

Opinion and satisfaction of critical care nursing students and staff regarding electronic exams and its barriers

Asmaa Ibrahim Mohamed¹, Naglaa Ahmed Ahmed² & Naglaa Gamal Eldien Abdelhafez³

¹. Demonstrator at Critical Care and Emergency Nursing Department Faculty of Nursing, Sohag University, Egypt.

². Assistant Professor of Critical Care and Emergency Nursing Department Faculty of Nursing, Assiut University, Egypt

³. Assistant professor of Critical Care and Emergency Nursing Department Faculty of Nursing, Sohag University, Egypt

Abstract:

Electronic exams presented through computer by teachers on several software with a high degree of accuracy. It saves a lot of effort and time and gives more stable and objective results to determining the educational levels. **Study aims to** assess opinion and satisfaction of critical care nursing students and staff regarding electronic exams and its barriers. **Design:** Descriptive research design. **Setting:** This study was carried out in Critical care & Emergency Nursing department (students and staff) Faculty of Nursing -Assiut University. **Sample:** convenience sample of all critical nursing students (660) and (26) member of the staff. **Tools:** Three main tools were used to collect data include, **Tool (I):** Critical care nursing Students opinion and Satisfaction Assessment questionnaire. **Tool (II):** Staff opinion and Satisfaction Questionnaire. **Tool (III):** Critical Care Nursing Student and staff Barriers of Electronic Exam Questionnaire **Results** revealed that near to three quarters (70.9%) of studied student were female, had less 25 years .More than half of the studied students (53.9%) & staff (57.7%) had satisfactory level about electronic exams. **Conclusion:** Electronic examinations are a modern and effective means of evaluating students electronically, as it enables a faculty member to prepare exams objectively and is relatively easy to apply to students and make corrections electronically. **Recommendations:** Develop training program regarding electronic exams among university instructors and students.

Keywords: *Critical care nursing, Electronic exams, Opinion, Satisfaction & Students and staff*

Introduction

Electronic exams offer an alternative means of assessing students' academic performance, organizing data, and fostering self-learning abilities. They also help to solve the challenges associated with the usage of traditional paper-based exams. Allowing educational establishments to use modern technologies to improve the quality of their instruction. As a result, a significant portion of the teaching and learning process and a significant amount of time are spent on electronic assessments. (Al shehri, & Al harthi, 2021).

A variety of questions, such as multiple-choice, true or false, matching, arranging, fill-in-the-blank, essays are used in electronic exams. It is made using specialist software to identify a person's performance in all pertinent areas. (Ahmed et al., 2021).

Benefits of electronic exams are time savings, test security, safe data storage, speed, instant exam results, cost effectiveness, paper savings, less time spent writing questions, rewriting papers, printing results, and automated record-keeping for learning analytics and item analysis as well as automated record-keeping for students, teachers, and institutions are all benefits of taking exams electronically.(Ilgaz, et al., 2020).

The following are some drawbacks of taking electronic exams such as power outages in some places; lack of access to computers; lack of reliable

and fast internet connection; potential for test fraud and cheating; ignorance of new technologies (Safabakhsh, & Arbabisarjou, 2020)

Faculty members' face some difficulties such as lack of preparation and expertise in creating and using computerized tests. Absence of a computer facility. Lack of computer skills makes it more difficult to create essay questions and create electronic exams. recognizing different question types, having experience with multimedia, and applying them to the test's format and target audience while also being able to save money, time, and resources necessary to prepare the exams (Al-Shehri, 2021)

Students' pleasure with the electronic exams might be used to gauge their success. E-examinations are crucial for cutting costs and preserving exam privacy by administering exams electronically via computer networks in labs. After the exam, results are sent straight to a database for processing and storage, and each nursing student receives an account with a username and password that are only good for that exam. (Mohamed, et al., 2023)

Significance of the study

Many universities from the last year are in the transition from traditional pen and paper examinations (paper exams) to electronic examinations (e-exams or digital exams). By observation of the researcher there are many challenging facing the student and academic

staff members so we hope to support this digital transformation and identified its obstacles and recommend solutions. Critical care nursing students who performed electrical exams on the online platform in 2021-2022 were approximately 1200 students in critical care nursing department, faculty of nursing, Assiut university. (**Critical Care Nursing Department, Faculty Of Nursing, Assiut University**). Therefore, the researcher will conduct this study to assess the opinion and extent of satisfaction of critical care nursing students and staff in electronic exams and the obstacles they face.

Aim of the study

This study aims to assess Opinion and satisfaction of critical care nursing students and staff regarding electronic exams and its barriers.

Research questions:

What is the opinion of critical care nursing students and staff regarding electronic exams?

What is the satisfaction level of critical care nursing students and staff regarding electronic exams?

What are the barriers facing critical care nursing students and staff regarding electronic exams and its barriers?

Subject and Methods

Research design: Descriptive research design was used to conduct this study.

Setting: This study was carried out in Critical care & Emergency Nursing (students and staff) Faculty of Nursing - Assiut University

Sample: A convenient sample of critical care nursing students and staff in critical care department were included in the study. They were approximately 660 students and 26 staff member were included in the study

Tools:

Three main tools were used to conduct the study they were developed by the researcher after reviewing of relevant and recent literature. (**Tawafak et al., 2019**)

Tool1: student assessment sheet "critical care nursing Students opinion and Satisfaction Assessment questionnaire ":-

It was developed by (**Tawafak et al., 2019**) and modified by the researchers through paraphrasing sentences to assess nursing students' satisfaction and opinion regarding electronic exams.

It consisted of three parts:

Part (1): Students socio demographic data which include (gender and age).

Part (2): Critical care nursing students opinion regarding electronic exam. It included 10 multiple choice questions about critical care nursing students opinion regarding electronic exam.

Part (3): Critical care nursing students satisfaction regarding electronic exam. It included 27 multiple choice questions, such as electronic exams are easier

than paper exams, the college adequately provided training on electronic exams

Tool two: Staff assessment sheet "Staff opinion and Satisfaction Questionnaire"

This tool adapted from (**Zahedi et al., 2021**). The questionnaire is aimed at assessment of staff opinion and Satisfaction regarding electronic exam.

It consisted of three parts:

Part (1): Staff sociodemographic data which include age, gender, their faculty, Practical degree, Have you ever made an electronic test design before? And have you ever received courses on information technology?

Part (2): Staff opinion regarding electronic exam: It included 14 questions about staff opinion regarding electronic exam.

Part (3): staff satisfaction regarding electronic exam: It included 16 questions.

Tool three: Critical Care Nursing Student and staff Barriers of Electronic Exam Questionnaire

This tool adapted from (**Omran et al., 2022**). It is used to assess the students' perception of barriers to electronic exams among critical care nursing students and staff.

It included 19 barriers divided into four domains, namely:

1. **Personal barriers (eight items):** such as difficulty and poor academic achievement under critical conditions and parents worrying about e-exam.
2. **Pedagogical barriers (eight items):** such as the answers are very similar among students, teachers do not have sufficient experience to prepare and apply for the exam, and poor exam quality.
3. **Technical barriers (three items):** such as power cuts (lack of electricity), internet unavailability, and lack of physical space.
4. **Regulatory obstacles (three items):** such as lack of resources and facilitating procedures and lack of administrative support.

Preparatory phase: This phase involved developing the data collection tools based on a review of the pertinent literature by the researchers and preparing the data collection instruments.

- 1- The official Permission to conduct the study was obtained from the dean of faculty of nursing Assiut University after explanation of the aim and nature of the study.
- 2- Development of the tools after reviewing the related literature.
- 3- The tools were reviewed by a jury of 5 experts in field (4 critical care nursing staff & one expert in statistics to assess the clarity, feasibility, applicability, and the content validity of the tools and all the necessary modifications were done)
- 4- A pilot study will be conducted in 10% of sample to evaluate the applicability and clarity of the developed tools.

- **Pilot study:** was conducted prior to data collection on 10% of the sample's to assess the applicability, clarity of the tools and recognize any problems. According to this pilot study, the necessary modifications were made. Additionally, it featured a time estimate for when the tools would need to be completed. And it was included with study sample.
- **Reliability:** Reliability of the questionnaire was tested using Cronbach's Alpha test and turned out to be for students and staff knowledge was 0.85 and for the second tools' Cronbach's coefficient alpha test (0.82) that indicate high reliability of the used tool.
- **Content Validity:** A jury of five experts in the connected domains, including three critical care nursing professionals, one special expert in statistics, evaluated the produced tools' content validity.

Ethical considerations:

Research proposal was approved from Ethical Committee in the Faculty of Nursing Assuit-University
 The study was followed common ethical principles in clinical research.
 There is no risk for study subject during application of research.
 Study subject assured that the data of this research will not be reused without second permission.
 Confidentiality and anonymity was assured.

Study subject were assured that they have the right to refuse to participate and/ or withdraw from the study without any rational at any time

Study subject privacy was considered during collection of data.

Oral consent was obtained from students and staff after explaining the nature and purpose of the study.

Field work:

Critical care student and staff member were recruited to participate in the study via WhatsApp groups , which included information about the study's goal and how long it would take to complete the questionnaire. The survey was administered using a Google Form https://docs.google.com/forms/d/e/1FAIpQLSdRw7Y-P3epUxehZQFnPphZzOPJ5MpcrucicKdNVQToSEbfzg/viewform?usp=sf_link for student and https://docs.google.com/forms/d/16Ts6nGooeTvtxhCv8i0jPhEash6UYz_BjFI-iWHea90/edit?usp=forms_home&ths=true for critical care staff. The online survey was written in Arabic. All of the replies of the student and staff "who accepted to respond to questionnaire" were compiled into an online spreadsheet assesses opinion and satisfaction of critical care nursing students and staff regarding electronic exams and its barriers. Collected data were recorded in a special chart, coded, analyzed and tabulated. Data entry and analysis were conducted using SPSS 26.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables. Person's test was used for correlation

Results

The result obtained from the study was presented in the following parts:

Part I: Critical care nursing students and staff ' opinion regarding electronic exam (Table 1-2)

Part III: Critical care nursing students and staff satisfaction regarding electronic exam (Table 3-4)

Part IV: Critical Care Nursing Student and staff Barriers of Electronic Exam (Table 5- 6)

Part VI: Correlation between the studied variables (table 7-8)

Table (1): Frequency distribution of the studied students' opinion regarding to electronic exam (n=660)

Items	Agree		To some extent		Disagree	
	No	%	No	%	No	%
1. Electronic exams are easier than paper exams	288	43.6	280	42.4	92	13.9
2. The exam hall is suitable for conducting electronic exams	422	63.9	170	25.8	68	10.3
3. The time limit for taking electronic tests reduces the phenomenon of cheating among students	296	44.8	180	27.3	184	27.9
4. There must be a specialized technical team to deal with technical errors during electronic exams	558	84.5	76	11.5	26	3.9
5. Electronic tests are clear and free of spelling errors	350	53.0	248	37.6	62	9.4
6. The time allotted for the test is suitable for the questions	182	27.6	230	34.8	248	37.6
7. Is there a variety in the level of difficulty and ease of the questions (easy - medium - difficult)?	348	52.7	246	37.3	66	10.0
8. Are the questions identical to the content of the curriculum?	338	51.2	268	40.6	54	8.2
9. The questions measure the objectives of the course?	390	59.1	232	35.2	38	5.8
10. Students are briefed on the electronic test system	376	57.0	176	26.7	108	16.4

Table (2): Frequency distribution of the studied staff' opinion regarding to electronic exam (n=26)

Items	Agree		To some extent		Disagree	
	No	%	No	%	No	%
1. Electronic tests are suitable for evaluating students in all theoretical courses.	3	11.5	16	61.5	7	26.9
2. The student only needs to learn the scientific material to pass the electronic exams and does not need any special skills in information technology	9	34.6	4	15.4	13	50.0
3. Electronic tests are suitable for measuring all learning goals.	3	11.5	9	34.6	14	53.8
4. Electronic tests measure the actual educational level of the student	3	11.5	14	53.8	9	34.6
5. Electronic tests are better for you because they help save paper consumption	17	65.4	6	23.1	3	11.5
6. The occurrence of technical problems cannot constitute an obstacle to conducting electronic exams.	1	3.8	6	23.1	19	73.1
7. Because the student's grades are calculated automatically, you prefer more electronic tests.	11	42.3	11	42.3	4	15.4
8. Correcting electronic tests is more accurate because the computer reduces human error.	12	46.2	10	38.5	4	15.4
9. Do you think that the electronic tests are characterized by fairness like the paper tests?	11	42.3	7	26.9	8	30.8
10. The question bank should be used in creating electronic tests to increase the reliability of the test results.	15	57.7	7	26.9	4	15.4
11. Cheating in electronic tests is more difficult.	6	23.1	6	23.1	14	53.8
12. The electronic exam system is secure enough to prevent leakage of exams	8	30.8	13	50.0	5	19.2
13. Using a username and password to log in provides adequate protection for electronic exams	14	53.8	10	38.5	2	7.7
14. Displaying the correct answers to the questions at the end of the test will help the students to learn.	15	57.7	7	26.9	4	15.4

Table (3): Frequency distribution of the studied students' satisfaction regarding electronic exam (n=660)

Items	Satisfied		Satisfied to some extent		Not satisfied	
	No	%	No	%	No	%
1. The electronic exams have been adequately trained	338	51.2	198	30.0	124	18.8
2. The instructions for the test are clear, such as (number, time, score for each question.)	346	52.4	186	28.2	128	19.4
3. Preoccupation with the computer reduces concentration during the test	224	33.9	300	45.5	136	20.6
4. Questions measure the ability to solve problems	312	47.3	264	40.0	84	12.7
5. Electronic tests qualify the student to practice practical performance	316	47.9	216	32.7	128	19.4
6. Results appear faster than in paper tests	500	75.8	118	17.9	42	6.4
7. Electronic tests give self-confidence	282	42.7	236	35.8	142	21.5
8. Electronic tests give opportunity to think and draw conclusions	228	34.5	272	41.2	160	24.2
9. Exams start on time	246	37.3	264	40.0	150	22.7
10. Examinations end on time	370	56.1	202	30.6	88	13.3
11. Pictures and videos in the tests are clear	406	61.5	192	29.1	62	9.4
12. Questions that contain pictures and media help measure many of the student's skills	398	60.3	202	30.6	60	9.1
13. Have any technical malfunctions in the program during the test?	286	43.3	238	36.1	136	20.6
14. you found it difficult to deal with the electronic test program	198	30.0	264	40.0	198	30.0
15. The electronic test will be announced in due course	356	53.9	212	32.1	92	13.9
16. The questions used in electronic tests measure knowledge and concepts only	170	25.8	304	46.1	186	28.2

Items	Satisfied		Satisfied to some extent		Not satisfied	
	No	%	No	%	No	%
17. Is it best to generalize this type of test in all subjects?	344	52.1	194	29.4	122	18.5
18. The grades obtained reflect real scientific level?	206	31.2	280	42.4	174	26.4
19. The college takes into account the student's needs when scheduling exams	218	33.0	230	34.8	212	32.1
20. I would like to repeat electronic exams more than once in one semester.	250	37.9	264	40.0	146	22.1
21. Electronic tests enable the student to know the typical answer on an ongoing basis.	250	37.9	258	39.1	152	23.0
22. Grievances are opened to all students as soon as the test results are published	242	36.7	272	41.2	146	22.1
23. Does the electronic exam system develop the spirit of innovation and creativity among students?	262	39.7	264	40.0	134	20.3
24. Electronic exam increases use of modern teaching strategies?	352	53.3	214	32.4	94	14.2
25. There are effective mechanisms to deal with students' grievances against test results	282	42.7	262	39.7	116	17.6
26. Student's opinion is polled periodically about the tests	330	50.0	198	30.0	132	20.0
27. Correcting tests electronically is fair	370	56.1	210	31.8	80	12.1

Table (4): Frequency distribution of the studied staff' satisfaction regarding electronic exam (n=26)

Items	Satisfied		Satisfied to some extent		Not satisfied	
	No	%	No	%	No	%
1. Your satisfaction level with analytical results of test (such as the difficulty index, the discrimination index for questions, the number of correct & incorrect answers for each question, the number of easy, appropriate and difficult questions, etc..)	11	42.3	9	34.6	z	23.1
2. Your level of satisfaction with the electronic test design programs	12	46.2	10	38.5	4	15.4
3. Your level of satisfaction with the training provided or the available media (videos, etc.) in the field of how to conduct electronic exams, how to design questions, complete files and answers for the exam, how to ask questions, and so on.	13	50.0	8	30.8	5	19.2
4. Your level of satisfaction. Teachers are present in the electronic examination center to answer students' questions	16	61.5	6	23.1	4	15.4
5. Your level of satisfaction with the presence of technical experts to fix possible faults in the testing system	20	76.9	6	23.1		
6. How satisfied are you with the new electronic testing systems?	12	46.2	9	34.6	5	19.2
7. Your level of satisfaction with participating in the preparation of question banks for the electronic test	9	34.6	13	50.0	4	15.4
8. The level of your satisfaction with the announcement of the rules for the electronic test	12	46.2	10	38.5	4	15.4
9. Your level of satisfaction with the questions measuring students' different skills	10	38.5	9	34.6	7	26.9
10. The electronic test must include questions that measure the students' mental and special abilities	19	73.1	3	11.5	4	15.4
11. Your level of satisfaction with the appropriateness of the test questions with the allotted time	12	46.2	5	19.2	9	34.6
12. Your level of satisfaction with the achievement of fairness and transparency in the assessment of students through the electronic test	12	46.2	6	23.1	8	30.8
13. Your level of satisfaction with the help of the electronic test in saving time and effort in evaluating students	15	57.7	6	23.1	5	19.2
14. Your level of satisfaction with the application of the electronic test in all courses?	11	42.3	9	34.6	6	23.1
15. Your level of satisfaction with the existence of an appropriate technological structure for conducting electronic tests in all courses	12	46.2	8	30.8	6	23.1
16. The grades students obtain reflect their real scientific level?	5	19.2	9	34.6	12	46.2

Table (5): Frequency distribution of the studied students regarding to personal barriers of electronic exam (n=660)

Items	Agree		Uncertain		Disagree	
	No	%	No	%	No	%
A- Personal barriers						
1. Difficulty studying and its weakness in the case of severe stress.	450	68.2	152	23.0	58	8.8
2. Students lack experience in technology	258	39.1	280	42.4	122	18.5
3. Electronic tests make the student feel nervous	272	41.2	250	37.9	138	20.9
4. Belief in the preference of the traditional exam over the electronic exam	160	24.2	212	32.1	288	43.6
5. Not attending full theoretical lectures	132	20.0	236	35.8	292	44.2
6. Feeling that the electronic tests did not show the exact level of students	210	31.8	242	36.7	208	31.5
7. Inability to organize time during the exam	232	35.2	234	35.5	194	29.4
8. Inability to focus while reading on the screen	212	32.1	236	35.8	212	32.1
B - Educational obstacles						
1. The answers are very similar among the students due to the standardization of the test system	244	37.0	246	37.3	170	25.8
2. Some faculty members do not have sufficient experience to prepare for electronic exams	172	26.1	224	33.9	264	40.0
3. The electronic tests are not characterized by high quality in design and preparation.	124	18.8	238	36.1	298	45.2
4. The difficulty of the questions	232	35.2	334	50.6	94	14.2
5. Teaching methods do not cover the curricula sufficiently.	166	25.2	234	35.5	260	39.4
6. A faculty member is not present during the test to respond to any explanation.	130	19.7	200	30.3	330	50.0
7. The faculty members did not prepare the students effectively for the test.	172	26.1	234	35.5	254	38.5
8. Students' dissatisfaction with the final test result	206	31.2	284	43.0	170	25.8
C- Technical barriers						
1. Power outage	142	21.5	192	29.1	326	49.4
2. The lack of internet and poor internet quality.	120	18.2	224	33.9	316	47.9
3. The area of the electronic examination hall is not suitable for the number of students	152	23.0	198	30.0	310	47.0
d- Regulatory obstacles.						
1. Lack of support for teachers and students	0	0.0	236	35.8	424	64.2
2. Increased cases of fraud due to insufficient observers	124	18.8	176	26.7	360	54.5
3. The duration of the test is short and not commensurate with the length of the test.	310	47.0	226	34.2	124	18.8

Table (6): Frequency distribution of the studied staff regarding to personal barriers of electronic exam (n=26)

Items	Agree		Uncertain		Disagree	
	No	%	No	%	No	%
A- Personal barriers						
1. Difficulty studying and its weakness in the case of severe stress.	10	38.5	12	46.2	4	15.4
2. Students lack experience in technology	8	30.8	12	46.2	6	23.1
3. Electronic tests make the student feel nervous	11	42.3	9	34.6	6	23.1
4. Belief in the preference of the traditional exam over the electronic exam	13	50.0	6	23.1	7	26.9
5. Not attending full theoretical lectures	13	50.0	9	34.6	4	15.4
6. Feeling that the electronic tests did not show the exact level of students	14	53.8	9	34.6	3	11.5
7. Inability to organize time during the exam	9	34.6	8	30.8	9	34.6
8. Inability to focus while reading on the screen	8	30.8	12	46.2	6	23.1

Items	Agree		Uncertain		Disagree	
	No	%	No	%	No	%
B - Educational obstacles						
1. The answers are very similar among the students due to the standardization of the test system and that it does not contain a narration	11	42.3	11	42.3	4	15.4
2. Some faculty members do not have sufficient experience to prepare for electronic exams	9	34.6	13	50.0	4	15.4
3. The electronic tests are not characterized by high quality in design and preparation.	8	30.8	12	46.2	6	23.1
4. The difficulty of the questions	6	23.1	15	57.7	5	19.2
5. Teaching methods do not cover the curricula sufficiently.	6	23.1	12	46.2	8	30.8
6. A faculty member is not present during the test to respond to any explanation.	6	23.1	7	26.9	13	50.0
7. The faculty members did not prepare the students effectively for the test.	9	34.6	12	46.2	5	19.2
8. Students' dissatisfaction with the final test result	13	50.0	9	34.6	4	15.4
C- Technical barriers						
1. Power outage	19	73.1	7	26.9	0	0.0
2. The lack of internet and poor internet quality.	11	42.3	10	38.5	5	19.2
3. The area of the electronic examination hall is not suitable for the number of students	9	34.6	9	34.6	8	30.8
d- Regulatory obstacles.						
1. Lack of support for teachers and students	10	38.5	11	42.3	5	19.2
2. Increased cases of fraud due to insufficient observers	11	42.3	7	26.9	8	30.8
3. The duration of the test is short and not commensurate with the length of the test.	9	34.6	7	26.9	10	38.5

Table (7): Correlation between the total studied students' opinion, satisfaction and barriers regarding electronic exam

Study variables	Opinion		Satisfaction		Barriers	
	R	P	R	P	r	P
Opinion	-	--	.812	.000**	-.406	.000**
Satisfaction	.812	.000**	-	-	-.321	.000**
Barriers	-.406	.000**	-.321	.000**	-	-

* Statistically significant at $p < 0.05$.

** highly statistically significant at $p < 0.001$

Table (8): Correlation between the total studied staff' opinion, satisfaction and barriers regarding electronic exam

Study variables	Opinion		Satisfaction		Barriers	
	R	P	R	P	r	P
Opinion	-	--	.762	.000**	.108	.599
Satisfaction	.762	.000**	-	-	.032	.876
Barriers	.108	.599	.032	.876	-	-

* Statistically significant at $p < 0.05$.

** highly statistically significant at $p < 0.00$

Table (1): Show that less than two thirds of the studied students (63.9%) thought that the exam hall is appropriate for holding electronic tests, but the majority of them (84.5%) agreed that "It is necessary to have a competent technical team to deal with technical faults during electronic exams." Furthermore, a majority of them (37.6%) disagreed with the statement "The time allotted for the test is suitable for the questions," and fewer than half

(42.4%) agreed to some extent that "Electronic exams are easier than paper exams."

Table (2): Illustrates that less than two thirds of the studied staff (65.4) agreed on "electronic tests are better for you because they help save paper consumption" and more than half of them (57.7%) agreed on " the question bank should be used in creating electronic tests to increase the reliability of the test results" and " displaying the correct answers to

the questions at the end of the test will help the students to learn". As well as, less than two thirds of them (61.5%) were to some extent agreed on "electronic tests are suitable for evaluating students in all theoretical courses". On other hand, less than three quarters of them (73.1%) disagreed with "the occurrence of technical problems cannot constitute an obstacle to conducting electronic exams".

Table (3): Reveals that majority of the studied students (75.8%) were satisfied about "results appear faster than in paper tests" and less than two thirds of them (61.5%) were satisfied about "pictures and videos in the tests are clear". In addition, less than half of them (46.1%) were satisfied to some extent about "the questions used in electronic tests measure knowledge and concepts only" and less than one third of them (32.1%) were not satisfied with "the College takes into account the student's needs when scheduling exams".

Table (4): Displays that majority of the studied staff (76.9%) were satisfied with " your level of satisfaction with the presence of technical experts to fix possible faults in the testing system", less than three quarters of them (73.1%) were satisfied with "the electronic test must include questions that measure the students' mental and special abilities" and less than two thirds of them were satisfied with "your level of satisfaction. Teachers are present in the electronic examination center to answer students' questions". In addition, half of them (50%) were satisfied to some extent with "your level of satisfaction with participating in the preparation of question banks for the electronic test" and less than half of them (46.2%) were dissatisfied with "the grades students obtain reflect their real scientific level".

Table (5): Shows that more than two thirds of the studied students (68.2%) agreed with "difficulty studying in the case of severe stress" , answers are very similar among the students , duration of the test is short While nearly two thirds of them (64.2%) disagreed with "Lack of support or faculty member is not present during the test " , "not attending full theoretical lectures "Also, less than half of them (42.4%) were uncertain about "Students lack experience in technology ".

Table (6): Reveals that more than half of the studied staff (53.8%) agreed with " electronic tests didn't show the exact level of students", "students' dissatisfaction with the final test result "also less than half of them (46.2%) were uncertain about "Difficulty studying in the case of severe stress", " Students lack experience in technology" and " Inability to focus while reading on the screen" respectively "Lack of support for teachers and students",. Meanwhile, more than one third of them (34.6%) disagreed with "Inability to organize time during the exam". "A

faculty member is not present during the test "while more than one third of them (38.5%) disagreed with "The duration of the test is short and not commensurate with the length of the test"

Table (7): Reveals that there was high statistically significant positive correlation between total studied students opinion and satisfaction regarding to electronic exam. In addition, there was high statistically significant negative correlation between total studied students opinion and barriers regarding to electronic exam and between total studied students barriers and satisfaction regarding to electronic exam.

Table (8): Reveals that there was high statistically significant positive correlation between total studied staff opinion and satisfaction regarding to electronic exam. In addition, there was no statistically significant correlation between total studied students opinion and barriers regarding to electronic exam and between total studied students barriers and satisfaction regarding to electronic exam.

Discussion

The electronic assessment is an important constituent of the nursing education/training program to measure and provide feedback on the student's knowledge, clinical skills, attitudes, professional qualities, and expertise for safe and competent practice at the time of graduation.(Khalaf, & El-Kishawi, 2020)

Electronic exam is one type of electronic evaluation where students can take exams using computers, either on the internet or through a private network, instead of written paper exams that offers additional avenues to boost performance of student knowledge, information consolidation, self-learning skill development, opportunity for learning demands, and quick feedback. (Seo et al., 2021)

In recent years, there has been an increasing interest in using electronic exams in learning. Therefore, assuit universities developed E-exams for all courses in different faculties to replace paper-based exams. This study was concerned with assessing opinion and satisfaction of critical care nursing students and educational staff regarding electronic exam and its barrier's.

According to the current results, the majority of the studied students agreed that "It is necessary to have a competent technical team to deal with technical faults during electronic exams." This is consistent with the findings of Alsadoon (2021), who reported that technical skills have an impact on both instructors' and students' performance on electronic exams.

Furthermore, less than two thirds of the students in the study agreed that "The exam hall is suitable for conducting electronic exams." This is comparable to a study by Omran et al. (2022) that examined the relationship between nursing students' satisfaction and

the facilitators and barriers of employing electronic exams. The study found that nearly three quarters of the students agreed that the exam hall is suitable for conducting electronic exams.

The results of this study indicate that nearly to half of the students who were tested agreed that "the time limit for conducting electronic tests reduces the phenomenon of cheating among students." Contrary to what **Butler-Henderson et al. (2020)** found in their study, which examined "A systematic review of online examinations: A pedagogical innovation for scalable authentication and integrity," the study's findings indicated that most students believed that taking an exam electronically made it simpler to cheat.

According to the current study, the majority of the investigated students had moderate levels of total opinion on electronic examination when it came to the total opinion level of the students. These results are consistent with those of **Paterniani et al. (2020)**, who conducted a cross-sectional study on the Electronic Test of Competence Administration and found that, on the whole, nursing students' opinions regarding the exam were moderate.

Furthermore, the result was consistent with that of **Khan et al. (2021)**, who investigated learners' attitudes towards online tests and found that most students had a positive opinion of them. Furthermore, the results align with the study conducted by **Eltahir et al. (2022)** on the implementation of e-exams, which revealed that students were receptive to and accepting of e-exams, and that they also expressed a preference for them.

This also comes in consistent with the study done by **(El-Mawas et al., 2019)**, who studied (Towards a functional and technical architecture for e-exams) and reported that students' knowledge is better assessed during the electronic exam than with a traditional exam. The results of the current study were not corroborated by a study by **Ismail et al. (2020)**, titled "A comparative analysis of an electronic exam versus paper exams between different gender of iraqi students," which found that most students rejected electronic exams.

The current study shows that there was disagreement among the studied staff members on the statement that "the student only needs to learn the scientific material to pass the electronic exams and does not need any special skills in information technology" The results are inconsistent with **Saleh & Mohamed's (2017)** findings about the significance of technology for students to use in electronic exams.

According to the study's findings, there was disagreement among over half of the staff members who were surveyed on the statement, "Cheating in electronic tests is more difficult." This result contradicted the findings of **(Amer, 2020)**, who

claimed that computerised exams inhibit pupils from engaging in cheating.

According to the current study, fewer than 75% of the staff under investigation disagreed with the statement that "technical issues cannot constitute an obstacle to conducting electronic exams." The study conducted by **Hillier et al. (2020)** further supports this, stating that in order to reduce unnecessary stress for students, administrators and teachers must maintain open lines of communication with the technical support department and students regarding problem-solving procedures .

According to the current findings, more than half of the studied staff disagreed that "Electronic tests are suitable for measuring all learning goals." This is in direct opposition to the findings of **Adanir et al. (2020)** in their study "Learners' perceptions of online exams: A comparative study in Turkey and Kyrgyzstan," which found that "Electronic exams are more reliable, fair, and less stressful than traditional paper-based exams."

According to this study, the majority of the studied staff agreed that using question banks when creating electronic tests will increase test reliability and that showing students the correct answers at the end of the test will aid in their learning. These findings are consistent with those of **Adanir et al. (2020)**, who also reported that question banks are necessary for electronic exams.

The results of this study, which found that most staff members agreed that "electronic tests are better for you because they help save paper consumption," are consistent with those of **Andersen et al. (2020)**, who studied the adaptation of engineering exams from paper to online and demonstrated the many benefits of electronic exams over traditional exams conducted on paper, including savings on paper cost, and time. as well as concurred with **Elbasri et al. (2018)**, whose study ("Improving e-learning by integrating a meta cognitive agent") demonstrated the significance of e-exam in lowering paper costs.

In terms of whether electronic exams are adequate for assessing students in all theoretical courses, the current study's results showed that less than two thirds of them agreed, at this point. The outcomes corroborate the findings of a study conducted by **Mallik et al. (2021)** on an E-exam management system (EEMS) that is based on multi-factor authentication. It was demonstrated that teachers can create tests using electronic means for a variety of topic areas. However, the results were in conflict with those of **(Hamsatu et al., 2016)**, who concluded that because of the limitations of automatic correction of complicated questions and exercises, computerized examinations are not fit for all bodies of knowledge and scientific disciplines.

Regarding to electronic exam protection, the finding demonstrate that more than half of studied staff agreed on "Using a username and password to log in provides adequate protection for electronic exams" the result in the same line with (Elbasri, et al., 2018) who reported that, each nursing student should have an account, including a username and password for electronic exam. But results contradict with (Amer, 2020) who studied (Effectiveness of using electronic exams in assessment in Saudi universities: empirical study) and found that electronic exam isn't considered as a secure method for assessing students

Regarding to studied staff total opinion level regarding to electronic examination, Reveals that less than two thirds of the studied staff had moderated level of opinion regarding electronic examination. The results are consistent with Saleh & Mohamed's (2017) who reported that the most of teaching staff had positive attitude toward about e- exam

Regarding to the studied students' satisfaction regarding electronic exam, the current study reveals that majority of the studied students were satisfied about "results appear faster than in paper tests "The finding in the same line with (Adanir et al., 2020) who study "Learners' perceptions of online exams: A comparative study in Turkey and Kyrgyzstan. The International Review of Research in Open and Distributed Learning" who reported that electronic exam provide students can receive immediate and detailed feedback. And the results are consistent with Saleh & Mohamed's (2017) who reported that the most of students claimed that e- exam saves time than paper exam.

Regarding to studied students' total satisfaction levels regarding electronic exam, The current study indicates that more than half of the studied students had high satisfaction level regarding electronic exam which is compatible with a study by Qalawa et al. (2021) titled "An investigation of satisfaction regarding electronic exams among KSA nursing students" found that most students had higher mean scores of satisfaction regarding electronic exams. and concur with Zahedi et al. (2022) who conducted a study at Birjand University of Medical Sciences on the attitudes and satisfaction of students taking electronic exams. They discovered that higher satisfaction levels were linked to better attitudes towards e-exams.

Also the result in the same line with (Rajala et al., 2015) who study "Student feedback' about electronic exams in introductory programming courses" and document that the students in general had very positive attitude towards the electronic exam and practically all of them preferred the electronic form over pen-and-paper. **On the other hand**, the current result disagreed with (Alsadoon, 2021) who study "Challenges of deploying online exams" and revealed

that student unfamiliarity with the e-exams. Also (Bello & Abdullah, 2021) who study (Investigating the influence of quality factors on user satisfaction with summative computer-based assessment) reported that examinees expressed negative views about electronic assessment.

Regarding to the studied staff' satisfaction regarding electronic exam, the present study The current study shows that less than half of the examined staff members were unsatisfied with the statement that "the grades students obtain reflect their real scientific level". The results are consistent with the findings of (Elshazly et al., 2023) who investigated the "Relationship between exam anxiety, computer experience, and obstacles for nursing students who had undertaken electronic exams" and concluded that the tests do not accurately reflect the actual level of the students.

Regarding the degree of satisfaction that trained staff members have with the electronic test's ability to save time and effort when evaluating students, the results of the current study indicate that over half of them are satisfied. This is consistent with a study conducted by Kruse & Seifert (2018) which examined the use of computer-assisted exams in a course on numerical analysis for engineering students and found that using the computer as a tool for grading can save time and effort, especially when the computer can grade automatically. In addition, the present study displays that more than one third satisfied as regards the point of "Your level of satisfaction with the questions measuring students' different skills". The result in constant with (Kruse & Seifert 2018) who reported that electronic exam is better in measuring learning goals, applications and practical skills .

Regarding the degree of satisfaction that trained staff members have with the electronic test's ability to save time and effort when evaluating students, the results of the current study indicate that over half of them are satisfied. This is consistent with a study conducted by Kruse & Seifert (2018) which examined the use of computer-assisted exams in a course on numerical analysis for engineering students and found that using the computer as a tool for grading can save time and effort, especially when the computer can grade automatically.

In relation to the individual barriers that students face when taking an online exam, the results of the current study indicate that over one-third of the students surveyed agreed that "students lack experience in technology. Also, they reported the difficulty studying and its weakness in the case of severe stress; electronic tests make them feel nervous, Inability to organize time during the exam and Inability to focus while reading on the screen.

This is consistent with the findings of **Bello & Abdullah (2021)**, who found that students lack knowledge about e-assessment techniques and are unfamiliar with assessment technology. Furthermore, the current study concurred with (**Majola & Mudau, 2022**). Their research shown that students' technological knowledge and proficiency are deficient. Additionally, in this study, students expressed disagreement about whether they preferred traditional exams over online ones. This is consistent with the findings of **Wassenberg et al. (2022)**. They found that computer-based exams can be a more effective and fair method of assessment than traditional methods.

In reference to educational barriers faced by students, the current study reveals that nearly to half of the students surveyed hold the opinion that "The electronic tests are not characterized by high quality in design and preparation." This finding contradicts the findings of **Majola & Mudau's (2022)** who study, "Lecturers' Experiences of Administering Online Examinations at a South African Open Distance E-Learning University during the COVID-19 Pandemic," which revealed that academics' reflection indicated that the online exams were not appropriately prepared.

Regarding to student Technical and regulatory barriers, the current study shows that almost half of the students surveyed disagree with the statement that "Power outages, the lack of internet, and poor internet quality" as being technical and regulatory barriers ; this finding conflicts with that of **Okak & Karakus (2021)**, who examined undergraduate students' perceptions of and challenges with online exams during the COVID-19 pandemic and discovered that most of the students' issues were technical, such as sudden logouts and internet connection issues. Additionally, the results differed from those of (**Majola & Mudau, 2022**). They stated that difficulties with connectivity and lack of electricity affect the online exam. Furthermore, the current study was not corroborated by the findings of **Coman et al. (2020)**, who investigated "Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective" and found that the most challenging problems to resolve are still technical ones.

While nearly two thirds of studied student reported their disagreement about "Lack of support for teachers and students" which is against with finding of (**Okak & Karakus, 2021**) who reported that students encountered different problems such as difficulty in being motivated to electronic exams.

One of the barriers faced by most of studied students was "The duration of the test is short and not commensurate with the length of the test" and it agree

with (**Okak & Karakus, 2021**) who mentioned that students have many problems with electronic exams such as short of time to answer the exam or insufficient feedback.

Regarding to studied students regarding barriers level of electronic exam, the current study illustrates that more than half of the studied students had moderate level regarding barriers of electronic exam, the result was supported by (**Omran et al., 2022**) they found that nearly two-thirds of nursing students had a moderate perception level about barriers to electronic exams.

Regarding considering experience of preparing electronic exam as a educational barrier the current result reported that about half of studied staff were uncertain of being experienced to prepare e-exam which is not similar to the study done by (**Omran et al., 2022**) who studied (Facilitators and barriers of employing electronic exams as perceived by nursing students and the relation to their satisfaction) and found that less than one third agreed that teachers do not have sufficient experience to prepare and apply for the exams

One of the major Technical barrier faced by studied staff is " Power outage " and this agreed with (**Okak & Karakus, 2021**) their study was about undergraduate students' views of and difficulties in online exams during the COVID-19 pandemic and found that students mostly had technical problems such as internet connection and sudden log out. Also the findings were similar to (**Majola & Mudau., 2022**) who reported that shortage of electricity and connectivity are challenges for the online exam as reported by studied staff. **In addition**, the current study supported by (**Coman et al., 2020**) who study "Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective) and reported that Technical issues are still the issues most difficult to solve.

Regarding correlation between the total studied students' opinion, satisfaction and barriers regarding electronic exam, the current study reveals that there was high statistically significant positive correlation between total studied students opinion and satisfaction regarding to electronic exam. This agree with (**Zahedi et al., 2022**) who reported that A positive and significant correlation was found between students' attitudes and students' satisfaction.

Also, the current study reveals that there was high statistically significant negative correlation between total studied students barriers and satisfaction regarding to electronic exam. This result is in the same line with (**Omran et al., 2022**) who found that there was a statistically significant negative correlation between total student satisfaction and barriers to the electronic exam. and also agree with (**Hillier et al.,**

2020) who reported that there was moderate negative correlation between electronic exams barriers and academic performance.

Conclusion:

Based on findings of current study, It can be concluded that:-

Electronic examinations are a modern and effective means of evaluating students electronically, as it enables a faculty member to prepare exams objectively and is relatively easy to apply to students and make corrections electronically.

Recommendations:

In the light of the current study findings, the following recommendations are suggested:

- ✓ Develop training program regarding electronic exams among university instructors and students.
- ✓ Generation of question banks.
- ✓ Duplicate this research on a massive sample size selected from different faculties setting.

References

- **Adanır, G. A., İsmailova, R., Omuraliev, A., & Muhametjanova, G. (2020):** Learners' perceptions of online exams: A comparative study in Turkey and Kyrgyzstan. *The International Review of Research in Open and Distributed Learning*, 21(3), 1-17.
- **Ahmed, F., Ahmed, T., Saeed, R., Alhumyani, H., Abdel-Khalek, S., & Abu-Zinadah, H. (2021):** Analysis and challenges of robust E-exams performance under COVID-19. *Results in Physics*, 23, 103987.
- **Alsadoon, H. (2021):** Challenges of deploying online exams. *Revista Românească pentru Educație Multidimensională*, 13(1Sup1), 403-415.
- **Alshehri, A., & Alharthi, M. (2021):** The Degree of Availability of Skills Needed to Build and Employ Electronic Exams for Faculty Members at the University of Jeddah in Light of the Global Trend in E-Learning. *International Journal of Educational Research Review*, 6(3), 240-249.
- **Amer, M. (2020):** Effectiveness of using electronic exams in assessment in Saudi universities: empirical study. *International Journal of Educational Technology and Learning*, 8(2), 61-69
- **Andersen, K., Thorsteinsson, S., Thorbergsson, H., & Gudmundsson, K. (2020):** Adapting engineering examinations from paper to online. In 2020 IEEE Global Engineering Education Conference (EDUCON) (pp. 1891-1895). IEEE.
- **Bello, H., & Abdullah, N. (2021):** Investigating the influence of quality factors on user satisfaction with summative computer-based assessment. *Electronic Journal of e-Learning*, 19(6), pp490-503.
- **Butler-Henderson, K., & Crawford, J. (2020):** A systematic review of online examinations: A pedagogical innovation for scalable authentication and integrity. *Computers & Education*, 159, 104024.
- **Coman, C., Țiru, L., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. (2020):** Online teaching and learning in higher education during the coronavirus pandemic: Students perspective. *Sustainability*, 12(24), 10367.
- **Elbasri, H., Haddi, A., & Allali, H. (2018):** "Improving e-learning by integrating a metacognitive agent," *International Journal of Electrical & Computer Engineering* (2088-8708), vol. 8, 2018.
- **El-Mawas, N., Gilliot, J., Montesinos, M., Karmann, M., & Garlatti, S. (2019):** Towards a functional and technical architecture for e-exams. In CSEDU 2019: 11th International Conference on Computer Supported Education.
- **Eltahir, M., Alsalhi, N., & Al-Qatawneh, S. (2022):** Implementation of E-exams during the COVID-19 pandemic: A quantitative study in higher education. *Plos one*, 17(5), e0266940.
- **Hamsatu, P., Yusufu, G., & Mohammed, H. (2016):** Teachers' Perceptions and Undergraduate Students' Experience in E-Exam in Higher Institution in Nigeria. *Journal of Education and Practice*, 7(23), 158-166.
- **Hillier, M., Kumar, N., & Wijenayake, N. (2020):** E-examinations: the impact of technology problems on student experience. In *Empowering Teaching for Digital Equity and Agency: IFIP TC 3 Open Conference on Computers in Education, OCCE 2020, Mumbai, India, January 6–8, 2020, Proceedings* (pp. 35-45). Springer International Publishing.
- **Ilgaz, H., & Afacan Adanır, G. (2020):** Providing online exams for online learners: Does it really matter for them?. *Education and Information Technologies*, 25(2), 1255-1269.
- **Ismail, M., Bashar, B., Elias, B. (2020):** A comparative analysis of an electronic exams versus paper exams between different gender of iraqi students. *Indonesian Journal of Electrical Engineering and Computer Science* Vol. 20, No. 1, October 2020, pp. 423-429 ISSN: 2502-4752, DOI: 10.11591/ijeecs.v20.i1.pp423-429
- **Khalaf, K., El-Kishawi, M., Moufti, M., & Al Kawas, S. (2020):** Introducing a comprehensive high-stake online exam to final-year dental students during the COVID-19 pandemic and evaluation of its effectiveness. *Medical Education Online*, 25(1), 1826861
- **Khan, M., Vivek, V., Khojah, M., Nabi, M., Paul, M., & Minhaj, S. (2021):** Learners' perspective towards e-exams during COVID-19 outbreak:

- Evidence from higher educational institutions of India and Saudi Arabia. *International Journal of Environmental Research and Public Health*, 18(12), 6534.
- **Kruse, K., & Seifert, C. (2018):** Implementing computer-assisted exams in a course on numerical analysis for engineering students. In 19th SEFI Mathematics Working Group Seminar.
 - **Majola, M. X., & Mudau, P. K. (2022):** Lecturers' Experiences of Administering Online Examinations at a South African Open Distance E-Learning University during the COVID-19 Pandemic. *International Journal of Educational Methodology*, 8(2), 275-283.
 - **Mallik, S., Halder, S., Saha, P., & Mukherjee, S. (2021):** Multi-factor authentication-based E-exam management system (EEMS). In Proceedings of International Conference on Frontiers in Computing and Systems: COMSYS 2020 (pp. 711-720). Springer Singapore.
 - **Elshazly, E., Abdelnasser, N., & Gomaa Ragab, O. (2023):** Relationship between exam anxiety, computer experience, and obstacles for nursing students who had undertaken electronic exams. *International Egyptian Journal of Nursing Sciences and Research*, 3(2), 327-341.
- Ocak, G., & Karakus, G. (2021):** Undergraduate students' views of and difficulties in online exams during the COVID-19 pandemic. *Themes in eLearning*, 14, 13-30.
- **Omran, E., Elgohary, A., Elsayad, H., & Abdelmonem, A. (2022):** Facilitators and barriers of employing electronic exams as perceived by nursing students and the relation to their satisfaction. *Evidence-Based Nursing Research*, 4(4), 33-43.
 - **Paterniani, A., Farina, I., Galeoto, G., Quaranta, C., Sperati, F., & Sansoni, J. (2020):** Electronic test of competence administration: qualitative evaluation of students' satisfaction on telematic platform a cross sectional study. In *Methodologies and Intelligent Systems for Technology Enhanced Learning*, 9th International Conference, Workshops (pp. 47-54). Springer International Publishing.
 - **Qalawa, S., Elgazzar, S. E., Saleh, M., Alsalamah, S., Soliman, M., Ibrahim, N. & Elhanafy, M. (2021):** An investigation of satisfaction regarding electronic exams among KSA nursing students: a multiuniversity study. *Int J Innov Creat Change*, 15(2), 514-31.
 - **Rajala, T., Lokkila, E., Lindén, R., & Laakso, M. J. (2015):** Student feedback about electronic exams in introductory programming courses. In *EDULEARN15 Proceedings* (pp. 2795-2800). IATED.
 - **Safabakhsh, L., & Arbabisarjou, A. (2020):** Stressors in Electronic Exams in Covid-19 Pandemic. *Surgery*, 60, 271-279.
 - **Saleh NMA & Mohamed MG., (2017):** Opinion of Teaching staff and Students' Toward Implementation of E-exam. *Assiut Scientific Nursing Journal Vol*, (5) No , (10)
 - **Seo, K., Tang, J., Roll, I. Roll I, Fels S & Yoon D. (2021):** The impact of artificial intelligence on learner-instructor interaction in online learning. *Int J Educ Technol High Educ* 18, 54
 - **Tawafak, R. M., Romli, A. B., & Arshah, R. B. A. (2019):** E-learning Model for Students' Satisfaction in Higher Education Universities. In 2019 International Conference on Fourth Industrial Revolution (ICFIR) (pp. 1-6). IEEE.
 - **Wassenberg, D., Walker, J. D., Binkowski, K. A., & Peterson, E. (2022):** First Do No Harm: In-Class Computer-Based Exams Do Not Disadvantage Students. *Journal of College Science Teaching*, 51(6).
 - **Zahedi, Z., Salehiniya, H., Zarei, A., & Abbaszadeh, H. (2022):** Attitudes and Satisfaction of Medical Sciences Students with Electronic Exams at Birjand University of Medical Sciences. *Educational Research in Medical Science*

This is an open access article under
[Creative Commons by Attribution Non-Commercial \(CC BY-NC 3.0\)](https://creativecommons.org/licenses/by-nc/3.0/)
 (<https://creativecommons.org/licenses/by-nc/3.0/>)