Original Article

The Relationship between Critical Thinking and Preferred Learning Styles at Secondary Nursing School in El-Beheira Governorate

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Abstract:

Background: One definition of critical thinking is the internal drive to solve issues and reach conclusions through reasoning. It is seen as a crucial element in assisting in the management of intricate medical circumstances and the successful resolution of patient concerns through the application of critical, autonomous, introspective, and clear rational thought. Students' distinct and consistent methods of processing and assimilating knowledge are known as their learning styles. **Aim:** To investigate the relationship between the relationship between critical thinking and preferred learning styles at secondary nursing school in El-Beheira governorate. **Research design:** A descriptive correlational research design. **Settings**: The study was conducted in at secondary nursing schools in El- Beheira governorate out of 19 secondary nursing schools (25%) of all secondary nursing schools in El Beheira governorate, throughout the academic year 2022-2023. **Subjects:** All nursing students enrolled in the previously mentioned setting will be selected **Tools:** Tool I: -Critical Thinking Questionnaire. Tool II: Kolb Learning styles Inventory Self-Assessment Questionnaire version (3). **Results:** More than half of the studied subjects had a moderate level of critical thinking and the four learning styles groups have positive and non-significant correlations with total critical thinking. **Conclusion:** studied subject had a moderate level of critical thinking and there was a positive and non- significant correlation with total critical thinking and learning styles **Recommendations:** In order to solve problems and make decisions, nurse educators must encourage their students to apply critical thinking. Additionally, in order to create fulfilling learning experiences, nurse educators need to comprehend and incorporate students' learning patterns into nursing courses.

Keywords: Critical thinking, learning styles, nursing education, nursing students, cognitive abilities.

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Introduction:

One of the most important things for people to succeed and be happy in our world is education. The world may be dominant, competitive, innovative, and dynamic with human knowledge and abilities. A fundamental human necessity is education. Helping nursing students acquire higher order thinking abilities to assist them deal with life's issues is one of the most important aspects of nursing education. Given the continually evolving nature of the health care industry, professional nurses must cultivate critical thinking abilities that will enable them to solve problems in a flexible, customized, and situation-specific manner. **Mahmood et al.,(2020)**

Therefore, by using the right teaching strategies, nursing education aims to support students' critical thinking development. In order to ensure that students engage positively with the material and acquire the deep learning skills necessary for lifelong learning, it is critical to design curricula that foster critical thinking and an understanding of the various learning styles of nursing students. Additionally, using teaching strategies that support student learning is essential. **Doğan.,et al (2022)**

According to one definition, critical thinking is the innate drive to solve problems and come to thoughtful conclusions. It is seen as a crucial element in assisting in the management of intricate medical circumstances and the successful resolution of patient concerns through the application of critical, autonomous, introspective, and clear rational thought. One of the thinking abilities that forms the foundation of 21st-century learning concepts is critical thinking. It is intended that a student who masters critical thinking will be well-informed, investigate a topic from multiple angles, make wise conclusions, and maintain an open mind. When students attain the desired learning outcomes, the teaching and learning process is deemed effective. **Selvam.,et al (2019)**

Individual learning preferences and styles may have an impact on critical thinking, despite the fact that it is a crucial aspect of the nursing profession. On the other hand, successful problem solving is related to critical thinking and learning styles. These days, every student has a very distinct learning style. These variations have triggered elements that affect their ability to use critical thinking when completing a task given to them by a teacher. **Purwanto.,et al (2020)**

Although there are other definitions of learning styles, Kolb (2017) offered the most accurate one, defining it as a person's approach to prioritizing some learning skills over others. Lewin's practical and laboratory model, Dewey's learning model, and Piaget's learning and cognitive development pattern are the three experiential learning templates that were combined to create Kolb's experiential learning theory. Kolb says that learning results from resolving conflicts between these three models. **Kolb.,et al (2017)**

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Additionally, each student has a distinct and consistent technique of processing and absorbing the knowledge they have been given. Because they are unaware of their learning preferences, students are having trouble learning. Accordingly, learning styles play a significant role in the learning process and have an impact on how students approach learning. The majority of pupils claim that they are unable to comprehend the lesson because they are unsure of how to learn. According to these claims, a significant element influencing students' learning is their learning style. **Willingham.,et al(2015)**

Teachers are aware that every student has a preferred method of learning. There are advocates and opponents of learning styles as a teaching method. "Learning styles are described as a set of factors, behaviors, and attitudes that facilitate learning for an individual in a given situation," according to Cassidy (2004) and Quinn Smtih (2018) . There is no right or wrong combination of learning styles; all students have a variety of them. It's possible that some students have a dominant learning style and use the other forms m It's possible that other students employ distinct techniques depending on the situation. One should work on becoming proficient in less dominating styles as well as improving on types they are already proficient in. **Taheri.,et al (2019)**

Even though every student has a unique learning experience, it's important to approach education from both an engaging and comprehensive standpoint. Enhancing the quality of education requires giving students opportunities to participate in inquiry, discovery, and construction. Four learning modes that represent the two main elements of perception and processing make up Kolb's cycle of learning model. Nurses could start by identifying each learner's unique qualities and how they connect to learning outcomes and critical thinking skills in order to support the lifelong learning process. The terms "critical thinking" and "learning styles" have both been studied separately in nursing literature. **Rezaeinejad.,et al(2015)**

Significance of the study:

Studying the relation between critical thinking and learning styles in nursing students is highly important particularly in nursing education. Students studying nursing will deal with patients in the future critical thinking is crucial for diagnosing and planning patient care and enables nursing students to analyse and evaluate information, which is essential for decision-making in clinical settings. Furthermore, understanding diverse learning styles enhances their ability to integrate knowledge and apply it in practice. **Andreou.,et al(2014)**

Aim of the study:

To identify the relationship between critical thinking and preferred learning styles at secondary nursing school in El-Beheira governorate.

Research Question:

What is the relationship between critical thinking and preferred learning style at secondary nursing school in El-Beheira governorate?

II. Materials and Methods

Research design:

A descriptive correlational research design was applied in this study

PISSN: 2974-3281
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Setting:

The study was conducted at secondary nursing schools in El- Beheira governorate out of 19 secondary nursing schools (25%) of all secondary nursing schools in El Beheira governorate, throughout the academic year 2022-2023. Schools was selected randomly by using ideal pull methods to represent the sectors, namely: - Kom hamada nursing school, Damanhour nursing school, Eldelingat nursing school, Itay elbarud nursing school, AL rahmaniyah nursing school.

Subjects:

All nursing students enrolled in the previously mentioned setting will be selected.

Inclusion Criteria:

i. All nursing students enrolled in the three years at the time of data collection.

ii. Accept to participate in the study.

Exclusion Criteria:

i. Students don't accept to participate.

Sampling size:

The EPI- info 7 software was used to estimate the total sample size based on students average number in the academic year 2022-2023 applying the following information:

1-total number of students: 2950

2-Expected frequency: 50%

3-Acceptable error: 5%

4-Confidence co-efficiency:95%

5-Minimum sample size: 340

6- Final sample size: 345

Sampling Technique:

The students was selected from each schools at all academic level by the equal allocation method, by using a systematic random technique from each school and each class during the year (2022-2023).

Study Tools:

Two tools were used for data collection

Tool I: Critical Thinking Questionnaire. It was developed by **Dr. Hussein Uzunboylu (2012) Sarigoz.(2012)** Aimed to assess critical thinking· It consists of 21 questions as (1-When I encounter a problem, I can solve it, and make deductions. 2-I can understand pale in the matter and obscurities from explanations regarding the matter.3-I can pass an accurate judgment on the matter, and I can come to a conclusion with my thoughts……etc.)

PISSN: 2974-3281
EISSN: 2974-329x

Scoring system:-

The response to those items will scored on a five point likert scale as:

(1)Never, (2) Rarely, (3) Sometimes, (4) Often, (5) Always.

Total score (21-105)

Lowest percent (21-62) less than 50%

Moderate percent (63-83) from (50% to less than 75%)

Tool II: Kolb Learning styles Inventory Version (3) Self-Assessment Questionnaire. It was developed by **Kolb (1984) Kolb.(1984).**It is a practical self-assessment instrument that aimed to help students assess their unique learning styles and to describe how students learn, not to evaluate their learning ability. It consists of rank order each set of four works in the nine items. Assign a four to the statement which best characterizes students learning styles, a three to the next best characterizes students learning styles, a two to the next, and a one to the least characteristic statement. Assign a different number to each of the four statements. There are no right or wrong answers, all the choices are equally acceptable as:-

I like to watch.	I like to analyze things and break them into parts.	I am open to new experiences.	I like to think about things.

Scoring system:-

It consists of thirty six statements distributed on four columns and nine rows, students will give score ranked from four to one according to his preference, total the rank numbers student have given to the nine statements in each of the four columns (add all of his scores going down). The sum of the first column gives nursing student his score on diverging the second column gives nursing student score on assimilating nursing student score on the third column is for converging and the fourth column is nursing student score on accommodating

Methods

- An official permission to conduct the study was obtained from the dean of faculty of nursing, Damanhour University.
- Official letters was directed to the ministry of health in El- Beheira governorate, directors of the educational directorate of Damanhur city, directors of the selected schools to inform them about the study objectives and to take their permission to conduct the study in the selected settings.
- The tool was translated into Arabic and introduced to five experts in the field of the study to be tested for its content validity and the necessary modification was done.
- Reliability of the tools was examined using the most appropriate statistical tests.

PISSN: 2974-3281
EISSN: 2974-329x

- Pilot study was carried out on a proximal 10% of sample size (34) nursing students to test the clarity and applicability of the tool and they excluded from the sample. Accordingly, the necessary modification was done.
- Data were collected from nursing student at the all three levels of school in theoretical classes in February 2023.
- Tools were distributed to be answered by the nursing students after explaining the study aim, the researcher responded to any questions raised by nursing student.
- Data were analyzed using the appropriate statistical tests.

Ethical Considerations:

- The research approval was obtained from the ethical committee at the Faculty of Nursing, Damanhour University, prior to the start of the study.
- A written informed consent was obtained from the study subject after explanation the aim of study.
- Privacy and confidentiality of nursing students was maintained during implementation of the study.
- Anonymity of the collected data were maintained during implementation of the study.

Data analysis: Data was fed to the computer and analyzed using IBM SPSS software package version 23.0. Quantitative data were described using numbers and percentages. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean and standard deviation. The significance of the obtained results was judged at the 5% level. The used tests were:

Pearson coefficient to correlate between two normally distributed quantitative variable, Chi-square test for categorical variables, to compare different groups, Monte Carlo correction for Correction for chi-square when more than 20 of the cells have expected count less than and ANOVA test For the relation between the average score.

Results:

It consists of two parts:

Part I

Distribution of the studied students according to their Critical Thinking level and their learning styles (tables 1)

Part III

Relationship and correlation between critical thinking and learning styles

(Tables2,3,4)

Table (1) indicates the distribution of the studied students according to their selected schools and their levels of critical thinking. More than three-quarters (75.4%) of students attending the Al Rahmaniyah secondary nursing school had a moderate level of critical thinking, compared to less than three-quarters of students

PISSN: 2974-3281
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at the Kom Hamada secondary nursing school (60.9%), Damanhour secondary nursing school (60.9%), Itay El Barud secondary nursing school (60.9%), and Eldelingat secondary nursing school (50.7%).

On the other hand, more than one-quarter of students attending Eldelingat secondary nursing school, Damanhour secondary nursing school, Kom Hamada secondary nursing school, and Itay El Barud secondary nursing school (46.4%, 37.3%, 36.2%, and 34.8%, respectively) had a high level of critical thinking compared to only 18.8% of students attending AL Rahmaniyah secondary nursing school.

While 1.4% of students attending Damanhour secondary nursing school had a low level of critical thinking compared to the students attending Eldelingat secondary nursing school, Al Rahmaniyah secondary nursing school, Kom Hamada secondary nursing school, and Itay El Barud secondary nursing school (2.9%, 4.3%, 2.9%, and 2.9%, respectively), There were no statistically significant differences between different schools and their levels of critical thinking. (X = 13.539, P = 0.095). **Table (1): Distribution of the studied students according to their selected schools and their levels of critical thinking. (N=345)**

Levels of Critical thinking	Kom Hamada No= (69)		Damanhour No= (69)		El delengate No = (69)		Itay elbaroud No= (69)		Erhamania No= (69)		Total No= (345)		Test of significant
	No	%	No	%	No	%	No	%	No	%	No	%	
• **Lowest**	2	2.9	1	1.4	2	2.9	3	4.3	4	5.8	12	3.5	
• **Moderate**	42	60.9	42	60.9	35	50.7	42	60.9	52	75.4	213	61.7	**X= 13.539 P= 0.095**
• **High**	25	36.2	26	37.7	32	46.4	24	34.8	13	18.8	120	34.8	

X^2= Chi-Square test * Significant P ≤0.05

Figure (I): illustrate the distribution of the studied students according to their levels total score of critical thinking. This figure indicates that less than two third (61.7%) of students attending the five secondary nursing schools had moderate level of total critical thinking and 34.8% had high level of total critical thinking. Only 3.5% of students attending the five secondary nursing schools had low level of total critical thinking.

PISSN: 2974-3281
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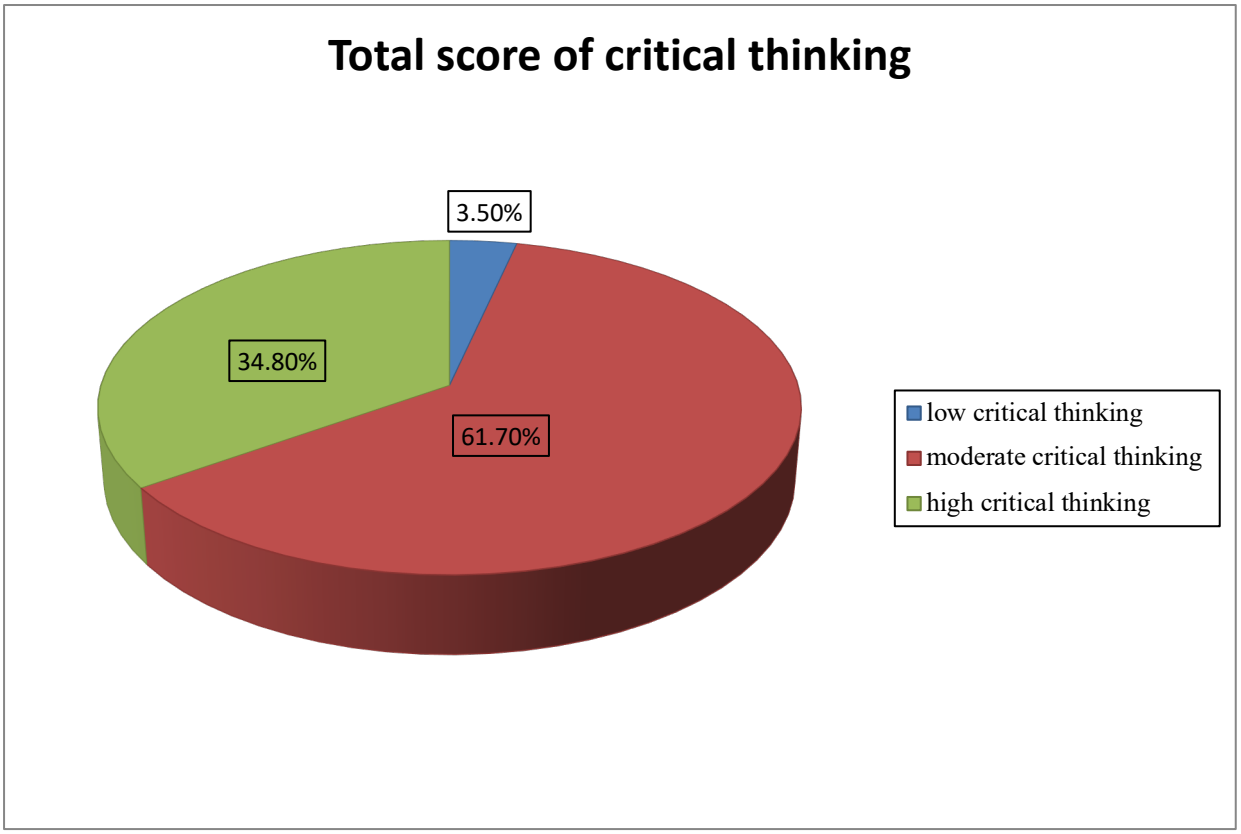

Figure (I): Distribution of the studied sample (n=345) according to their total levels of critical thinking

Table (2): Relationship between average scores of four learning styles of studied sample and their Sub-Groups. (n= 345)

Sub-Groups four learning style	Concrete Experience		Reflective Observation		Abstract Conceptualization		Active experimentation	
	No	%	No	%	No	%	No	%
• Low	8	2.3	28	8.1	135	39.1	53	15.4
• Average	269	78.0	180	52.2	185	53.6	237	68.7
• Good	68	19.7	137	39.7	25	7.2	55	15.9
Mean ±SD	**28.35±3.26**		**28.44±5.22**		**22.67±5.50**		**25.57±4.97**	
	X^2=286.53 P= 0.000*							

* Significant P ≤0.05

Table (6) clarifies the relationship between the average scores of the four learning styles of the studied students and their sub-groups. It was evident from this table that a statistically significant relationship was found between the average scores of the four learning styles of the studied students and their sub-groups (X^2=286.53, P= 0.000*). More than one-third of students (39.1%) had a low level of abstract conceptualization, while more than one-tenth of students (15.4%) had active experimentation, concrete experience was 2.3%, and reflective observation was 8.1%.

PISSN: 2974-3281
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On average, it can be noticed that more than three-quarters (78%) of their learning styles were concrete experience, while more than two-thirds (68.7%) were active experimentation, more than half (53.6%) were abstract conceptualization, and more than half (52.2%) were reflective observation.

At a good level, it can be noticed that more than one-third (39.7%) were reflective observations, while more than one-tenth (19.7%) and more than one-third (15.9%) were active experiments, and only 7.2% were abstract conceptualizations.

Table 3: Relationship between average scores of the four learning style groups n (345)

ANOVA						
		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Concrete Experience	**Between Groups**	65.565	2	32.783	.	**…...**
	Within Groups	0.000	342	0.000		
	Total	65.565	344			
Reflective Observation	**Between Groups**	5.324	2	2.662	6.516	**0.002 ***
	Within Groups	139.719	342	0.409		
	Total	145.043	344			
Abstract Conceptualization	**Between Groups**	2.806	2	1.403	3.784	**0.024 ***
	Within Groups	126.834	342	0.371		
	Total	129.641	344			
Active experimentation	**Between Groups**	3.147	2	1.573	5.133	**0.006 ***
	Within Groups	104.842	342	0.307		
	Total	107.988	344			

F= ANOVA test * Significant P ≤0.05

PISSN: 2974-3281
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Table (4): Correlation matrix between the critical thinking and four learning style groups.

r = Pearson correlation * Significant P ≤0.05

Correlations						
		Concrete Experience	**Reflective Observation**	**Abstract Conceptualization**	**Active experimentation**	**Total Critical thinking**
• **Concrete Experience**	r	1				
	P (2-tailed)					
• **Reflective Observation**	r	-0.118*				
	P (2-tailed)	0.028				
• **Abstract Conceptualization**	r	-0.142**	-.0.166**			
	P (2-tailed)	0.008	0.002			
• **Active experimentation**	r	-0.064	-0.182**	-0.434**		
	P (2-tailed)	0.239	0.001	0.000		
• **Total Critical thinking**	r	0.065	-0.036	0.094	-0.055	1
	P (2-tailed)	0.228	0.500	0.081	0.312	
***. Correlation is significant at the 0.05 level (2-tailed).**						
****. Correlation is significant at the 0.01 level (2-tailed).**						

r ≥0.9 Very high correlation r 0.7 ≤ 0.9 High correlation
r 0.5 ≤ 0.7 Moderate correlation r < 0.5 Low correlation

The correlation matrix between critical thinking and the four learning style groups there are positive and not significant relationships between the four learning style groups and total critical thinking. On the other hand, negative highly significant (< 0.01) low relationships were found between active experimentation and reflective observation (r = -0.182**, p = 0.001) and abstract conceptualization (r = -0.434, p = 0.000), and no significant relationship was found between active experimentation and concrete experience (r = -0.064, p = 0.239).

Discussion

By using the right teaching strategies, nursing education aims to support students' critical thinking development. In order to ensure that students engage positively with the material and acquire the deep learning skills necessary for lifelong learning, it is critical to design curricula that foster critical thinking and an understanding of the various learning styles of nursing students. Additionally, using teaching strategies that support student learning is essential. **Daemicke.,et al(2020)**

The distribution of students by level of critical thinking was displayed in the current study. According to the survey, two-fifths of nursing students consistently engage in critical thinking because they are able to assess the rationale behind the explanations of the explained issue. This indicates that nursing students have a

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moderate to high level of critical thinking. Additionally, they are able to comprehend the pale in any situation that is presented to them or that they encounter. Additionally, the researcher saw during the data collection period that they were able to identify and resolve the issue. Additionally, almost half employ critical thinking since they are able to articulate and defend their opinions when confronted with material. According to **Luis.,et al(2024)** , nursing students exhibited intermediate critical thinking abilities, supporting these findings and highlighting the necessity of specialized teaching strategies to improve critical thinking in nursing education.

These result was contradicted with **Nemati.,et al (2023)** who found that more than two thirds of nursing students demonstrated low critical thinking level the study found that nursing students in Iran exhibited low to moderate levels of critical thinking,

The current study examined the association between students' four learning styles and their mean score by age. It's obvious that the highest mean score for the four learning styles (Concrete Experience, Reflective Observation, Abstract Conceptualization and Active experimentation) regarding age Meanwhile, there were Significant differences were found between age and four learning styles ($p < 0.000$).

From the researcher point of view this may be due to the nature of this age as they use technology all the time which improve and varied their learning styles and acquiring them different learning experiences.

These finding are supported by **aurențiu.,et al (2021)**The preference for a particular learning style varies according to age indicating that this factor influence how students engage with their learning processes and adapt their strategies accordingly. On the other hand these findings were contraindicated by Azizollah, **Arbabisarjou.,et al (2016)**who found that no statistically significant relationship.

The current study identified a correlation between the four learning styles and sex by mean score it was found that the highest mean score for the four learning styles (concrete experience, reflective observation, abstract conceptualization, and active experimentation) respectively regarding males. Female students had the highest mean scores in the four learning styles (active experimentation, reflective observation, concrete experience and abstract conceptualization), with a significant difference between reflective observation and abstract conceptualization based on sex ($P<0.000$**).

The relatively even spread of the four learning styles amongst nursing students in this study suggests that kolp's learning styles are multidimensional. Moreover, this positive correlation may be due to the attempt to accommodate the varying learning styles of nursing students and they introduce a variety of different teaching approaches and methods to enable learning to occur for all undergraduate nursing students to suit their learning style.

In agreement with these findings **Markoni., (2022)** found that the variable "gender" affected participants' reflective observation (RO) and processing information scores, indicating a relationship between Kolb's learning styles and sex among history undergraduates in Türkiye.

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These findings are in consistent with **Dumcho.,et al** (2020)who found that male students preferred the assimilator learning style, while female students preferred the diverger style. A significant mean difference was noted in the accommodator style between genders, with males scoring lower than females.

The current study found that the four learning style groups have positive and non-significant correlations with total critical thinking. In the same line **kabeel.,et al (2016)** that there was an evidence of positive correlation between learning style and critical thinking among baccalaureate nursing students.

On the other hand **Ghazivakili.,et al(2014)** found a significant relationship between critical thinking and learning style .

Conclusion

The findings show that the mean scores of critical thinking skills and its subdomains were moderate among the nursing students who were surveyed for this study. In addition, obtaining information about the dominant learning styles of students may encourage and enable nursing educators to create appropriate learning environments and prepare the areas for academic achievement of the students. Learning outcomes improve when training matches the learning styles of the student.

Recommendations

• According to the research's findings, nurse educators should employ teaching strategies and tactics that encourage curiosity rather than the passive teaching and learning that occurs in a classroom.
• Nurse educators need to encourage their pupils to solve problems and make decisions by using critical thinking skills.

• To create fulfilling learning experiences, nurse educators must comprehend and incorporate students' learning patterns into nursing courses.
• More study is required to determine instructional approaches that foster the growth of critical thinking abilities.
• Look at the methods of instruction that best encourage critical thinking.

Limitations of the study

Sometimes some nursing students refuse to participate in the study. Small sample size so it was difficult to generalize results to all nursing students.

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CONFLICTS OF INTEREST

There is no conflict of interest to disclose.

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PISSN: 2974-3281
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