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The Effects of ARCS on the Acceptance of Online Learning Environments during the Novel Coronavirus Pandemic: A Structural Regression Analysis

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Abstract

Although the use of online learning environments has been increasingly integrated into teaching and learning of university students worldwide, the global pandemic COVID-19 has urged almost the exclusive use of these environments for at least temporary periods. Since there may be situations that disrupt the efficiency of education-teaching environments such as a pandemic, it is expected that university teaching will continue either in a mixed-mode combining face-to-face and online learning or in some cases by online learning only. Hence, it is essential to assess the acceptance of online environments by university students. This study assesses the effect of motivation on the acceptance of such environments. It concentrates on examining the effect of motivation regarding teaching materials on the acceptance of online learning environments. For this, while the motivation concept related to the teaching materials is based on the Attention, Relevance, Confidence, Satisfaction model developed by Keller (1987), the acceptance of online learning environments is based on the Technology Acceptance Model developed by Davis (1989). Discussions and suggestions regarding the results are presented by considering the relevant literature.

Keywords: distance education, online learning, media in education, teaching and learning strategies.

Yeni Tip Korona Virüsü Sürecinde Öğrenme Motivasyonunun Çevrimiçi Öğrenme Ortamlarının Kabulü Üzerindeki Etkisi: Bir Yapısal Regresyon Analizi

Öz

Çevrimiçi öğrenme ortamlarının kullanımı dünya çapında üniversite öğrencilerinin öğretim ve öğrenimine giderek daha fazla entegre edilmiş olsa da, küresel COVID-19 salgını en azından geçici sürelerle bu ortamların neredeyse özel olarak kullanılmasını zorunlu kılmıştır. Pandemi gibi eğitim-öğretim ortamlarının verimliliğini sekteye uğratan durumlar olabileceği için, üniversite öğretiminin ya yüz yüze ve çevrimiçi öğrenimi birleştiren karma öğrenme ya da bazı durumlarda yalnızca çevrimiçi öğrenimle devam etmesi beklenmektedir. Bu nedenle, üniversite öğrencileri tarafından çevrimiçi ortamların kabulünün değerlendirilmesi önemlidir. Bu çalışma, motivasyonun bu tür ortamların kabulü üzerindeki etkisini değerlendirmektedir. Öğretim materyallerine ilişkin motivasyonun çevrimiçi öğrenme ortamlarının kabulü üzerindeki etkisini incelemeye odaklanmaktadır. Bunun için öğretim materyallerine ilişkin motivasyon kavramı Keller (1987) tarafından geliştirilen Dikkat, İlgililik, Güven, Doyum modeline dayandırılırken, çevrimiçi öğrenme ortamlarının kabulü Davis (1989) tarafından geliştirilen Teknoloji Kabul Modeline dayanmaktadır. Sonuçlara ilişkin tartışma ve öneriler ilgili literatür dikkate alınarak sunulmuştur.

Anahtar kelimeler: uzaktan eğitim, çevrimiçi öğrenme, eğitimde medya, öğretme ve öğrenme stratejileri.

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INTRODUCTION

Reflection of constructivist approaches to learning environments has led to reconsider the meaning of many concepts. This has led to new dynamics in teaching and learning; changing from teaching the students to student-centered learning. This approach brought new challenges for both the educators and the learners that need to be addressed. The global pandemic caused by the new type of Coronavirus has re-iterated the importance of online learning environments; almost all educational institutions felt obliged to review their educational processes to sustain learning in these environments effectively. Learning is a process (Tan, 2012) and whether this is performed face-to-face or online, it is essential to consider the characteristics of the learners and the ways they learn (Jonassen, 1986; Gulbahar, 2005). This highlights the importance of acceptance and motivation in learning. Acceptance is an important indicator of the attitude (ATTD) and behavioural intention (BI) towards adopting the use of technology in the learning environment concerned (Davis, 1989). Motivation is defined as "direction and magnitude of behaviour, an indicator of effort" (Keller, 1983). Ajzen and Fishbein (1980) explained behavioral intention as "a measure of the probability that a person will complete a given behavior", based on the fact that motivational factors influence behavioral intention.

The Motivation Model of Davis, Bagozzi and Warshaw (1992), states that the intrinsic and extrinsic motivations of individuals are important in technology acceptance. However, learner motivation regarding the teaching material used in the learning environment is not considered in their work. Moore (1993) on the other hand, emphasizes the content and interaction elements in the concepts of structure and dialogue that he discusses in the Transactional Distance theory. Teaching materials are important elements in helping learning in a learning environment. In an online learning environment, the interaction of a learner with the teaching materials is as important as the interaction with the instructor(s) and other learners. Also, the learning motivation of a learner based on his/her interaction with the teaching materials may play an important role in the acceptance of online learning environments.

As online learning environments become more essential than ever due to the ongoing COVID-19 pandemic process, it has become even more important to assess the effect of motivation on the acceptance of these environments. This study aims to examine the effect of motivation regarding teaching materials on the acceptance of online learning environments; a different presentation of distance education environments (Gülbahar, 2012). Within the scope of this study, the motivation concept related to the teaching materials is based on the Attention, Relevance, Confidence, Satisfaction (ARCS) model designed by Keller (1987), and the acceptance of online learning environments is based on the Technology Acceptance Model (TAM) developed by Davis (1989). Discussions and suggestions regarding the results are presented by considering the relevant literature.

Theoretical Framework

While the category of relevance, which can also be called interest, includes the education being aimed at achieving the goals of the learner, being compatible with learning styles, and being linked to previous knowledge; the confidence category states the positive effect of learners' positive expectations for success, experience geared towards success, and qualities of success. (Keller, 2016). Finally, under the category of satisfaction; the perception of satisfaction includes rewarding outcomes planned internally and externally to reveal desired learning behaviours (Keller, 2016). The feeling that they are learning new and useful things creates an inner sense of satisfaction for learners (Arora & Sharma, 2018).

Acceptance of Online Learning Environments and Motivation in Teaching Materials

Online learning environments can create flexible situations according to the learners' learning characteristics. According to transactional distance learning theory, learners interact with content (e.g. course materials), instructors, and other learners (Moore, 1989) and online technologies play a key role in this interaction. Learning activities and resources are prepared based on instructional design to enable learners to learn in a planned way on their own (Carman, 2002).

Motivation Theory (Keller, 1987), which is structured around the concepts of attention, relevance, confidence, and satisfaction, gives clues in the context of how teaching materials and online learning environments should be structured. In general, the majority of learning difficulties and unwanted behaviours in educational settings stem from a lack of motivation (Yıldız et al., 2019). This also applies to interactions in online environments. Considering the interaction of the learners with the teaching materials in the learning processes in online learning environments, the teaching materials in online learning environments should contribute to learning motivation in terms of design, content and access.

The main and sub-dimensions of the online learning environments in general and the teaching materials in particular based on the ARCS Motivation Model are presented in Table 1.

Table 1. Dimensions and sub-dimensions for materials to provide motivation based on the ARCS model

Attention	Relevance	Confidence	Satisfaction
To attract and sustain students' interest and attention.	To achieve what is expected.	To develop success expectation.	To provide the satisfaction of what is achieved.
To attract attention in terms of visuality, content and effectiveness.	The appropriate structuring of content to enable students' achievements.	Teaching materials should develop success expectation among learners.	Teaching materials should be satisfying in relation to access, design and content.

Attention

The category of attention includes sensory areas such as curiosity, excitement, interest, and boredom (Keller, 2016). Teaching materials prepared for online learning environments can be in the form of presentations, animations, text documents, video and audio files containing multimedia. Properly designed environments are effective in attracting the attention of learners (Mayer, 2003). Reeves (1998) states that multimedia is effective in attracting and sustaining attention because it can activate more than one senses at the same time.

Liu et al. (2009) discuss the concept of attention within the concept of concentration. In their work, an important relationship between concentration and perceived usefulness (PU) is stated. Hence, in this research, it is hypothesized that in an online learning environment;

H1. Attention has a positive effect on PU.

Relevance

This category, which can also be named as interest, includes the education being aimed at achieving the goals of the learner, being compatible with learning styles and being linked to previous knowledge (Keller, 2016). Variables such as subjective norms, image, professional suitability, and predictability of results have a significant effect on perceived ease of use (PEU) (Šumak et al., 2011). According to this, the following hypothesis is presented:

H2. Relevance has a positive effect on PU.

Confidence

This category states the positive effect of learners' positive expectations for success, experience geared towards success, and qualities of success. This effect is wholly based on a person's ability and effort and excludes variables such as luck, and the level of difficulty of the work to be completed (Keller, 2016). The learners' level of confidence is often dependent on motivation and effort needed to succeed (Orji et al., 2019). About this subject, the following hypothesis is proposed:

H3. Confidence has a positive effect on PEU.

Satisfaction

This category includes the perception of satisfaction includes rewarding outcomes planned internally and externally to reveal desired learning behaviours (Keller, 2016). The feeling that they are learning new and useful things creates an inner sense of satisfaction for learners (Arora & Sharma, 2018).

As with almost all information systems, the success of e-learning is thought to largely depend on user satisfaction and other factors that will subsequently increase their intention to continue using it (Roca et al., 2006). For example, it has been observed that satisfaction in the use of video for learning has a direct positive effect on PU (Nagy, 2018). Also, Lee et al. (2005), by integrating a motivational perspective into the TAM, reveal that both extrinsic (PU and PEU) and intrinsic (perceived pleasure) motivation tools are effective in explaining learners' intention to use the new learning environment.

Therefore, it can be proposed that:

H4. Satisfaction has a positive effect on PU.

It is believed that perception of satisfaction, one of the components of the ARCS motivation model, has a direct effect on the intention variable, which is one of the TAM components. However, there is very little work reported in the literature on direct impact. In a study conducted in the service industry, it was seen that after online shopping, customer satisfaction positively affected the intention to comment on the site (Finn et al., 2009).

H5. Satisfaction has a positive effect on BI.

Technology Acceptance

According to the TAM, the intention factor is very important for an individual to perform a behaviour; the higher the measure of an individual's intention to use a particular technology, the higher the behaviour of using that technology in the future. This explains the impact of the acceptance and use of technology and the realization of future behaviour. So that another variable that is effective in individual acceptance and use of technology is attitude (Davis, 1989). Ülgen (1995) emphasizes that attitude is a psychological variable that guides behaviour and is effective in decision-making.

Although our positive attitude towards technology will not bring along the behaviour of using that technology in the future, studies show that it has a very explanatory effect on intention, which affects behaviour (Ajzen, 1991; Davis, 1989, Venkatesh & Bala, 2008). On the other hand, while the PU is defined as the belief that using a certain system increases a person's job performance; PEU refers to the level of effort spent to use a particular system (Davis, 1989). In line with this definition, it can be stated that there is a relationship between PEU and PU. Joo et al. (2018) stated in their study that there is a strong relationship between PEU and PU. Attitude is expressed as the psychological disposition obtained as a result of the evaluation of a certain entity in terms of goodness or discontent (Eagly & Chaiken, 2007). It is believed that the perceived benefit of using new technology has a positive effect on attitude towards that technology in theory. In this context, Heijden (2003) stated in their research on web sites that there is a significant positive relationship between the PU of the site visitors towards the use of the site and the attitude towards the web site.

Similarly, it can be said that the PEU of technology has a positive effect on the attitude towards using that technology. This situation can be easily observed in the use of smartphones, search engines and social media platforms. For example, in the study of an online flight booking site, Guritno and Siringoringo (2013) stated that the PEU of the website has a positive effect on the attitude towards buying tickets from the website, but not as much as the PU and confidence variables have. In another study (Hu et al., 1999) stated that PU has an effect on the use of technology, but PEU has no effect. Finally, considering that technology is constantly evolving to facilitate human life and new products, new business models and approaches emerge, it is seen that some technologies are not adopted by the users at the expected level. This may mainly be due to the poor perception of the usefulness of that particular technology by the user. In a study conducted on an internet shopping site, it was established that the perception of the benefit of shopping from the website has a positive effect on the intention to use the website (Ramayah & Ignatius, 2005). In the studies carried out in the concept of e-learning, it has been observed that the PU has a positive effect on the intention regarding e-learning environments (Masrom, 2007; Liaw 2008). According to this, the following hypotheses are formed:

H6. PEU has a positive effect on PU.

H7. PU has a positive effect on ATTD.

H8. PEU has a positive effect on ATTD.

H9. ATTD has a positive effect on BI.

H10. PU has a positive effect on BI.

Based on the above-mentioned hypotheses, the suggested model is shown in Figure 1.

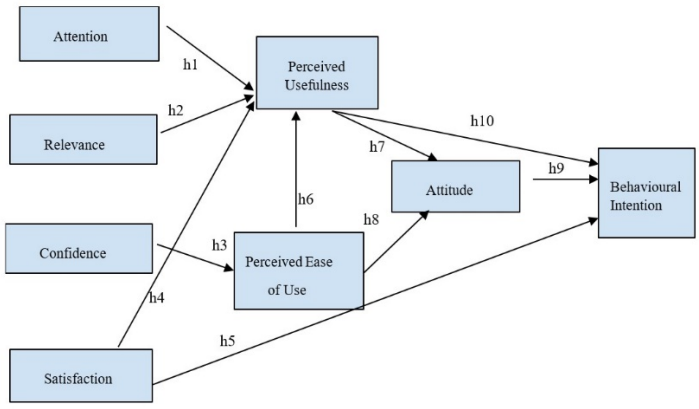

Figure 1. *The model tested by structural regression*

Importance of the Study

In his work on TAM, Davis (1989) stated that the acceptance of technology in technology-enriched learning environments is related to the internal factors of individuals, consists of variables such as BI, ATTD, PEU and PU. According to TAM, two concepts are known to explain the attitude: PEU and PU (Davis, 1989). According to the PEU and PU variables, which have an indirect impact on the BI of the use of current technologies in the learning environment supported by the technology, the learner must believe that the use of existing technology is easy and beneficial.

In this case, the effect of the motivation of learners regarding teaching materials on their acceptance of online learning environments emerges as an important research question. As a matter of fact, during the COVID-19 global pandemic process, we are in, as the educational institutions move their teaching and learning activities to online environments; it is essential to address the concept of the motivation of teaching materials in the acceptance of these environments. In the literature, there are studies on external factors that affect the acceptance of technology (Davis, 1989; Esteban-Millat et al., 2018; Joo, Kim, & Kim, 2016; Qin et al., 2011). A study of relevant work reveals that technology acceptance is mostly affected by external factors such as PEU and PU. However, learning is a process and hence the elements in the environment can affect technology acceptance too. Although this may not be a direct effect, it may be the case that the motivation learning materials give to a learner may help the acceptance of online learning environments. Therefore, in the acceptance of online learning environments, it is necessary to address the factors that serve learning rather than the PEU and the PU. In evaluating online learning environments, the teaching materials an individual interacts with must be considered in technology acceptance. To assess this, a focus on motivation in learning is essential. Since teaching materials are the fundamental elements of learning in online learning environments, these materials may help considerably in the acceptance of online learning environments. In this context, as the global pandemic enforces the use of online learning environments, the question to be answered can be formulated as; “What is the effect of university students’ motivation in learning materials on their acceptance of online learning environments?

METHOD

The study aimed to examine the effect of university students' learning motivation (ARCS) on technology acceptance. This study, designed with a general survey model, aimed to take a snapshot of and describe a current situation (Büyüköztürk et al., 2017). In screening studies, it is important how the individuals participating in the research are distributed, rather than the reasons for the opinions and characteristics, without the effort to change and affect the situation in question (Fraenkel & Wallen, 2006). In the study conducted as an example of the relational screening model, the relationships between variables were tested with structural regression analysis. Bollen (1989) explains the evolution of the Structural Equation Model to its current form through three basic developments: path analysis, contextual synthesis of latent variable and measurement models, and general estimation procedures. Accordingly, the basic models of the Structural Equation Model were path analysis, confirmatory factor analysis models, structural regression models, and latent change models (Raykov & Marcoulides, 2006). Accordingly, structural regression models are built on the assumption that there are some specific explanatory relationships, such as latent regressions, on top of confirmatory factor analysis; and it is generally used to test the existence of explanatory relationships involving various latent variables.

Participants

The study group consisted of 999 students studying in different departments of the university within the scope of common compulsory courses that a total of 10,000 students are required to take at a state university in the spring semester of the 2019-2020 academic year. Students had online access to the teaching materials prepared for these courses. The teaching materials that were delivered synchronously and asynchronously through the university's learning management system where live lessons, an interactive interface (chat, blog, board, etc.), PowerPoint presentations and text-based documents were offered to learners through virtual classrooms with interaction for the study group.

Data Collection Tools

Motivation scale regarding instructional material

In this study, the motivational design for learning and performance was used: The ARCS Model approach scale related to the teaching material developed by Keller (2010) and adapted into Turkish by Dinçer and Doğanay (2016). The adapted scale consists of four subscales and explains 47.5% of the total variance. The Cronbach Alpha

Internal Consistency Coefficient for the whole scale is 0.93. The structure of the scale obtained by confirmatory factor analysis has fit indices $\chi 2/df = 2.32$, SRMR = 0.04, RMSEA = 0.07, AGFI = 0.78, GFI = 0.81, NFI = 0.97, and CFI = 0.98. According to the fit indices it is possible to say that the tool has an excellent and acceptable values.

Technology Acceptance Scale

The technology acceptance scale developed by Ursavaş et al. (2014) consists of 37 items and 11 sub-factors. The factors in the scale are as follows: PU (4-items), PEU (3-items), perceived enjoyment (4-items), anxiety (3-items), BI (4-items), convenience (3-items), technological complexity (3-items), subjective norm (3-items), facilitating conditions (3-items), ATTD (4-items) and self-efficacy (3-items). Only 4 factors were used in this study, and these factors are PU, PEU, ATTD, and BI subscales

Data Analysis

Data analysis was performed with SPSS 23 and AMOS 23 programs and n, Min, Max, M, Sd, Skewness and Kurtosis values were obtained from the descriptive properties of the variables. The relationship between variables was tested with the Pearson Correlation coefficient. Also, variables related to students' learning motivations in the online learning environment were considered based on Keller's (2010) ARCS model and their effect on technology adoption was tested with structural regression analysis. Structural regression analysis is used because it is a technique more commonly used in exploratory research aimed at describing the relationship between structures (Hair et al., 2018). After presenting the descriptive statistics, findings related to the tested structural model are given.

Research Ethics

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

FINDINGS

Findings of the Descriptive Statistics and Correlation Values

Descriptive statistics regarding the variables examined in the study are shown in Table 2.

Table 2. Descriptive Statistics

Variable	n	Min	Max	M	d	Skewness	Kurtosis	Attention(1)	Relevance(2)	Confidence(3)	Satisfaction(4)	PU(5)	PEU(6)	ATTD(7)	BI(8)
Attention(1)	999	10	50	30.26	9.93	-0.147	-0.32	1							
Relevance(2)	999	8	40	24.83	7.82	-0.2	-0.221	.959**	1						
Confidence(3)	999	9	45	27.85	8.71	-0.18	-0.196	.934**	.944**	1					
Satisfaction(4)	999	6	30	18.27	6.12	-0.16	-0.362	.961**	.950**	.934**	1				
PU(5)	999	4	20	14.14	4.13	-0.722	0.205	.653**	.670**	.689**	.648**	1			
PEU(6)	999	3	15	10.65	3.09	-0.724	0.253	.596**	.622**	.645**	.589**	.861**	1		
ATTD(7)	999	4	20	13.91	4.166	-0.657	0.087	.662**	.671**	.680**	.652**	.886**	.860**	1	
BI(8)	999	4	20	13.85	4.134	-0.656	0.118	.658**	.672**	.675**	.658**	.853**	.829**	.917**	1

PU: Perceived usefulness, PEU: Perceived ease of use, ATTD: Attitude, BI: Behavioural intention 0.05>p; 0.01>p***

According to Table 2, based on the mean score obtained from the instruments it was discovered that the students have a higher score than the average in ATTENTION (χ =30.26), RELEVANCE (χ =24.83), CONFIDENCE (χ =27.85), SATISFACTION (χ =18.27), PU (χ =14.14), PEU (χ =10.65), ATTD (χ =13.91), and

BI (χ =13.85) dimensions. In addition, when Table 2 is examined, there is a significant and positive relationship exists between the PU, CONFIDENCE, ATTD and BI dependent variables and the independent variables relevant to this study ($p < 0.01$).

Findings of the Structural Regression Model

Structural regression models findings were found by the structural regression technique. These findings are shown in Table 3 below.

Table 3. Fit index values obtained in the first level CFA

Fit index values	Perfect fit	Acceptable fit	Fit Index Value Achieved in the Level-One CFA
$\chi 2$/sd	$0 \leq \chi 2/sd \leq 2.$	$2 \leq \chi 2/sd \leq 5$	3.49
GFI	$0.95 \leq$ GFI	$0.85 \leq$ GFI	0.99
AGFI	$0.90 \leq$ AGFI ≤ 1.00	$0.85 \leq$ AGFI	0.97
CFI	$0.95 \leq$ CFI ≤ 1.00	$0.90 \leq$ CFI ≤ 0.95	0.99
IFI	≥ 0.95	≥ 0.90	0.99
RMSEA	$0.00 \leq$ RMSEA ≤ 0.05	$0.06 \leq$ RMSEA ≤ 0.08	0.05
SRMR	$0.00 \leq$ SRMR ≤ 0.05	$0.06 \leq$ SRMR ≤ 0.10	0.01

Table 3 shows the fit indexes obtained from the structural regression model. The model has perfect fit indexes ($\chi 2$/sd =41.842/12) =3.49, p=0.000; GFI=0.99; AGFI=0.97; CFI=0.99; IFI=0.99; RMSEA=0.05; SRMR=0.01) (Bentler & Bonett, 1980; Browne & Cudeck, 1993; Byrne, 2006; Byrne & Campbell, 1999; Hu & Bentler, 1999; Joreskog & Sorbom, 1993; Kline, 2011; Tanaka & Huba, 1985; Schermelleh-Engel & Moosbrugger,2003). In the model, the testing of the data was performed with the structural regression technique and the effects of the variables are presented in Figure 2.

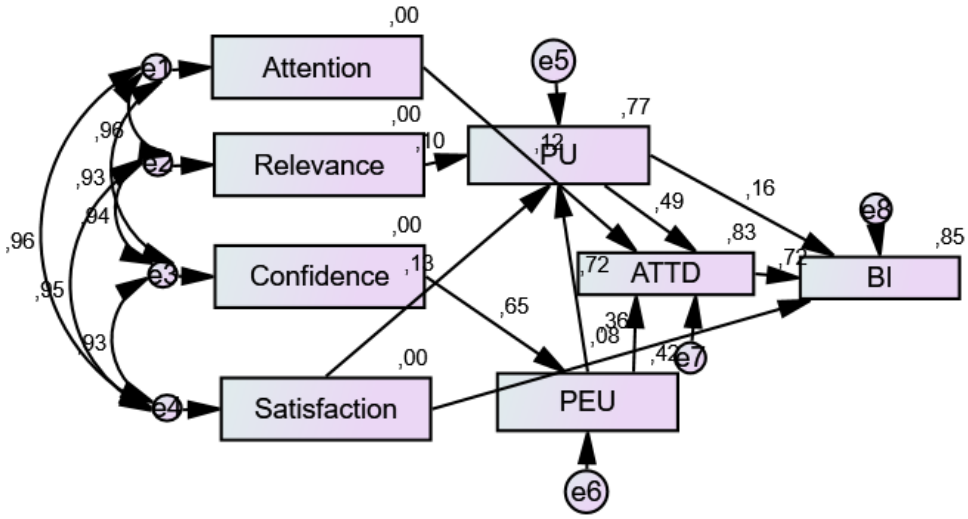

Figure 2. *Testing model with Structural Regression Technique*

Table 4. Results for hypothesis testing

Hypothesis	Relationship	β	t	p	r^2	f^2	Decision
h1	Attention→ATTD	0.124	7.153	***	0.124	0.14	Supported
h2	Relevance→PU	0.099	1.997	*	0.099	0.11	Supported
h3	Confidence→PEU	0.645	26.690	***	0.645	1.82	Supported
h4	Satisfaction→PU	0.126	2.621	**	0.126	0.14	Supported

h5	Satisfaction→BI	0.150	5.189	***	0.150†	0.18	Supported
h6	PEU→PU	0.724	37.515	***	0.724	2.62	Supported
h7	PU→ATTD	0.493	18.058	***	0.493	0.97	Supported
h8	PEU→ ATTD	0.719	14.091	***	0.719†	2.56	Supported
h9	ATTD→BI	0.717	26.709	***	0.717	2.53	Supported
h10	PU→BI	0.163	6.090	***	0.516†	1.07	Supported

†*the independent variable had a direct and indirect effect on the dependent variable. PU: Perceived usefulness, PEU: Perceived ease of use, ATTD: Attitude, BI: Behavioural intention*

When Figure 2 and Table 4 are evaluated together, it is seen that the ATTENTION independent variable has a direct effect (β=0.124, p<0.001) on the ATTD dependent variable, and an indirect effect (β=0.089) on the BI dependent variable. In addition, it is seen that the RELEVANCE independent variable has a direct effect on the PU dependent variable (β=0.099, p<0.05), and an indirect effect on the ATTD (β=0.049) and BI (β=0.051) dependent variables. While the CONFIDENCE independent variable has a direct effect (β=0.645, p<0.001) on the PEU dependent variable; It also has an indirect effect on the dependent variables of PU (β=0.467), ATTD (β=0.464) and BI (β=0.409). The SATISFACTION independent variable has a direct effect on the PU dependent variable (= 0.126, p<0.01), and an indirect effect on the ATTD dependent variable (β=0.062). It can also be seen that the SATISFACTION independent variable has both a direct (β=0.085, p<0.001) and an indirect effect (β=0.065, p<0.001) on the BI dependent variable. Furthermore, the PEU independent variable has a direct effect (β=0.724, p<0.001), on the PU, both a direct (β=0.362, p<0.001) and an indirect (β=0.357, p<0.001) effect on the ATTD, and an indirect effect (β=0.6333, p<0.001) on the BI dependent variables. While the PU independent variable has a direct effect on the ATTD dependent variable (β=0.493, p<0.001), it affects BI dependent variable both directly (β=0.163, p<0.001) and indirectly (β=0.353, p<0.001). Finally, it can be seen that the ATTD independent variable also has a direct (β=0.717, p<0.001) effect on the BI dependent variable.

Table 5. Effect size

Variables	r^2	f^2
PU	0.77	3.35
PEU	0.42	0.72
ATTD	0.83	4.88
BI	0.85	5.67

The proposed and tested model showed that the endogenous variables have adequate predictive relevance as given in Table 5. Accordingly, the PU variable is explained by the independent variables RELEVANCE, SATISFACTION and PEU at 77% (r2=0.77), the PEU variable is explained by the SATISFACTION independent variable at 42% (r2=0.42), the ATTD variable is explained by the ATTENTION, PU and PEU independent variables at 83% (r2=0.83) and finally, the BI variable is explained by the SATISFACTION, ATTD, and PU variables at 85% (r2=0.85).

Cohen's (1988) f value, which shows the effect size was determined on the dependent variables PU, PEU, ATTD, and BI. This method measures the effect size, if the significant results obtained in the model and its significance in practice, or not. To reach this, calculating the f2 value for regression analyses and linear models are being suggested as follows:

$$f^2 = R^2/(1 - R^2)$$

The results can be interpreted by the division of multiple correlation coefficient (R2) by its subtraction from 1(1-R2). An f value giving 0.02≤f2<0.15 refers to small effect, 0.15≤f2<0.35 means there is a medium effect and 0.35≤f2 indicates a large effect (Cohen, 1988). Hence, in this study the effects of all endogenous variables are large.

DISCUSSION & CONCLUSION

In the current study that was carried out based on the dynamics of online learning environments, the motivation of the teaching materials' impacts on learner acceptance of online learning environments was investigated. The data was gathered with the participation of students following online courses during the COVID-19 lockdown. The results reveal that the model tested in the ARCS and TAM framework is reliable and valid. Also, all hypotheses tested were supported in the scope of study. The structural regression analysis used in testing the model indicates that the motivation linked to the learning materials significantly and strongly explains the acceptance related to online learning environments with a variance of 85%. The findings of the study show that the motivation given to the learners by the instructional materials has an important effect on the components that affect the acceptance of the online learning environments.

H1. Attention→ATTD

In this study, a significant predictor of attitude was found as a result of testing the attention variable. Keller (2008) stated in his study that the attention factor related to the teaching materials increases the learners' motivation. The "attention" dimension is an element that increases attention and the motivation of learners and hence it necessitates that, the teacher has to consider ways of attracting the attention of learners and avoiding any distraction while delivering a lecture (Ocak et al., 2011). In this case, concretization, agreement and conflict, laugh, diversity, participation and questioning are strategies that serve attention dimension and increases motivation (Keller, 2008). Hence, teaching materials can attract learners' attention and have an impact on their attitudes towards online learning environments. Attitude is an important determinant of latent variables (Byrne, 2010) and BI (Ajzen, 1991; Davis, 1989). Keller (2010) states three important strategies for attracting learners' attention: perceptual arousal, inquiry arousal, and changeability. According to Cobb (2013), perceptual arousal becomes active with a change of environment. In this case, the change of the teaching and learning environment for students during the current pandemic period and the accompanying online teaching materials constitute a perceptual stimulation. Thus, a positive effect on students approach to learning environments related to attention variable was found. However, inquiry arousal is also related to the satisfaction of learners' curiosity, and it encourages students to solve problems and ask questions (Cobb, 2013); the findings of this study indicate that online learning environments help students in their research and in finding answers to their questions. Online teaching materials satisfying students' curiosity has a positive effect on students' attitudes. Finally, since the changeability strategy is also about providing continuity for learners (Cobb, 2013); it forms a positive attitude through online teaching materials (enriched with graphics, pictures, sound, etc.).

H2. Relevance→PU

In this study, the appropriateness of the teaching materials is a significant predictor in terms of usefulness. According to Keller (2010), students' expectations and needs and informing them about the importance of learning outcomes is related to the appropriateness of the teaching materials. This perspective makes the findings of the study quite interesting. It implies that as the interaction of learners with the learning materials reveals the importance and functionality of the learning materials in real-life situations, their motivation affects their perception of benefit in the learning environment. Instead of presenting the subject directly to the learners, allowing the learners to assimilate the subject and helping them to visualize the subject serve the dimension of relevance in increasing motivation (Ocak et al., 2011). This dimension has the feature of increasing the motivation of the learners in terms of the learners' experiences on the subject, the importance of the subject, its future benefits and its relevance (Keller, 2008). Therefore, informing learners about the relevance of a resource in the learning environment is likely to affect the PU of the said resource positively.

H3. Confidence→PEU

Another external variable considered in this study is confidence. Keller (2010) stated that learners need to feel competent in performing the tasks assigned to them. The confidence dimension, which requires organizing activities to develop the sense of confidence in the learner during the learning process and to ensure active participation in the lesson (Ocak et al., 2011), besides requiring that the learning objectives and needs are clearly stated, the difficulty level is increased, the learner is given responsibility with realistic expectations, and has a motivation-enhancing feature that includes different teaching strategies in terms of providing opportunities for its independence (Keller, 2008). Hence, the teaching materials offered in online learning environments are important for learners to develop a positive attitude. Confidence in the learning materials presented to students positively affects the acceptance of learning environments. It also has a positive effect on the PEU of learners who feel competent in the online learning environment. Therefore, it is seen that the materials presented are meaningful for

learners and that they serve the learners to complete the task by feeling confident and that they serve positively to the PEU, which is a predictor of the PU and ATTD. Also, Keller (2010) states that expectation for success, challenge setting and attribution moulding that are associated with the trust dimension, serve to understand the dimension of trust regarding the teaching materials. Providing a learner in an online learning environment with the confidence that he/she can achieve success will meet the expectation of success. This is further clarified by (Keller, 2010) stating that the sense of achievement can be triggered by the design of the instructional material presented to the learner, the presentation of the content in a meaningful way, and the clear and understandable expression of the learning tasks.

The findings of the study show that the motivation towards the teaching material is related to the PEU. The confidence dimension serves the motivation element regarding the teaching materials. This leads to the PEU. So, the perception that the opportunities in the environment where the material is presented serve their learning and support their success, the learners will further strengthen the PEU of the learning environment. This dimension serves the confidence motivation element and hence it is possible to talk about its effect on the PEU. So that, with the help of the perception that the opportunities in the environment where the material is presented serve their learning and support their success, the learner will further strengthen the perception of convenience on the learning environment. Finally, the dimension of attribution moulding, which emphasizes the effort shown to contain the element of trust and includes providing feedback to support the learner, also supports the perception of the convenience of the materials.

Finally, the attribution moulding, which is contained within the confidence element, emphasizes the effort shown and includes the provision of feedback to support the learner, also supports the perception of the convenience of the presented material.

H4-H5. Satisfaction→PU and BI

According to Keller (2008), seeing his/her expectations in the outcomes of the tasks given increases a learner's motivation. Hence, the outcomes of the study are important. When the teaching materials presented to a learner in online learning environments meet the learner's expectations, it can be concluded that the teaching materials are beneficial for the learner. The satisfaction dimension which requires structuring the course/teaching materials so that the learners are satisfied with the learning outcomes (Ocak et al., 2011), helps to increase motivation in terms of real-world connection, using positive reinforcement and equality (Keller, 2008). The PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989:320). Similarly, considering the strong correlation between benefit and behavioural intention (Davis, 1989; Khalifa & Shen, 2008), it is meaningful to determine a learner's perceived satisfaction as an important predictor for BI. Bağcı and Çelik (2018) reveal in their studies that satisfaction is effective in the intention to continue to use a resource.

H6-H7-H8-H9-H10

According to Venkatesh and Bala (2008), attitude is one of the strong determinants of BI. The current study' findings are parallel with various studies reported, showing that students' attitudes towards mobile learning and acceptance model are positively correlated with behavioral intention factor (Chaka & Govender, 2017) and attitude in e-learning environments is an important determinant of BI (Moreno et al., 2017). The important predictors of BI are the PU and the PEU; the effect of attitude on behavioral intention is also known (Davis, 1989). The significant effect of the satisfaction factor on the BI shown in this study is also explained in the literature (Wang, 2017). Ajzen and Fishbein (1980) describe BI as the measure of the probability of a person completing a given behaviour, suggesting that motivational factors influence the BI.

On the other hand, the attitude factor is significantly predicted by the PU and the PEU factors and the attention factor of ARCS. The form, to change/have changed or to measure attitudes is an important factor in determining human behaviour (Kaçar, 2011). Cüceloğlu (1991) stated that temporary tendencies are not seen as attitudes emphasizing that attitudes include not only feelings but also behaviours and they are long-term. He also stated that the most important factor that transforms into behavior is the strength of an attitude. Considering that the strength of an attitude is affected by its cognitive, affective and motor dimensions and that these dimensions are in interaction with each other (Fishbein & Ajzen; 1975). Attitude is an implicit variable that cannot be directly observed and is resistant to changes (Hamutoğlu, 2018). The PEU is expressed as an indicator of the PU and the attitude towards use (Davis, 1989). In this study, both the PU and the PEU were found to be important predictors of the attitude variable confirming the studies reported (Davis, 1989; Esteban-Millat et al., 2018). Besides, in line with the study that found that the confidence motivation element is effective on attitude (Balantekin & Bilgin,

2017); in this study, it is seen that the attention motivation element also has a significant effect on attitude. Other studies state the relationship between attitude and motivation (Karahan & Taşdan, 2016; Erdem & Gözük Küçük, 2013).

In this study, the PU factor is significantly predicted in terms of PEU factor as well as the satisfaction and relevance factors of ARCS. The findings of this study are influenced by individuals' PEU. The PEU of an online learning environment helps improve PU. This result is similar to the findings in the literature. In their studies on the acceptance of social networks by Qin et al. (2011) and acceptance of mobile learning management system by Joo et al. (2016), it is stated that the perception of ease of use has a significant and positive effect on perceived benefit. This study also showed that satisfaction and suitability factors also predict perceived benefit significantly and positively. This is due to the satisfaction of learners with the teaching materials presented to them in an online learning environment. (Keller, 2010) stated that the instructional elements in a learning process should be from the students' immediate environment; saying that this will serve the convenience strategy by benefiting from the students' current interests and experiences. It can be considered among the reasons why the presentation of the concepts that the students are familiar with from their close environment with the convenience strategy affects the result.

Finally, the PEU factor is predicted by ARCS' confidence factor. The PEU is defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989:320). Although in the field of study the PEU is described with features such as having a simple, usable and user-friendly user interface (Güldal, 2014); it can be seen in this study that motivation based on confidence has a significant effect on the PEU too. Although this finding contradicts Keller's statement of confidence previously quoted, it demonstrates similarities to the study conducted by Orji et al. (2019). The findings of the study show that the outcome is linked to giving the learners the perception that the materials presented on the online learning environment will meet their needs and they will complete the course. In giving this perception, the teaching and learning materials presented to learners should not have complexities and promote confidence, and hence have a significant effect on the PEU.

Implications for Theory and Practice

The main contribution of this study to the literature is the attempt to examine the motivational factor on students' online acceptance behaviour during the COVID-19 pandemic. However, this study is different than the studies assessing the direct impact of external variables on the design of teaching, and the impact of external and internal variables on technology integration and acceptance (Hamutoğlu & Başarmak, 2020; Ertmer, 1999, Sánchez-Prietoa et al., 2019; Wachira, & Keengwe, 2011). The use of the ARCS model in this study is not for increasing the acceptance of online learning environments by designing education, but for increasing the acceptance indirectly by increasing motivation. The acceptance of online learning environments was tested through the online materials offered to learners. For this reason, the results of the study offer some important implications for both theoretical and practical aspects of online learning during the crisis period. Theoretically, the study explains the adoption of online learning environments holistically through the TAM and the ARCS. The findings of this study, which is an example of exploratory work, have been supported by the studies in the literature. When the implications of using these results in practical applications are considered, it can be noted that the teaching materials presented to students in online learning environments have important consequences on the behaviour of using these environments by increasing students' motivation. Besides, different motivational factors linked to the teaching materials offered to learners also have different effects on different predictors of behavioural intention. For example, one of the practical implications of the study is that the perception of benefit is related to the learners' satisfaction with the material presented to them and the suitability of the material. Similarly, if you want to indirectly increase the learner's intention to use a particular technology in the future by increasing the PEU, you need to work on teaching strategies related to the element of confidence. Similarly, you can focus on the attitude factor to ensure the acceptance of a particular technology, and indirectly increase the acceptance of that technology through the attitude factor with the attention motivation element. Finally, the satisfaction motivation element, which has a direct effect on acceptance, can be used in line with the practical implications of the results. Learners can develop a positive attitude towards online learning environments and develop an attitude of using these environments in the future based on the PU and the PEU of the teaching materials offered, through their motivation.

Conclusion

In this study, the unavoidable transition of educational institutions to online learning environments due to the global pandemic process and the evaluation of the effect of the motivation of university students regarding teaching materials on their acceptance behaviours of online learning environments were examined. In this study, the concept of motivation was discussed in the framework of the ARCS model and acceptance of online learning environments in the TAM framework. The findings of the study show that the intention factor in the acceptance of online learning environments is significantly predicted by attitude and PU factors and the satisfaction factor of ARCS. On the other hand, the attitude factor is significantly predicted by the PU and PEU factors and the attention factor of ARCS. Finally, while the satisfaction and relevance dimensions of motivation and the PEU factor were significant predictors of the PU factor; the PEU factor is also significantly predicted in terms of the confidence factor of the motivation dimension.

Limitations and Future Directions

It is thought that this study, which has some limitations, should focus on the limitations of the research in order to guide future research opportunities. The first of these limitations is that the participants were studying in a public university in Turkey, and they were obliged to take common courses that are determined by the Higher Education Council. The model tested in the study should also be carried out with different groups of learners. So that more comprehensive results can be obtained in testing the validity of the model and in the discussion of the findings. Another limitation is the generalizability of the study.

Although evidence is provided by G*power analysis (Faul et al., 2007) that the sample of the study is sufficient, similar studies can also be conducted with data collected from different university students and students studying at different countries. Finally, the results obtained in the study can be supported by the controlled experimental setups and qualitative studies to be carried out. For example, the motivational elements of the teaching materials offered to the learners may allow a comparative analysis of the effect of the experimental setups on the acceptance of the technology. With qualitative interviews with students, the effect of motivational factors on variables that affect acceptance behaviour can be supported by providing data diversity.

Statements of Publication Ethics

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

Researchers' Contribution Rate

Author 1: %25

Author 2: %25

Author 3: %25

Author 4: %25

All authors took an equal part in all processes of the article. All authors have read and approved the final version of the study.

Conflict of Interest

The authors declare that there is no conflict of interest with any institution or person within the scope of the study.

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