



Online learning in higher education: Examining the predictors of students' online engagement

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Abstract

In this study, the effects of remote learning attitude, extrinsic and intrinsic goal orientation on the dimensions of online engagement were examined. 293 teacher candidates at a state university in Turkey participated in the research. PLS-SEM was used to analyze the data. In all models, relationships related to online collaboration with peers, online communication with instructor, participation in online classes, and completing assignments and tasks were confirmed. The relationships between the attitude towards attending online courses and the skills and emotional dimensions of engagement were confirmed. The relationships between intrinsic goal orientation (IGO) and skills and emotional dimensions of engagement are significant. Extrinsic goal orientation (EGO) is only related to the performance dimension of engagement.

Keywords Online engagement · Student engagement · Higher education · Remote learning attitude · Motivation · Extrinsic and intrinsic goal orientation

1 Introduction

It is important to explore the situation and variables associated with online learning to identify ways in which students' learning experience can be improved and to provide a better learning context in higher education. During the pandemic process, different dimensions occurred in online learning applications. As a matter of fact, it has become necessary to conduct up-to-date research on the factors that may have an impact on learning progress in online environments. Therefore, this study focused

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on the concepts of motivation and remote learning attitude (RLA) that affect online engagement.

It is emphasized that student engagement (SE) has a significant impact on student performance, including the successful completion of learning activities in higher education (Chen et al., 2010; Dumford & Miller, 2018; Kuh, 2001) defined engagement as student participation in educational activities. Newman et al. (1992) defined engagement as a measure of the effort to increase knowledge and competencies aimed at learning objectives. Engagement, as a one of the components that play an important role in effective learning (Axelson & Flick, 2010; Pascarella & Terenzini, 2005), is handled differently for online and face-to-face learning environments. Online engagement has been discussed in the context of social constructivism by Dixon (2015). In this study, the engagement framework developed by Dixon (2010) and adapted to the cultural context of Turkey by Polat et al. (2022) is addressed. Within this context, the focus of this study was on students' spending time and effort to learn the online course content, having a meaningful interaction with other people, emotional involvement in online learning processes, and their skills in this direction.

SE is affected by a variety of factors, both inside and outside the classroom (Kuh, 2001). Student motivation can be considered as the concept that most closely explains SE (Ferrer et al., 2020). Students who are actively engaged in learning tend to achieve better learning outcomes when they derive a sense of enjoyment and value from what they are doing (Ryan & Deci, 2000). On the other hand, Samuelli et al. (2020) emphasize that a positive attitude towards emergency remote education (ERE) in the COVID-19 period is associated with SE. Indeed, the changing online education with Covid-19 makes it necessary to understand the new conditions (Tzafilkou et al., 2021). As a result, in this study, the effects of IGO and EGO and RLA on online engagement during pandemic were examined. Understanding how IGO and EGO and remote learning attitude affect engagement in an online learning environment will provide insights and tips on the implementation of online programs.

1.1 Importance of the research

Engagement is a multifaceted concept (Bolliger & Martin, 2021). It describes different aspects of learning, including beliefs, attitudes and behaviors (Rodgers, 2008), skills, emotional, participation, and performance (Dixon, 2010), focusing on behavioral, cognitive and affective dimensions. Although engagement is a frequently discussed variable, the literature on online SE is still developing (Martin et al., 2022; Polat et al., 2022). On the other hand, research on engagement indicates that this structure is complex and may include different elements in different contexts within the education system (Martin et al., 2022). The Covid-19 pandemic has required higher education institutions to adopt ERE tools and practices (Stewart & Lowenthal, 2022; Tzafilkou et al., 2021), and the online teaching and learning context has undergone major changes. These online learning contexts are considered different from traditional classrooms, which significantly change the way students communicate, engage and learn (Xie, 2021). Moreover, Roman et al. (2022) stated that due

to the life-threatening mental and emotional conditions of the pandemic, stress reactions (psychosocial, physiological and behavioral) that can affect students' engagement in online education environments occur.

This study aimed to determine the factors affecting online engagement dimensions (skills, emotional, participation, and performance) in the context of online ERE due to the Covid-19 epidemic. As a matter of fact, one of the most important difficulties encountered during the emergency transition to online learning is considered to be the engagement of students (Kurt et al., 2022). More studies are needed on the nature of engagement in learning environments where engagement is not mandatory, students are not widely observable, learning is self-paced, and interaction is diverse (Harris et al., 2022). In addition, SE is a critical issue for designing educational environments suitable for future waves of COVID-19-like pandemics (Kurt et al., 2022). Also, as we rapidly transitioned to ERE, it was a strong challenge to attract students' attitudes towards this new context, their motivation and engagement to learn, who had left the traditional learning context. It can be said that this study is needed to address the constructs of these ERE environments that affect the characteristics of engagement and to understand the characteristics of SE at the same time.

In this study, which focuses on online SE during the COVID-19 process, first of all, the theoretical basis is explained and the research variables are discussed in order. Afterwards, students' characteristics, findings and results are presented.

2 Theoretical and conceptual framework

Social construction learning and Community of Inquiry model are based on, respectively, to explain how IGO and EGO and remote learning attitude affect university students' engagement during online learning. We think that this theoretical context proposed by Dixon (2015) has the potential to provide insight into structures that enable students to engage. The effect of RLA and motivation was investigated to explain the online engagement in this study. Online engagement is a concept that includes student participation, knowledge and skills to be acquired in the context of teaching, effort and interaction during learning (Dixon, 2015). Online engagement, which is examined as a dependent variable, has four sub-dimensions: skills, emotional, participation and performance.

While the skills dimension is about keeping up with learning activities and making an effort, the emotional dimension includes emotional connection with the course and applying it to their own lives, the participation dimension includes actively participating in small group discussions, and the performance dimension includes succeeding in tests and getting a good grade (Handelsman et al., 2005, p. 187).

One of the variables whose relationship with online engagement is examined in this study is the RLA variable. This variable expresses the attitude towards the teaching presentation, which is shifted to an alternative mode during the crisis caused by the pandemic conditions. The framework described by Tzafilkou et al. (2021) has five dimensions: (a) online attending lecturers (OAL), (b) online communicating

with professors (OCPR), (c) online collaborating with peers (OCPE), (d) online find, access & study educational material (OEM), (e) online doing assignments & homework (OAH) dimensions. Each dimension includes aspects of easiness, usefulness, enjoyment, control, interest and flexibility. OAL is about the perception of ease, flexibility and pleasure created by participating in online courses. While OCPR expresses the opinion about the ease, flexibility and perceived pleasure of communicating with instructors, OCPE refers to communication with peers. OEM is about perceived ease of use, flexibility, and usefulness in finding, accessing and working with educational material online. OAH, on the other hand, describes the perceived ease of use, flexibility, and usefulness of online homework and assignments. Another variable whose relationship with online engagement is examined in the model is motivation. While IGO, which is one of the dimensions of motivation, expresses the tendency of the student to do it because he/she gets satisfaction naturally while doing a learning activity, EGO points out the learning behaviors directed by external incentives. Since it is thought that it is important to examine the relationship of each sub-dimension that establish the online engagement separately in order to obtain more detailed results, hypotheses were proposed for each dimension.

2.1 Engagement

Engagement plays an essential role for academic achievement both in face-to-face and online learning environments (Heflin et al., 2017; Coates, 2006) defined engagement as the efforts made in the learning process by the learner to accomplish the goals of learning. While different perspectives on SE emphasizing motivation and self-regulation have been discussed (Reschly & Christenson, 2012; Reeve & Lee, 2014), engagement plays a crucial role in active participation in learning activities (Reeve, 2013). Therefore, Sun and Rueda (2012) underlined that engagement is related to the level of participation in teaching activities. These activities may include attending lessons, completing the assignment, and doing quizzes, following the teacher, using social tools, messaging, forums, etc. (Capone & Lepore, 2021) underline that engagement includes students' interactions, assignments, and forum activities besides participation, and they asserted that engagement increased because of online learning platforms and technological tools. Ferrer et al. (2020) summarize components of engagement as follows: connectedness (connection with learning and learning environments); involvement (active participant in learning); effort, energy, and time (quality of the effort towards learning).

Three types of engagement including behavioral, emotional, and cognitive are underlined (Ben-Eliyahu et al., 2018; Lee et al., 2016; Hsieh, 2014; Oga-Baldwin et al., 2017; Sinatra et al., 2015) define behavioral engagement as the degree to which a student participates in his/her learning process through actions. These actions can be active involvement in learning tasks and in school related tasks (Yildiz-Durak, 2022). Fredericks et al. (2004) defined emotional engagement as students' emotional responses to the class or their peers and teachers. Cognitive engagement is defined as the cognitive and psychological efforts made during the learning process

(Fredericks et al., 2004). In this study, engagement is regarded as students' skills, emotions, participation, and performance during online learning activities.

This study is based on the engagement structure (skills, emotion, participation, and performance) created by Dixson (2010). Dixson (2010, 2015) explains SE as student effort and time spent on knowledge, skills and learning that the course aims to develop, a meaningful interaction effort with people in online learning environments, and emotional involvement in learning processes.

2.2 RLA

The term “remote learning” has been stated to be used more frequently with the start of the COVID-19 pandemic in the literature. ERE, a branch of distance education, was obligatory during the pandemic (Bozkurt & Sharma, 2020; Hodges et al., 2020). ERE differs from pre-planned experiences designed to be online in that the teaching delivery is temporarily transferred to an alternative mode of delivery due to the circumstances of the crisis (Hodges et al., 2020; Guillén-Gámez et al., 2020) stated that cognitive, affective, and behavioral dimensions compose attitude which is defined as positive, negative, or neutral perceptions and beliefs about a specific issue. Numerous studies have been done to evaluate the students' attitude towards online learning and scales have been developed and validated to measure the students' readiness to participate in online education (Brooks & Grajek, 2020; Chen et al., 2017; Chung et al., 2020; Joo et al., 2018; Romero Martínez et al., 2020; Tzi-
vinikou et al., 2020; Ullah et al., 2017; Zhou, 2016; Zhu et al., 2020; Tzafilkou et al., 2021) reported that the previous measurement models are based on theories such as the Technology Acceptance Model, but have not been adopted to the remote education which is an urgent need in the current pandemic. For instance, the Online Readiness Scale developed by Hung et al. (2010) included five dimensions: *self-directed learning, motivation for learning, computer / Internet self-efficacy, learner control, and online communication self-efficacy*. Yıldız-Durak (2017) has used these dimensions in flipped learning environments. However, Tzafilkou et al. (2021) identified functional components in the context of ERE, such as online collaboration with peers, online communication with professors, online participation in lectures, finding online, accessing, and studying educational materials, doing homework and tasks online. They also developed an instrument by establishing relationships between these dimensions and six aspects of attitude: easiness, usefulness enjoyment, flexibility, control, and interest (Tzafilkou et al., 2021).

2.3 Motivation: IGO and EGO

Understanding learners' motivation that initiates and sustains behavior is an important component in online instruction design since it will support learners to complete the online courses successfully. For instance, what, how, and when students learn in online learning environments are affected by motivation (Barak et al., 2016; Deimann & Bastiaens, 2010). Therefore, it is essential to understand motivation and its types for a better designed online learning. Motivation is multidimensional and

this study focused on IGO and EGO. According to Ames (1992), goal orientation is a set of goals, beliefs, and attitudes that define a learner's main reason for engaging in a learning activity.

Locke and Schattke (2019), argue that IGO refers to the pleasure and enjoyment gained from an activity, whereas EGO is generally doing something to an end and to get some future value. Chyung et al. (2010) stated that IGO results from mainly internal reasons such as being curious, having desire to challenge, while EGO stems from mainly external reasons such as getting good grades, competing with others, and seeking approval or rewards from a parent or teacher. There are other studies that have the same findings (D'lima et al., 2014; Peck et al., 2018; Yang & Cao, 2013).

Lee et al. (2010) reported that students should be encouraged to adopt IGO to enhance learning motivation since intrinsically motivated students are more eager to persist with learning to achieve their goals, while extrinsically motivated students generally engage in surface learning and give up the learning as soon as extrinsic reasons are over or achieved. Accordingly, Vansteenkiste et al. (2006) reported that providing deeper participation in the learning process, better conceptual learning and high permanence can be achieved with IGO. Moreover, it is underlined in research that IGO helps a deeper level of understanding of tasks, whereas EGO leads to memorization or guessing, more surface-level processing strategies; hence, students' IGO made significant contributions to their learning (Chyung et al., 2010). Even though the number of studies focused on the IGO and EGO in online learning environments is not sufficient, it is reported that level of IGO triggers and sustains the interest of students, especially in online learning environments (Firat et al., 2017). Consequently, although there are numerous studies about the learners' motivation to attend online courses voluntarily, different factors should be examined in remote learning implemented because of the COVID-19 since students did not select the online courses voluntarily (Tzafilkou et al., 2021).

2.4 Role of RLA on engagement

In this study, it is regarded as important to measure the attitude towards remote learning that was obligatory during the pandemic and find the relationship between RLA and engagement. As it is stated above, several studies have been done to evaluate the students' attitude towards online learning, yet the number of studies done on the relationship between RLA and engagement.

In a recent study, the findings showed that a more positive attitude towards online flipped learning further promoted the engagement, and students having higher levels of attitudes are less likely to suffer from anxiety, self-sabotage, and disengagement (Jiang et al., 2021). In their study, the authors underlined that a student with a more positive attitude towards online learning may be more likely to engage in online learning, regardless of other factors. Accordingly, Junior et al. (2018) underlined that the engagement level of students having more positive attitudes towards distance education will be greater. They added that more positive attitudes make the students more likely to be committed to their academic development.

In another study, it is found that students' attitude and their engagement were highly related during online learning (Aguilera-Hermida, 2020). In addition, Ferrer et al. (2020) reported that having negative attitudes towards online learning reduces the likelihood of engagement. For this reason, it is thought that an in-depth examination of the relationship between attitude and engagement will contribute to the understanding related increasing the positive attitudes and engagement towards online learning (Ferrer et al., 2020).

2.5 Role of motivation on engagement

Even though online learning is used all over the world during the pandemic, some researches highlight that it is not as effective as face-to-face learning in terms of increasing motivation and engagement. Therefore, it is seen important to know the role of motivation on engagement to understand online learning and design better online learning environments at the time of COVID-19.

There are many references to the relation between motivation and engagement, and the findings largely confirmed that positive motivation leads to positive engagement behaviors (Ben-Eliyahu et al., 2018; Cazan, 2015; Chen & Chen, 2015; Chen & Kraklow, 2015; Eseryel et al., 2014; Lee et al., 2016; Martin et al., 2017; Yen Chaw & Meng Tang, 2019; Yin, 2018). Moreover, Yen Chaw and Meng Tang (2019) reported that negative motivation leads to negative engagement behaviors in learners.

It is also reported that motivation is significantly affecting student course engagement (Xiong et al., 2015; Eseryel et al., 2014), reported that learners' motivation influenced their engagement.

3 Method

3.1 Research model

The literature-based models and hypotheses of this study are presented in Fig. 1.

H1. Attitude towards online collaboration with peers has a positive effect on the attitude towards attending online lectures.

H2. The attitude towards online collaboration with peers has a positive effect on the attitude towards completing online assignments and tasks.

H3. The attitude towards online communication with the instructor has a positive effect on the attitude of attending online lectures.

H4. The attitude towards online communication with the instructor has a positive effect on the attitude of completing online assignments and tasks.

H5. The attitude of attending online lectures has a positive effect on SE.

H6. Attitudes towards completing online assignments and tasks have a positive effect on SE.

H7. IGO has a positive effect on SE.

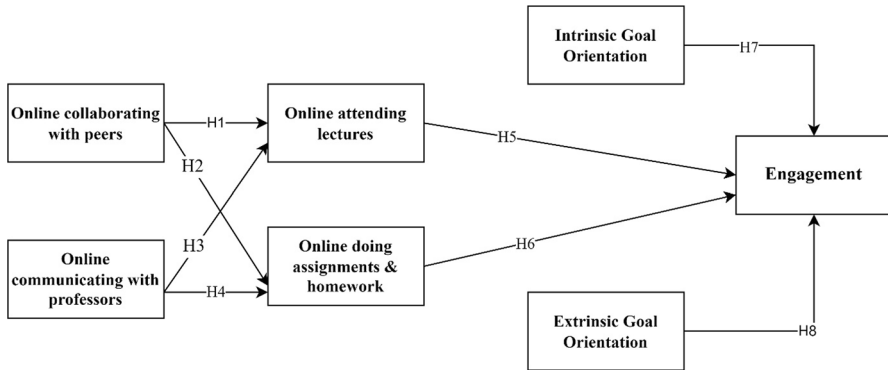


Fig. 1 The research model

H8. EGO has a positive effect on SE.

3.2 Participants

The study group consisted of 293 teacher candidates from the faculty of education at a state university in Turkey. The distribution of the participants by gender and digital competencies is given in Fig. 2.

Female participants are consisted of 54.3% and male are 45.7% of the study group. The ages of participants range from 18 to 41, with an average of 24.3. In terms of digital competencies, 7.5% of the teacher candidates stated that they were at a low level, 33.1% at a medium level, 34.1% at a good level, and 25.3% at an advanced level.

3.3 Data collection and analysis

In the study, the data were collected with three survey. The first survey is the RLAS developed by Tzafilkou et al. (2021). The survey has five factors: (a) OAL, (b) OCPR, (c) OCPE, (d) OEM, (e) OAH. Each factor includes six items related to easiness, usefulness, enjoyment, control, interest, flexibility,

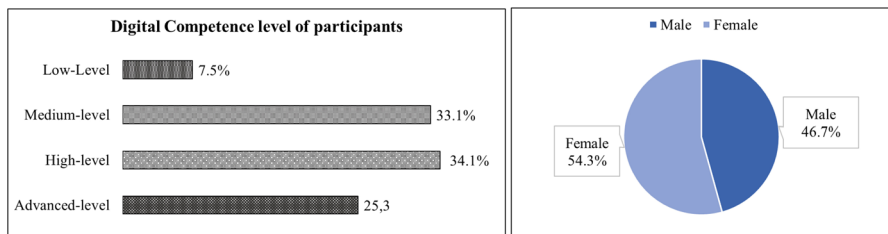


Fig. 2 The demographics of participants

and the survey consists of a total of 30 items. The OAL factor surveys participants' perceptions of the easiness, usefulness, flexibility etc. of attending online courses. An example of this factor is as follows: "It is easy to attend lectures". OCPR surveys the student's attitude towards the communication process with the professor: "It is easy to communicate with the professor". OCPE includes items to survey students' attitudes towards the process of working collaboratively with their peers: "I enjoy to collaborate with my peers (co-students)". The OEM factor relates to finding, accessing and studying lecture notes, materials and resources related to the learning process: "I have control when to find, access and study educational material (class notes, presentation slides, bibliography, etc.)". OAH includes items measuring students' attitudes towards online assignments and tasks: "I have flexibility and many opportunities to do the assignments, homework, etc.". The survey is 7-point Likert type and the answers were prepared to reflect the statements 1 = I totally disagree and 7 = I totally agree. All of Cronbach's alpha internal consistency coefficients calculated for the factors in the survey were above 0.70. Composite reliability coefficients were calculated as 0.950 for OAL, 0.952 for OCPR, 0.950 for OCPE, 0.951 for OEM, and 0.948 for OAH (Tzafilkou et al., 2021).

The second survey includes intrinsic and extrinsic goal orientation dimensions of Motivated and Learning Strategies Questionnaire, developed by Pintrich et al. (1991) and adapted into Turkish by Büyüköztürk et al. (2004). IGO includes four items for the individual to perceive that he or she participates in a task for reasons such as mastery, curiosity, or challenge: "The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible." (Pintrich et al., 1991). EGO includes four items about an individual's participation in a learning task for reasons such as getting a good grade, performance, or competition. An example item related to this dimension is as follows: "Getting a good grade in this class is the most satisfying thing for me right now" The scale is 7-point Likert type and the answers were prepared to reflect the statements 1 = I totally disagree and 7 = I totally agree. Cronbach's alpha internal consistency coefficient was calculated for the Turkish version as 0.63 for extrinsic goal orientation and 0.59 for intrinsic goal orientation (Büyüköztürk et al., 2004).

The third scale is an online SE scale developed by Dixson (2010) and adapted into Turkish by Polat et al. (2022). There are four factors in the scale: (a) skills (7 items), (b) emotional (5 items), (c) participation (5 items), (d) performance (2 items). According to Dixson (2010, 2015), the skills dimension includes the student's activities such as being organized about the online course, keeping the lecture notes and working regularly, while the emotional dimension includes aspects such as individuals' willingness to learn and applying what they have learned to their life. Participation represents the student's interaction and enjoyment with their classmates. Performance, on the other hand, is about the student's desire for high grades and performance in tests. (Polat et al., 2022). The scale is 5-point Likert-type and the answers were prepared to reflect the statements 1: Does not define me at all, 5: Definitely describes me. In the scale adapted to Turkish, Cronbach's internal consistency coefficients were calculated as 0.87 for skills factor, 0.77 for emotional,

0.82 for participation, and 0.87 for performance (Polat et al., 2022). Variance-based structural equation model and partial least square were used in the analysis of the data. The data were analyzed in the Smart PLS 3.0 program.

4 Findings

4.1 Measurement model

The measurement model consisting of OAL, OCPR, OCPE, OAH, OEM, EGO, IGO, and factors of engagement (skills, emotional, participation, and performance) were evaluated with convergent and discriminant validity. Factor loads, average variance extracted (AVE) values, and composite reliability values were examined for convergent validity. Fornell and Larcker (1981) and HTMT values were considered for discriminant validity (Fornell & Larcker, 1981). According to Fornell and Larcker (1981), the square roots of the AVE values of the structures should be greater than the correlations with the other variables in the measurement model. It is recommended that HTMT values be below 0.90 (Hair et al., 2017). In addition, the variance inflation factor (VIF) values of the items were evaluated. According to Hair et al. (1995), the fact that VIF values are above 10 indicates the problem of multicollinearity (Hair et al., 1995).

It was determined that discriminant validity between OEM and OPD was not achieved. In addition, it was determined that the VIF values of the items in the OEM structure were above 10 and were therefore excluded from the measurement model. In addition, the OAH5 item was not included in the measurement model because its VIF value was above 10. As a result, it was determined that Cronbach's alpha, composite reliability, and AVE values of the remaining constructs in the measurement model (OAL, OCPE, OCPR, OAL, IGO, EGO, and engagement) were within the ranges recommended in the literature. (Table 1). Also, the VIF values of all indicators are below 10. (Appendix Table A). The factor loads of the indicators of the

Table 1 Cronbach's alpha, composite reliability, and AVE values of the constructs in the measurement model

Construct	Cronbach's alpha	Composite Reliability	AVE
OAL	0.941	0.953	0.772
OCPR	0.948	0.958	0.794
OCPE	0.958	0.966	0.827
OAH	0.95	0.973	0.877
EGO	0.843	0.890	0.671
IGO	0.883	0.919	0.741
Skill (Engagement)	0.927	0.941	0.697
Emotion (Engagement)	0.882	0.913	0.679
Participation (Engagement)	0.903	0.929	0.723
Performance (Engagement)	0.890	0.948	0.901

structures vary between 0.748 and 0.952 and all are above 0.70 (Appendix Table A). As a result, sufficient evidence has been reached regarding the convergent validity of the measurement model.

Sufficient evidence for discriminant validity has been found according to Fornell and Larcker (1981). As shown in Table 2, the square roots of the AVE values of the structures are above the correlation coefficients shared among the structures.

For discriminant validity, HTMT values were also examined. As shown in Table 3, HTMT values are below 0.90. In conclusion, sufficient evidence for discriminant validity is presented.

4.2 Structural model

In this section, findings related to four structural models in which four dimensions of engagement are included as dependent variables are presented.

4.2.1 Engagement - Skills

When the structural model proposed in this study was tested, it was found that 28.9% of the variance explained the skills dimension of engagement. The coefficients between the structures are presented in Fig. 3.

As shown in Fig. 2, the proposed model explained 71.5% of the variance in OAL and 56.4% of the variance in OAH. The bootstrapping method was used to examine the statistical significance of the coefficients given in Fig. 2 (1000 subsamples). When the bootstrapping findings were examined, it was found that the hypothesis put forward for the relationship between It is also found that the hypothesis put forward for the relationship between OCPE and OAL was supported ($\beta=0.639$, $p<.001$, $t=8.500$, H1a accepted). At the same time, OCPE positively affects OAH ($\beta=0.431$, $p<.001$, $t=4.554$, H2a accepted). The hypothesis related OCPR and OAL was supported ($\beta=0.239$, $p<.005$, $t=2.996$, H3a accepted). At the same time, OCPR positively affects OAH ($\beta=0.357$, $p<.001$, $t=3.636$, H4a accepted).

Table 2 Discriminant validity according to Fornell and Larcker criteria

	1	2	3	4	5	6	7	8	9	10
1 OCPE	0.909									
2 OCPR	0.817	0.891								
3 OAH	0.709	0.722	0.936							
4 OAL	0.762	0.835	0.736	0.879						
5 IGO	0.356	0.421	0.332	0.454	0.861					
6 EGO	0.156	0.242	0.221	0.274	0.490	0.819				
7 Skills	0.341	0.417	0.415	0.451	0.426	0.294	0.835			
8 Emotion	0.337	0.386	0.363	0.436	0.450	0.267	0.806	0.824		
9 Participation	0.364	0.333	0.383	0.364	0.233	0.141	0.658	0.660	0.851	
10 Performance	0.318	0.355	0.389	0.386	0.254	0.279	0.609	0.596	0.557	0.949

Table 3 HTMT values

	1	2	3	4	5	6	7	8	9	10
1 OCPE										
2 OCPR	0.858									
3 OAH	0.738	0.756								
4 OAL	0.802	0.883	0.774							
5 IGO	0.384	0.455	0.358	0.493						
6 EGO	0.165	0.264	0.242	0.308	0.551					
7 Skills	0.360	0.443	0.437	0.477	0.461	0.305				
8 Emotion	0.365	0.415	0.386	0.472	0.496	0.264	0.875			
9 Participa- tion	0.387	0.358	0.407	0.387	0.252	0.140	0.719	0.732		
10 Perfor- mance	0.344	0.386	0.419	0.422	0.281	0.303	0.668	0.666	0.617	

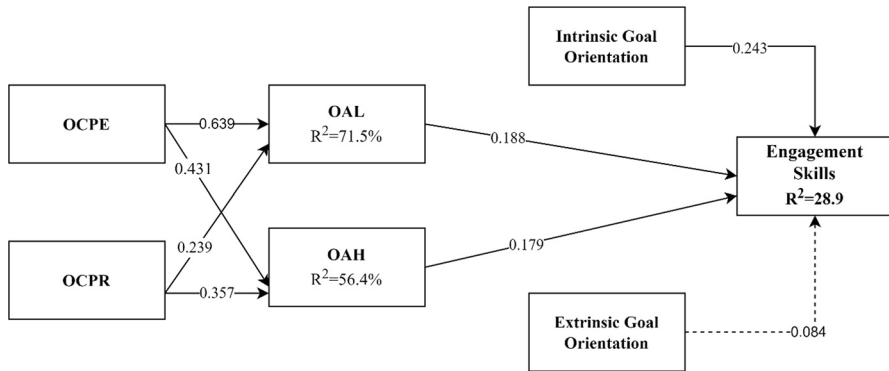


Fig. 3 Structural model findings of engagement-skills (Model 1)

OAL has a positive effect on the skills dimension of engagement ($\beta=0.188$, $p<.005$, $t=2.254$, H5a accepted). It was found that the hypothesis put forward for the relationship between OAH and skills was supported ($\beta=0.179$, $p<.005$, $t=2.204$, H6a accepted).

While the effect of IGO on engagement skills was significant ($\beta=0.243$, $p<.005$, $t=3.229$, H7a accepted), the effect of EGO was not significant ($\beta=0.091$, $p>.005$, $t=1.314$, H8a rejected).

4.2.2 Engagement- Emotional

When the structural model proposed in this study was tested, it was found that engagement explained 28.1% of the variance in the emotional dimension. The coefficients between the structures are presented in Fig. 4.

As shown in Fig. 3, Model 2 explained 71.6% of the variance in OAL and 56.4% of the variance in OAH. As a result of the bootstrapping analysis performed to examine the statistical significance of the coefficients in Model 2, it was found that the

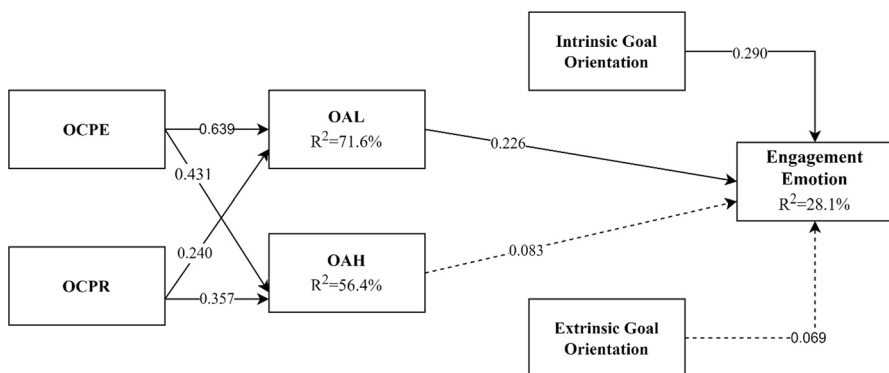


Fig. 4 Structural model findings of engagement-emotion (Model 2)

hypothesis put forward for the relationship between OCPE and OAL was supported ($\beta=0.639$, $p<.001$, $t=8.105$, H1b accepted). At the same time, OCPE positively affects OAH ($\beta=0.431$, $p<.001$, $t=4.573$, H2b accepted). It was found that the hypothesis related to OCPR and OAL was supported ($\beta=0.240$, $p<.005$, $t=2.854$, H3b accepted). At the same time, OCPE positively affects OAH ($\beta=0.357$, $p<.001$, $t=3.690$, H4b accepted). As can be seen, the results of the H1, H2, H3, and H4 hypotheses in Model 2 are close to the findings of Model 1.

OAL has a positive effect on the emotional dimension of engagement ($\beta=0.226$, $p<.005$, $t=2.708$, H5b accepted). The coefficient reached for H5b is higher than that of Model 1. It was found that the hypothesis put forward for the relationship between OAH and engagement skills was not accepted ($\beta=0.081$, $p>.005$, $t=1.082$, H6b rejected). According to Model 1, it is noteworthy that while attitude about online assignments and tasks has a positive effect on the skills dimension of engagement, its effect on the emotional dimension of engagement is not significant. While the effect of IGO on emotional dimension of engagement was significant ($\beta=0.290$, $p<.001$, $t=3.825$, H7b accepted), the effect of EGO was not significant ($\beta=0.069$, $p>.005$, $t=1.123$, H8b rejected).

4.2.3 Engagement- Participation

When the structural model proposed in this study was tested, it was found that engagement explained 17.6% of the variance in the participation dimension. In Fig. 5, the coefficients between the structures are presented.

As shown in Fig. 4, the proposed model explained 71.7% of the variance in OAL and 56.4% of the variance in OAH. When the bootstrapping findings were examined, it was found that the hypothesis put forward for the relationship between OCPE and OAL was supported ($\beta=0.638$, $p<.001$, $t=8.557$, H1c accepted). At the same time, OCPE positively affects OAH ($\beta=0.430$, $p<.001$, $t=4.692$, H2c accepted). It was found that the hypothesis put forward for the relationship between OCPR and OAL was supported ($\beta=0.241$, $p<.005$, $t=3.076$, H3c accepted). At the same time, OCPR positively affects OAH ($\beta=0.357$, $p<.001$, $t=3.751$, H4c accepted). The

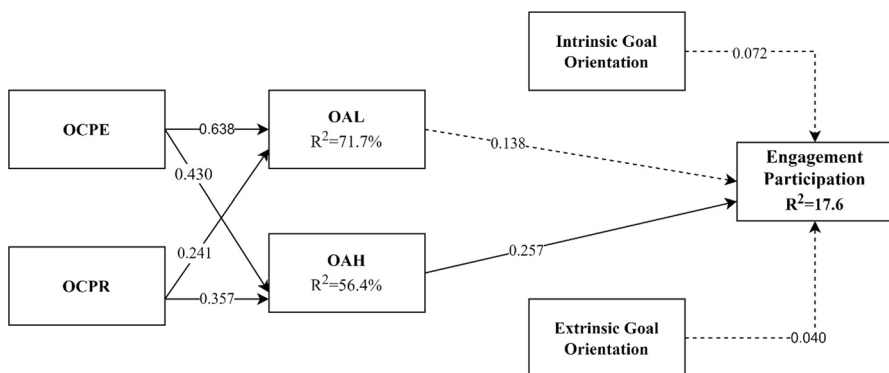


Fig. 5 Structural model findings of engagement-participation (Model 3)

results of the H1, H2, H3, and H4 hypotheses in Model 3 are close to the findings of Model 1 and Model 2.

On the other hand, the hypothesis regarding the effect of OAL on the participation dimension of the engagement was not accepted ($\beta=0.138$, $p>.005$, $t=1.595$, H5c rejected). While the hypotheses about the relationships between the skills and emotional dimensions of engagement and the attitude to participate in online classes were supported, it was found that this relationship was not statistically significant in the participation dimension. The hypothesis put forward for the relationship between OAH and the participation dimension of the engagement was supported ($\beta=0.257$, $p<.005$, $t=3.172$, H6c accepted). Accordingly, while the relationship between the attitude towards online assignments and tasks and the emotional dimension of engagement was not significant, participation and skills dimensions were found to be related. In addition, the effect of IGO ($\beta=0.072$, $p>.005$, $t=0.974$, H7c rejected), and the effect of EGO were not significant ($\beta=0.040$, $p>.005$, $t=0.484$, H8c rejected).

4.2.4 Engagement- Performance

When the structural model proposed in this study was tested, it was found that engagement explained 20.5% of the variance in the performance dimension. The coefficients between the structures are presented in Fig. 6.

As shown in Fig. 5, the proposed model explained 71.8% of the variance in OAL and 56.3% of the variance in OAH. When the bootstrapping findings were examined, it was found that the hypothesis put forward for the relationship between OCPE and OAL was supported ($\beta=0.639$, $p<.001$, $t=7.938$, H1d accepted). At the same time, OCPE positively affects OAH ($\beta=0.414$, $p<.001$, $t=4.503$, H2d accepted). It was found that the hypothesis put forward for the relationship between OCPR and OAL was supported ($\beta=0.241$, $p<.005$, $t=2.811$, H3d accepted). At the same time, OCPR positively affects OAH ($\beta=0.374$, $p<.001$, $t=3.636$, H4d accepted). The results of the H1, H2, H3, and H4 hypotheses in Model 4 are close to the findings of Model 1, Model 2, and Model 3.

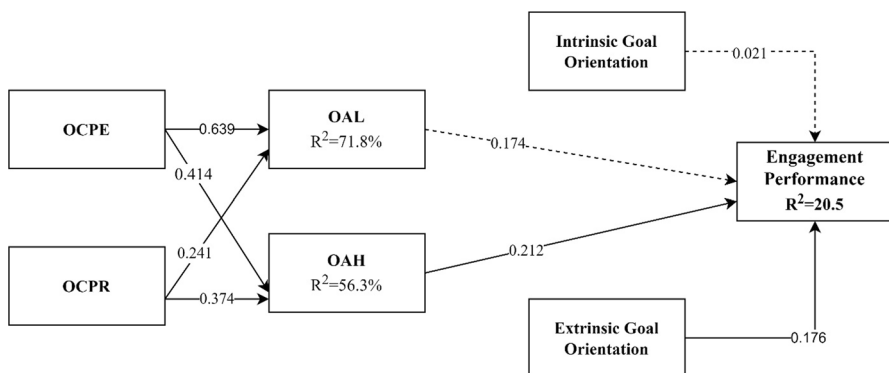


Fig. 6 Structural model findings of engagement-performance (Model 4)

Hypothesis regarding the effect of OAL on the performance dimension of engagement was not accepted ($\beta=0.174$, $p>.005$, $t=1.710$, H5d rejected). While the hypotheses about the relationships between the skills and emotional dimensions of engagement and the attitude to attend online classes were supported, it was found that this relationship was not statistically significant in the performance dimension. The hypothesis put forward for the relationship between OAH and the participation dimension of the engagement was supported ($\beta=0.212$, $p<.005$, $t=2.284$, H6d accepted). Accordingly, while the relationship between the attitude towards online assignments and tasks and the emotional dimension of engagement was not significant, it was found to be related to the performance dimension as well as the participation and skills dimensions. On the other hand, it was found that the hypothesis about the relationship between IGO and the performance dimension of the engagement was not accepted ($\beta=0.021$, $p>.005$, $t=0.974$, H7d rejected). However, unlike other dimensions of engagement, the effect of EGO on performance dimension is significant ($\beta=0.176$, $p<.005$, $t=2.755$, H8d accepted).

As a result, in this study, it was revealed that there are differences in the attitudes towards emergency remote learning, the effects of IGO and EGO constructs on the dimensions of the engagement. The acceptance status of the hypotheses tested in this study according to the dimensions of the engagement was summarized in Table 4.

5 Discussion

In this study, the effects of attitude towards emergency remote learning, IGO and EGO on the dimensions of online engagement were examined. In this context, four dimensions of engagement in online learning were tested separately as four models' skills, emotional, participation, and performance. Among the 4 models tested, the best-described model was the skills dimension of engagement. It was followed by emotional, performance, and participation, respectively. In the study conducted by Handelsman et al. (2005), four factors that show how students spend time and energy in the classroom were highlighted. According to their study, skills engagement is about keeping up with learning

Table 4 Hypothesis test results according to dimensions of engagement

	Relationship	Skills	Emotional	Participation	Performance
H1	OCPE→OAL	✓	✓	✓	✓
H2	OCPE→OAH	✓	✓	✓	✓
H3	OCPR→OAL	✓	✓	✓	✓
H4	OCPR→OAL	✓	✓	✓	✓
H5	OAL→Engagement	✓	✓	X	X
H6	OAH→Engagement	✓	X	✓	✓
H7	IGO→Engagement	✓	✓	X	X
H8	EGO→Engagement	X	X	X	✓

activities and making an effort to acquire knowledge and skills. From this point of view, it may be beneficial to use approaches that support learners' IGO or EGO and their attitudes towards online learning to support skills engagement in online learning. According to Handelsman et al. (2005), while emotional participation is about learning emotions such as finding the course interesting, being excited about the idea, and being satisfied with what they have learned, performance participation is about showing high performance in achievement tests, and participation is about actively participating in the activities in the learning environment and spending time. Therefore, while motivation and attitude components support emotional engagement relatively more, they support learning performance and participation in learning activities less.

Relationships related to online collaboration with peers, online communication with the instructor, participation in online classes, and completing assignments and tasks were confirmed in all of the tested models (See H1, H2, H3, and H4). It can be said that online cooperation with peers and online communication dimensions with instructors are important for the attitude towards participation in online courses. Similar findings were obtained for the attitude towards completing online assignments and tasks. In the study conducted by Yildiz Durak (2018) and Yildiz Durak (2020), it was emphasized that communication preferences, communication self-efficacy, and instructor support are important for pre-study and participation in online courses in flipped structure.

While the hypotheses about the relationship between the attitude towards participating in online courses and the skills and emotional dimensions of engagement were supported, this relationship is not significant in terms of participation and performance (See H5). The effect of the attitude towards participating in online courses on the emotional dimension of engagement is higher than the skills dimension. In addition, the attitude towards completing online homework and tasks was supported in other dimensions except for the emotional dimension (See H6). When the relationships between the dimensions of engagement and attitude towards completing online assignments and tasks are examined, it is seen that the highest coefficient is obtained in the dimension of participation. According to the study conducted by Samuelli et al. (2020), it is emphasized that developing a positive attitude towards ERE in the COVID-19 emergency distance process supports the engagement of students. As a matter of fact, the dropout problem has increased with the Covid-19 process (Amelan, 2020). It can be said that a positive attitude reduces the dropout problem (Carr, 2000) and in this context, positive perceptions increase students' motivation to learn (Maltby & Whittle, 2000) and engagement. Therefore, attitude, which is one of the internal factors affecting online learning in higher education, provides online learning engagement by facilitating the implementation of education and increasing its effectiveness (Mitchell & Geva-May, 2009; Wang et al., 2003). On the other hand, it is remarkable that the attitude is more effective on the effort spent on learning emotional and information skills. The reason for this finding may be the mediating role of attitude in directing efforts to improve

knowledge and skills in time management due to the emotional emptiness and social isolation during the Covid-19 process. While the relationships between IGO and skills and emotional dimensions of engagement supported the relevant hypotheses, this relationship is not significant in terms of participation and performance (See H7). IGO is higher in emotional engagement than in skills. IGO supports learning participation because of the pleasure derived from a learning activity and the perception of efficacy that the action brought (Ryan & Deci, 2000). For this reason, it is inevitable for students with high IGO to exhibit higher emotional engagement and effort in learning environments. It is noteworthy that IGO is effective in skills and emotional dimensions. In this context, the fact that IGO affects the effort to learn emotional and information skills in online environments can be explained by the fact that IGO is directly related to the perception of value and pleasure from learning. EGO was found to be significantly related only to the performance dimension of engagement (See H8). Students tend to achieve better learning outcomes when they are actively engaged in the learning process and gain a sense of pleasure and value from what they do. EGO refers to participating in teaching activities because the learning effort is linked to a result to be achieved, and an external stimulus or factor is needed (a material reward, appreciation, promotion, etc.). Hsieh (2014) emphasized the determining role of the branch in the relationship between students' motivation and engagement. Within the framework of Hsieh (2014)'s emphasis, there are some points worth discussing in the research findings. First of all, the student's branch variable plays an important role in explaining the student's learning outcomes. Hsieh (2014) underlines that there is a learning structure in education faculties that emphasizes teaching and learning, cooperative learning, and interaction with instructors more. From this point of view, the students in the faculty of education may have more internal goal orientation in terms of personal, social, and general education knowledge and show engagement in the emotional dimension. On the other hand, the fact that EGO only explains engagement performance can be interpreted as an expected finding due to the nature of EGO.

5.1 Limitations and recommendations

This study has some limitations. First of all, in the study carried out, there was no control over the types of activities and interaction densities of students in online environments. For example, the model reflection on engagement levels of students who interact more with each other on discussion forums may differ from students who use email more heavily (For example, the reflections of more discussion forums on the model of engagement levels of students who interact with each other may differ from students who use email more heavily). Future studies can be designed to explore the effects of online learning activities.

This study also has methodological limitations. Methodologically, teaching methods and course requirements influence SE. In addition, the personality of the student and instructor can also have an impact on engagement. This study does not take these variables into account. Models can be made by considering these variables in future studies.

This study has limitations in terms of the participant group. It has been emphasized in the literature that the branch factor may be effective on the models tested in this study (See Hsieh, 2014). Therefore, it may be recommended to test research models on different study groups.

This study includes only four SE dimensions. However, engagement has various definitions and theoretical contexts, as well as a wide variety of measurement tools. It may be suggested to consider engagement in different theoretical contexts.

6 Conclusions

In this study, it is aimed to determine how IGO and EGO and RLA affect engagement in online learning. The results are expected to guide practitioners on how online environments can be made more ready to learn to achieve engagement and more effective teaching.

The results of this study reveal that the skills and emotional dimension in online engagement require special attention. The results of the study show that online collaboration with peers and online communication with the instructor positively affect attitude towards attending online classes and the completion of homework and tasks. Therefore, it seems to be valuable to support peer collaboration in learning environments. Moreover, enriching student-teacher communication with various online communication tools can yield beneficial results.

On the other hand, it reveals that attitude towards attending online lectures is a significant predictor of skills and emotional dimensions of engagement. It is thought that this result serves to raise awareness about the importance of encouraging students to participate in online classes in order to support them in the context of cognitive effort and especially emotional participation. The dimension in which the attitude towards completing online assignments and tasks is most effective is participation.

The most remarkable result of this study is that IGO explains the skills and emotional dimensions of engagement, while EGO explains only the performance dimension of engagement. These results show that providing teaching that supports IGO mechanisms is an effective option in supporting the effort spent for knowledge and skills and providing emotional participation in the online learning environment. To increase learning achievement in an online learning environment, external support mechanisms such as activities supporting EGO and rewards can provide significant advantages.

Appendix 1

Table A

Table A Factor loadings and VIF values

	Items	Factor Loading	VIF
Engagement- Skills	e1	0.850	3.795
	e3	0.847	2.874
	e4	0.836	2.782
	e5	0.820	3.122
	e6	0.836	2.932
	e7	0.778	2.020
	e8	0.874	3.512
Engagement-Emotional	e2	0.748	1.584
	e9	0.848	3.779
	e10	0.851	3.834
	e11	0.830	2.135
	e12	0.838	2.216
Engagement-Participation	e13	0.823	2.025
	e14	0.885	3.253
	e15	0.770	1.719
	e18	0.903	4.136
	e19	0.865	3.546
Engagement-Performance	e16	0.952	2.810
	e17	0.947	2.810
IGO	IGO1	0.804	1.984
	IGO2	0.912	3.028
	IGO3	0.895	2.756
	IGO4	0.829	1.982
EGO	EGO1	0.855	2.228
	EGO2	0.815	2.196
	EGO3	0.761	1.828
	EGO4	0.842	1.625
OAH	oah1	0.939	5.728
	oah2	0.945	6.256
	oah3	0.941	5.952
	oah4	0.935	5.367
	oah6	0.920	4.566
OAL	oal1	0.861	3.607
	oal2	0.898	4.337
	oal3	0.898	5.213
	oal4	0.858	2.950
	oal5	0.918	5.515
	oal6	0.836	2.613

Table A (Continued)

	Items	Factor Loading	VIF
OCPE	ocpe1	0.882	3.886
	ocpe2	0.931	6.809
	ocpe3	0.901	5.049
	ocpe4	0.903	4.306
	ocpe5	0.931	7.781
	ocpe6	0.908	5.636
OCPR	ocpr1	0.870	3.179
	ocpr2	0.903	3.965
	ocpr3	0.901	4.355
	ocpr4	0.863	3.141
	ocpr5	0.918	5.166
	ocpr6	0.889	3.488

Declarations

Conflict of interest None.

References

- Aguilera-Hermida, A. P. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, 1. <https://doi.org/10.1016/j.ijedro.2020.100011>
- Amelan, R. (2020). *UN Secretary-General warns of education catastrophe, pointing to UNESCO estimate of 24 million learners at risk of dropping out*. Retrieved from <https://en.unesco.org/news/secretary-general-warns-education-catastrophe-pointing-unesco-estimate-24-million-learners-0>
- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84, 261–271.
- Axelsson, R. D., & Flick, A. (2010). Defining student engagement. *Change: The magazine of higher learning*, 43(1), 38–43.
- Barak, M., Watted, A., & Haick, H. (2016). Motivation to learn in massive open online courses: Examining aspects of language and social engagement. *Computers & Education*, 94, 49–60. <https://doi.org/10.1016/j.compedu.2015.11.010>
- Ben-Eliahu, A., Moore, D., Dorph, R., & Schunn, C. D. (2018). Investigating the multidimensionality of engagement: affective, behavioral, and cognitive engagement in science across multiple days, activities, and contexts. *Contemporary Educational Psychology*, 53, 87–105.
- Bolliger, D. U., & Martin, F. (2021). Factors underlying the perceived importance of online student engagement strategies. *Journal of Applied Research in Higher Education*, 13(2), 404–419.
- Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education*, 15(1), 1–6.
- Brooks, D. C., & Grajek, S. (2020). *Faculty readiness to begin fully remote teaching*. *Educause Review*. Retrieved February 2022 from <https://er.educause.edu/blogs/2020/3/faculty-readiness-to-beginfully-remote-teaching>
- Büyükoztürk, Ş., Akgün, Ö. E., Özkahveci, Ö., & Demirel, F. (2004). The validity and reliability study of the Turkish version of the motivated strategies for learning questionnaire. *Educational Sciences: Theory & Practice*, 4(2), 231–239.

- Capone, R., & Lepore, M. (2021). From distance learning to integrated digital learning: A fuzzy cognitive analysis focused on engagement, motivation, and participation during COVID-19 pandemic. *Technology, Knowledge, and Learning*. <https://doi.org/10.1007/s10758-021-09571-w>
- Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. *Chronicle of Higher Education*, 46(23), 39–41.
- Cazan, A. M. (2015). Learning motivation engagement and burnout among university students. *Procedia-Social and Behavioral Sciences*, 187, 413–417.
- Chen, B., Fan, Y. Z., Zhang, G. G., & Wang, Q. (2017). *Examining motivation and self-regulated learning strategies of returning MOOCs learning*. The Seventh International Learning Analytics & Knowledge Conference, Vancouver, BC, Canada.
- Chen, P. S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of Web-based learning technology on college student engagement. *Computers & Education*, 54(4), 1222–1232.
- Chen, Y. H., & Chen, P. J. (2015). MOOC study group: Facilitation strategies, influential factors, and student perceived gains. *Computers & Education*, 86, 55–70.
- Chen, Y. L. E., & Kraklow, D. (2015). Taiwanese college students' motivation and engagement for English learning in the context of internationalization at home: A comparison of students in EMI and non-EMI programs. *Journal of Studies in International Education*, 19(1), 46–64.
- Chung, E., Subramaniam, G., & Christ Dass, L. (2020). Online learning readiness among university students in Malaysia amidst Covid-19. *Asian Journal of University Education*, 16(2), 45. <https://doi.org/10.24191/ajue.v16i2.10294>
- Chyung, S. Y., Moll, A. J., & Berg, S. A. (2010). The role of intrinsic goal orientation, self-efficacy, and e-learning practice in engineering education. *The Journal of Effective Teaching*, 10(1), 22–37.
- Coates, H. (2006). *Student engagement in campubased and online education: University connection*. Routledge.
- D'Lima, G. M., Winsler, A., & Kitsantas, A. (2014). Ethnic and gender differences in first-year college students' goal orientation, self-efficacy, and extrinsic and intrinsic motivation. *The Journal of Educational Research*, 107(5), 341–356. <https://doi.org/10.1080/00220671.2013.823366>
- Deimann, M., & Bastiaens, T. (2010). The role of volition in distance education: An exploration of its capacities. *International Review of Research in Open and Distributed Learning*, 11(1). <https://doi.org/10.19173/irrodl.v11i1.778>
- Dixon, M. D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning*, 10(2), 1–13.
- Dixon, M. D. (2015). Measuring student engagement in the online course: The online student engagement scale (OSE). *Online Learning*, 19(4), n4. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1079585.pdf>
- Dumford, A. D., & Miller, A. L. (2018). Online learning in higher education: exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education*, 30(3), 452–465.
- Eseryel, D., Law, V., Ifenthaler, D., Ge, X., & Miller, R. (2014). An investigation of the interrelationships between motivation, engagement, and complex problem solving in game-based learning. *Educational Technology & Society*, 17(1), 42–53.
- Ferrer, J., Ringer, A., Saville, K., Parris, M. A., & Kashi, K. (2020). Students' motivation and engagement in higher education: The importance of attitude to online learning. *Higher Education*, 83, 317–338. <https://doi.org/10.1007/s10734-020-00657-5>
- Firat, M., Kılınç, H., & Yüzer, T. V. (2017). Level of intrinsic motivation of distance education students in e-learning environments. *Journal of Computer Assisted Learning*, 34, 63–70. <https://doi.org/10.1111/jcal.12214>
- Fornell, G., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 39–50.
- Fredricks, 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.
- Guillén-Gámez, F. D., Colomo-magaña, E., Sánchez-rivas, E., & Pérez, R. (2020). *Attitude towards ICT: A statistical analysis of gender differences in Spanish higher education teachers*. In 3rd International Conference on Advanced Research in Education, Teaching & Learning, Oxford UK, 1–11.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks, CA.

- Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate data analysis* (3rd ed.). Macmillan.
- Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *The Journal of Educational Research*, 98, 184–192.
- Harris, L., Dargusch, J., Ames, K., & Bloomfield, C. (2022). Catering for ‘very different kids’: distance education teachers’ understandings of and strategies for student engagement. *International Journal of Inclusive Education*, 26(8), 848–864.
- Heflin, H., Shewmaker, J., & Nguyen, J. (2017). Impact of mobile technology on student attitudes, engagement, and learning. *Computers & Education*, 107, 91–99.
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*, 27, 1–12.
- Hsieh, T. L. (2014). Motivation matters? The relationship among different types of learning motivation, engagement behaviors, and learning outcomes of undergraduate students in Taiwan. *Higher Education*, 68(3), 417–433.
- Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, 55(3), 1080–1090.
- Jiang, L., Meng, H., & Zhou, N. (2021). English learners’ readiness for online flipped learning: Interrelationships with motivation and engagement, attitude, and support. *Language Teaching Research*. <https://doi.org/10.1177/13621688211027459>
- Joo, Y. J., So, H. J., & Kim, N. H. (2018). Examination of relationships among students’ self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs. *Computers & Education*, 122, 260–272. <https://doi.org/10.1016/j.compedu.2018.01.003>
- Junior, F. A. C., Cortat, M., Flores, C. L., Santos, F. A. M., Alves, G. C., Faiad, C. ... de Rodrigues, A. (2018). Evidences of validity of the Brazilian scale of learner’s attitude towards distance education programs. *International Journal of Information and Communication Technology Education*, 14(1), 1–16. <https://doi.org/10.4018/IJICTE.2018010101>
- Kuh, G. D. (2001). Assessing what really matters to student learning: Inside the national survey of student engagement. *Change*, 33, 10–13. <https://doi.org/10.1080/00091380109601795>
- Kurt, G., Atay, D., & Öztürk, H. A. (2022). Student engagement in K12 online education during the pandemic: The case of Turkey. *Journal of Research on Technology in Education*, 54(sup1), S31–S47.
- Lee, C. S., Hayes, K. N., Seitz, J., DiStefano, R., & O’Connor, D. (2016). Understanding motivational structures that differentially predict engagement and achievement in middle school science. *International Journal of Science Education*, 38(2), 192–215.
- Lee, J. Q., McNerney, D. M., Liem, G. A. D., & Ortega, Y. P. (2010). The relationship between future goals and achievement goal orientations: An intrinsic–extrinsic motivation perspective. *Contemporary Educational Psychology*, 35, 264–279. doi:<https://doi.org/10.1016/j.cedpsych.2010.04.004>
- Locke, E. A., & Schattke, K. (2019). Intrinsic and extrinsic motivation: Time for expansion and clarification. *Motivation Science*, 5(4), 277–290. <https://doi.org/10.1037/mot0000116>
- Maltby, J. R., & Whittle, J. (2000). Learning programming online: Student perceptions and performance. ASCILITE, 2000 Conference. Retrieved from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.674.1189&rep=rep1&type=pdf>
- Martin, A. J., Ginns, P., & Papworth, B. (2017). Motivation and engagement: Same or different? Does it matter? *Learning and Individual Differences*, 55, 150–162.
- Martin, F., Xie, K., & Bolliger, D. U. (2022). Engaging learners in the emergency transition to online learning during the COVID-19 pandemic. *Journal of Research on Technology in Education*, 54(sup1), S1–S13.
- Mitchell, B., & Geva-May, I. (2009). Attitudes affecting online learning implementation in higher education institutions. *Journal of Distance Education*, 23(1), 71–88.
- Newman, F. M., Whelage, G. G., & Lamborn, S. D. (1992). The significance sources of student engagement. In F. M. Newman (Ed.), *Student engagement and achievement in American secondary schools* (pp. 11–39). Teachers College Press.
- Oga-Baldwin, W. L. Q., Nakata, Y., Parker, P., & Ryan, R. M. (2017). Motivating young language learners: A longitudinal model of self-determined motivation in elementary school foreign language classes. *Contemporary Educational Psychology*, 49, 140–150.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research. Volume 2*. Jossey-Bass. An Imprint of Wiley. 10475 Crosspoint Blvd, Indianapolis, IN 46256.

- Peck, L., Stefaniak, J. E., & Shah, S. J. (2018). The correlation of self-regulation and motivation with retention and attrition in distance education. *The Quarterly Review of Distance Education*, 19(3), 1–15.
- Pintrich, P., Smith, D., García, T., & McKeachie, W. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. University of Michigan.
- Polat, E., Hopcan, S., & Kamalı Arslantaş, T. (2022). Çevrimiçi Öğrenci Bağlılık Ölçeğinin Türkçe'ye Uyarlanması: Geçerlik ve Güvenirlilik Çalışması. *Eğitim Teknolojisi Kuram ve Uygulama*, 12(1), 41–56.
- Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, 105, 579–595.
- Reeve, J., & Lee, W. (2014). Students' classroom engagement produces longitudinal changes in classroom motivation. *Journal of Educational Psychology*, 106(2), 527–540.
- 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. 3–20). Springer.
- Rodgers, T. (2008). Student engagement in the e-learning process and the impact on their grades. *International Journal of Cyber Society and Education*, 1(2), 143–156.
- Roman, T. A., Brantley-Dias, L., Dias, M., & Edwards, B. (2022). Addressing student engagement during COVID-19: Secondary STEM teachers attend to the affective dimension of learner needs. *Journal of Research on Technology in Education*, 54(sup1), S65–S93.
- Romero Martínez, S. J., Ordóñez Camacho, X. G., Guillén-Gamez, F. D., & Agapito, J. B. (2020). Attitudes toward technology among distance education students: Validation of an explanatory model. *Online Learning Journal*, 24(2), 59–75. <https://doi.org/10.24059/olj.v24i2.2028>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78.
- Samueli, B., Sror, N., Jotkowitz, A., & Taragin, B. (2020). Remote pathology education during the COVID-19 era: Crisis converted to opportunity. *Annals of Diagnostic Pathology*, 49, 151612.
- Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist*, 50(1), 1–13.
- Stewart, W. H., & Lowenthal, P. R. (2022). Distance education under duress: a case study of exchange students' experience with online learning during the COVID-19 pandemic in the Republic of Korea. *Journal of Research on Technology in Education*, 54(sup1), S273–S287.
- 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. doi:<https://doi.org/10.1111/j.1467-8535.2010.01157.x>
- Tzafilkou, K., Perifanou, M., & Economides, A. A. (2021). Development and validation of a students' remote learning attitude scale (RLAS) in higher education. *Education and Information Technologies*, 26, 7279–7305. <https://doi.org/10.1007/s10639-021-10586-0>
- Tzivinikou, S., Charitaki, G., & Kagkara, D. (2020). Distance Education Attitudes (DEAS) during Covid-19 crisis: Factor structure, reliability and construct validity of the brief DEA scale in Greek-speaking SEND teachers. *Technology, Knowledge, and Learning*. <https://doi.org/10.1007/s10758-020-09483-1>
- Ullah, O., Khan, W., & Khan, A. (2017). Students' attitude towards online learning at tertiary level. *PUTAJ – Humanities and Social Sciences*, 25(1–2), 63–82.
- Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist*, 41(1), 19–31. https://doi.org/10.1207/s15326985sep4101_4
- Wang, M., MacArthur, D. A., & Crosby, B. A. (2003). Descriptive study of community college teachers' attitudes toward online learning. *TechTrends*, 47(5), 28–31.
- Xie, K. (2021). Projecting learner engagement in remote contexts using empathic design. *Educational Technology Research and Development*, 69(1), 81–85.
- Xiong, Y., Li, H., Kornhaber, M. L., Suen, H. K., Pursel, B., & Goins, D. D. (2015). Examining the relations among student motivation, engagement, and retention in a MOOC: A structural equation modeling approach. *Global Education Review*, 2(3), 23–33.
- Yang, Y., & Cao, L. (2013). Differential influences of achievement approach goals and intrinsic/extrinsic motivation on help-seeking in e-learning. *Knowledge Management & E-Learning*, 5(2), 153–196.

- Yen Chaw, L., & Meng Tang, C. (2019). Driving High inclination to complete massive open online courses (MOOCs): Motivation and engagement factors for learners. *The Electronic Journal of e-Learning*, 17(2), 118–130.
- Yıldız-Durak, H. (2017). Ortaokul öğrencileri için ters yüz öğrenme hazırbulunuşluk ölçeğinin Türkçeye uyarlanması. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 6(3), 1056–1068.
- Yildiz Durak, H. (2018). Flipped learning readiness in teaching programming in middle schools: modeling its relation to various variables. *Journal of Computer Assisted Learning*, 34(6), 939–959.
- Yildiz Durak, H. (2020). Modelling different variables in learning basic concepts of programming in flipped classrooms. *Journal of Educational Computing Research*, 58(1), 160–199.
- Yildiz-Durak, H. (2022). Conversational agent-based guidance: examining the effect of chatbot usage frequency and satisfaction on visual design self-efficacy, engagement, satisfaction, and learner autonomy. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-022-11149->
- Yin, H. (2018). What motivates Chinese undergraduates to engage in learning? Insights from a psychological approach to student engagement research. *Higher Education*, 76(5), 827–847.
- Zhou, M. M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. *Computers & Education*, 92–93, 194–203. <https://doi.org/10.1016/j.compedu.2015.10.012>
- Zhu, Y., Zhang, J. H., Au, W., et al. (2020). University students' online learning attitudes and continuous intention to undertake online courses: A self-regulated learning perspective. *Educational Technology Research and Development*, 68, 1485–1519. <https://doi.org/10.1007/s11423-020-09753-w>

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