Effect of Electronic Exams on Nursing Students' Test-Anxiety and Academic Self-efficacy

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Abstract

Background: Implementing electronic exams for nursing students increases the anxiety related to the exams so, these students need to increase their self-efficacy to overcome test anxiety: **This study aimed to:** Assess the effect of electronic exams on nursing students' test -anxiety and academic self-efficacy. **Design:** A descriptive design was used to conduct this study. **Setting:** This study was conducted by the faculty of nursing at Sohag University. **Subjects:** A stratified sample of 330 nursing students. **Tools of data collection:** The first tool is a socio-demographic interviewing questionnaire. The second tool is the Westside Test Anxiety Scale. Third tool: Academic Self-Efficacy Scale. **Results: M**ore than half (55.2%) of the studied nursing students had high levels of test anxiety. In addition, less than half (49.7%) of them had moderate self-efficacy levels. **Conclusion:** Electronic exams are an effective factor that contributes to increased test anxiety and decreased levels of academic self-efficacy among nursing students. **Recommendation:** Designing and implementing counseling interventions in order to raise their academic self-efficacy and lower nursing students' test anxiety.

Keywords: Academic Self-efficacy, Electronic Exams, Nursing students, Test- Anxiety.

Introduction

Due to COVID-19, educational systems now provide electronic strategies for teaching, learning, and assessment. Since the (COVID-19) epidemic has broken out, online tests became regular practice in educational assessment **(Gorgani and Shabani, 2021).**

The Electronic examination is an innovative system that enables universities to conduct safe, automated examinations with excellent outcomes. The system is technological devices and internet-based evaluations. Educators submit a test to the system; the system rebuilds the format of the test and shares it among the students who registered for the test **(Abdallah, 2020).** The students then read the questions straight from the screen and answer them with the available input tools **(Babitha, et al., 2022).** Depending on the user's preference, the system may either keep the findings locally or upload them to a cloud service **(Al-Shehri and Al Harthi, 2021).** However, there are obstacles connected with its use, such as technological problems, and lack of experience with online tests may cause fear and test anxiety **(Ilgaz and Adanır, 2020).**

Test anxiety is characterized as a combination of tension, nervousness, and autonomic activity that happens when being tested **(Martin and Naziruddin, 2020).** It impairs student and prevents from exhibiting previously acquired knowledge, hinders learners from focusing on the exam **(Keller and Szakál, 2021),** which leads to negative clinical consequences, including poor academic performance, internet addiction, academic procrastination, and decrease academic self-efficacy **(Hayat, et al., 2021).**

Academic Self-efficacy is the degree to which learners believe in the ability they have to plan and carry out the activities necessary to achieve a specific outcome **(Maier, et al., 2021).** Learners with an elevated degree of self-efficacy will establish suitable educational objectives, choose successful methods of learning, focus in the lesson, regulate their time efficiently, appreciate learning, have a positive perspective on the results of their actions, and be proud of their efforts. Therefore, it is hypothesized that increasing self-efficacy will minimize test anxiety **(Wang and Rashid, 2021).**

Anxiety and low self-efficacy can be obstacles in the teaching process. So, there are several strategies that reduce test anxiety and improved academic self-efficacy as, self-regulated learning strategies, relaxation techniques, adjusting perceptions of threat, effective goal structures, coping strategies **(Gonzaga, et al., 2022),** and necessity of having adequate sleep, as the brain requires sleep and rest well in order to relax and activate cognitive

functions such as attention and memory **(Dikmen, 2023).**

Significance of the study

The COVID-19 epidemic has caused a shift in the way of conducting tests from the actual appearance of learners to online assessments **(Mbabazi, et al. 2022).** There is a good and a bad effect that electronics have on learners. Test anxiety may result from the challenges encountered during an online examination **(Elshazly, et al., 2023).**

A low to average degree of test anxiety is typically regarded advantageous for learners and works as a motivating factor by encouraging them to make more energy into obtaining academic achievement. Nevertheless, increased exam anxiety is regarded as a hazard to learners' mental and physical health. High exam anxiety levels significantly impair students' personal, social, and educational outcomes which can result in poor test performance **(Rehman, et al., 2021).**

Nursing learners had test anxiety that varied from moderate to severe **(Khaira, et al., 2023).** Between 50%-100% of nursing students experience test anxiety **(Baich, 2022),** 52.3% among medical students **(Tsegay, et al., 2019),** 29% among university students which might result in low academic achievement and self-efficacy. **(Mohamad, et al., 2020).** Therefore, learners must possess sufficient self-efficacy to effectively manage test anxiety. Academic self-efficacy is the learner's belief in their capacity to complete educational duties and effectively learn the material **(Hayat, et al., 2020).** Previous study showed that self-efficacy is explained the 15% of anxiety, and 40% of the test anxiety is predictable with self-efficacy **(Asayesh, et al., 2018).**

Self-efficacy is regarded a major cognitive, emotional, and behavior driver for learner, having considerable effect on their participation, effort, perseverance, self-management, and accomplishment. These features allow self-efficacy a key variable in reducing stress, and it is an important defense against the influence of anxiety at college **(Freire, et al., 2020).** Test anxiety that lasts longer is more likely to affect those who have low self-efficacy **(Khan, 2023).** Regarding the significance of self-efficacy for nursing students and the detrimental impact that anxiety may have on self-efficacy and additionally, student performance, the present research aimed to assess the influence of electronic tests on test anxiety and academic self-efficacy in nursing students to assist in lowering test anxiety and raising academic self-efficacy.

This study aimed to

Assess the effect of electronic exams on nursing students' test -anxiety and academic self-efficacy.

This aim was achieved by assessing the following:

1- The levels of electronic test- anxiety among nursing students.
2- The levels of academic self-efficacy among nursing students.
1. The relation between test- anxiety and self-efficacy among nursing students.

Study questions

This aim was achieved through answering the following questions:

1- What are the levels of electronic test- anxiety among nursing students?
1- What are the levels of academic self-efficacy among nursing students?
2- Is there a relationship between test anxiety and academic self-efficacy among nursing students?

Subjects and methods

The subjects and methods of this study were portrayed under four main designs as follows:

I. Technical design
II. Operational design
III. Administrative design
IV. Statistical design

I.Technical Design

The technical design for this study includes the Study design, Setting of study, subjects of the study, and tools of data collection:

Study design

A descriptive research design was utilized in the present study.

Setting of study

The study was conducted at the Faculty of Nursing affiliated with Sohag University.

Subjects of the study

The subjects were equal to 330 nursing students. The total number of nursing students in the first, second, third, and fourth at the faculty of nursing, in Sohag University was 2368 nursing students of the academic year (2023/2024).

Academic Year	Number	Percentage
First	74	22.4 %
Second	94	28.5 %
Third	78	23.6 %
Fourth	84	25.5 %
Total	330	100 %

Sample type
A stratified sample was used in this study. Every academic year categorized as a group (state).

Sample size
The sample size was taken from each academic year's stratum (according to the following sample size equation *(Krejcie and Morgan, 1970).*

$nn = (\chi\chi 2)\ (NN)(PP)(1-PP) \div [(dd2)\ (NN-1) + (\chi\chi 2)\ (PP)(1-PP)]$ where, n = the required sample size $\chi 2$ = table value of chi-square for 1 *df* at desired confidence (generally 95%) level, N = the population size

P = the population proportion (generally assumed to be .50 to maximize sample size)

d = the level of accuracy of the estimate expressed as a proportion

$$n=\frac{3.841\times 2368\times 0.5\times 0.5}{((0.05)2\times(2368-1)+(3.841)\times 0.5\times 0.5)}=330$$

Tools of data collection
Data were collected through the use of the following tools:

Tool I: Socio-demographic questionnaire: It was developed by the researcher and aimed to assess the student's age, sex, place of residence, and academic grade/year.

Tool II: A Westside Test Anxiety Scale: It was developed by **Driscoll (2007)** to assess anxiety levels and cognitions which can impair performance. It consists of 10 statements. It includes two sub-items: Impairment items (1, 4, 5, 6, 8, and 10) and Worry items (2, 3, 7, and 9).

Scoring systems

The responses followed five points Likert scale ranging from extremely or always true (5 degrees), highly or usually true (4 degrees), moderately or sometimes true (3 degrees), slightly or seldom true (2 degrees), not at all or never true (1 degree).

The total score of the Westside test anxiety scale for Facilitating statistical analysis ranges from 10-50 classified as:

- 10-22 low levels of anxiety
- 23-37 Average levels of anxiety
- 38-50 high levels of anxiety

Tool III: Academic Self-Efficacy Scale: It was developed by **Greco, et al., (2022)** to assess students' self-efficacy beliefs in managing academic tasks. It consists of 30 statements divided into eight subscales "Planning Academic Activities, (6 items)" "Learning Strategies, (6 items), Information Retrieval, (6 items), "Working in Groups, (3 items)" "Management of Relationships with Teachers, (3 items) "Managing Lessons," (4 items) "Stress Management," (2 items).

Scoring systems

Each item was rated on five responses: 1= exactly false, 2= nearly false, 3= neutral, 4= nearly true, 5= exactly true.

The total score ranged from 30: to 150 divided as follows:

- 30-70 low level Academic Self-Efficacy.
- 71-110 moderate level Academic Self-Efficacy.
- 111-150 high level Academic Self-Efficacy

II. Operational Design
The operational design for this study includes the preparatory phase, pilot study, fieldwork, and ethical considerations.

Preparatory phase
It included reviewing past, current, local and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines regarding assessment of the effect of electronic exams on nursing students' test -anxiety and academic self-efficacy.

Tool Validity and Reliability
The tools were tested and evaluated for face and content validity and reliability by three experts from the Faculty of Nursing Ain Shams and Sohag University. They were from different academic categories, i.e., professor and assistant professor. To ascertain the relevance, clarity, and completeness of the tool experts elicited responses that were either agreed or disagreed for the face validity and content reliability. All of the tool items had consensus from the group of experts.

Testing the reliability through Cronbach's Alpha reliability analysis. To achieve the criteria of trustworthiness of the tool reliability a doctor in statistics checked the faces and content of all items. The reliability of the tools was assessed through 10 % of cases (pilot study) using the developed questionnaire. Measuring their internal consistency by determining Cronbach alpha coefficient, proved to be high as indicated in the following table:

Tools	Reliability		Validity		Internal consistency
	Reliability Coefficient	Cronbach 's Alpha	Self validate	Content valiantly	
1	0.859	0.929	0.932	0.922	Good
2	0.818	0.753	0.824	0.782	Good
3	0.954	0.878	0.949	0.912	Good
Total	0.858	0.848	0.897	0.863	Good

Pilot study
A pilot study was performed after the researcher was granted official permission from the Dean of the Faculty of Nursing of Sohag University. The pilot

study was carried out in October 2023 before data collection on a group of 10% (33) students to test and evaluate the clarity, feasibility and applicability of the research tools, in order to estimate the time needed to collect data. No changes were made to the tools. So, the students from the pilot study were added to the overall sample.

Filed work

The actual fieldwork for the process of data collection consumed two months starting in November 2023 and was completed by December 2023. The researcher obtained approval from the dean of the Faculty of Nursing at Sohag University, heads of departments, and clinical coordinators responsible for students during the clinical period to collect data.

Ethical Consideration

After securing official requirements for carrying out the study, approval of the Scientific Research Ethics Committee was obtained. The university nursing students were informed that they are allowed to participate or not in this study and that they have the right to withdraw from the study at any time. Informed consent was taken from each student to participate in the study. The researcher explained the objectives and nature of this study to the university nursing students included in the study. The researcher assured maintaining anonymity and confidentiality of the subject data with reassurance about the information given and that it will be used for scientific research only.

III. Administrative design

The researcher in order to obtain approval to conduct the research study, the researcher received official permissions from the following authorities:

- Official letters from the Dean and the Ethical Committee of the Faculty to responsible authorities in the faculty of nursing at Ain-shams University.
- The dean of the faculty of nursing at Sohag University.

IV. Statistical design

Recorded data were analyzed using the statistical package for social sciences, version 22.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- A chi-square (x2) test of significance was used in order to compare proportions between qualitative parameters.
- Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
  - Probability (P-value)
  - P-value <0.05 was considered significant.
  - P-value <0.001 was considered as highly significant.
  - P-value >0.05 was considered insignificant.

Results

Table (1) demonstrates that the mean age of the studied nursing students was 20.20 ±1.47 and less than two-thirds of them (60.9%) were female. Concerning residence, more than two-thirds (67.3%) of the studied nursing students reside in rural areas. As regards academic year more than one quarter (28.5%) of them were in their second academic year.

Table (2) As evidenced from the table more than one-third of the studied nursing students reported that always true they worry so much before the major exam that they wear out to do their best on the exam, and they feel out of sorts when they take important exams and they find that they mind sometimes wanders when they taking important exams (39.7%, 38.8%, 33.6%) respectively. Also, nearly one-third of them reported that sometimes the closer to the major exam, the harder to concentrate on the material and when they study, they worry that they do not remember the material on the exam (30.3%, 30%) respectively.

Figure (1): represents that more than half (55.2%) of the studied nursing students had high levels of test anxiety.

Figure (2): demonstrates that less than half (49.7%) of the studied nursing students had moderate self-efficacy levels.

Table (3): reveals that there was a highly significant negative correlation between total Westside test anxiety and total academic self-efficacy among the studied nursing students at P-value =<0.001**.

Results

Table (1): Number and percentage distribution of the studied nursing students according to their socio-demographic characteristics (N=330).

Socio-demographic data	No.	%
Age (years)		
18-19 years	115	34.8
20-21 years	144	43.6
>21 years	71	21.5
$\bar{X}$ ±SD	20.20±1.47	
Sex		
Male	129	39.1
Female	201	60.9
Residence		
Urban	108	32.7
Rural	222	67.3
Academic Year		
First	74	22.4
Second	94	28.5
Third	78	23.6
Fourth	84	25.5

Table (1): Number and percentage distribution of the studied nursing students according to their items of test anxiety scale (N=330).

Items	Not at all or never true		Slightly or seldom true		Moderately or sometimes true		Highly or usually true		Extremely or always true	
	No.	%	No.	%	No.	%	No.	%	No.	%
The closer I am to a major exam, the harder it is for me to concentrate on the material.	13	3.9	48	14.6	100	**30.3**	91	27.6	78	23.6
When I study, I worry that I will not remember the material on the exam.	11	3.3	40	12.1	99	**30.0**	84	25.5	96	29.1
During important exams, I think that I am doing awful or that I may fail.	23	7.0	64	19.3	83	25.2	91	27.6	69	20.9
I lose focus on important exams, and I cannot remember material that I knew before the exam.	15	4.5	60	18.2	72	21.8	91	27.6	92	27.9
I finally remember the answers to exam questions after the exam is already over.	14	4.2	60	18.2	78	23.6	86	26.1	92	27.9
I worry so much before a major exam that I am too worn out to do my best on the exam.	15	4.6	41	12.4	65	19.7	78	23.6	131	**39.7**
I feel out of sorts or not really myself when I take important exams.	16	4.8	33	9.4	57	17.3	96	29.1	128	**38.8**
I find that my mind sometimes wanders when I am taking important exams.	15	4.5	51	15.6	76	23.0	77	23.3	111	**33.6**
After an exam, I worry about whether I did well enough.	19	5.8	46	13.9	68	20.6	91	27.6	106	32.1
I struggle with writing assignments, or avoid them as long as I can. I feel that whatever I do will not be good enough.	39	11.8	69	20.9	85	25.8	74	22.4	63	19.1

Figure (1): Number and percentage distribution of the studied nursing students according to their levels of test anxiety = (330).

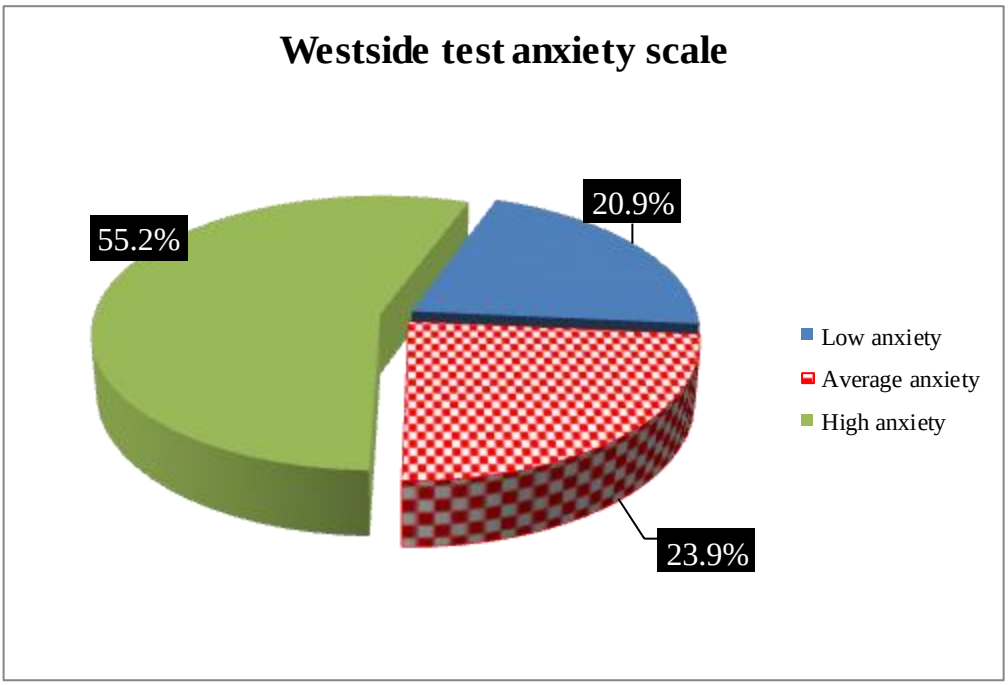

Figure (2): Number and percentage distribution of the studied nursing students according to their total levels of academic self-efficacy scale (N=330).

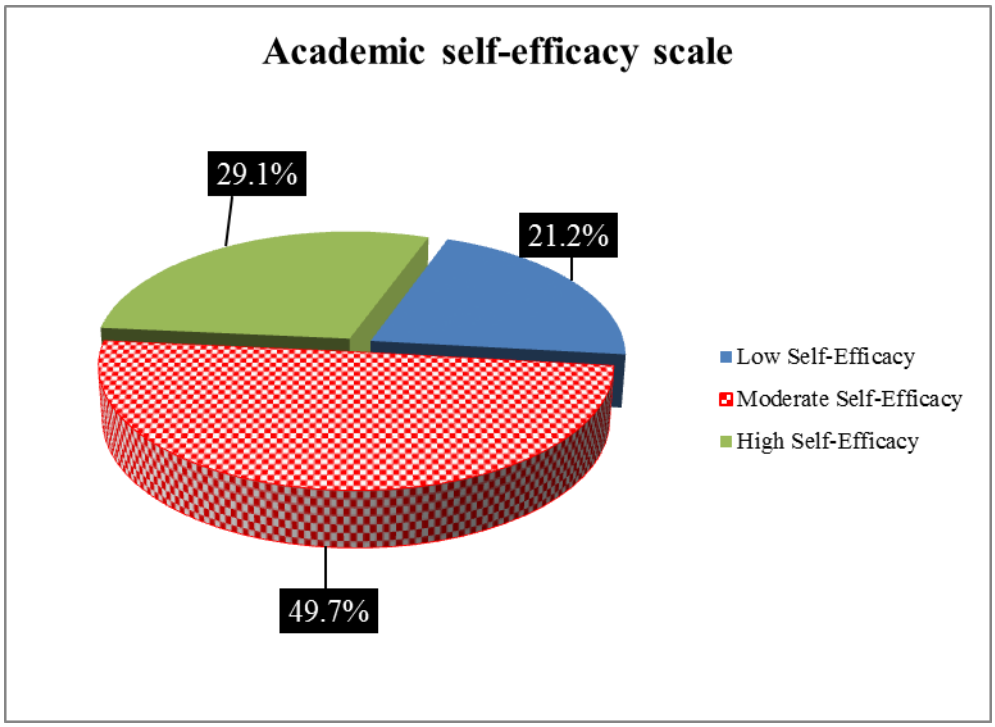

Table (3): Correlation between total score of Westside test anxiety scale and total score of academic self-efficacy scale.

		Total score of Westside test anxiety scale	Total score of academic self-efficacy scale
Total score of Westside test anxiety scale	r		-0.409
	p-value		<0.001**
	N		330
Total score of academic self-efficacy scale	R	-0.409	
	p-value	<0.001**	
	N	330	

r-Pearson Correlation Coefficient;
**p-value <0.05 significant correlation; **p-value <0.001 highly significant*

Discussion

Nursing students are exposed to many practice-related stressors causing anxiety **(Berdida and Grande, 2023).** With the advent of virtual classes, teleconferences, and tests, COVID-19 marked the beginning of the educational institutions program's digital transformation to maintain high-quality nursing education **(Kim, et al., 2021)**. To get over the challenges that come with using conventional paper-based assessments, one electronic assessment option that may be used is the electronic test **(Al-Shehri and Al Harthi, 2021).**

The current study demonstrated that the mean age of the studied nursing students was 20.20±1.47. These findings are in line with **Ferguson and Perry (2022)**, which reported that the mean age of the students was 20.73.Concerning the sex of the study sample, the results revealed that less than two-thirds of them were female. This finding was congruent with the result of **Almory et al. (2023)**, who proved that more than two-thirds of the students were female.

Also, this finding was accepted by the result of **Elshazly et al. (2023),** which reported that less than two-thirds of the participants were female. However, this finding was inconsistent with the result of **Orhan et al. (2022)**, who proved that more than two-thirds of the participants were Male. Students who came from rural areas represented more than two-thirds in the current study. This result agreed with **Salem et al. (2023)**, which found that less than three-quarters of the study participants were living in rural areas.

This result was contrary to **Ugwuanyi et al. (2020),** who proved that more than half of study participants were living in an urban area.

Regarding academic year, the present result demonstrated that more than one-quarter of them were in the second year in nursing college; this may be due to that the sample size of second-year nursing students was larger than the rest of the study groups.

The current result agreed with **Hidayati et al. (2022)**, which revealed that more than one-quarter of them were in the second academic level. The current result was incongruent with the **Salem et al. (2023),** which revealed that more than one-third of them were in the third academic level.

This result of the study illustrated that nearly one-third of students' responses were sometimes true the closer to the major exam, the harder to concentrate on the material. This may be due to different factors related to the nature of nursing students (emphasis on practical aspects, fear of competition with peers, fear of question tricks, and lack of previous exam forms in the library).

The study was parallel to **Bhatta et al. (2023)**, which presented that more than one-third of them were difficulty concentrating before the exam. On the opposite side, the current study was incongruent with **Aydin et al. (2020),** which revealed that a minority of nursing students had difficulty concentrating before the exam.

Also, nearly one-third of the student's responses were sometimes true when they study, they worry that they do not remember the material on the exam. This may be due to their emphasis on practical aspects. This result agreed with **Bell (2023),** who announced that nearly one-third of the nursing students worry that they do not remember the material on the exam.

Conversely, the current result was incongruent with **Aydin et al. (2020),** which revealed that a minority of the nursing students were having difficulties remembering answers.

The results illustrated that more than one-third of their responses were always true: they worry so much before a major exam that they wear out to do their best on the exam; their mind sometimes wanders when they take important exams; and they feel out of sorts when they take important exams. This could be due to multiple factors: the students had experienced different signs and symptoms of anxiety, a negative experience with the exam, a lack of adequate preparation, poor self-care (insufficient sleep), fear of

failure, being afraid of parent exceptions, and placing too much effort on the test.

The study parallel with **Bhatta et al. (2023)** and **Sullivan (2017)** who revealed that more than one-third of them were worn out due to worry during exams, their minds sometimes wander when they take important exams, and more than one-quarter of students feel out of sorts when they take important exams.

Despite that, the current result was in contrary with **Bell's (2023),** which revealed that the minority of nursing students worry so much before the major exam that they wore out to do the best on the exam and feel out of sorts when they take important exams.

This study presented that more than half of the studied nursing students had high levels of test anxiety. This may be related to various considerations, such as lack of experience in using computers and the technique of electronic exams. Students spend more time in clinical placements and are required to perform multiple roles. Poor study skills, a focus on getting good grades, a lack of problem-solving skills, and ineffective communication skills.

The result was congruent with **Sohail et al. (2020)**, which announced that less than half of the nursing students had high levels of test anxiety.

While, the study was incongruent with **Hanfesa et al. (2020)**, which presented that the minority of the nursing students had a high level of test anxiety.

The result of this study demonstrates that about half of the studied nursing students had moderate levels of self-efficacy. This could be explained by the university students are exposed to more stressors generated by the academic context as the overload of tasks and frequent evaluations could lower expectations of self-efficacy. Also, negative emotions such as tension and a high level of concern could decrease the levels of achievement and academic self-efficacy. On the other hand, low academic achievements may lead to further anxiety that affects their level of academic self-efficacy.

The current study was congruent with **El-Sayed et al. (2021),** who revealed that about half of them had Moderate levels of self-efficacy. While, the study was incongruent with **Bhati et al. (2022)**, which revealed that about half of them had high levels of self-efficacy.

There was a significant negative correlation between total Westside test anxiety and total academic self-efficacy among the studied nursing students at P-value =<0.001**. This may be due to that, the increased level of test anxiety leads to a reduction in academic self-efficacy. Test anxiety causes learners to constantly focus about the exam and its outcomes, making it difficult for them to recall knowledge from memory, steal their calm of mind, and use the right coping mechanisms to deal with obstacles in their learning process. As a consequence, academic self-efficacy declines in these learners.

This result was congruent with **Jasani (2022),** who revealed that a significant correlation between total self-efficacy among students and their total of test anxiety. This result was incongruent with **Lei et al. (2021),** which revealed that no significant correlation between total self-efficacy among students and their total of test anxiety.

Conclusion

Electronic exams are an effective factor that contributes to increased test anxiety and decreased levels of academic self-efficacy among nursing students.

Recommendations

The current study recommended that:

1. There is a need for future studies to evaluate the electronic and compare it with the traditional evaluation.
2. Further studies are essential to examine variables which might promote academic self-efficacy.
3. Additional investigation is required to investigate the connection among academic self-efficacy and academic accomplishment, and anxious symptoms in first-year students.

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