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Effective Use of Distance Education Tools in Higher Education During Covid-19 Pandemic in Türkiye

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Abstract

In this study, it was aimed to determine the attitude of students at state universities towards the effective use of distance education tools during the COVID-19 pandemic in Türkiye. This study was conducted within the scope of the Technology Acceptance Model by using a relational survey design. The sample consisted of 4.118 undergraduates from different public universities. The results showed that technology acceptance scores (TAS) of undergraduate students were higher than associate degree students. In addition, TAS increases as the duration of distance education use increases. A strong positive correlation was found between university students' perceptions of experience, enjoyment, and self-efficacy and the perceived benefit and ease of use of distance education. Perceived usefulness and perceived ease of use are determinants of the intention to use and attitude towards using distance education systems. The research also identified that university students' intention to use the system and their attitude towards using it have positive effects on behavior during actual use. In conclusion, it may be asserted that, distance education is an indispensable system in terms of providing quality education services and developing human resources in times of crisis.

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INTRODUCTION

During the COVID-19 pandemic, countries have made great efforts to avoid problems in education and to ensure the continuity of education service by using all the means at their disposal. This made it necessary and imperative to use technology in developing human resources. Since university students are perceived as the potential human resources, in this study we focused on the effective use of distance education tools in higher education based on the Technology Acceptance Model (TAM) (Rizun & Strzelecki, 2020). In current study, regarding the perceptions of undergraduates in Türkiye, the effective use of distance education tools, and its role of distance education was examined.

Almost all of the education systems in the world tried to fight against coronavirus (COVID-19) pandemic and found ways to continue education during the epidemic (Sari & Nayir, 2020). COVID-19 crisis emerged at a time when most of the education systems were not ready for the world of digital learning opportunities, according to the latest report from the OECD's International Student Assessment Program (PISA) (OECD, 2020). In other words, the Coronavirus has revealed that education systems around the world are not ready for times of crisis. Students from remote and impoverished locations faced numerous obstacles, including limited technical access, inadequate internet connectivity, and adverse study conditions (Sakka, 2022). COVID-19 pandemic has changed the way of learning in higher education (Simamora, 2020). Online and distance learning is a necessity in times of lockdowns and social distancing due to COVID-19 pandemic (Ali, 2020). Moreover, Yaylak (2022) asserts that distance education is indispensable in maintaining education services and using technology in education during the COVID-19 process. Students consider distance learning as the interesting, modern, adequate, and convenient, but it doesn't able to replace their experience of social interaction with fellow students and teachers (Kedraka & Kaltsidis, 2020). On the contrary, Alawamleh, Al-Twait, and Al-Saht (2022) found that students preferred face-to-face lessons more than online lessons due to many problems during the COVID-19 process. These problems are feeling of loneliness caused by online lessons, lack of motivation, lack of understanding of the subject, decreased communication between students and instructors. In particular, the reflections of the suspension of face-to-face education and the transition to emergency distance education will be more clearly understood in the following years (Izgı-Onbaşılı & Sezginsoy-Şeker, 2021).

Countries have been pushed to expand their use of distance education and make it mandatory in view of the danger of being unable to resume face-to-face education (Masalimova et al., 2022). In Türkiye, due to COVID-19 pandemic, face-to-face education has largely been replaced by distance education practices (Keskin & Ozer-Kaya, 2020). Literature review revealed different variables affecting students' effective use of distance education tools. These variables are internet access, having a computer, motivation, perception regarding distance education, knowledge and experience, perceived usefulness, and flexibility (Ibicioglu & Antalyali, 2005; Sahin & Shelley, 2008). In addition, numerous factors that determine the satisfaction level of university students regarding distance education tools are mentioned. These factors are expressed as the quality of live courses, the course contents, the quality of videos, ease of access, technological support, and possibilities to watch the recordings afterwards (Yilmaz-Ince et al., 2020).

In studies conducted within the scope of TAM, various external variables that affect the attitude of individuals to accept technology are mentioned. These are experience, computer anxiety, enjoyment, self-efficacy, subjective norms, and quality (Abdullah et al., 2016; Aypay et al., 2012; Efiloglu-Kurt, 2015; Lau & Woods, 2008; Lee et al., 2014; Park et al., 2012; Pituch & Lee, 2006; Rizun & Strzelecki, 2020; Wang & Wang, 2009). In this sense, system and user characteristics have a significant effect on use of technology as the external variables. Moreover, external variables also affect perceived ease of use and perceived usefulness in adopting a technology (Davis et al., 1989). In other words, the suitability of external factors enhances the efficiency of the lessons, and so, increases the

adoption level of students' distance education application and their active participation. In current study, Technology Acceptance Model was adopted as a research design (Rizun & Strzelecki, 2020) considering self-efficacy (SE), enjoyment (ENJ), computer anxiety (CA), experience (EXP), perceived ease of use (PEoU), perceived usefulness (PU), intention to use (ITU), attitude towards use (ATU), and actual use (AU). Regarding the results from previous studies, the sub-dimensions of the model are discussed below.

SELF-EFFICACY (SE)

The most well-known definition of SE is the confidence level displayed by individuals who successfully use a particular system. Zimmerman (1995) defines SE as people's positive judgments about their ability to organize and implement the action plans necessary to achieve certain types of performance. According to Wood and Bandura (1989), SE is people's perceptions of their belief in their ability to activate the motivation, cognitive resources, and action pathways they need to gain control over the events or phenomena they encounter. SE is also related to previously experienced knowledge systems (Bandura, 1977; Wang & Wang, 2009). In this sense, SE perception of students is significant to ensure participation and encourage learning in distance education (Sun & Rueda, 2012).

SE beliefs affect an individual's cognitive, motivational, and emotional attitudes as well as decision making. Numerous studies have included the findings that SE beliefs are a strong predictor of PEoU and PU (e.g., Abdullah et al., 2016; Igbaria & Livari, 1995; Liaw & Huang, 2013). In addition, the research results of Venkatesh and Davis (1996, 2000) reveal that the perception of computer self-efficacy is a strong predictor of the perception of ease of using certain systems in individuals. The results of different studies not only reveal a positive relationship between SE and PEoU, but also reveal that SE also positively affects PEoU (e.g., Abbad et al., 2009; Aypay et al., 2012; Davis et al., 1989; Lee et al., 2013; Motaghian et al., 2013; Pituch & Lee, 2006; Wu et al., 2013). For instance, Lee et al. (2014) found that while computer and internet self-efficacy has a positive effect on PEoU and PU, computer SE does not have a significant effect on PU.

There are also studies in the literature showing that SE beliefs do not have a significant effect on PEoU and PU. For instance, according to the results of the research conducted by Lau and Woods (200 8), the perception of SE does not have a significant effect on individuals' PU and PEoU of learning tools. Similarly, a study by Rezaei et al. (2008) includes findings that there is no significant relationship between individuals' SE perceptions and their PEoU of using technological tools. There are many studies in the literature that include the finding that technological SE belief does not have a significant effect on PU from technological tools (Aypay et al., 2012; Lee et al., 2013; Motaghian et al., 2013; Pituch & Lee, 2006).

ENJOYMENT (ENJ)

ENJ in the context of using a technological system or information system is only an indication of how enjoyable it is to use a particular system (Park et al., 2012). Shyu and Huang (2011) argue that individuals' perceived ENJ of technological tools has a positive effect on PEoU. According to Al-Gahtani (2016) and Al-Ammary et al. (2014), the ENJ individuals perceive in the process of using technological tools is a significant predictor of their PEoU of these tools. In addition, Park et al. (2012) found that individuals' perceived ENJ in the web-based education process has a significant positive effect on their PU from this education. However, in the same study it was reported that perceived ENJ of web-based education does not have any effect on PEoU of technological devices Chen et al. (2013) found that university students' perceived ENJ from web-based education had a positive effect on their PEoU and PU. Sahin and Shelley (2008) found a positive and significant relationship between perceived ENJ of students in distance education process and their PEoU of distance education systems. According to Abdullah et al. (2016), in the e-learning process, a high level of perceived ENJ ensures better learning and to adopt e-learning. Looking at the results of previous studies, it may be said that the ENJ

individuals perceive from distance education systems is an intrinsic motivation source that has a positive effect on PEoU and PU.

COMPUTER ANXIETY (CA)

CA is defined as individuals' fear of the necessity or possibility of using a computer. More precisely, CA is expressed as emotional fear, anxiety, and phobia that people feel when they interact with or think about using a computer (Chua et al., 1999). In a study, conducted by Calisir et al. (2014) and Karaali et al. (2011) there are findings that employees' anxiety about using web-based learning systems negatively affects their perceptions of ease of use. Moreover, the findings of a study by Liu (2010) showed that CA was not a significant predictor of PEoU or PU. It may be said that CA will make things difficult for students in the process of acquiring the habit and proficiency of using computers. However, it is known that the computer as a technological device is mostly preferred by students for distance education during the COVID-19 epidemic (Aydemir et al., 2012; Yilmaz-Ince et al., 2020). According to Abdullah et al. (2016), CA level of students is one of the most basic determinants of their PEoU. Similarly, Rizun and Strzelecki (2020) determined that university students' CA negatively affects their PEoU of distance education systems. Similarly, Rezaei et al. (2008) in Iran and Shen and Eder (2009) in the USA concluded that there is no significant relationship between students' CA and their PEoU.

EXPERIENCE (EXP)

EXP can be defined as all of the knowledge and skills that individuals acquire in a certain period of time or throughout life. In literature, there are numerous studies examining the relationship of EXP with technological tools with ease of use and usefulness of these tools, or the effect of EXP on PEoU and PU. For instance, Igbaria et al. (1995) stated that the EXP of using computers has a direct effect on PEoU and PU. DeSmet et al. (2012) indicate that individuals' computer EXP has a positive effect on their PEoU. In addition, Davis et al. (1989) found a positive relationship between the participants' technological system experience scores and their PEoU of use from the technological system. Similar results were obtained in studies conducted with students. Tsai et al. (2021) reported a close relationship between students' EXP and their participation in live courses. In this sense, active participation is a significant indicator of effective online learning. Therefore, students need to focus on new learning EXP and get rid of prejudices, and so they can learn through their EXP (Kolb, 2015). Abdullah et al. (2016) determined that students' EXP with a technological system has a positive effect on the ease of using the system and the usefulness of the system. Similarly, Lee et al. (2013) found that students' experiences with e-learning systems have a positive effect on their PEoU and PU.

Regarding that individual experience has a positive effect on PEoU, it may be said that the results of studies examining the relationship between personal experience and PEoU and PU differ. Abbad et al. (2009), in their study with students, found that the effect of students' internet EXP on PEoU was significant, but it did not have a significant effect on PU by students. In research conducted by Abdullah et al. (2016) and Lee et al. (2011) the results show that EXP does not have a significant effect on PU. In a similar study by Pituch and Lee (2006), it was concluded that internet EXP is not a significant predictor of PU. In addition, Rezaei et al. (2008) found that internet EXP was not a significant predictor PEoU. Similarly, Lau and Woods (2008) concluded that computer EXP did not have a significant effect on students' PEoU and PU of computer-based learning tools.

PERCEIVED EASE OF USE (PEoU)

Davis et al. (1989) define PEoU as the degree to which a potential user thinks using a particular system is effortless. In other words, it is the relatively easy acceptance and adoption of a technology by individuals (Liu et al., 2009). Features of a system, such as menus, icons, and touchscreen capability, aim to increase the usability of technology. PEoU, as well as the qualities of technological systems, is an issue that users care about because ease of use can be effective in individuals' adoption, use or

intention to use a system or technology (Davis, 1989). In numerous studies (e.g., Lee et al., 2014; Liu, 2010; Venkatesh & Davis, 1996, 2000) the results reveal that the PEoU regarding technological tools has a positive effect on individuals' intention to use these tools. According to Liu et al. (2009), there is a positive relationship between individuals' PEoU about technological devices and their attitudes towards using these devices. The PEoU by individuals regarding a technological system positively affects their intentions and behaviors towards using that system (Abdullah et al., 2016; Chen et al., 2013; Lau & Woods, 2008; Lee et al., 2011; Wu et al., 2013). In this context, it may be said that the PEoU for distance education technology positively affects students' willingness to participate in distance education (Aydemir et al., 2012). Moreover, in different studies a positive relationship was found between university students' PEoU of e-learning systems and their intention to use it (Al-Gahtani, 2016; Pituch & Lee, 2006; Rezaei et al., 2008). In addition, Farahat (2012) found PEoU related to online learning is a determinant of university students' attitude towards learning.

During COVID-19 pandemic process, university students had to access distance education through technological systems. In this process, the fact that the education platform offered by the institutions to the students is without alternative makes the ease of use of the distance education system much more important. This is because the PEoU of a system is an indicator of its actual use (Rizun & Strzelecki, 2020). On the other hand, PEoU also increases the lecturers' intention to use web-based learning systems (Motaghian et al., 2013). In some studies, there are findings that there is no significant relationship between the participants' PEoU of technological systems and their intention to use these technologies. (Shen & Eder, 2009). However, the results of some studies (e.g., Purnomo & Lee, 2013; Wang & Wang, 2009) show that PEoU of a technological system has no effect on the intention to use of it. In addition, Hu et al. (1999) found that the PEoU regarding the technological system was not a significant predictor of participants' attitude towards learning.

PERCEIVED USEFULNESS (PU)

PU is expressed as individuals' thoughts about whether a technological system they use while performing their duties facilitates their work and increases their job performance compared to alternatives. In other words, it is the degree to which a potential user sees a particular technology as more valuable than alternative methods that perform the same task (Davis et al., 1989) or accepts it as being superior (Liu et al., 2009). According to Davis et al. (1989), PU is a potential user's subjective belief that using a particular system is likely to improve job performance in an organizational context. Davis (1989), who explains the relationship between the usefulness of distance education systems and the PU of the users, states that the PU is closely related to the adoption or acceptance of a technological system. The PU of a particular technology is a determinant factor of whether or not that technology is used (Liu et al., 2009). In addition, PU may increase depending on the usage time of the technological system. In this sense, the increase in the perception scores of individuals that a technological system is useful positively affects their intention to use a technological system (Davis et al., 1989).

In different studies, a positive relationship was found between PU of a technological system, web-based learning or e-learning system tools and individuals' intentions and attitude towards using the system (Aypay et al., 2012; Ozer et al., 2010; Purnomo & Lee, 2013). Literature review showed that there were numerous studies include findings, that the PU of individuals from e-learning system tools positively affected their attitudes and behaviors towards using web-based learning applications, technological systems or information technologies (e.g., Chen et al., 2013; Calisir et al., 2014; Hu et al., 1999; Lau & Woods, 2008; Lee et al. 2013; Lee et al., 2011; Liu, 2010; Liu et al., 2009; Shen & Eder, 2009; Shyu & Huang, 2011; Venkatesh & Davis, 1996, 2000; Wu et al., 2013; Yang, 2005). Moreover, similar findings were found in studies conducted with students and teachers. These studies show that the PU of e-learning systems has a positive effect on students' attitudes towards using, adopting and actually using the system (e.g., Abbad et al., 2009; Al-Gahtani, 2016; Lee et al., 2014; Motaghian et al., 2013). There are also studies in the literature, which found that the PU of students from distance

education positively affects their intention to use distance education tools and their attitudes towards using them (Liu et al., 2009; Rizun & Strzelecki, 2020). Farhat's (2012) study included the finding that there is a positive relationship between students' PU from online learning and their attitudes towards learning. In addition, Pituch and Lee's (2006) study included the findings that students' PU of distance education system positively affect their adoption or use of distance education. In conclusion, it may be said that students' PU positively affects their intention to use a technological system. However, the results obtained from some studies show that the PU does not have a significant effect on the attitude towards using the distance education system. Lee et al. (2013) found that PU has no effect on the attitude towards using the distance learning system. Similarly, Efiloğlu-Kurt's (2015) study includes the findings that the PU of university students does not have a significant effect on their behavior of actively using the distance education system.

INTENTION TO USE (ITU)

According to Liu et al. (2009) ITU is the degree to which users decide to adopt or use a technology. In the present study, the concept of ITU is expressed as the degree of willingness of students to adopt or continue using a particular distance education system. The nature of the distance education system and its modules affect the ITU a system and its modules. It may be said that students' willingness to use distance education tools has a positive effect on their behavior of actually using distance education tools (Rizun & Strzelecki, 2020). Ozer et al. (2010) found a positive relationship between the ITU the distance education system and the behavior to actually use it. There are also studies in the literature including the findings that the ITU technology positively affects the behavior of using technology (e.g., Liu, 2010; Venkatesh & Davis, 2000). Moreover, the results of some studies (e.g., Al-Gahtani, 2016; Motaghian et al., 2013; Wang & Wang, 2009) show that participants' ITU a web-based system has a positive effect on their actual use behavior.

ATTITUDE TO USE (ATU)

In this study, the attitude towards using is considered as the attitude of university students towards using the distance education system. In this context, the attitude towards use is expressed as the degree to which university students adopt and use the distance education system. Liu et al. (2009) defines attitude towards use as the degree to which participants enjoy using technology. Both PU and PEoU are shown among the main determinants of their attitudes towards the use of distance education. In studies conducted by Aypay et al. (2012) and Ozer et al. (2010), a positive relationship was found between university students' intentions to participation distance education and their attitudes to use distance education tools. According to Farahat (2012), attitude towards use is one of the factors that play the most determining role on students' distance education behaviors. In the research conducted by Karaali et al. (2011) and Lee et al. (2013), the results reveal that students' attitudes towards distance education have positive effects on their ITU a web-based learning system. Similarly, Lau and Woods (2008) found that students' behavioral intentions towards distance education systems had a positive effect on their AU behaviors.

ACTUAL USE (AU)

In current study, AU was discussed in the context of a student's behavior in actually using the distance education system. TAM claims that the ease of use of technology affects the AU of a technology-related system. In addition, the factors such as the PU of a technological system, the PEoU of the system, the attitude and behavioral intentions of individuals to use the technological system play a decisive role on the adoption and AU of a technological system (Shyu & Huang, 2011; Tao, 2009). For example, Rizun and Strzelecki (2020) found a positive relationship between university students' ITU of the distance education system and their AU behavior. In this context, it may be said that students' PEoU has a significant effect on their adoption and use of distance education. Lee (2010) argues that the ease of using distance education systems and the usefulness of the system has a positive effect on the adoption level of students ITU and satisfaction with the system. Although it was

decided to switch to distance education due to the Covid-19 outbreak, lecturers who were not ready for the functioning of distance education and face difficulties seemed less willing to distance education (Hilli, 2020). Similarly, in study conducted by Sari and Nayir (2020) the participants reported that they were not ready for the distance education process, teachers and students had difficulties in using the system and therefore they have difficulty in following the lesson.

RESEARCH AIM AND QUESTIONS

Due to the COVID-19 epidemic, education at universities in Türkiye and other countries was carried on through technological tools and web-based systems. It may be said that this process has both positive and negative effect on the development of students. Thanks to the technological tools and applications used in the distance education process, the opportunity to easily communicate with the instructors, and watch the live lesson recordings are among the positive effects of the system. However, research results showed that distance education was not effective as the face-to-face education (Yilmaz-Ince et al., 2020). Moreover, Keskin and Ozer-Kaya (2020) found that university students quickly forgot what they learned and experienced technical problems during distance education. Educational disruptions and school closures during the COVID-19 pandemic have become a remarkable social issue, particularly among the developing countries. Ample literature has verified the adverse effects of the long-lasing epidemic on school education (Ali, 2020; Izgı-Onbaşılı & Sezginsoy-Şeker, 2021; Kedraka & Kaltsidis, 2020; Keskin & Ozer-Kaya, 2020; Sakka, 2022; Sari & Nayir, 2020; Simamora, 2020; Yaylak, 2022). However, limited studies seek to understand the association between the severity of COVID-19 and effective use of distance education tools as an alternative education model (Li et al., 2022). In this sense, it is predicted that determining the tendency of university students to prefer distance education applications in the context of TAM will fill the gap in the literature and provide scientific to policy makers and practitioners in higher education.

In this study, it was aimed to determine the attitude of students at state universities towards the effective use of distance education tools during the COVID-19 pandemic in Türkiye. In this context, the aim was to determine the relationship between SE, ENJ, attitude and perceptions about CA and EXP and PEoU and PU of the distance education system of students. For this purpose, answers to the following questions were sought:

- Do university students' perceptions related to the TAM differ significantly in terms of gender, program, experience, and frequency of use?
- Is there a correlation between SE, ENJ, CA, EXP, PEoU, and PU regarding distance education?
- Do the PU and PEoU of distance education system has a determinant effect on ITU the distance education system and attitude towards using it?
- Are the intentions and attitudes of students towards using the distance education system predictive of their AU of it?

METHOD

RESEARCH MODEL AND HYPOTHESES

This study was carried out within the scope of TAM, and the relational survey model, which is one of the quantitative research designs was adopted. The Technology Acceptance Model attempts to explain and predict what the determinants of individuals' behavior towards a particular technological system are. The TAM model proposes two basic attitudes including PU and PEoU, to determine the usefulness of a technology. According to Liu et al. (2009) PU indicates the extent to which the potential adopter perceives the target technology as better and worth using compared to alternative methods to accomplish the same task. In this study, the perceptions of associate and undergraduate students attending their education at state universities in Türkiye regarding distance education during the

COVID-19 epidemic were analyzed within the scope of TAM. In addition, the effects of distance education applications on development of university students were determined. In Figure 1, the hypotheses and research model were given.

The hypotheses given below were developed by reviewing the relevant literature about the TAM model.

H1: EXP, ENJ, and SE have positive effects on the PU of distance education.

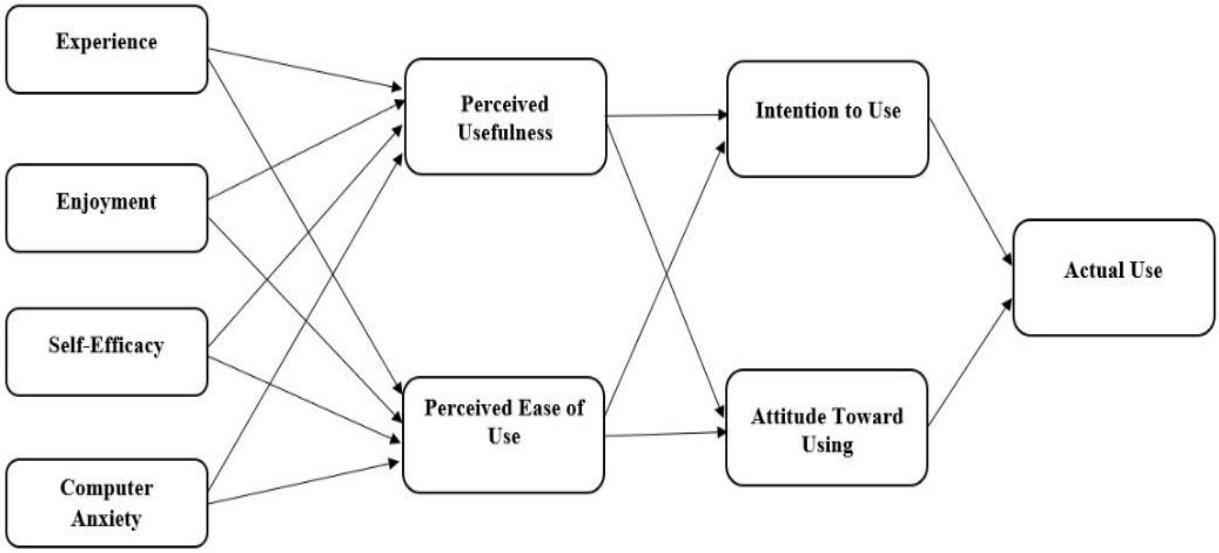
H2: CA has a negative impact on the PU of the distance education system.

H3: EXP, ENJ, and SE have positive effects on the ease of use of distance education.

H4: The PU and ease of use of the distance education system positively affect the intention and attitude of university students to use distance education.

H5: University students' ITU distance education and their attitude towards using it affect their AU of distance education positively.

Figure 1. *Research Model*



PARTICIPANTS

The population of this research consisted of university students studying at state universities in Türkiye. The number of students continuing their education at state universities in the 2021-2022 academic year is 7,616,360. The sampling group was determined by using the convenient sampling method among the students who attended 80 different state universities during the 2020-2021 academic year. The sample group was determined as 4,145 with 2% margin of error, 99% confidence level and 5% estimated response rate. So, the sample for this study was 4,118 associate and undergraduate students. Participants were determined based on the two criteria. The first criterion was that the participants should be associate or undergraduate students enrolled in formal education. The second was that the participants should be the students who used distance education systems during the period when distance education continued, and the data were collected. The aim in determining these criteria was to reach a data set that reflects more accurate and original views about distance education. The demographic characteristics of the sampling group were given in Table 1.

Table 1. *Demographic Characteristics of Sampling Group (N=4.118)*

Gender	*N*	*%*
Female	2977	72.3
Male	1141	27.7
Program	*N*	*%*
Associate's degree	1904	46.2
Bachelor's degree	2214	53.8
Experience Using Distance Education	*N*	*%*
For the first time this term	530	12.9
For the second time in this term	1775	43.1
For the third time in this term	1813	44.0
Frequency of Using Distance Education	*N*	*%*
Only during online course hours	1.984	48.2
1-5 hours every weekday	942	18.4
6-10 hours in total per week	508	12.3
11-15 hours in total	378	9.2
16 hours or more per week	488	11.9

DATA COLLECTION TOOL

The TAM Scale was used as a data collection tool. TAM Scale developed by Rizun and Strzelecki (2020) and adapted to Turkish by the researchers. The fit indices were calculated by the researchers. Accordingly, it was calculated as CFI=.93, TLI=.92, RMSEA=.07. The scale includes 30 items of five-point Likert type. The Scale has nine sub-dimensions: Self-Efficacy (3 items), Enjoyment (3 items), Computer Anxiety (4 items), Experience (4 items), Perceived Ease of Use (4 items), Perceived Usefulness (4 items), Intention to Use (3 items), Attitude Towards Use (4 items) and Actual Use (1 item). The fit indices of the TAM scale in the original study were not included. Cronbach Alpha internal consistency scores were calculated for the sub-dimensions. These scores were α=.88 for ATU; α=.89 for CA; α=.94 for ENJ; α=.87 for ITU; α=.88 for PEoU; α=.93 for PU; α=.93 for SE, and α=.87 for XP. The Cronbach Alpha internal consistency scores for this study were α=.86 for ATU; α=.86 for CA; α=.96 for ENJ; α=.93 for ITU; α=.87 for PEoU; α=.95 for PU; α=.91 for SE, and α=.86 for XP. This value shows that the internal reliability level of the TAM Scale is quite high. Data were collected electronically between 25.09.2022 and 25. 01.2023. During the data collection process, a letter was written to state universities by the second researcher, ethics committee permission and data collection tools were sent. In addition, the faculty secretaries of the education faculties were reached via e-mail, and they were asked to support the study.

DATA ANALYSIS

Data were analyzed by using IBM SPSS 25.0 statistical package program. Skewness and kurtosis values were determined to reveal whether the data was distributed normally or not. In this study, the skewness and kurtosis values for the data range from -1.5 to +1.5. These results revealed that the distribution of data was normal across the variables (Tabachnick & Fidell, 2014). Demographic characteristics of the participants were presented by using descriptive statistics such as percentage and frequency. Independent t-test and ANOVA test were used to determine whether the technology acceptance scores differed according to the demographic characteristics of the participants. The relationship between the variables was calculated by using the Pearson correlation coefficient method. Tests related to the hypotheses were carried out by using multiple regression analysis.

FINDINGS

Table 2 shows the results regarding the level of differentiation of participant views in terms of demographic variables within the scope of TAM.

Table 2. *The TAM Scores Regarding Demographic Variables (N=4.118)*

Variable	*Category*	*N*	*Mean*	*SD*	*SE*	*df*	*F*	*t*	*p*
Gender	Female	2.977	2.99	.773	.0141	4.116	36.970	1.565	.000*
	Male	1.141	3.04	.862	.0255				
Program	Associate's degree	1.904	2.96	.829	.0189	4.116	13.642	3.393	.000*
	Bachelor's degree	2.214	3.04	.777	.0163				
Use	First time	530	2.91	.866	.0376	4.117	5.016	-	.007
	Second time	1.775	2.99	.800	.0190				
	Third time	1.813	3.04	.775	.0182				
FoU*	During online course	1.984	2.79	.771	.0173	4.117	98.178	-	.000*
	1-5 hours every weekday	334	2.92	.764	.0370				
	6-10 hours in total per week	426	3.20	.723	.0396				
	11-15 hours in total	886	3.26	.724	.0243				
	16 hours or more per week	488	3.37	.830	.0376				

FoU= Frequency of Use.

As may be understood from Table 2, the technology acceptance scores have a statistically significant difference in terms of the gender variable. Independent t-test results revealed that male students' technology acceptance scores (*M*=3.04) were higher than female students (*M*=2.99). According to these results, it may be said that male students more adapt to technology and accept technology at a higher level compared to female students. Technology acceptance scores show a statistically significant difference according to the type of program. Compared to students with associate degree (*M*=2.96), students with bachelor's degree have higher technology acceptance scores (*M*=3.04). These results revealed that the adaptation and acceptance level of technology among students with bachelor's was higher than students with associate degree. ANOVA results revealed that the technology acceptance scores of the participants did not show a statistically significant difference in terms of experience of using distance education. In addition, ANOVA results revealed that the technology acceptance scores of the participants differed statistically in terms of the frequency of using distance education. Technology acceptance scores of participants who use distance education more than 16 hours a week are higher than the other participants. These results indicate that as the duration of distance education use increases, technology acceptance scores increase.

Table 3 shows the results of the correlation analysis.

Table 3. *Correlation Analysis Results*

	Mean	***SD***	*AU*	*ITU*	*ATU*	*PU*	*PEoU*	*EXP*	*ENJ*	*SE*	*CA*
AU	**3.52**	**1.31**	1.00								
ITU	**3.46**	**1.27**	.762**	1.00							
ATU	**2.62**	**1.28**	.535**	.573**	1.00						
PU	**2.33**	**1.29**	.570**	.604**	.786**	1.00					
PEoU	**3.23**	**1.14**	.642**	.636**	.616**	.641**	1.00				
EXP	**3.20**	**1.17**	.668**	.650**	.595**	.613**	.783**	1.00			
ENJ	**2.34**	**1.38**	.559**	.611**	.801**	.804**	.655**	.666**	1.00		
SE	**3.54**	**1.26**	604**	.592**	.465**	.485**	.674**	.709**	.511**	1.00	
CA	**3.27**	**1.27**	-.423**	-.445**	-.674**	-.581**	-.540**	-.588**	-.666**	-.461**	1.00

** *p<.01*

Actual Use (AU); Intention to Use (ITU); Attitude Toward Using (ATU); Perceived Usefulness (PU); Perceived Ease of Use (PEoU); Experience (EXP); Enjoyment (ENJ); Self-Efficacy (SE); Computer Anxiety (CA)

Given in Table 3 correlation analysis results showed that, there was a statistically significant and positive relationship (p<.01) between perceptions of EXP, ENJ, and SE of university students and the perceived benefit from distance education and perceived ease of use. A moderate positive

correlation was found between EXP and PU (r=.613, p<.01) and a high positive correlation was present between EXP and PEoU (r=.783, p<.01). In addition, a positive correlation was found between perceived ENJ and PU at a high level (r=.804, p<.01) and between perceived ENJ and ease of use at a moderate level (r=.655, p<.01). A moderate positive correlation was found between SE and PU (r=.485, p<.01) and a moderate positive correlation was present between SE and PEoU (r=.674, p<.01). Moreover, there is a moderate negative correlation between CA and usefulness from distance education perceived by students (r=-.540, p<.01). A moderate negative correlation was found between CA and ease of use of distance education (r=-.581, p<.01).

A statistically significant and positive relationship was found between the PU and PEoU scores for distance education, and the ITU distance education and the attitude towards using it. A moderate correlation was found between PU and the ITU (r=.604, p<.01). On the other hand, a high level (r=.786, p<.01) positive correlation was found between PU and ATU. In addition, a moderate (r=.636, p<.01) positive relationship was found between PEoU and ITU. Moreover, a moderate positive correlation was found between PEoU and ATU (r=.616, p<.01). PU and PEoU of distance education play a decisive role on the ITU and ATU of distance education systems. According to these results, it may be asserted that distance education has an important role on development of university students, who are potential human resources in Türkiye.

A high level (r=.762, p<.01) positive correlation was found between ITU and AU scores. Moreover, a moderate positive correlation was found between ATU and AU scores (r=.535, p<.01). The findings indicated that university students' ITU of distance education and their attitudes towards using it predict their AU scores at a high level. AU, ITU, ATU, SE scores revealed that distance education has a significant effect on development of the university students. According to these results, it may be asserted that distance education is highly beneficial for development of university students as the potential human resources.

Table 4 shows the results of regression analysis regarding the research hypotheses.

Table 4. *Regression Analysis Results*

Model 1	B	SE	β	t	p	Tolerance	VIF
Dependent Variable: PU							
Constant	.480	.078	-	6.169	.000	-	-
XP	.109	.017	.099	6.502	.000	.359	2.783
ENJ	.643	.013	.684	49.858	.000	.441	2.268
SE	.045	.013	.043	3.346	.001	.494	2.026
CA	-.049	.013	-.048	-3.775	.000	.518	1.931
R^2= .659	Adjusted R^2=.658		$F_{(4,41)}$ = 1985.493	p=.000 < .01; Durbin-Watson=1.971			
Model 2	B	SE	β	t	p	Tolerance	VIF
Dependent Variable: PEoU							
Constant	.673	.068	-	9.930	.000	-	-
EXP	.463	.015	.474	31.713	.000	.359	2.783
ENJ	.179	.011	.216	15.993	.000	.441	2.268
SE	.200	.012	.220	17.252	.000	.494	2.026
CA	-.014	.011	-.016	-1.272	.204	.518	1.931
R^2= .670	Adjusted R^2=.669		$F_{(4,41)}$ = 2083.283	p= .000< .01; Durbin-Watson= 1.908			
Model 3	B	SE	β	t	p	Tolerance	VIF
Dependent Variable: ITU							
Constant	1.173	.043	-	27,070	.000	-	-
PU	.328	.015	.334	22.586	.000	.590	1.696
PEoU	.470	.016	.423	28.609	.000	.590	1.696
R^2= .470	Adjusted R^2=.470		$F_{(2,41)}$ = 1828.210	p=.000<.01; Durbin-Watson= 1.847			
Model 4	B	SE	β	t	p	Tolerance	VIF
Dependent Variable: ATU							
Constant	.386	.036		10.708	.000		
PU	.660	.012	.664	54.496	.000	.590	1.696
PEoU	.214	.014	.191	15.634	.000	.590	1.696
R^2= .640	Adjusted R^2=.639		$F_{(2,41)}$ = 3650.415	p=.000<.01; Durbin-Watson= 1.933			
Model 5	B	SE	β	t	p	Tolerance	VIF
Dependent Variable: AU							
Constant	.702	.039	-	18.202	.000	-	-
ITU	.701	.013	.678	56.001	.000	.672	1.489
ATU	.149	.012	.146	12.044	.000	.672	1.489
R^2= .595	Adjusted R^2=.594		$F_{(2,41)}$ = 3018.514	p=.000<.01; Durbin-Watson= 1.963			

As may be understood from Table 4, EXP, ENJ, SE, and CA has a statistically significant effect on PU of distance education [$F_{(4.41)}$ = 1985,493; R2=.658; p<.01]. In Model 1, multiple linear regression analysis results revealed that EXP (β=.099p<.01), ENJ (β=.684; p<.01), and SE (β= .043; p<.01) has positive effect on PU, but CA has a negative effect (β= -.048; p<.01).

In Model 2, EXP, ENJ, and SE has a statistically significant and positive effect on the PEoU of distance education systems [$F_{(4.41)}$ =2083,283; R2=.658; p<.01]. EXP (β=.474; p<.01), ENJ (β= .216; p<.01), and SE (β= .220; p<.01) has positive effect on PEoU. It is seen that CA does not have a significant effect on PEoU (p>.01). According to Model 3 and Model 4, PU is a determinant variable for the ATU (β= .664; p<.01) and the ITU (β=.334; p<.01). In addition, PEoU affects positively ATU (β=.191; p<.01)

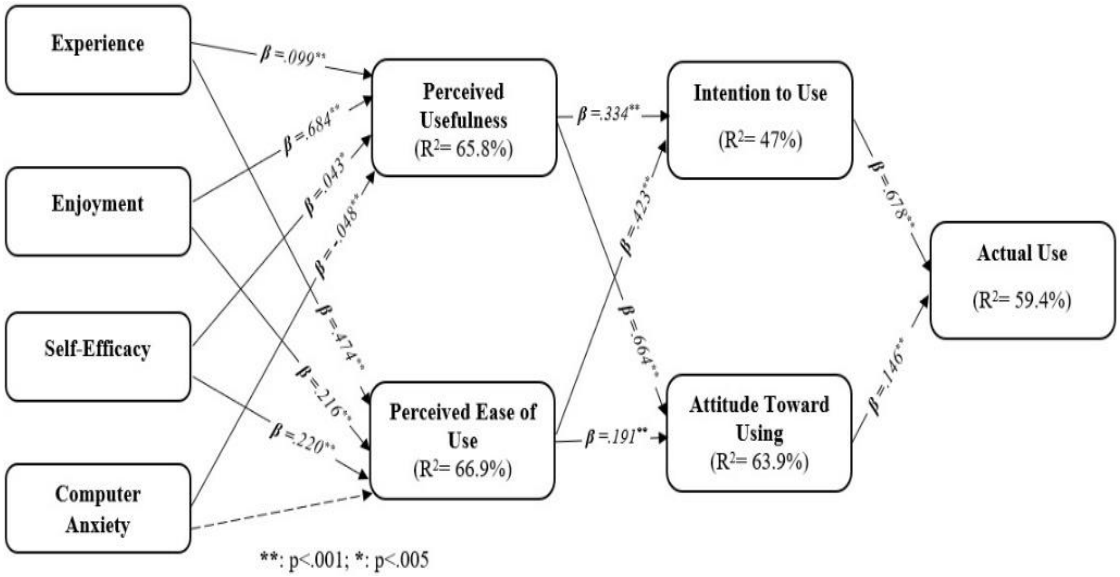
and ITU (β=.423; p<.01). Regarding these results, it may be said that the usefulness of distance education has a positive effect on ITU and ATU.

In Model 5, ITU (β= .678; p<.01) and ATU (β=.146; p<.01) has positive effect on AU. ITU and ATU explain 59.4% of the variance regarding the AU [$F_{(2.41)}$ = 3018,514; R2=.594; p<.01]. These results show that ITU and ATU broadly affects AU.

RESULT MODEL

In Figure 2, the result model related to the hypothesis tests of the research was presented.

Figure 2. *Result Model*



As explained in Figure 2, EXP, ENJ, and SE has positive effect on PU. These results revealed that the H_1 hypothesis was confirmed. CA has a significant and negative effect on PU. These results indicated that the H_2 hypothesis was confirmed. In addition, EXP, ENJ, and SE has positive effect on PEoU. These results revealed that hypothesis H_3 was confirmed. PU and PEoU has positive effect on ITU and ATU. According to these results, the H_4 hypothesis was confirmed. It was determined that ITU and ATU has positive effect on AU. These results revealed that the H_5 hypothesis was confirmed.

DISCUSSION

This research aims to determine the attitude of students at state universities towards the effective use of distance education tools during the COVID-19 pandemic in Türkiye. The variables such as EXP, ENJ, SE, CA, PEoU, PU, ITU, ATU, and AU were considered to determine the attitude and perceptions of undergraduate students towards distance education. In this context, the relationship between variables was determined by using correlation analysis technique and the hypotheses were tested by using multiple linear regression analysis.

The results showed that male participants reported higher technology acceptance scores than female participants. It may be said that the fact that male participants have fewer problems in accepting and using technology than females is effective in the emergence of this result. In literature, numerous studies revealed that male participants reported a higher level of acceptance scores and tendency to use technology compared to women. Venkatesh et al. (2003) found that females were more anxious than males when it comes to IT utilization and this nature of females reduced their SE, which in turn led to increased perceptions of the effort required to use IT. Similarly, Venkatesh and Morris (2000) found that women perceived lower-level ease of use because they reported higher level

of CA when compared to their male counterparts. The students with bachelor's degree reported higher technology acceptance scores than students with associate degree. In addition, as the duration of using distance education increases, technology acceptance scores also increase. Regarding these results, it may be asserted that the students with bachelor's degree benefit more from distance education practices during the Covid-19 process. Moreover, the results showed that as the duration of using the distance education system increases, the system provides more benefits for the development of university students. These results are consistent with the findings of previous studies. De Smet et al. (2012) assert that EXP has a positive effect on PEoU. Similarly, Igbaria et al. (1995) state that the EXP of using a computer has a direct effect on PEoU and PU. In a study conducted by Yaylak (2022), the participants reported the use of technology in education as indispensable to continue of education during COVID-19 pandemic. However, they reported that the lack of interaction in distance education, digital impossibilities, and psiko-social factors were the negative aspects. The participants also emphasized that rather than being adequate, distance education was inadequate due to interaction- and infrastructure-related issues.

The results revealed a strong positive relationship between the EXP, ENJ, SE, PU, and PEoU perception scores of university students. However, CA has a negative effect on PU and PEoU. This result may be due to the fact that university students have not tablet computer or PC. It may be said that this negatively affects the academic development of university students by reducing the PU and PEoU scores of distance education during the COVID-19 pandemic. Numerous studies include findings that are consistent with these results. Igbaria et al. (1995) found that the experience of using a computer has a positive effect on PEoU and PU. Moreover, Park et al. (2012) found that ENJ has a positive effect on PU of web-based education. In another study conducted by Igbaria and Livari (1995), technological SE has a positive effect on computer use. Similarly, in Liaw and Huang's (2013) study, technological SE is a significant factor for PEoU and PU of e-learning environments. On the contrary, in Sari and Nayir's (2020) study, the participants reported that they were not ready for the distance education process and there was a lack of technology support and distance education training. Moreover, the participants stated that they did not have sufficient knowledge and experience about distance education.

In this research, another remarkable result is that the PU and PEoU of distance education has a decisive effect on the ITU and ATU of distance education systems. Similar findings were found in previous studies. In a study conducted by Rizun and Strzelecki (2020), the results revealed that university students' PU and PEoU of distance education during the COVID-19 pandemic decisively affected their intention and attitude to use distance education systems. These results show that distance education has an important role in the academic development of university students during the COVID-19 pandemic in Türkiye. On the contrary, in a study conducted by Ocak and Sahin (2021), participants declared lower proficiency levels in their learning goals. In addition, they reported lower scores especially in practical training results during distance education. Conversely, student academic grades were higher in the distance education group. Moreover, there were serious difficulties in measurement and evaluation methods in distance education.

The results also revealed that EXP, ENJ, SE, and CA has a significant effect on PU and PEoU. According to these results, it may be asserted that reducing computer anxiety, eliminating problems in accessing the system and strengthening students' self-efficacy perceptions will play a significant role in ensuring the effective development of university students through distance education. Although the findings of this study are completely unique, it is possible to see similar findings in previous studies. Abdullah et al. (2016) found that EXP, ENJ, and SE perceptions of participants affected PU and PEoU. Similarly, Rizun and Strzelecki (2020) found that the EXP, ENJ, and SE perceptions of university students affected the PU and PEoU during the COVID-19 pandemic. Chen et al. (2013) found a positive correlation between perceived enjoyment and perceived usefulness of distance education. Computer anxiety has not a statistically significant effect on perceived usefulness of distance education. This result is consistent with the results of studies conducted by Liu (2010), Rezaei et al. (2008), Rizun and

Strzelecki (2020), and Shen and Eder (2009), but it is not consistent with studies conducted by Abdullah et al. (2016), Calisir et al. (2014), and Karaali et al. (2011).

The results revealed that PU and PEoU was a significant determinant for the ATU and ITU. These results show that distance education is perceived as useful and easy to use during the COVID-19 pandemic, and it has a positive contribution to development of the university students. In literature, numerous studies have findings that the PU and PEoU is the determinant of ATU and ITU distance education. In studies conducted by Abdullah et al. (2016), Calisir et al. (2014), Farahat (2012), Lee et al. (2013); Liu et al. (2009), Rizun and Strzelecki (2020), and Weng et al. (2018), PU and PEoU is predictive variable for attitude towards using distance education and intention to use it.

ITU and ATU has positive effect on AU of distance education system. Based on these results, it may be considered that distance education is an indispensable application for academic development of university students during the COVID-19 pandemic. In a number of studies (e.g., Al-Gahtani, 2016; Davis et al., 1989; Farahat, 2012; Lau & Woods, 2008; Liu, 2010; Motaghian et al., 2013; Ozer et al., 2010; Wang & Wang, 2009) ITU and ATU has positive effect on AU of distance education systems. As a result, if used properly, technology can help students succeed academically and prepare them for subsequent online learning and within the future. In reality, it's not enough to only offer online learning opportunities to students to offer them accessibility and adaptability (Simamora, 2020). Actually, the shutting down of schools has widened learning inequalities and has harmed the education chances of students around the world, especially in low-income developing countries, where the resources of education are quite limited and education inequality are more common (Li et al., 2022). Therefore, lecturers must remember to still connect the advantages of studying and training online with students.

CONCLUSION AND IMPLICATIONS

In conclusion, PU and PEoU of distance education is a significant determinant of ATU of distance education systems. As the PU and PEoU of distance education system increases, the ITU and AU behavior increases. These results indicated that during the COVID-19 pandemic, distance education systems were indispensable implementation for academic development of university students in Türkiye. Moreover, both digital technologies and traditional medias can be implemented to enhance the possibilities of carrying out distance learning.

This quantitative research includes a broad observation, which higher education institutions in Türkiye faced because of the COVID-19 pandemic since March 2020. Based on the example of different universities, this study provides a full picture of effective use of distance education tools in higher education. However, qualitative research on the current case will provide more functional and in-depth empirical data and contribute more by sharing the real experiences of university students. Another limitation of this study that can be criticized by readers is the indirect examination of the effect of distance education on the development of university students as a potential human resource during the COVID-19 pandemic process within the scope of TAM. To overcome this, in-depth interviews with a more specific working group to be determined with the targeted sampling method would be beneficial. However, it should be considered that the extensive quantitative research cannot be carried out easily during the COVID-19 pandemic. These results may be beneficial for the Council of Higher Education (CoHE) to understand of undergraduate students' preferences on effective use of distance education tools in higher education. Hopefully, this results from current study may lead policy makers in education to enhance and harden strong and comprehensive online learning within the future. In addition, tablet computer may be provided to undergraduate students, and they may be supported in effective use of technology. In the light of the findings from current study, qualitative research may be conducted to achieve a deeper understanding of the topic. Although the participants stated that they use distance education tools effectively, there are doubts about the quality of the education received during the Covid-19 pandemic process. In this context, research should be conducted to determine the

effect of distance education, which is carried out during the pandemic, on the academic success and professional skills of university students.

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AUTHOR CONTRIBUTIONS

The first author contributed to the conceptual framework of the study, method, data analysis, and presentation of the findings.

The second author made significant contributions to the collection of the research data, the formulation of hypotheses, and the analysis and interpretation of the data.

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