Perspectives and Attitudes of Emergency Medicine Educators Towards E-Assessment Technologies

Acil Tıp Eğitimcilerinin E-Değerlendirme Teknolojilerine Yönelik Bakış Açıları ve Tutumları

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ABSTRACT

Aim: The widespread use of distance education due to the pandemic has accelerated distance assessment and evaluation technologies (E-assessment). While educators and trainees promptly adapt to distance learning platforms, several factors can affect the adoption of e-assessment models. This study aimed to identify these factors affecting the perspectives and attitudes on e-assessment technologies among emergency medicine educators.

Material and Methods: A survey on self-efficacy, self-confidence, and attitudes toward E-assessment technologies was conducted on ninety emergency medicine educators. In this questionnaire-based study, educators of emergency medicine residency training programs with different academic ranks who work in emergency departments involved in emergency medicine residency training were included. A pool of questions was created from the questionnaires with the concepts of "self-efficacy", "self-confidence", "attitude", "educational need" and "computer-use self-efficacy". The items were evaluated with a 7-point Likert scale. Correlation, validation, reliability and factor analysis were performed.

Results: There was a statistically significant difference among computer-use skills, especially regarding self-confidence (p=0.02) and self-efficacy (p=0.01). No significant difference was found in terms of attitude (p=0.877). Advanced computer skills had higher levels of self-confidence and self-efficacy for E-assessment. There was a significant difference in self-confidence (p=0.001) and self-efficacy (p=0.001) regarding increased E-assessment experience. Forty-four percent of the participants had ethical concerns, 30% were not concerned about this issue, and 25.6% were partially concerned about screen sharing.

Conclusion: Experience, computer-use skills and self-efficacy, and E-assessment education are the key factors that may be related to self-confidence and self-efficacy and may indirectly affect attitudes toward E-assessments in emergency medicine education. Since it is important to monitor and evaluate the training processes, the adaptation of the trainers to this technology is possible by increasing their computer skills and experience to ensure this continuity in conditions such as pandemics.

Keywords: Emergency medicine, e-assessment, e-learning, self-efficacy

ÖZ

Amaç: Pandemi nedeniyle uzaktan eğitimin yaygınlaşması, uzaktan ölçme ve değerlendirme teknolojilerini (E-assessment) hızlandırmıştır. Eğitimciler ve öğrenciler uzaktan eğitim platformlarına hızla uyum sağlarken, çeşitli faktörler e-değerlendirme modellerinin benimsenmesini etkileyebilir. Bu çalışma, acil tıp eğitimcilerinin e-değerlendirme teknolojilerine bakış açılarını ve tutumlarını etkileyen bu faktörleri belirlemeyi amaçlamıştır.

Gereç ve Yöntemler: Doksan acil tıp eğitimcisi üzerinde öz yeterlilik, özgüven ve E-değerlendirme teknolojilerine yönelik tutumlar üzerine bir anket yapıldı. Ankete dayalı bu çalışmada, acil tıp uzmanlık eğitimi alan acil servislerde görev yapan farklı akademik kademelerdeki acil tıp uzmanlık eğitimi programlarının eğitimcileri dâhil edildi. Anketlerden "öz-yeterlik", "özgüven", "tutum", "eğitim ihtiyacı" ve "bilgisayar kullanım öz-yeterliği" kavramları ile bir soru havuzu oluşturuldu. Maddeler 7'li Likert ölçeği ile değerlendirildi. Korelasyon, doğrulama, güvenilirlik ve faktör analizi yapıldı.

Bulgular: Bilgisayar kullanma becerileri açısından, özellikle özgüven (p=0.02) ve öz yeterlilik (p=0.01) açısından istatistiksel olarak anlamlı bir fark vardı. Tutum açısından anlamlı bir fark bulunmadı (p=0,877). Gelişmiş bilgisayar becerileri, E-değerlendirme için daha yüksek düzeyde özgüvene ve öz yeterliliğe sahipti. Artan E-değerlendirme deneyimi ile ilgili olarak özgüven (p=0,001) ve öz yeterlilik (p=0,001) arasında anlamlı bir fark vardı. Katılımcıların %44'ü etik kaygılara sahipti, %30'u bu konuda endişeli değildi ve %25,6'sı ekran paylaşımı konusunda kısmen endişeliydi.

Sonuç: E-değerlendirme deneyimi, eğitimi ve bilgisayar kullanma becerileri, özgüven ve öz-yeterlik ile ilişkili olabilir ve acil tıp eğitiminde E-değerlendirmelere yönelik tutumları dolaylı olarak etkileyebilecek anahtar faktörlerdir. Eğitim süreçlerinin izlenmesi ve değerlendirilmesi önemli olduğu için eğiticilerin bu teknolojiye adaptasyonu, pandemi gibi koşullarda bu sürekliliğin sağlanması için bilgisayar becerilerinin ve deneyimlerinin arttırılmasıyla mümkündür.

Anahtar Kelimeler: Acil tıp, e-değerlendirme, e-öğrenme, öz-yeterlik

Introduction

Distance education (including online education and web-based education) delivers education to teachers and learners geographically distant from each other using different technologies (satellite, video, audio, graphics, computer, and multimedia technology) (1,2). The coronavirus disease (COVID-19) epidemic in Wuhan Province of China in December 2019, which was declared a global pandemic by the World Health Organization (3), has also accelerated the increasing trend (4).

In addition to distance education, face-to-face assessment and evaluation exams have begun the necessity of remote assessment and evaluation to the agenda. Electronic assessment technologies (E-assessment/web-based assessment) allow examinations to be carried out electronically through the web/internet (5,6). In addition to allowing exams to be taken by distant learners, fully automated E-assessment systems also have advantages for educators in terms of reducing errors in manual scoring, providing quick feedback and allowing assessments to be stored and analyzed in the database without workload (5).

Self-confidence is defined as "confidence in oneself and one's powers and abilities which is affected by the experience of being successful and will affect the person's perception of achievement" (7–10). Self-efficacy is close in meaning but refers to the perception of achieving specific tasks or situations (11). This concept was created by social cognitive theorist Albert Bandura (12,13). Self-efficacy is different from self-confidence in managing organizational skills, but self-efficacy is a determinant of self-confidence.

Pre- and postgraduate emergency medicine education has also grown, supported by free open access medical education sites (FOAMed), podcasts, and web-based seminars. During the pandemic period, moving to distance education platforms became widespread for emergency medicine residency training and clerkship training for medical students. However, there is no proposal for distance education and assessment in the curriculum of emergency medicine education either in Europe or in Turkey.

This study aimed to evaluate emergency medicine educators' experiences, perspectives, self-confidence, self-efficacy, attitudes, educational needs, and concerns (opinions, needs, ethical and anxiety issues) about E-assessment technologies to offer solutions. This study aims to guide assessment and evaluation studies to develop quickly applicable E-assessment platforms for emergency medicine educators.

Material and Methods

Study design: The study protocol for involving emergency medicine educators was obtained according to the institution's ethical guidelines and the Declaration of Helsinki. This prospective cross-sectional questionnaire-based study was held between 01 October 2020 and 31 October 2020 after the approval of the Institutional Research Ethics Committee (2020/372).

Study setting and population: In this questionnaire-based study, educators of emergency medicine residency training programs with different academic ranks (professor, associate professor, assistant professor, lecturer, and specialist) who work in emergency departments in Turkey and are involved in emergency medicine residency training were surveyed. Educators who were engaged in education and training activities and completed emergency medicine residency training in emergency medicine were included. Emergency medicine residents or educators in departments other than emergency medicine residency training or nonemergency physicians working in emergency medicine training programs were excluded. Responses about experience in other educational activities (pre-congress courses, workshops, surveys, etc.) rather than emergency medicine residency training were excluded due to standardization among educators in emergency medicine residency training. Those who did not give consent were also excluded from the study.

Study protocol: Since there was no opportunity to meet face-to-face due to the pandemic, an online questionnaire was created. The data were obtained through a semi structured/structured questionnaire prepared on web and mobile-based platforms, with the questionnaire delivered to the participants via e-mail and academic and social groups.

There is no standard scale for the E-assessment of emergency medicine residency training in the literature. A systematic analysis evaluated attitudes toward e-exams with different variables among lecturers, teachers, and academic staff and emphasized that there is no standard theory on this subject and that behavioral and intuitive effects are less evaluated (14). For this reason, in this study, a questionnaire for emergency medicine educators was created to evaluate the self-efficacy, self-confidence and attitude levels in light of the validated questions in both Turkish and English versions (4,14–24). A pool of questions was created from the questionnaires, which mostly evaluated the concepts of self-efficacy, self-confidence, level of knowledge, and attitudes toward e-learning. Accompanied by the experts, new items were developed regarding E-assessment for emergency medicine education. With the concepts of "self-efficacy", "self-confidence", "attitude", "educational need" and "computer-use self-efficacy", the items were evaluated with a 7-point Likert scale, with 1 point indicating "strongly disagree" and 7 "strongly agree".

To evaluate whether the questionnaire form was clear and understandable, 17 emergency medicine educators with different academic ranks were pilot tested, and minor changes were made based on their feedback. They were not included in the final analysis.

The questionnaire used in the study consisted of 76 questions in 13 sections.

Primary endpoint: What factors affect emergency medicine educators' attitudes, self-efficacy, and self-confidence toward using E-assessment (Figure 1).

Secondary endpoints: Do emergency medicine educators' attitudes, self-efficacy, and self-confidence in E-assessment differ according to their experiences?

What are emergency medicine educators' motivations and concerns about E-assessment in emergency medicine training?

Data Analysis

Independent groups were assessed using the independent t test, the Mann–Whitney U test, and the Kruskal–Wallis test
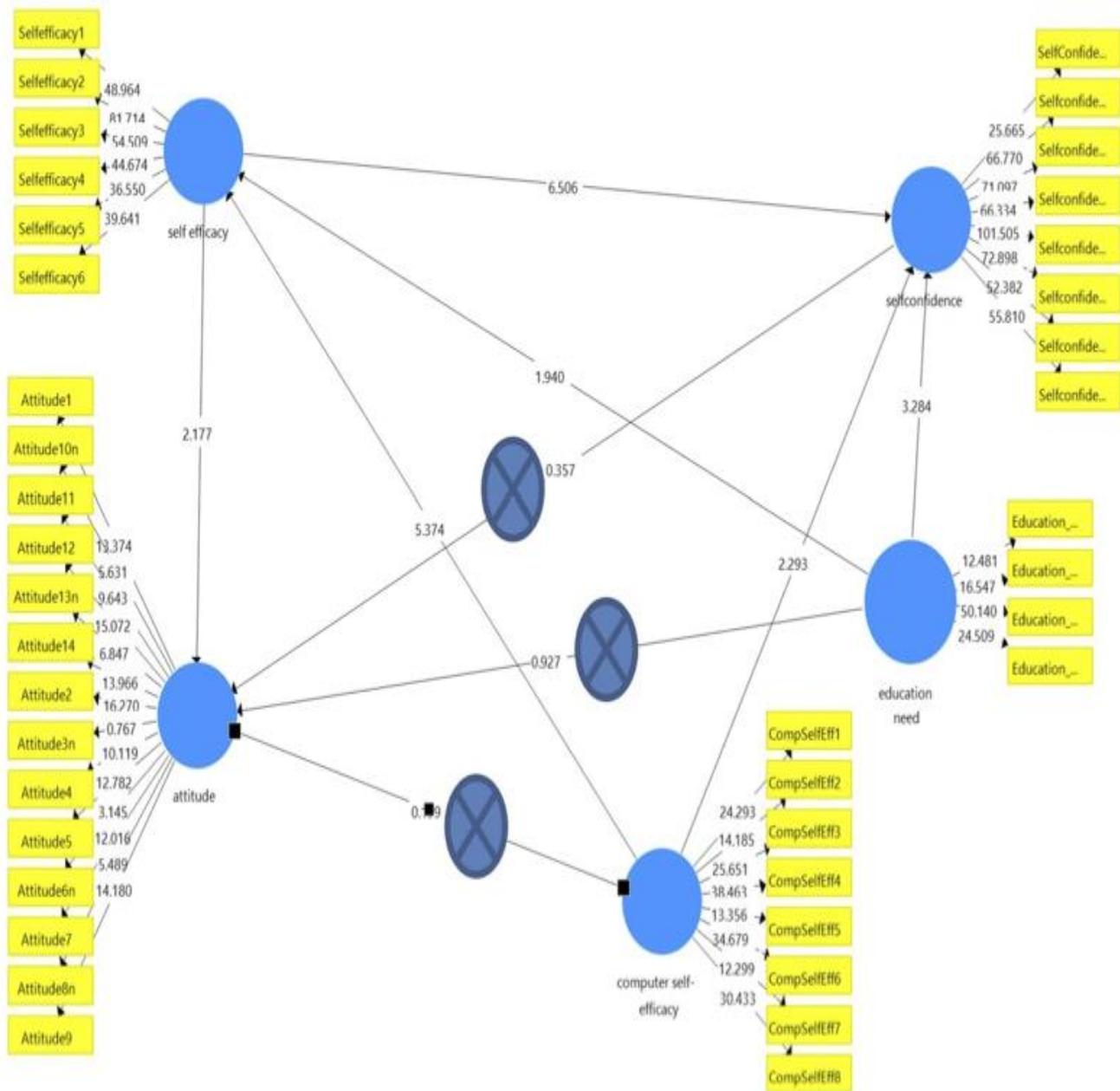
Figure 1. Path analysis

for comparisons of more than two groups. Spearman's test was used in the correlation analysis according to the distribution of the data. The statistical significance level was set as $p < 0.05$. Statistical analysis of the data was performed with IBM SPSS Statistics 23.0. The validation, reliability and factor analysis were performed in SPSS Statistics 23.0 and Smart PLS v3.3.5.

Results

In this study, 99 emergency medicine residency training programs were authorized by the Ministry of Health's Board of Medical Specialties to provide emergency medicine speciality training in Turkey. Undergraduate medical education was also provided in 71 of these institutions.

During this period, approximately 400 emergency medicine educators met the inclusion criteria. The questionnaire was shared through the national emergency medicine speciality association, through social media groups, and within clinics. Five of the 95 respondents did not agree to participate at the beginning of the questionnaire. Thus, the data of 90 participants were included in the analysis.

Reliability analysis

The reliability analysis for the questions is shown in Table 1, and the factor analysis is shown in Table 2. *Demographic data*

The demographic data of the participants are shown in Table 3.

	Cronbach's Alpha Coefficient	Rho	Composite reliability	Average Variance Extracted (AVE)
Attitude Towards E-assessment	0.737	0.98	0.799	0.593
Self-Efficacy on Computer Use	0.941	0.943	0.952	0.713
Educational need	0.930	1.166	0.944	0.810
Self-Efficacy on E-assessment	0.966	0.968	0.972	0.853
Self-confidence on E-assessment	0.979	0.981	0.982	0.872

Table 1. Confidence Analysis

	KMO Sampling Adequacy Measurement	Bartlett Correlation Test (p ≤0.05)
Computer-use Self-Efficacy	0.901	0.000
E-assessment Self-Confidence	0.920	0.000
E-assessment Self-Efficacy	0.846	0.000
Attitude Towards E-assessments	0.904	0.000

Abbreviations: KMO = Kaiser–Meyer–Olkin.

Table 2. Factor Analysis

Distance Education Experiences
The delivery of emergency medicine residency training through distance education started at 7–11 months with a rate of 56.7% and at 0–6 months with a rate of 36.7%. The target audience of emergency medicine education was mostly emergency medicine residents (83.3%; n=75), emergency medicine specialists (44.4%; n=40), medical students, and other health personnel. It was determined that 75.6% of the distance learning experience was also in congresses/symposiums and conference activities and 65.6% in emergency department lectures. The most frequently used distance education platforms were the Zoom Client for Meetings (77.8%) and Microsoft Teams (41.1%).

E-assessment Experiences
While the rate of taking part in the distance exams was 67.4% (n=29), it was found that these educators mostly worked in preparing questions (58.1%; n=25) and evaluating the results (30.2%; n=13). The number of those with supervision experience was found to be 6 (14%).

Distance exams were mainly used for medical school students' clerkship exams (83.7%; n=36), 34.9% were used for seniority exams of emergency medicine students, and 20.9% were used for the final examination in emergency medicine residency training. It was determined that online (53.5%) and offline (34.9%) tests with multiple-choice questions were the most frequently used remote exam types in clinics. The examination duration was mostly between 0 and 60 minutes (83.7%; n=36). A total of 95.3% of the exams were made accessible from anywhere.

Platforms where examination evaluations (grading) were mainly calculated automatically by the E-assessment platform (74.4%) were at the forefront. Of the participants, 69.8% with E-assessment experience stated that audio and video recordings were not taken during the exams, 32.6% stated that only video recordings were taken, and 18.6% stated that only audio recordings were taken. The rate of invigilation in online theoretical exams was 44.2% (n=19). The rate of using a question bank/pool in specialty training

in medicine was 48.8%, and all participants (n=21) using this pool could also use this pool for E-exam questions.

Advantages
Participants believe that the most significant advantages of taking the exams are as follows:
1. Accessibility of exams from anywhere (n=73; 81.1%)
2. Savings on paper/labor/material (n=67; 74.4%)
3. Collection of exam data/statistics (n=57; 63.3%)
4. Applicability of the exam to more than one person at the same time (n=56; 62.2%)
5. Quick feedback (n=52; 57.8%)
6. Repeatability (n=39; 43.3%)
7. Applicability of the standard exam format quickly (n=36; 40%)
8. Student development follow-up (n = 29; 32.2%)
9. Availability of audio-visual invigilation (n = 22; 24.4%)

The participants considered that 72.2% (n=65) of the multiple-choice questions and 53.3% (n=48) of the multiple true/false question tests were the most suitable type for distance exams. According to the purposes of the exams, the participants believed that summative assessment (56.7%), diagnostic assessment (made at the entrance to the program) (50%), and formative assessment (47.8%) were more suitable for remote examinations.

Those who thought that an effective assessment and evaluation could not be performed with E-assessment were 13.3% (n=12); 48.9% (n=44) believed it could be done partially, and 37.8% (n=34) considered that it could absolutely be performed.

Situations that the participants perceived as the greatest deficiency were students' ability to get help from others, i.e., cheat, during the exam (n=67; 74.4%), problems with the internet connection/technological infrastructure (n=65; 72.2%), problems in measuring procedural skills (n=57; 63.3%) and ethical problems (n=56; 62.2%). Most of the participants had the opinion of taking deterrent measures against security breaches (n=56; 62.2%), maximizing the security of the question pools (n=54; 60%), and taking audio-visual recordings (n=50; 55.6%).

Security and ethical concerns
The rate of ethical concerns about video and audio recording in E-assessments was found to be 48.9%. The rate of those who were not concerned about this was 26.9%, and the rate of those who were partially concerned was 24.4%. Regarding

		n(%)	Median(IQR)
Age, years			39(35-45)
Gender	Female	33(36.7%)	
	Male	57(63.3%)	
Title	Specialist	30(33.3%)	
	Lecturer	10(11.1%)	
	Asst. Professor	19(21.1%)	
	Assoc. Professor	20(22.2%)	
	Professor	11(12.2%)	
Institute	State University	40(44.4%)	
	Training and Research Hospitals	32(35.6%)	
	Other private		
		18(19.9%)	
Education experience, years			4(1-4)
Experience in EM, years			6(5-15)
Computer skill levels	Advanced	21(23.3%)	
	Good	46(51.1%)	
	Medium	21(23.3%)	
	Beginner	2(2%)	
E-learning in ED	Yes	85 (94.4%)	
	No	5(5.6%)	
E-assessment experience	Yes	43(47.8%)	
	No	47(53.2%)	
Computer Self-Efficacy			7,0(6-7)
Self-Confidence			4,125(2.21-5.37)
Self-Efficacy			4(2.66-5.50)
Attitudes			3,785(3.14-4.21)

Table 3. Demographics and average self-efficacy, self-confidence, computer self-efficacy and attitude scores of the participants.

screen sharing, 44.4% of the participants had ethical concerns, 30% were not concerned about this issue, and 25.6% were partially concerned. There was no statistically significant difference in ethical anxiety between those with and without E-assessment experience (p=0.914).

Sharing user codes/passwords (n=59; 65.6%), open source/vulnerable systems (n=58; 64.4%), insufficient verification (not identifying the correctness of IP, MAC addresses) (n=53; 58.9%), security vulnerabilities related to

the E-assessment application program (n=59; 65.6%), programs that share background information/screen (n=60; 66.7%), and cameras working in background/voice access programs (n=60; 66.7%) were the most common security concerns.

Need for Education

The participants in both groups thought that they themselves, students, other colleagues, and administrators needed to receive training on E-assessment.

Factors affecting the Self-Confidence, Self-Efficacy and Attitude Scores

No statistically significant correlation was found between age and self-confidence, self-efficacy, and attitude scores (p>0.05). There was no significant difference between genders in terms of attitude (p=0.117), self-confidence (p=0.052), or self-efficacy (p=0.224).

There was no statistically significant difference between the academic ranks in terms of levels (self-confidence = 0.170; self-efficacy = 0.772; attitude = 0, respectively). There was no statistically significant relationship found between scores and experience for the specialists and trainers (p>0.05). No significant difference was found between the institutions regarding scores (self-confidence = 0.158; self-efficacy = 0.169; attitude = 0.828). Age, gender, institution, and experience groups did not differ regarding levels of self-efficacy, self-confidence and attitude.

There was a statistically significant difference between computer-use skills and scores, especially in terms of self-confidence (p=0.02) and self-efficacy (p=0.01), but no significant difference was found in terms of attitude (p=0.877). Medium, good, and advanced levels were statistically higher than baseline levels regarding self-confidence and self-efficacy. However, advanced levels showed higher self-confidence and self-efficacy scores than medium levels. Computer skills were found to affect self-confidence and self-efficacy for E-assessments.

In terms of computer self-efficacy, the median level of problem solving without technical support during use was 5. There was a correlation between computer use levels (Table 4) and computer self-efficacy (p<0.01, 95% CI 0.494-0.745) (Table 4). Computer self-efficacy was poorly correlated with attitude (Rho=0.324) but positively and significantly correlated with self-efficacy (Rho=0.463) and self-confidence (Rho=0.403).

There was a significant difference in self-confidence (p=0.000, 95% CI 2.21-5.37) and self-efficacy (p=0.001, 95% CI 2.66-5.50) between those with and without E-assessment experience. The self-confidence and self-efficacy of those with E-assessment experience were found to be higher than those of non-experienced participants. The experience of E-assessment made a statistically significant difference in self-confidence and self-efficacy.

Self-confidence (p=0.01 95% CI 2.21-4.12), self-efficacy (p=0.001, 95% CI 2.66-5.50), and attitude (p=0.000% 95% CI 3.14-4.21) were found to be statistically higher in those who thought E-assessment was effective. Although there was no significant difference between gender (p=0.518) or academic rank (p=0.327) groups, perception of effectivity showed a positive relationship between the increase in self-confidence, self-efficacy, and attitude of E-assessment and the belief that it was a practical assessment and evaluation. Those participants who did not have ethical concerns about video and voice recordings had significantly higher self-efficacy scores (p=0.002%, 95% CI 2.66-5.5). Screen-sharing concerns also had a statistically significant association with self-efficacy (p=0.028) and self-confidence (p=0.027), in which participants without concerns about screen sharing were more self-efficient and self-confident.

Discussion

This study aimed to evaluate emergency medicine educators' self-efficacy, self-confidence, and attitudes toward E-assessments during the COVID-19 pandemic. The study revealed that 93.4% of the distance education experiences started during the COVID-19 pandemic. During this period, when social distancing gained importance, the duration of experience of the study participants was determined to be less than one year.

E-assessment technology in higher education institutions has rapidly gained acceptance in the last 20 years (14). E-evaluation is implemented in electronic reports, portfolios, blogs and forums, and electronic exams. There are two tools used for E-assessment purposes: learning management systems used to provide teaching, learning, and assessment in educational institutions and large-scale computer-based assessment technologies designed for assessment purposes only (25).

Despite the development of many E-assessment technologies and their advantages, it is clear that these technologies did not receive much attention, as they were not required until the COVID-19 pandemic.

When considering the studies on E-assessment, university educators are generally familiar with computer technology and prefer E-assessments to paper- and pencil-based assessments (26). Likewise, high computer-use skills and computer-use self-efficacy correlated with high self-confidence and self-efficacy on E-assessments.

Educators have favorable attitudes toward computer-based exams. It has been stated that women and educators with higher academic ranks are more positive about these exams than less experienced high school educators (27). Although this study's perception of effectiveness was not statistically associated with gender or academic rank, women and lower academically ranked educators found E-assessment more effective than men and higher ranked educators. No association was found between attitudes, gender and rank. It is believed that the distribution of women in higher academic ranks might cause this result.

Self-confidence, self-efficacy, and attitudes toward the E-assessment also increased the belief that the E-assessments were effective**.**

A positive correlation was found between the use of information and communication technologies, educators' competence, the importance of educators' volunteerism and compliance with E-assessments. In addition, it has been found that there is an inverse correlation between the use of information and communication technologies and age and teaching experience in second-cycle school educators (28). No statistical correlation with age, teaching experience, or attitudes was found. This may be because of the acute necessity of using e-learning and e-assessment platforms due to the pandemic circumstances that did not provide an opportunity to discuss the preferences of emergency medicine educators. It has also been reported that educators and students need time to understand how E-assessments function, but experience is the key to use(28–30). In this study, experience was limited to a one-year pandemic period; it is believed that the increase in experience had a strong effect on disseminating the E-assessment, which fosters self-confidence and self-efficacy in emergency medicine educators.

In general, there are various advantages and disadvantages of online E-assessments (31).

Advantages:

- There is no need to print any exam documents before the exam.
- There is an option to sort questions to prevent duplication randomly.
- The exam results can be obtained immediately after the test is completed.
- Questions, past results, and student profiles can be archived in one place
- It is possible to evaluate a student several times and create additional exams based on their incorrect answers in previous exams.

Disadvantages:

- One computer is required for each student in the class.
- There is the possibility of cheating, which is prevented by designing the computer room. The possibility of accessing other computer resources should be disabled.
- Before the assessment, checks should be made to ensure that each computer is operational and connected to the internet.
- If many students take the exam simultaneously, powerful servers are needed to process the amount of information recorded in the system. Problems will arise in the case of power failure or server failure.
- Training medical school educators using the system requires time and workload.

The most frequently used testing method is online and offline exams with multiple-choice questions, and the exam types they consider the most appropriate are also exams with multiple-choice and multiple true/false questions. However, there is no ideal method to be used in E-assessments in emergency clinical practice.

It has been observed that concerns about video audio recordings and screen sharing do not decrease with experience.

In addition, the participants thought that they and colleagues in the education environment needed training. The pandemic may have also led to an acute and unplanned need to adopt e-learning and e-assessment processes to ensure continuity of education. This situation may have affected the participants' self-confidence and caused an increase in the need for training.

Due to the COVID-19 pandemic, studies on attitudes, readiness, and self-efficacy toward distance education, particularly for medical students, are available in the literature (31–33). Studies show that the self-efficacy and readiness of academic staff affect the success of distance education (33, 34). The findings also confirm that as experience in distance education increases, effectiveness increases at the same rate (33). Although this study was not a study of effectiveness, it was found that experience might affect self-confidence and self-efficacy. Studies on E-assessment are limited. Although specific criteria are used to ensure the standardization and control of E-assessment technologies, there is no study on the opinions, concerns, perspectives, and readiness of educators for assessment and evaluation in emergency medicine residency training.

In a study evaluating the effectiveness of an emergency medicine education program that integrates web-based learning into classroom sessions, the success and satisfaction of students who completed more than 75% of the web-based module were found to be statistically higher (34). Studies have found that university educators are not comfortable with how to include students in the online environment, causing difficulties in encouraging participation and illustrating the need for education in online learning (33). Further studies should provide a comparison between trainers and trainees in emergency medicine.

Limitations

This study has limitations. First, the number of participants is only one-fourth of the total number of educators. In addition to providing an opportunity for distance education and E-assessment, the pandemic affected survey participation rates due to the workload in emergency departments. Considering that distance education experiences are less than one year, the E-assessment experiences are only half of these experienced educators. Participation may have been limited since the survey was conducted at the beginning of the period of adaptation to distance learning. However, in the study population, more than 80% of participants were in state universities and training and research hospitals of the Ministry of Health. In the study country, these hospitals (n=91) represented 83.4% of all emergency medicine residency training hospitals (n=109) in the study period. Thus, the sample of the responders is representative for interpretation to provide generalizable results.

Although the correlation analysis was statistically significant, this study was found to have low significance for path analysis. The study suggested conducting the Tucker–Lewis Index, Comparative Fit Index and root mean square error of approximation for reliable interpretation with small sample size studies (35). Therefore, a higher number of participants are needed for the validation of the results. This statistical significance obtained by the correlation analysis may lead emergency medicine educators to conduct large-scale studies on E-assessment applications in the future. In this study, experiencing E-assessments with multiple-choice questions might affect their self-confidence, self-efficacy, attitude, and anxiety levels. Further studies should also include a comparison of the types of E-assessments applied. Although this study's population includes experiences with the E-assessments given in hospitals accredited with emergency medicine residency training, it does not include exams experienced or taken remotely, such as board exams and certification exams. This situation can also be taken into consideration in further studies. In addition, further studies are needed to examine technology acceptance model theories on E- in terms of ease of use and usability.

Conclusion

In conclusion, self-efficacy, self-confidence, and attitude toward E-assessments are related to the level of computer skills and E-assessment experiences. If experience and training for e-assessments increase, self-confidence and self-efficacy will increase, which will help e-assessment practices become widespread. It is recommended that emergency

medicine educators increase their computer skills and their E-assessment training and experience to be ready for E-assessment activities; this will ensure the continuity of emergency medicine education, especially in conditions such as pandemics.

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Ethical Approval: Ethics approval of the study was granted by Bakirkoy Dr Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee in August 2020 (2020/372).
The participants were informed about the study through an explanation paragraph before the start of Google survey, and their consent was obtained before they start to answer questions.
The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected a priori approval by the institution's human research committee.

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