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Undergraduate nursing students' experiences of distance education during the COVID-19 pandemic

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ABSTRACT

Background: The COVID-19 pandemic has led to significant changes in the field of education, including not least of all the adoption of distance education, which nursing students have had limited experience with in Turkey.
Purpose: This study aimed to determine the factors affecting nursing students' success in distance education and to evaluate their experiences during this process.
Methods: The study was designed as a descriptive, cross-sectional study and involved the participation of 454 nursing who were members of the Student Nurses Association in Turkey. An evaluation form for assessing students' sociodemographic and distance education-related characteristics and the Distance Education Assessment Questionnaire for Nursing Students (DEAQNS) were used for data collection.
Results: The students further reported that the main factors affecting the success of distance education were provision of preliminary information, proficiency level of technological software use, economic status, proficiency level of use of technological devices, and asynchronous learning.
Conclusions: In order to increase the success of distance education, students need information on the protection of personal data and use of technological software and devices in the nursing curriculum.

Introduction

The effects of the COVID-19 pandemic spread throughout the world very quickly. In order to keep the increasing number of cases under control, an immediate shift to distance education (DE) was implemented. There are only a limited number of studies on the DE experience of nursing schools in Turkey. This study therefore aimed to determine the factors affecting nursing students' success in DE and to evaluate their experiences during this process to contribute to improving DE in nursing schools.

Background

The COVID-19 pandemic, which originated in Wuhan city in China in December 2019 and quickly spread across the world, has caused a range of health issues, from mild infections to severe acute respiratory syndrome (Republic of Turkey Ministry of Health, 2020; Singhal, 2020). The disease is transmitted via virus-containing respiratory droplets that are spread by contact with infected individuals. The first COVID-19 case in Turkey was detected on March 11, 2020 (Republic of Turkey Ministry of Health, 2020). Around the same date, the WHO declared COVID-19 as a pandemic (WHO, 2020). Maintaining social distance was one of the main strategies applied to prevent the spread of the disease as the world awaited the development of a vaccine or treatment.

The practice of social distancing in the field of education prevents students from gathering in conference halls or classroom environments (Keswani et al., 2020; Rose, 2020). Many countries, therefore, have suspended educational activities in the classroom environment and started DE to prevent the spread of the COVID-19 pandemic (Zhu & Liu, 2020). In accordance with the decision of the Council of Higher Education in Turkey (CoHE), universities launched DE on March 16, 2020 to prevent the spread of the pandemic. Due to the lack of other definitive solutions to prevent the spread of COVID-19 in educational settings, DE continues to be applied by universities as of January 1, 2021 (CoHE,

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2020a).

Distance education is defined as a planned teaching-learning process that requires regular, meaningful, and supportive instructor-student and student-student interactions by utilizing one or more instruments of technology as channels for learning when students are separated from the instructor. The interactions can be real-time (synchronous) or independent of time and space (asynchronous) (Griffiths, 2016). Nursing schools should be prepared for DE by following and adopting the latest technological developments and methods. The ability of both instructors and students to effectively use the technology is critically important for participation in DE. The rate of burnout is higher in institutions where students and/or instructors are not prepared for DE. In particular, to ensure the success of DE, students should have suitable technological devices, an appropriate working environment, sufficient digital literacy, self-discipline, and effective time management skills, and actively participate (Angelino et al., 2007; Frith & Clark, 2013; Langegård et al., 2021; Reinckens et al., 2014).

The DE system has been implemented in Turkey to some extent since the 1980s (Bozkurt, 2017). However, given that an important part of nursing education involves applied courses, the DE experience of academicians and nursing students working in the field has been very limited. Under these circumstances, it is necessary to conduct an evaluation of the experiences nursing students have had with the rapid switch to DE due to the pandemic.

This study aimed to determine the factors affecting nursing students' success in DE and to evaluate their experiences during this process. The results to be obtained from the study will contribute to the development of strategies aimed at improving the DE applied in nursing schools.

Methods

Design and participants

The study used a descriptive, cross-sectional research design. The population of the study consisted of 9000 undergraduate nursing students who were members of the Student Nurses Association (SNA). At least 10 participants per predictor variable is appropriate for regression equations involving six or more predictors and 30 participants per variable are recommended to detect a small effect size (VanVoorhis & Morgan, 2007).

Based on these recommendations, the sample size of the study was calculated as 450 individuals by assuming 40 subjects per variable for regression analysis and considering the possibility of data loss (40 × 11 (number of variables) + 10 (probability of data loss) = 450). Applying the convenience sampling method, student nurses who were members of the SNA and agreed to participate in the study were included in the study. Those who were continuing their nursing education abroad (Erasmus program etc.) and those who took a break from their education (suspended their studies due to health problems etc.) were excluded from the study.

A total of 454 students voluntarily participated in the study and fully completed the data collection forms.

Instruments

Evaluation Form of students' sociodemographic and distance education-related characteristics

This form consists of items addressing the students' age, gender, and academic grade point average, area type of residence where DE is accessed, the device used to access DE, presentation method of the lessons, proficiency level of using technological devices and software, protection of personal data, factors that negatively affect DE, and the success of the DE. The success of the DE was evaluated with a form that includes 5 questions addressing the general success of the DE, personal success in the DE, the success of the instructor, the success of the platform used (Zoom, etc.), and the success of the school. These five questions were arranged on a 5-point Likert-type scoring system, with response options ranging from 1 = very unsuccessful to 5 = very successful. The scores on this 5-question evaluation form range between 5 and 25.

Distance Education Assessment Questionnaire for Nursing Students (DEAQNS)

This questionnaire was created by the researchers on the basis of a review of the related literature and of examination of DE systems (Jones et al., 2020; Ozturk et al., 2017; Tagoe & Cole, 2020; DE Accrediting Commission, 2020). The questionnaire includes 27 questions aimed at evaluating the DE platforms (Zoom, Google Meet, etc.), support resources, DE courses, and the benefits of DE. Each question is evaluated on a 5-point Likert-type scale, with options ranging from 1 = strongly disagree to 5 = strongly agree. Total possible scores obtainable from the questionnaire vary between 27 and 135, where higher scores indicate greater success of the DE for the student (Table 1).

The questionnaire was submitted to five experts, including three faculty members working in the field of teaching and learning in nursing and two faculty members working in the field of assessment and evaluation in educational sciences, to assess content validity. The experts rated each question using one of the following options: 1 = much change needed (with recommendation), 2 = slight change needed (with recommendation), 3 = appropriate, 4 = highly appropriate. From the content validity index used in the evaluation of the expert opinions, it was determined that the item-level content validity index ranged between 0.91 and 1.00 and that the scale-level content validity index was 0.96. Acceptable content validity index values are reported to be above 0.80 for both the item and scale level (Davis, 1992). After achieving expert agreement, a pilot study of the questionnaire was applied to a group of 30 individuals with the same characteristics as the sample.

The individuals who participated in the pilot study provided no negative feedback about the clarity and intelligibility of the questionnaire. After the pilot application, the reliability of the questionnaire was evaluated by calculating the Cronbach's alpha reliability coefficient, the results of which showed the alpha value to be 0.82.

Data collection and ethical considerations

The study data were collected via online Google-based data collection forms between June 2020 and August 2020 from undergraduate nursing students who were members of the SNA. Ethical approval from the Scientific Research and Publication Ethics Committee of the university was obtained before the data collection process (Date: 22-06-2020 Issue: 2020/14-05). Institutional permission of the Student Nurses Association and approval of the Turkish Republic Ministry of Health for scientific research studies on COVID-19 were also obtained. To start the data collection process, the informed consent form and other data collection forms were sent to the email addresses of students registered in the database of the association. The email stated that no personal data would be collected, and that the responses given would remain anonymous. This information was also added to the data collection form. The inclusion and exclusion criteria were specified in both the research invitation email and the online data collection form. Accounting for the possibility of data loss, the research invitation email was sent once to the email addresses of 600 students who were selected randomly from the members of the association.

The contact addresses of the researchers were added under the informed consent form so that any questions the students had about the research could be answered. In this section, the participating students were directed to address any points they did not understand to the researchers during the data collection process. The students who signed the informed consent form and agreed to voluntarily participate in the study were included in the research, while those who did not agree to participate in the study or did not want their data to be used after participation were not included in the research. It took approximately

Table 1
Distance Education Assessment Questionnaire for Nursing Students (DEAQNS).

Items no	Please mark your level of agreement with the statements below about the distance education process. Distance education system: It refers to the education on digital platforms, such as Microsoft teams, Zoom, and Sakai, used in the distance education process.	(1) Strongly disagree.	(2)	(3)	(4)	(5) Strongly agree
1.	I can easily use the distance education system on all devices (smartphones, tablets, computers).					
2.	I have often experienced problems, such as freezing, disconnection, and crashing, in the distance education system.					
3.	The image and sound quality of the distance education system is good.					
4.	I can easily perform all operations in the distance education system.					
5.	I am sure that my personal data are protected in the distance education system.					
6.	I have not experienced any internet quota problem during the distance education process.					
7.	I receive support from my friends when I have problems in the distance education process.					
8.	I receive support from my school when I have problems in the distance education process.					
9.	When I have problems in the distance education process, I receive support from the instructors in charge of the course.					
10.	My family supports me during the distance education process.					
11.	I have had trouble adapting to the distance education process.					
12.	My school has managed the distance education process well.					
13.	I can use the distance education system well.					
14.	Course instructors can use the distance education system well.					
15.	During the distance education process, the lessons are presented on a predetermined calendar.					
16.	Exams/homework have been evaluated properly in the distance education process.					
17.	Homework has been assigned in an efficient manner during the distance education process.					
18.	I have not had any problems with doing and uploading homework during the distance education process.					
19.	The tests taken during the distance education process have been administered in a secure manner.					
20.	I have not had any problems in receiving, doing, and uploading tests during the distance education process.					
21.	I can access recorded lessons conducted during the distance education process whenever I want.					
22.	Lessons in distance education have been as effectively presented as those in formal (face-to-face) education.					
23.	Theoretical courses can be given through distance education.					
24.	The applied parts of the courses related to clinical practice can be given through distance education.					
25.	The distance education experience has contributed to building distance learning skills that I may need in the future.					
26.	The distance education process has contributed to my self-learning skills.					
27.	The flexibility of the distance education process has helped me to improve myself in different areas (social, cultural, scientific, etc.).					

15 min for the participants to fill out the data collection tools.

Data analysis

Data were analyzed using the SPSS 25.0 software package (SPSS Inc., Chicago, IL). The general characteristics of the participants were evaluated in terms of frequencies and percentages. The Shapiro-Wilks test was used to determine whether the data showed normal distribution. The relationship between the DEAQNS score and the success score of the DE was analyzed using Pearson correlation analysis. Multiple linear regression analysis (enter method) was applied to analyze the extent to which independent variables (age, gender, academic grade point average, area type of residence where DE is accessed, the device used to access DE, presentation method of the lessons, proficiency level of using technological devices, etc.) predicted the DEAQNS score. Before conducting multiple linear regression analysis, the multicollinearity and normality of the data were analyzed. The level of acceptable significance was set at $p < .05$.

Results

A total of 454 nursing students (response rate = 75.7%) participated in the study. According to the findings, 78.4% (n = 356) of the students were female, their mean age was 21.2 ± 2.48, and 35.5% (n = 161) stated that they did not read the information about "Protection of Personal Data" in the DE system. Furthermore, 40.5% (n = 184) of the participants stated that the devices they used in the DE were inadequate, 25.9% (n = 118) reported that they did not have their own study rooms, and 24.2% (n = 110) said that they did not have internet access at their place of residence, all factors that were reported as negatively affecting the DE. Students' sociodemographic and distance education-related characteristics are given in Table 2.

A statistically significant, positive, high level linear relationship was found between students' mean DEAQNS scores (85.06 ± 19.67, min. = 33, max. = 132), and the mean score on the 5 questions used to evaluate the success of the DE (16.04 ± 4.33, min = 5, max = 25) ($r = 0.820$, $p < .001$).

Prediction of the DEAQNS score by the students' sociodemographic and distance education-related variables was analyzed using multiple linear regression analysis. Sociodemographic and distance education-related variables (sex, age, economic status, place of residence where student accesses the DE system, school year, received preliminary information, device used, lesson format, academic grade point average, proficiency level of using technological devices, and proficiency level of using technological software) were found to be statistically significant predictors of the DEAQNS score ($F = 8.88$, $p < .001$), with all variables explaining 23.3% of the variance in the DEAQNS score (R square = 0.233). Based on order of importance, the variables of preliminary information ($\beta = -0.268$; $p < .001$), the proficiency level of use of the technological software ($\beta = 0.155$; $p = .006$), economic status ($\beta = 0.139$; $p = .002$), the proficiency level of use of technological devices ($\beta = 0.138$; $p = .011$), and asynchronous teaching method ($\beta = -0.107$; $p = .042$) predicted DEAQNS score at a statistically significant level (Table 3).

Discussion

This study aimed to determine the factors affecting nursing students' success in DE and to evaluate their experiences during this process. Detailed data about DE success and experiences were collected from the students. At the completion of the data collection process for the DEAQNS developed by the researchers, Cronbach's alpha value was calculated and found to be 0.92. This result indicates that the questionnaire developed for the study had a high level of reliability (George & Mallery, 2019). In addition, a statistically significant, positive, strong linear correlation was found between the students' scores on the

Table 2
Students' sociodemographic and distance education-related characteristics (n = 454).

Characteristics	X ± SS	
Age	21.2 ± 2.48	
Academic grade point average	75.3 ± 8.84	
Characteristics	**(n)**	**(%)**
Sex		
Female	356	78.4
Male	98	21.6
School year		
1st year	61	13.4
2nd year	155	31.1
3rd year	94	20.7
4th year	144	31.7
Economic status		
Low	124	27.3
Middle	298	65.6
High	32	7.0
Area type of residence where DE system is accessed		
City	220	48.5
Town	137	30.2
Village	97	21.4
Received preliminary information		
Yes	354	78.0
No	100	22.0
Lesson format		
Synchronous	118	26.0
Asynchronous	107	23.6
Synchronous and asynchronous	229	50.4
Device used		
Smartphone	197	43.4
Computer	257	56.6
Proficiency level of using technological devices		
Poor	170	37.4
Moderate	173	38.1
Good	111	24.4
Proficiency level of using technological software		
Poor	263	57.9
Moderate	128	28.2
Good	63	13.9
Have you read the information on the "Protection of Personal Data" in the distance education system you use?		
Yes	143	31.5
No	161	35.5
No idea	79	17.4
No information in the system	71	15.6
What plans have been made to address the absence of clinical practice in the hospital due to the distance education process?		
Assessed with homework or project	362	79.7
A make-up program has been planned for the new school term.	62	13.7
No information has been given, yet.	30	6.6
Please mark the situations that have negatively affected your distance education process. (You can choose more than one option)		
The device I have been using to access distance education system is inadequate.	184	40.5
I do not have my own study room.	118	25.9
There are other individuals at home receiving distance education.	113	24.9
We have no internet access in the place I live.	110	24.2
I currently hold a job while receiving distance education.	34	7.5
Other	27	5.9

Table 3
The level at which sociodemographic and distance education-related variables predicted the students' DEAQNS score.

Independent variables	Unstandardized coefficients		Standardized coefficients	t	p	95.0% CI
	B	SE	β			
(Constant)	60.690	11.572		5.244	<.001*	37.946 to 83.435
Sex (R = Male)						
Female	−1.324	2.154	−0.028	−0.615	.539	−5.557 to 2.909
School year (R = Second year)						
1st year	−0.142	2.745	−0.002	−0.052	.959	−5.536 to 5.253
3rd year	−1.257	2.373	−0.026	−0.529	.597	−5.922 to 3.408
4th year	1.386	2.375	0.033	0.584	.560	−3.281 to 6.053
Place of residence where student accesses the DE system (R = City)						
Town	−2.529	1.938	−0.059	−1.305	.193	−6.337 to 1.279
Village	−1.150	2.249	−0.024	−0.511	.609	−5.571 to 3.270
Received preliminary information (R = Yes)						
No	−12.732	2.037	−0.268	−6.251	<.001*	−16.735 to −8.729
Device used (R = Smartphone)						
Computer	2.302	1.880	0.058	1.225	.221	−1.393 to 5.998
Lesson format (R = Synchronous)						
Asynchronous	−4.938	2.417	−0.107	−2.043	.042*	−9.689 to −0.187
Synchronous and asynchronous	−1.451	2.047	−0.037	−0.709	.479	−5.475 to 2.573
Academic grade point average	−0.007	0.100	−0.003	−0.072	.943	−0.203 to 0.189
Age	0.383	0.389	0.048	0.984	.326	−0.382 to 1.147
Economic status	4.981	1.582	0.139	3.149	.002*	1.872 to 8.089
Proficiency level of using technological devices (computers, tablets, smartphones, etc.)	3.508	1.380	0.138	2.542	.011*	0.795 to 6.220
Proficiency level of using technological software (Word, Excel, Microsoft Teams, Google Meet, Zoom, etc.)	4.207	1.516	0.155	2.775	.006*	1.227 to 7.187

Notes: Durbin-Watson = 1.867; F = 8.888, p < .001; R = 0.483; $R^2 = 0.233$; Adjusted $R^2 = 20.7\%$.
Abbreviations: CI, confidence interval; SE, standard error; β, standardized regression coefficient.
* Significance level was accepted as p < .05.

questionnaire and their perceptions of the success of DE (Schober et al., 2018).

Students' experiences during distance education

DE offers key advantages, including providing students the opportunity to learn independent of time and place. However, to carry out this process efficiently, many basic requirements, such as technological devices, internet connection, proper study environment, and data security must be met (Akdemir, 2011). The basis requirement of data security stands at the forefront of the field of DE, just as it does in many other fields today. The video and audio communication methods and types of file transfers used in the DE systems are particularly important issues in the protection of personal data (Huang et al., 2020). A considerable portion of the students (65.6%) in the study stated that they did not read the information about the protection of personal data nor had any information about it, or that the system did not provide information about the issue (Table 2). In DE, a major amount of data are produced, shared, and stored as a result of student and teacher interaction.

If these data fall into the wrong hands, they can lead to many problems, such as blackmailing, stalking, and exposure to unwanted advertisements. With the developments in technology and the internet, many countries and institutions have issued laws and created policy documents on the protection of personal data to protect individuals from these adverse situations (General Data Protection Regulation (GDPR), 2020, The European Commission, 2020, USA Government, 2020). Considering the rapid transition to DE because of the pandemic, it is likely that students and academicians do not have enough awareness about the protection of their personal data (Huang et al., 2020). The use of DE in nursing education is particularly concerning when it comes to the issue of protection of personal data, as significant amounts of personal data, including patient records, are being shared online. It is therefore important that instructors and nursing students alike are sufficiently informed about the data security including personal data. Moreover, with the prevalent use of the internet and related technology in the field of health, the issue of protection of data security including personal data should be included in nursing curricula. Nursing education institutions should take all necessary measures to ensure data security.

In the study, the students were asked about the factors that negatively affected DE. Accordingly, 40.5% (n = 184) of the students stated that the device they used to access DE was inadequate. For DE to be successful, devices that can run the related software are required. In most cases, this will mean computers that can run the live stream software and office software required by DE. In a study conducted in Turkey by Ozturk et al., it was found that students who experienced DE for the first time had difficulty in finding a computer (Ozturk et al., 2017). In the present study, 43.4% (n = 197) of the students reported that they had participated in DE lessons with their smartphones. The use of small smartphone screen sizes for live lessons and office software applications can negatively affect the success of DE. Bringing awareness to students about the advantages of using computers for DE would contribute positively to student achievement in DE (Jowsey et al., 2020).

Among the students in this study, 25.9% (n = 118) stated that they did not have a study room of their own, and 24.9% (n = 113) reported that there were other family members receiving DE at their home. For successful DE, it is necessary that students have a suitable study environment. Having a private study room at home has positive effects on academic achievement (Erdogdu & Erdogdu, 2015). The closure of libraries and other study areas due to the pandemic means that students have to continue their education at home. Lack of an appropriate working environment at home can be an obstacle to achieving success in DE.

According to the data, 24.2% of the students (n = 110) stated that there was no internet access in their homes. Internet access is indispensable for successful DE, as the internet allows students to follow posts, lessons, and homework and to communicate with their instructors and other students. The lack of internet access especially seen in regions with low socioeconomic levels negatively affects students' DE. This situation can lead to educational inequality and life-long problems for

those students living in these areas (Nature Editorial, 2020). In rural areas of Turkey, internet infrastructure is provided by government agencies. To prevent this inequality, governmental organizations and non-governmental organizations need to take action and provide adequate internet access to regions where internet access is not widely available.

According to the findings, 7.5% (n = 34) of the students stated that they held jobs while taking DE. Students who working a job while taking DE may not have enough time to spare for their lessons and homework, a situation that could potentially cause disruptions in their education process. For successful DE, the same amount of time allocated to formal face-to-face education should be allocated to DE. As part of the preliminary information given to students on the distant education process, detailed information about the importance of DE should be included.

In the study, 79.7% (n = 362) of the students stated that clinical practice was evaluated on the basis of homework or projects. Only 13.7% of the students (n = 62) stated that they would be able to make up the clinical practice they had missed when the new term started. Nursing is an applied undergraduate education program. After successful completion of their theoretical courses and clinical practice, nursing students earn their undergraduate nursing degrees. CoHE has declared that clinical practice is mandatory in nursing education. Clinical practice is mandatory in nursing education, however due to the regulations hospitals have imposed to deal with the COVID-19 pandemic, nursing students cannot perform their clinical practice (Deng, 2015; International Council of Nurses, 2020; Schwartz, 2019). DE alone does not accomplish nursing clinical practice (Nabolsi et al., 2021). Considering the important function clinical practice holds for nursing students, failure to fulfill incomplete clinical practice in nursing education due to the COVID-19 pandemic may negatively affect students' readiness for working life, whereas completion of the missing clinical practice would have a positive effect on nursing students' readiness.

Factors affecting students' success during the distance education process

To identify the factors that affected the success of DE for students as a whole, the extent to which students' sociodemographic and distance education-related variables (sex, age, economic status, place of residence where student accesses the DE system, school year, received preliminary information, device used, lesson format, academic grade point average, proficiency level of using technological devices, and proficiency level of using technological software) predicted the DEAQNS score was analyzed using multiple linear regression analysis. Results of the analysis showed that the sociodemographic and distance education-related variables predicted the scores on the questionnaire to a statistically significant extent, and that they explained 23.3% of the variance in the score.

In the regression analysis, examination of the variables that were found to provide a statistically significant prediction of the DEAQNS score showed that the variable of 'preliminary information' was first in order of importance. In the study, the students who had received information about DE beforehand had higher scores on the questionnaire compared to those who had not received any information, meaning that the students who had received information beforehand had a more successful DE experience than those who had not. Preliminary information, which is defined as providing information on a subject in advance, is very important in the field of education. Due to the pandemic, DE had to be launched rapidly, and students and academicians were unprepared for this process. To prevent the negative effects of this situation, institutions provided students and academicians with training programs on DE, and websites were prepared to inform them (CoHE, 2021). It was also found in the study that 22.0% (n = 100) of the students had not received any information or training about the DE. The rate of burnout is higher in institutions where students and/or instructors are not prepared for DE (Angelino et al., 2007). Users who lack information about the DE system spend most of their time learning the DE system (Nabolsi et al., 2021). For successful DE, it is important that institutions provide all students with necessary preliminary information. This preliminary information can include subjects like introduction to the DE program, access to technical support, etc.

The second variable in order of importance was 'the proficiency level of use of the technological software' and the fourth variable was 'the proficiency level of use of technological devices'. According to the findings, the higher the students' proficiency level of using technological software and technological devices, the higher their scores were on the questionnaire, which means that students who had a good proficiency level of use of technological software and technological devices had a more successful experience of DE compared to that of students whose technological skills were poor. Digital literacy (finding, understanding, analyzing, producing, and sharing information with digital devices) is a necessary competency for proper utilization of technological devices (computers, tablets, smartphones, etc.) and technological software (Office software, Zoom, Microsoft Teams, etc.). Students with poor digital literacy experience more difficulties in DE and therefore require training on how to use technological software and technological devices more proficiently for learning purposes (Ozdamar-Keskin et al., 2015; Griffiths, 2016; Posey & Pintz, 2017; Human Rights Watch, 2020; Jowsey et al., 2020). These training programs must be included in the nursing curriculum to ensure that nursing students gain the necessary digital literacy to effectively pursue their careers. In order for these training programs to be carried out efficiently, students and instructors should also be provided with adequate technical support.

The third variable in order of importance was 'economic status'. In the study, the students with better economic status were found to have higher scores on the questionnaire, the results of which indicated that these students were more successful with DE. The basic requirements for achieving successful DE, such as having a computer, internet connection, and a study room, are directly related to socioeconomic status. While students with higher socioeconomic status can easily access these basic needs and more, students with poor socioeconomic status struggle to meet these basic needs. Studies have shown that improvement in socioeconomic status positively affects academic success (Ciftci & Caglar, 2014; Liu et al., 2020; Van Hoek et al., 2019). Especially with the transition to DE, there has been an increase in the demand for electronic devices (laptop etc.). The increase in demand led to an increase in prices (Nabolsi et al., 2021). Generally, nursing schools attract students of middle and low socioeconomic status (Alkaya et al., 2018; Natan & Becker, 2010), which means that nursing schools should identify students who are struggling to meet the basic requirements for DE due to their socioeconomic status and enter into cooperation with governmental organizations and non-governmental organizations to equip these students with the proper requirements to have a successful DE experience.

The fifth variable in order of importance was 'asynchronous teaching method'. The study found that students who received their lessons synchronously + asynchronously had higher scores on the questionnaire than students who received their lessons asynchronously, which means that students who received their lessons with synchronous + asynchronous methods had more success with DE. Learning environments in DE are divided into synchronous and asynchronous dimensions. In asynchronous lessons, lecturers and students are not restricted by time or space in presenting and receiving lessons, respectively, whereas in synchronous lessons, students and lecturers are restricted to specifically scheduled lessons that must be attended by both at the same time (Hrastinski, 2008; Ozkok & Bulutlu, 2020). Students tend to find synchronous lessons more beneficial because they have the opportunity to ask questions, discuss, brainstorm, and get feedback (Mackavey & Cron, 2019). The CoHE reported that 22% of the lessons conducted in DE in Turkey were synchronous (CoHE, 2020b). In DE for nursing schools, it is important that the lessons are given synchronously to facilitate student-academician and student-student interaction. In cases where asynchronous courses are offered, it is necessary to provide communication

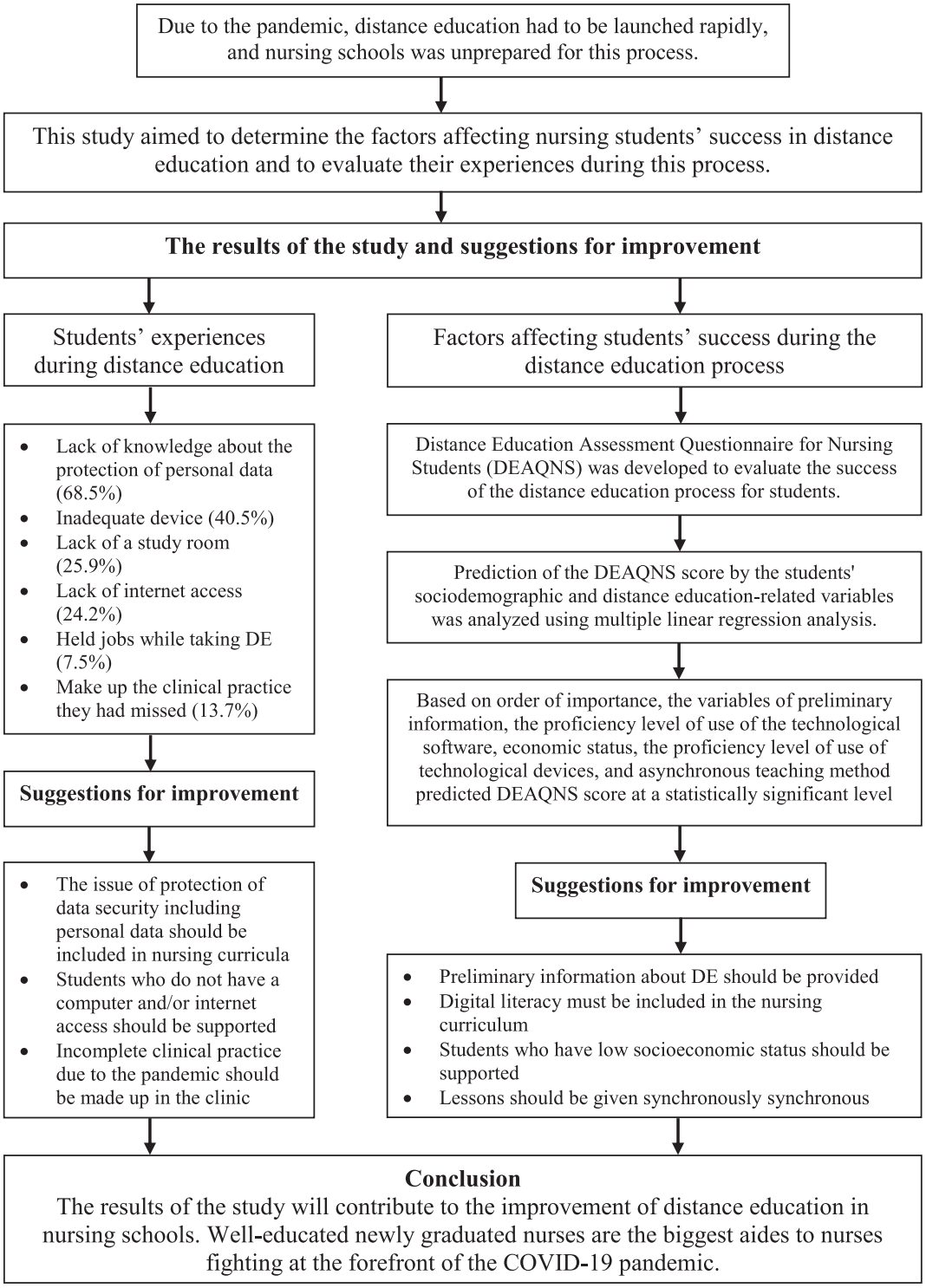

Fig. 1. A roadmap for improving the distance education process for nursing schools.

channels whereby students can receive answers to their questions and be provided with feedback.

Fig. 1 presents a road map that includes the factors shown to affect the success of DE, along with suggestions to improve these factors.

Limitations

The research results obtained from this study can only be generalized to the sample group of the current research. The study data were limited to students' self-reports, and given that this was a cross-sectional study, the results of the study only reflect the situation at the time of data collection. However, in order to better represent nursing students from across all of Turkey, we worked with the Student Nurses Association to form our research sample. The use of the convenience sampling method in the study may have negatively affected the representativeness of the sample.

Conclusions

From the results of this study, the factors affecting the success of nursing students in DE were identified. Technical support (computer, internet connection, study environment, etc.) should be provided to students who need it to ensure successful DE. It is furthermore important that the topics of personal data protection and digital literacy be included in the nursing curriculum. Well-educated newly graduated nurses are the biggest aides to nurses fighting at the forefront of the COVID-19 pandemic.

Future research

Recommendations for future studies:

- Use a broader sample to analyze the effects of DE on schools, instructors, and students
- Develop scales that assess the outcomes of DE processes
- Create common standards for DE processes
- Compare DE processes at nursing schools located in different countries.

Compliance with ethical standards

Ethical approval from the Scientific Research and Publication Ethics Committee of the Dokuz Eylul University was obtained before the data collection process (Ethical Approval Number: 2020/14-05, Date: 22-06-2020). Institutional permission of the Student Nurses Association and approval of the Turkish Republic Ministry of Health for scientific research studies on COVID-19 were also obtained. To start the data collection process, the informed consent form and other data collection forms were sent to the email addresses of students registered in the database of the association. The contact addresses of the researchers were added under the informed consent form so that any questions the students had about the research could be answered. In this section, the participating students were directed to address any points they did not understand to the researchers during the data collection process. The students who signed the informed consent form and agreed to voluntarily participate in the study were included in the research, while those who did not agree to participate in the study or did not want their data to be used after participation were not included in the research.

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CRediT authorship contribution statement

M.M.K. and I.C. contributed to the conception and design of this study. Ş.K. and A.Y.Y. carried out the data collection process. I.C., M.M. K., Ş.K., and A.Y.Y. performed the statistical analysis and drafted the manuscript. M.B. critically reviewed the manuscript and supervised the whole study process. All authors read and approved the final manuscript.

Declaration of competing interest

The authors declare that they have no conflict of interest, and that the content has not been published or submitted for publication elsewhere.

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