout rates, educators and academics are more interested in how students are engaged in their studies. Engagement is seen as one of the most important factors associated with learning, achievement, high grades, motivation, and dropout [2]–[6]. In recent years, the concept of disengagement, which typically denotes passivity, lack of interest, and a lack of participation in the course and frequently results in failure and dropping out, has begun to appear in the online learning literature as a distinct concept from engagement.

## 2. LITERATURE REVIEW

### 2.1. Engagement

Reviewing and synthesizing the definitions of engagement in the literature, Trowler [7] defined student engagement in the scope of interaction between the time, effort and other relevant resources invested by both students and their institutions aimed to enrich the student experience and enhance their learning outcomes /performance. Axelson and Flick [3] stated that the simplest definition of engagement is to involve the student in the learning process. Engagement has been reputed to be a multidimensional construct which consists of behavioral, emotional, and cognitive engagement implying the way of participation into the learning process [1].

Student engagement in the face to face context may differ from student engagement in online learning contexts [8], [9]. Online engagement reflects a variety of interactions, including learner-to-content, learner-to-learner, and learner-to-teacher interaction [10]. In the online learning environment, because of the limited communication between students and teachers and some uncontrollable factors such as learning environment, information interference and learning time, engagement of the students in the learning process is a bigger problem [5]. In order to achieve the goal of optimizing online learning outputs and online learning resources, students must actively participate in the whole learning process [11]. Students should be completely engaged in their online learning, which includes both quantity and quality of engagement, communication with others, deliberate learning, as well as other people's guidance and assistance along with their own self-management and self-control [5].

Engaging students in a learning environment is a constant motivational consideration; re-engaging disengaged students is a major motivational problem [12]. Arroyo *et al.* [13] stated that it can be onerous to develop educational strategies to interact with disengaged students online. So, while student engagement in online courses is important and essential, separately student disengagement is a serious and critical issue. The concept of disengagement is generally used as a synonym for not being engaged in the course or dropping out of the course, disengagement is not solely the absence of engagement. The next section aims to provide a general framework for the definition of disengagement.

### 2.2. Disengagement

Disengagement is a concept that refers to a variety of events, including inactivity, lack of participation, disruptive behavior, lack of effort, poor motivation or desire, disaffection, boredom, and poor academic achievement [14]. Disengagement is defined in the dictionary as "the action or process of withdrawing from involvement in an activity, situation, or group" [15]. Disengagement should not only be considered to reflect the absence of engagement, but rather it is a separate and distinct psychological process that contributes uniquely to student outcomes in learning settings [16]. Although engagement and disengagement are significantly correlated and explain unique variance in an academic process, they should be discussed in complementary but distinct ways [2]. Disengagement is sometimes used as a synonym for dropout or withdrawal, but it can be said that it is actually one of the reasons for dropout and withdrawal [17]. Skinner and Belmont [18] suggest that engagement is accompanied by enthusiasm, optimism, curiosity, interest, and learning effort, while disengagement could manifest in students "not trying," passiveness, and giving up easily in the face of challenges, along with feelings of boredom, depression, anxiety, anger, withdrawal, and protesting. Disengagement among students in educational settings constitutes a major challenge for many educators [19] and developing pedagogical approaches to respond to online students who have become disengaged is a challenging task [13]. Based on the engagement model of Skinner *et al.* [20], Wolters and Taylor [21] stated that disengagement can be conceptualized with emotions like boredom, tiredness, frustration, anger and reluctance to participate, which are pointing the way to undesirable negative outcomes and a lack of effort. From the school disengagement perspective, Reschly [22] stated that the risk of student disengagement from school is related to variables like absenteeism, low participation levels in class or extracurricular activities, and relations with peers and teachers. Similarly, in the case of online courses, student disengagement may result in non-interactive online courses and low academic success rates. For example, from the online learning perspective, De Falco *et al.* [23] argued that behaviorally disengaged students do not comply with the learning activity rules or expectations, instead acting in ways that are against norms or standards, such as quitting an activity early or participating in an inappropriate way.

Generally, research has focused on student disengagement in traditional face to face education contexts or disengagement in technology-enhanced classrooms (i.e. [24], [25]). However, although there has been a rapid increase in the number of studies on student engagement in courses, it is seen that studies dealing with the context of disengagement in online courses are limited. Disengagement can be induced by internal (lost interest, other things come into mind, other tasks, needing to eat/ drink, or use the washroom) or external factors (distractions and interruptions, technological issues, lack of novelty) [26]. Previous research has not fully addressed the precise variables that can cause student disengagement or suggested solutions to the problems in online learning [19]. To shed light on students' reasons for disengagement and the processes

by which students disengage can be more valuable than any other policy or method for dropout, failure, or ineffectiveness [27]. Exploring disengagement in online learning entails more than simply recognizing it as the opposite of engagement since it brings complexity to the learning situation [9]. Therefore, disengagement must be regarded as separate from the absence of engagement because simply being online in a course does not equal engagement [16].

Reschly and Christenson [28] emphasized that it may be valuable to measure disengagement as well as engagement. On the other hand, while there are many tools in the literature to measure online student engagement, no scale that directly measures student disengagement in online courses has been found. Disengagement is generally handled with the engagement scale, and a low engagement score or the opposite of engagement is considered disengagement [29], [30]. From this point, this study aimed to develop a scale that examines student disengagement in online courses through validation and reliability studies.

### 3. METHOD

#### 3.1. Study group

Study group was comprised of 772 undergraduate students from a mid-sized public university in Turkey. Students from a representative sample of different faculties participated in the study: education faculty, engineering faculty, communication faculty, arts and sciences faculty, applied sciences faculty, economics and administrative sciences faculty, health sciences faculty, and sport sciences faculty. All grade levels except first graders were invited to study. Due to the pandemic era, students had finished two semesters totally online and two semesters with a combination of 40% online and 60% face-to-face education as of 2020. The first graders were not included in the study since they began their education entirely face-to-face, even though all students in the second, third, and fourth grades took online courses for at least two semesters. Faculty members from each faculty were contacted, and students were asked to voluntarily fill out the online questionnaire during the course they lectured in. The study group consisted of 36.3% male and 63.7% female students. According to grade level, 31.1% are in second grade, 41.8% are in third grade, and 27.1% are in fourth grade.

#### 3.2. Item generation

In scale development studies, Streiner *et al.* [31] provide a variety of potential sources for the item generation process, including: i) potential research subjects, ii) theory, iii) related research findings, iv) clinical observations, and v) experts' opinions. Based on this point of view, we conducted an item generation process sequentially using several data sources. At first, relevant theoretical literature and current research findings were reviewed in order to conceptualize students' disengagement in online courses. With regard to this review, key points of disengagement were determined. Second, students who took an online course conducted by the researcher were interviewed with open questions. It has been stated that the best way to learn about student experiences is to ask the students themselves [32], and key information from participants in specific social/behavioral research can enrich the quality of the research [33]. Semi-structured interviews included open-ended questions derived from the literature review and prepared based on the researcher's observations in the course (e.g., "When you consider the online courses you take, do you think that you often disengage from the course?"; "What personal or course-related factors do you believe caused you to disengage during the online course?"; "What are the reasons for not being able to participate in online classes or for participating but not being active?"). Semi-structured interviews were conducted with a total of 35 students to generate the items of the scale to be developed. The initial item pool of 15 items was derived from student responses. Third, we ran our items through an expert validation procedure to identify items that were confusing, ambiguous, or redundant. Lastly, a pilot study was conducted with 20 different students from the same online course to validate whether the items were understood and interpreted correctly. Totally, 10 items were retained and included in the scale for validation and reliability studies. Items were scored using a five-point scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

#### 3.3. Data analysis

Before reliability and validity analyses, the data were screened for assumptions. Standardized Z scores were calculated to detect univariate outliers and Mahalanobis distances were calculated for multivariate outliers. Using a standardized z score between  $\pm 3.00$ , no univariate outliers were discovered. Five multivariate outliers were removed from the dataset after examining each participant's Mahalanobis distances with a chi-square cutoff of  $p.001$  [34]. The data for the remaining 767 students was found to be within the acceptable range. For the normality assumptions, skewness and kurtosis values were calculated for each item. All skewness and kurtosis statistics were within the range of  $+2$  to  $-2$ , indicating that the data were normally distributed. Because reliability is a precondition for validity, reliability analyses were carried out

first [35]. Item total correlations were calculated for each item to determine the contribution of each item to the scale total, and the Cronbach alpha coefficient and composite reliability (CR) index were evaluated to analyze internal consistency for the reliability of the scale.

Convergent validity is examined using the average variance extracted (AVE) value and CR. The recommended degree of convergent validity is a CR of 0.70 or higher and an AVE of 0.50 or higher [36]. To confirm the construct validity, exploratory factor analysis was executed to determine the factors underlying the scale, and confirmatory factor analysis (CFA) was conducted to validate the model retained by the exploratory factor analysis. It is suggested that CFA should be conducted after exploratory factor analysis using a different sample of data [37]. Therefore, the data were divided into halves at random as odd and even data. The exploratory factor analysis was performed on 384 participants, while the CFA was performed on 383 participants.

## 4. FINDINGS

### 4.1. Reliability analysis

The reliability of the scale was assessed by item total correlations, the Cronbach alpha coefficient, and the CR index. Item-total correlations were calculated for the 10 items in the final scale. Only one item (D5) had item-total correlations less than 0.3, and its deletion would increase Cronbach's alpha. So, item 5 (D5) was eliminated from the scale, and reliability analysis was executed. The Cronbach alpha value of the remaining 9 items was found to be 0.87, and the CR index was found to be 0.909, both of which are greater than 0.7, indicating that the scale has good internal consistency. All the corrected item total correlations of items were above 0.3, as suggested [35].

### 4.2. Convergent validity

The AVE was calculated for convergent validity. AVE value of nine items was found to be 0.53. Convergent validity was confirmed for the scale since  $AVE > 0.5$  and  $CR > 0.7$ , as suggested [36]. Table 1 presents the reliability statistics of the scale.

Table 1. Reliability statistics of disengagement scale

Items	Item total correlations	Cronbach Alpha	CR	AVE
D1	0.66			
D2	0.70			
D3	0.70			
D4	0.69			
D6	0.66	0.89	0.90	0.53
D7	0.47			
D8	0.66			
D9	0.55			
D10	0.67			

### 4.3. Exploratory factor analysis

Exploratory factor analysis was conducted to examine the factor structure of the remained 9 items. Bartlett's test of sphericity was used to assess factorability of data and kaiser-meyer-olkin (KMO) measure was calculated for sampling adequacy. The Bartlett's test of sphericity was found to be significant ( $\chi^2=1410.95$ ,  $df=36$ ,  $p<0.001$ ), and the KMO value was 0.909, indicating that the data was suitable for factor analysis.

Exploratory factor analysis was performed using the principal components extraction method and the varimax rotation technique. Exploratory factor analysis results showed that all nine items were extracted under one-factor with an eigenvalue of  $>1$  and factor loadings higher than 0.5. The scree plot of eigenvalues for scale is presented in Figure 1. Factor loadings for items are presented in Table 2.

As seen in Table 2, all the factor loadings range from 0.559 to 0.768. being higher than 0.50. The result of exploratory factor analysis showed that a one-factor solution explained approximately 51.2% of the common variance. This factor was named "disengagement" in online courses.

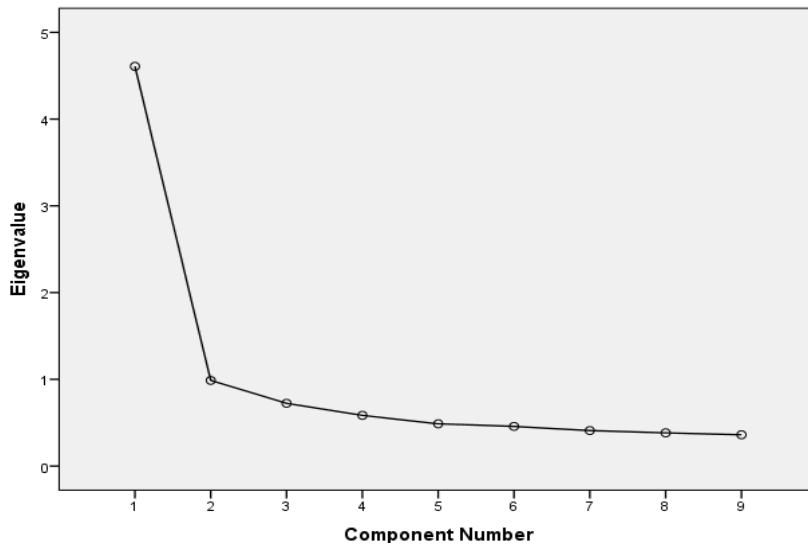


Figure 1. Scree plot of eigenvalues for the scaled questionnaire items

Table 2. Disengagement in online courses scale items and factor loadings

Items	Factor loadings
D1	0.757
D2	0.771
D3	0.768
D4	0.768
D6	0.735
D7	0.559
D8	0.726
D9	0.606
D10	0.717
Total eigenvalue	4.608
Total variance explained	51.198

#### 4.4. Confirmatory factor analysis

To validate the unidimensional structure of students' disengagement in online courses, CFA was conducted through nine items with 383 students' data. The CFA was executed using Lisrel 8.7 and the maximum likelihood method. In order to evaluate model, fit,  $\chi^2/df$ , root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR), comparative fit index (CFI), incremental fit index (IFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), and tucker-lewis index (TLI) fit indices were examined. The one-factor structure of the disengagement scale used in the CFA produced a respectable model fit. Examining the modification indices revealed that freeing the three error covariances would improve the model. Since these items represent the same factor, three of the error covariances were set free. The CFA determined the model's fit index values after two error covariances were specified as follows:  $\chi^2/df=3.04$ , RMSEA=.073, SRMR=.069, AGFI=.92, GFI=.96, NFI=.98, CFI=.99, IFI=.99. These fit indices revealed the model is a good fit [38], [39]. The standardized factor loadings were statistically significant at the  $p<.01$  level. Standard path coefficients ranged from 0.42 to 0.82. The standardized factor loadings and t values for the one-factor structure of the model are displayed in Table 3.

Table 3. Standardized path coefficients and t values

Item	Standardized path coefficient	T values
D1	0.73	16.09
D2	0.80	18.18
D3	0.82	18.88
D4	0.75	16.77
D6	0.75	16.22
D7	0.42	8.23
D8	0.70	15.35
D9	0.55	11.21
D10	0.74	16.43

#### 4.5. Descriptive statistics of disengagement scale

Descriptive statistics regarding the items and the total disengagement scale score were examined. Data from the entire sample (N=767) was used to assess descriptive statistics. Means, standard deviations, skewness and kurtosis values of scale items are presented in Table 4.

Table 4. Descriptive statistics of scale items

	N	Mean	Sd	Skewness	Kurtosis
D1	767	3.05	1.31	-0.12	-1.19
D2	767	3.21	1.33	-0.27	-1.17
D3	767	3.23	1.35	-0.31	-1.18
D4	767	2.79	1.34	0.09	-1.23
D6	767	2.77	1.38	0.11	-1.31
D7	767	2.36	1.37	0.55	-0.99
D8	767	3.06	1.40	-0.08	-1.30
D9	767	2.81	1.52	0.14	-1.46
D10	767	3.39	1.43	-0.42	-1.20

The mean score for the items ranged from 2.36 to 3.39, as shown in Table 4. The highest scoring item was D10: "When I'm taking the online course on my phone, I get distracted by instant incoming calls or messages." The item that had the second highest score was the D3, "I get bored after a while and deal with other things because the instructor gives only presentations during the class." The lowest scoring item was D7, "I feel lonely because I can't interact with anyone in the class." Also, only item D7 received a score below average. Beyond item analysis, the scale's total score was examined across genders and grades (Table 5).

Table 5. Disengagement scale scores across demographic variables

	N	Mean	Sd	Min.	Max.		
Total	767	26.67	9.00	9	45		
Gender							
Male	278	26.70	9.31	9	45	t=0.074	p=0.941
Female	489	26.65	8.82	9	45		
Grade							
2.00	238	25.02	9.20	9	45	F=8.14	p=.000
3.00	322	28.07	8.99	9	45		
4.00	207	26.39	8.45	9	45		

The total score was found to be, which is above the average. As seen in Table 5, independent sample t test results showed that the total score of disengagement in online courses was not significantly different across gender ( $p>.05$ ). One-way analysis of variances (ANOVAs) was performed to examine differences in disengagement total scores across grades. There were statistically significant differences between grades ( $p<.05$ ), and the Scheffe post hoc test revealed that second grade disengagement ( $\bar{x}=25.02$ ;  $sd=9.20$ ) was significantly lower than third grade disengagement ( $\bar{x}=28.07$ ;  $sd=8.99$ ).

## 5. DISCUSSION

There has been a great deal of concern about how students engage in online courses. Various engagement scales were used to evaluate the factors affecting engagement. However, in addition to engagement, disengagement is also considered to be a significant component that affects the success, participation, and activity of the students in the online course. Despite the existence of tools for measuring perceived engagement, disengagement was traditionally regarded as low engagement or a lack of engagement. Some researchers conducted qualitative interviews with students to investigate student disengagement. Reviewing the literature revealed the lack of a tool for measuring online student disengagement in online courses. From this point, following the scale development process, this study has developed and validated a new instrument that measures perceived disengagement in online courses.

The disengagement scale has been confirmed as a one-factor structure with nine items. In the process of generating the items, relevant theoretical literature and current research findings were reviewed; students who took an online course were interviewed; and expert opinions were obtained. After creating the item pool, validity and reliability studies were conducted. Experts and pilot study participants were consulted for content and face validity to improve and refine scale items. The reliability of the scale was tested with

item total correlation, the internal consistency coefficient of Cronbach's alpha, and the CR index. Convergent validity was evaluated using AVE values. Construct validity was analyzed through exploratory and CFA.

After the refinement of items, it was observed that all item-total correlations of the remaining 9 items were higher than 0.3. The Cronbach's alpha and CR index values, which were both found to be 0.87 and 0.909, respectively, provided further evidence of the scale's high reliability. The AVE value of items was found to be 0.53, indicating convergent validity. Exploratory factor analysis yielded that the factor structure of the model was unidimensional and accounted for 51.2% of the variance. CFA confirmed that the one-factor structure of the model was a good fit, and all of the standardized factor loadings were found to be statistically significant at the p.01 level. To sum up, the disengagement scale with a one-factor structure was confirmed as being valid and reliable based on the results. The final version of the disengagement scale proved that it can be used in a variety of settings.

Results indicated that students were primarily disengaged when they attended the course via their mobile phones because they were distracted by instant incoming calls or messages. This finding affirmed that the habitual use of technology, and even addiction to it, is one of the most important indicators of distraction in online learning environments [40]. According to Wang [41] due to the lack of instructor-student interactions, students are frequently interrupted by smartphones during online learning. Fries *et al.* [42] stated that the availability of leisure activities like digital devices prevents students from learning by constantly reminding them of the exciting activities they are missing. Furthermore, it has been emphasized that many students who attend the course even remain disengaged because of difficulties like distracting notifications or impulses to use technology, which may prevent students from paying attention to the concepts being taught [9]. The second frequent reason given by students for their disengagement was that they became bored after a while with the instructor's presentations during class. Supporting this finding, Aagaard [43] declared that students engage in off-task activities and distract their attention when a lecture is perceived as monotonous and boring. Students find it difficult to concentrate, and learning becomes meaningless if instructors just talk for extended periods of time [44].

Literature shows that feeling isolated, lonely, and lacking a sense of community has been seen as one of the major negative outcomes of online learning and has a negative relationship with engagement. Although it was one of the significant indicators of disengagement, feeling lonely because of a lack of interaction with classmates (D7) had a relatively lower score than other items. Participants within the scope of this study took some of their courses online and some face-to-face throughout the research period, indicating that they are not enrolled in a fully online program. Because students had the opportunity to interact with their classmates in face-to-face classes, feeling lonely may have been a lower predictor of disengagement than other factors.

Descriptive statistics showed that students' disengagement total score ( $X=26,67$ ;  $n=767$ ) was above the average of the total score. Also, a gender-based comparison showed that there were no significant differences between female and male students. Significant differences were discovered when disengagement scores were compared by grade level. The disengagement scores of second graders were significantly lower than those of third graders. Because of the pandemic, the second graders were the first to begin their university careers entirely online. Following two semesters, these students took both online and face-face courses. Second graders, unlike third and fourth graders, did not experience a sudden transition from face-to-face education to emergency remote learning because their undergraduate education began directly with fully online teaching during the pandemic. As second graders were at the start of their academic careers, disengagement scores may have been slightly lower, assuming that they began their education with more enthusiasm, excitement, and focus [45], [46].

Disengagement in online learning can be induced by a variety of factors, including distracting notifications, poor learning activities, or limited learning resources [9]. Olphert and Damodaran [47] stated that it is important to understand and explain the triggers, onset, and contributory factors to digital disengagement and the indicators of disengagement. Disengagement may be modeled using the scale developed in this study by analyzing the relationship between disengagement and variables like cyberloafing and mobile technology addiction that can predict it. Since it has been stated that student disengagement can lead to student dropout, student engagement can act as a protective factor against academic failure [1]. So further research can design experimental studies that endeavor to minimize the disengagement and maximize the engagement in online learning environments.

## 6. CONCLUSION

Disengagement is distinct from absence of engagement, and the reasons given by students for their disengagement may be more useful than any other dropout prevention strategy or policy. To successfully determine the antecedents and consequences of disengagement, this construct must be conceptualized and

measured. This study helps to achieve this goal by providing empirical evidence confirming the psychometric features of the disengagement in online courses scale. This measure is expected to be useful for scholars researching the contextual factors and academic effects of disengagement in online courses. Furthermore, this scale will be valuable for teachers and academics looking to identify students at risk of disengagement in online courses.

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