Effect of Electronic Based Learning Application on Practical Skills among Community Health Nursing students

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Abstract

Background: Electronic based learning refers to instruction that is delivered based on electronics through various multimedia, internet platforms and m-learning applications as a new electronic based learning strategy. **This study aimed** to evaluate the effect of electronic based learning application on practical skills among Community Health Nursing students. **Research design:** Intervention study design was utilized to conduct this study. **Setting:** This study was conducted at Clinical Lab, at Faculty of Nursing, Benha University, Egypt. **Sampling:** Systematic random sample of 25% as one every fourth of (64) Community Health Nursing undergraduates' students, the participants were categorized into intervention and control groups 32 participants in each group but excluded one from intervention group during study. **Tools: Two tools were used I):** A structured questionnaire which consisted of two parts. **A):** Personal characteristics of the studied students (intervention and control groups). **B):** Data about electronics used by the intervention group of Community Health Nursing students. **II):** Observational skills checklist that measured nursing skills practical skills of the studied students. **Results:** 90.3% of the intervention group had competent practice level post intervention flipped classroom method based on electronic learning compared to 68.7% of control group. **Conclusion:** Application of Electronic Based Learning succeeded in improving the practical skills among intervention group students compared to control group students. **Recommendations:** Implementing new learning strategies to be used in both theoretical and clinical curriculums.

Key words: Electronic learning, Community Health Nursing students, Practical skills.

Introduction

Community Health Nursing students are fourth year undergraduate students that must be knowledgeable, aware of community concepts and also master adequate theoretical knowledge and clinical skills during their nursing studies. Recently, nursing students have shown great interest in personalized learning, which means they are no longer satisfied with traditional classroom learning; instead, they study at their own pace with no restraint on time and space. For these reasons,

traditional teaching and learning methods are not in line with modern nursing learning.

Therefore, new educational methods must be identified and introduced to improve the knowledge, skills and patient care of nursing students *(Kim & Park, 2019).*

Community health nursing practice is as equally important as theoretical nursing education. Therefore, to provide nursing students with indirect experience of clinical situations, a variety of nursing practice

contents have been developed in recent years. These developments reflect the importance of nursing students' practical training to provide them with real nursing practice experiences that cannot be learned only through theoretical education and for adequate adaptation to actual clinical practice after graduation *(Lee & Sim, 2020).*

Electronic learning (E-learning) platforms offer the utilization of the internet to deliver information to the students at different time and place. Also, e-learning platforms provide free access to the network without considering the time and places restrictions through web technologies in order to promote learning. E-learning systems are web-based software for distributing, tracking and managing courses over the internet . Mobile e-learning is a new way to approach learning content using mobile applications. The Medical e-learning mobile app is one of the most popular e-learning apps in the world. It offers learners educational videos and lectures that are related to the medical field. Mobile learning is an essential educational technology component in higher education. It strengthens the practices in the curriculum and the use of innovative teaching techniques and approaches will be a paramount importance *(Criollo et al., 2021; Elsayed et al., 2023).*

Today, for preparing the nurses to practice in complex practice environment, this requires calls for change and transformation in how nursing education is implemented. An innovative method being used in nursing education is the Flipped Classroom Method (FCM). The FCM is a teaching strategy for delivering electronic learning that encourages critical thinking, application of knowledge obtained outside of the classroom to real-world situations and problems within the class *(Joseph et al., 2021).*

Community Health Nurse educators around the world have been interested in developing educational strategies in the faculties, through the change of the student's practical skills by using electronic application (apps) in learning. In addition, there is an important need for the faculty to change the traditional method of teaching into the implementation of a student-centered learning environment. Increasing learning experiences that facilitate knowledge-building, awareness, problem- solving and precarious thinking is important *(Amr et al., 2023).*

Significance of the study

In the 21st century, technology is growing more rapidly than ever. E-Learning apps are the third most frequently installed apps on mobile devices, with a current rate of 8.47%. Mobile applications are gradually changing the traditional classroom communication mode between teachers and students and facilitating local colleges and universities to better achieve the cultivation goal of high-quality application-oriented talents and exploring a new learner-centered classroom teaching model as flipped classroom are hot issues of current research in the education field *(Maurya, 2022; Hao & lan, 2023).*

Aim of the study

This study aimed to evaluate the effect of electronic based learning application on practical skills among Community Health Nursing students.

Research hypothesis

Practical skills among intervention group students will be improved after application of electronic based learning (using flipped classroom method based on mobile

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application) than control group students using traditional learning.

Subjects and Method

Research design:

Intervention study design was utilized to conduct this study.

Setting:

This study was conducted at Clinical Lab, in Faculty of Nursing- Benha University, Egypt.

Sampling:

Simple random sample of 25% as one every fourth of Community Health Nursing undergraduates' students which include (64) from (253) who was enrolled at Community Health Nursing course in second terms of 4th academic year 2021-2022 at Faculty of Nursing- Benha University, the participants were categorized into intervention and control groups and resulting in 32 participants in each group, but one of student in intervention group refuse to complete the study, so sample size became (63) *(as shown table(1)* and this study was conducted throughout 9 weeks from beginning of February 2022 to the first week of April 2022.

Table (1): Follow up table of participants progress through the study.

Participant groups	The total number of eligible participant groups	The total number of participant groups post intervention
Control group	32	32
Intervention group	32	31(one student withdrew during the study)
Total	64	63

Tools of data collection:

Two tools were used to collect the data
Tool (I):- <u>**A structured questionnaire format**</u>: It was developed by the researcher based on reviewing related literatures and it was written in simple clear English language: **It comprised of two parts: - It was concerned with:**

A- Personal characteristics of the studied students (intervention and control groups); **it comprised of three questions**; age, sex and place of residence.
B- Data about electronic used by the intervention group students as; it comprised of **seven questions about; type** of mobile phone, **operational** system of mobile phone, **availabl**e personal internet speed, **level of** practice in technology, **type** of the previously any training course using electronic learning application and **indication** of use medical apps on the mobile.

Tool II:- Observational skills checklist that measured the nursing skills practical skills, it was developed by the researcher based on a nursing textbook and clinical sheet on basic nursing skills adopted from *(The Canadian Red Cross Comprehensive Guide for First Aid & CPR, 2022*; *Nemeth, 2020)* approved by supervisors and it was developed for Community Health Nursing students who used learning method through asking about practical skills questions regarding the five procedures (Cardio and Pulmonary Resuscitation (CPR), external and internal bleeding, head and spinal cord injuries, seizure and choking)

Scoring system:

Practical skills of the studied students (intervention and control groups) toward practical course using learning methods: It

comprised of one hundred and fifteen (115) steps; each step of Community Health Nursing students' practical skills has two levels of answers: Done and not done. These were respectively scored 1, 0. For analysis students' practical skills were plotted under two main categories (competent & in competent). The scores of the steps were summed-up and the total divided by the number of the steps, giving a mean score. These scores were converted into percentage score. The total practices score was calculated and ranged from (0- 115 points) which was classified as competent if the score of the total practices ≥ 80% (≥92points), while considered incompetent if it is < 80% (< 92 points).

Content validity:

The content validity of tools was done by Three of Faculty's Staff Nursing experts from the Community Health Nursing Specialties who reviewed the tools for clarity, relevance, comprehensiveness, applicability and give their opinions.

Reliability of tools:

Reliability of the tools was applied by the researcher for testing the internal consistency of the tool by administration of the same tools to the same subjects under similar condition. The reliability was done by Cronbach Alpha coefficient test which revealed that each of the two tools consisted of relatively homogenous items as indicated by moderate to high reliability of each tool. The internal consistency of the practical skills was 0.751 for intervention group and 0.771 for control group

Ethical considerations:

1. Ethical certificate was approved from ethical committee at faculty of Nursing, Benha University
2. All ethical issues were assured, approval and an informed oral and written consents from all study participants has been obtained after explaining the purpose of the study to gain

their trust and cooperation. Each student had a choice to continue or withdraw from the study. Ethics, values, culture and beliefs were respected. The data collected was stored in confidential manner.

Pilot study:

The pilot study was carried out on (6) Community Health Nursing students' participant, (3) from intervention group and (3) from control group which represented (10 %) of the study sample to test the clarity, objectivity, feasibility and applicability of tools using Google form questionnaire (https://docs.google.com/forms/d/e/1FAIpQL SefIVuhJe-d8hoy8r7i7Cca1-VLoKYqZeyHPZ2ilqMtvBs4ZA/viewform?u sp=sf_link) and observational checklist as pre-test sheet. No modification was done so the pilot study sample was included in the total sample.

Electronic based learning application construction:

An electronic based learning application was designed by the researcher after reviewing the related literature. It was implemented through three phases:-

Preparatory and assessment phase:

Preparation of the study design and data collection tools was based on reviewing current, past, local and international related literature about electronic based learning by using periodical journal, magazines, book, internet search and similar application design to contrast the tool of the study and preparation of mobile application and clinical practical content, videos, activity based on community health nursing textbook on basic nursing skills.

Implementation phase:

Data was collected over the second term of community health nursing practices which

was exactly the first 9 weeks of practical course from the beginning of February to first week of April, 2022 with 6 hours per week, divided into to two days; online session in one day and face to face on other day according to the defined schedule, 3 hours for each day defined on Tuesday and Wednesday from 12:00 Pm to 3:00 Pm; the researcher chose these days according to academic schedule. In this phase the researcher implemented the intervention for the intervention group from **the second week to seventh week**. Implementation of the application was done through 12 sessions (6 sessions online and 6 sessions face to face) the duration of each session was from 1-3 hours. On the other hand, the control group took the practical course in the same days from 9 Am to 12 Pm using the indoctrination teaching method.

Teaching methods in FC for intervention group:

Between weeks 3th to 7th weeks, the five procedures was applied with trained activities which divided each procedure on two days; each day formed as session, one day for online sessions for learning the procedures at the mobile application system and other day for face-to-face session for discussion, practices and correct the practical skills they learned at the mobile application system and training on semi-actual practical situations. **From the third session onward**, implement the intervention on five procedures during 10 sessions in 5 weeks, each procedure divided on two sessions (online session and face to face session) were presented in one week by following FC principles, including a three-step process (pre-class, in-class, and post-class activities), described in detail below.

Pre-class activities

At the self-learning stage, video or textual contents designed by the instructor were presented outside the official classroom time. To this end, one week before each procedure was presented; its educational content was made available to the participants in narrated PDF (Portable Document Format) files, podcasts, or short educational videos. The instructor produced electronic content with the help of an programming engineer in making software part. Books, journals and YouTube were also used in designing the content (video or reading material). Each content included a topic, objectives, text and a self-assessment.

In-class activities

This stage, also known as practices on the dolls, focused on peer-to-peer activities and the discussion of instructors with students, which lasted about 3 hours. After seeing the required training materials, students attended Community Health Nursing Lab at the time specified in the schedule.

Post-class activities

Extended assignments (descriptive and problem-based) were presented after completing each educational content and entering the following to consolidate learning. Assignments were uploaded to the instructor for giving score. The tests related to the assessment of essential learning did not have any impact on the final assessment score. Hence, the final evaluation was based on the selected procedures consisting of practice an actual situation and problem solving.

Teaching methods in the control group:

Education was provided as traditional practical learning in the Clinical Lab for 10 consecutive sessions per five weeks. The content of lessons was learned according to

the course schedule (Tuesdays and Wednesdays per week) two days a week, 3 hours per day from 9:12 am and its chronological order. The control group was taught using the traditional lecture method, which involved using indoctrination method. The instructor demonstrated the procedure on the training dolls and the students seen the steps of procedures and the practical skills performed by instructor at defined practical days in Clinical days.

Evaluation phase:

Evaluation of electronic based learning application was done immediately after the end of the application by using the same pre/post-test and questionnaires using electronic form. Evaluation goals were used to measure learning outcomes to understand learning achievements and progress in practical skills. This study used the observational checklist to measure the practical skills toward the practical course by using the electronic flipped learning method for the intervention group students and traditional learning method for control group from Community Health Nursing students.

Statistical analysis:

All data collected were organized, tabulated and analyzed by using the Statistical Package for Social Science (SPSS version 22), which was used frequencies and percentages for qualitative descriptive data, and chi-square (x^2) was used for relation tests and mean and standard deviation was used for quantitative data.

Statistical significance was considered at:

- Significant result when P- value < 0.05.
- Highly significant result when P- value <0.001.
- Non- significant result when P-value >0.05.

Results:

Table (1): Shows that; 62.5 % of the intervention group aged from 21 to less than 22 years old with mean age was 21±0.86, while 50% of the control group aged from 21 to less than 22 years old with mean age was 22±0.95, 90.6 % of intervention group were females, 93.7% of them were females respectively and 62.5 % of them lived in rural areas, while 56.3% of them lived in urban areas.

Table (2): Shows that; all of the intervention group students had advanced mobile phone, 56.3% of them had moderate internet speed, 84.4% of them are perfect users in practice of technology, 96.9% of them presented workshop about electronic learning and 87.5% of them use medical apps on the mobile for nursing care plan reference and drug reference respectively.

Table (3): Shows that; there were no statistically significance differences in pre intervention between the studied and controlled Community Health Nursing students in practical skills of all procedures about cardio pulmonary resuscitation, bleeding, head and spinal cord injuries, seizure and chocking (P- value >0.05), while there were statistically significance differences in post intervention between the studied and controlled Community Health Nursing students in practical skills of all procedures about cardio pulmonary resuscitation, bleeding, head and spinal cord injuries, seizure and chocking (P- value < 0.05).

Figure (1): This figure illustrates that; 38.7 % of the intervention group students had competent practice level pre intervention flipped classroom method based on electronic learning and then this percentage increased to 90.3% post-intervention, while 43.2 % of the control group from Community Health

Nursing students had competent practice level pre intervention the traditional learning method and then increased to 68.7% post intervention.

Table (1): Frequency distribution of the intervention and control groups students regarding their personal characteristics (n=64).

Personal characteristics	Intervention group (n=32).		Control group (n=32).		X^2	p-value
	No	%	No	%		
Age/years						
21 –	20	62.5	16	50	6.000	٠.306
22-	9	28.1	10	31.25		
≥23	3	9.4	6	18.75		
Mean ±SD	21±0.86		22±0.95			
Sex						
Female	29	90.6	30	93.7	٠.٢١٦	٠.٦٤١
Male	3	9.4	2	6.3		
Residence						
Urban	12	37.5	18	56.3	٢.٢٥٩	٠.١٣٣
Rural	20	62.5	14	43.7		

Table (2): Frequency distribution of the intervention group students regarding their using of electronics (n=32).

Items	No.	%
Type of mobile phone		
Advanced	32	100
Operational system of mobile phone		
Android OS	32	100
Internet speed		
High	6	18.7
Moderate	18	56.3
Low	8	25
Level of practice in technology		
Perfect users (use standard Web and mobile technologies, on a monthly Average and tend to engage in web publishing and file sharing).	27	84.4
Basic users (extremely infrequent use of new and emerging technologies but regular users of standard mobile features (i.e. call and text people).	5	15.6
Previous course using electronic learning*		
ICDL.	6	18.75
Online course	27	84.4
Workshop about electronic learning	31	96.9
Indication of use medical apps on the mobile*		
Nursing care plan reference	28	87.5
Drug reference	28	87.5

*****Answers are not mutually exclusive**

Table (3): Frequency distribution of the studied students (intervention and control groups) regarding their practical skills about all procedures (n=63).

Procedures	Incompetent/ Competent	Pre-intervention						X^2	p-value	Post-intervention						X^2	p-value
		Intervention group (N=31).		Control group (N=32).						Intervention group (N=31).		Control group (N=32).					
		No	%	No	%					No	%	No	%				
Procedure about CPR	Incompetent	23	74.2	24	75			0.005	.941	4	12.9	11	34.4			4.002	0.045*
	Competent	8	25.8	8	25					27	87.1	21	65.7				
Procedure about bleeding	Incompetent	20	64.5	21	65.6			0.008	0.926	3	9.7	10	31.3			4.474	0.034*
	Competent	11	35.5	11	34.4					28	90.3	22	68.7				
Procedure about head and spinal cord injuries	Incompetent	19	61.3	20	62.5			0.010	0.921	2	6.5	9	28.1			5.132	0.023*
	Competent	12	38.7	12	37.5					29	93.5	23	71.9				
Procedure about seizure	Incompetent	18	58.1	17	53.1			0.156	0.693	2	6.5	8	25			4.057	0.044*
	Competent	13	41.9	15	46.9					29	93.5	24	75				
Procedure about choking	Incompetent	20	67.7	21	65.6			0.009	0.926	4	12.9	11	34.4			4.002	0.045*
	Competent	11	32.3	11	34.4					27	87.1	21	65.7				

*Statistically significant difference (P > 0.05)

Figure (1): Percentage distribution of the studied students (intervention and control groups) regarding their total practices level pre and post intervention(n=63).
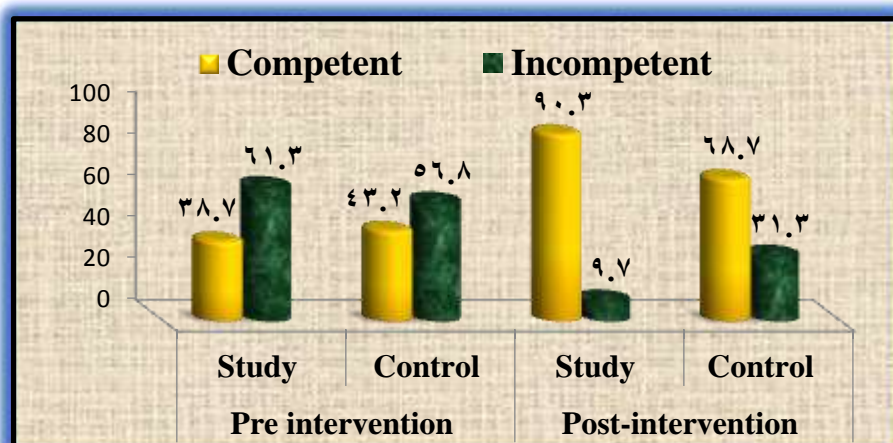
Discussion:

Technological advancements have contributed to the rising popularity of e-learning. The emergence of information technology has diversified learning methods *(Barbour & Schuessler, 2019).* The development and prevalence of mobile devices have introduced innovative directions in learning models. An innovative method being used in nursing education is the Flipped Classroom Method (FCM). The FCM is a teaching strategy that encourages critical thinking and application of knowledge obtained outside of the classroom to real-world situations and problems within the classroom *(Baharum et al., 2020).*

Concerning to the electronics using by intervention group students:

Regarding students' mobile phone type, the current study showed that; all of the intervention group students had advanced mobile phone. This finding was inconsistent with *Karma & Santiana, (2021)*, who studied "Blended Learning is An educational Innovation and Solution during The COVID-19 Pandemic, in Indonesia", (n=562), and found that; more than two thirds of their students (67.7%) had developed mobile phone. While this finding agreed with *Othman et al., (2022)*, who studied "Nursing Students' Attitude and Satisfaction regarding to Blended Learning at The Time Of COVID-19 Pandemic, in Egypt", (n=400) and found that; most of their students (93.8%) had developed mobile phone. This might be due to mobile phone has several benefits in the students' educational process, such as enhancing learner participation in the teaching-learning process and providing easy

access to more information, so many students had developed mobile phone.

Regarding students' mobile phone operation system, the current study showed that; most of the intervention group students had Android OS mobile phone. This finding agreed with *Özkütük et al. (2021)*, who studied "The Readiness of Nursing Students for Mobile Learning: A Cross-Sectional Study. Contemporary Nurse ", that conducted at 3 different state universities, (n=678), and found that; the majority (84.6%) of their nursing students had Android OS mobile phone. From the researcher points of view, this finding might be due to the proportion of Apple OS apps for using the public is limited.

Regarding internet speed for practicing in technology, the current study showed that; more than half of the intervention group students had moderate internet speed. This finding was inconsistent with *Qader& Yalcin (2019),* who studied "The Effect of Flipped Classroom Instruction in Writing: A case Study " that conducted at Salahaddin University in Iraqi, (n=66) and found that; only tenth of their students (10.6%) had slow internet speed. From the researcher points of view, the students were lived in rural areas where irregular internet speed, so the researcher solved the problem by making the material downloaded to facilitate its study without internet.

Regarding students' level of practice in technology, the current study showed that; majority of the intervention group students were perfect in technology. This finding was inconsistent with *Abou Shosha et al. (2019)*, who studied "Effect of Mobile Based Learning Program on Postgraduate Nursing Students' Satisfaction and Attitudes in Faculty of Nursing

Damanhour University", (n=36), and found that; more than half of nursing students (52.8%) were perfect technology users.

Regarding students' previous E-learning training courses, the current study showed that; most of the intervention group students received the workshop about electronic learning platform. This finding disagreed with *Mahrlamova & Chabanovych, (2021)*, who studied "Implementation of Interactive Methodology in Medical Education: Blended Learning Approach, E-Learning Versus Conventional Learning, in Ukraine", (n=80) and found that; majority of their students (80%) had taken platform course. From the researcher points of view, this finding might be due to the blended learning platforms were used to replace traditional face-to-face educational experience to improve the quality of learning and revise long-standing teaching methods through the possibilities offered by the modern technologies.

Also the result of this study showed that, the majority of the intervention group students had mobile phone device used to access the online course. This finding was inconsistent with *Saad et al., (2021)*, who studied "Comparing Undergraduate Nursing Student Academic Engagement and Achievement in Traditional Versus Blended Learning Models, in Pakistan", (n=162) and found that; less than three fifths of their students (56.3%) utilized smart phone device to access the online course. Moreover, this finding disagreed with *Resmiaty et al., (2021)*, who studied "The Implementation of Blended Learning in The New Normal Era at Vocational School of Health, in Indonesia", (n=158) and found that; more than two thirds of their students (69.6%)

use smart phones in the educational process. From the researcher points of view, this might be due to one of the most useful benefits of using mobile devices for online learning is the freedom to learn from virtually anywhere on the planet.

Regarding students' use medical apps on the mobile, the current study showed that; the majority of the intervention group students used medical apps on the mobile for nursing care plan reference and drug reference equally. This finding was inconsistent with *O'connor & Andrews (2018)*, who studied "Smartphones and Mobile Applications (Apps) in Clinical Nursing Education: A Student Perspective", in Irelan, (n=195) and found that; 35% of their nursing students use mobile educational app for drug reference and 13% for nursing care plan.

Concerning to practical skills of the studied sample (intervention and control group students) toward their practical procedures, the current study showed that; there were no statistically significance differences in pre intervention between the studied students (intervention and control groups) in practical skills of all procedures about cardio pulmonary resuscitation, bleeding, head and spinal cord injuries, seizure and chocking (P- value >0.05), while there were statistically significance differences in post intervention between the intervention and control groups from Community Health Nursing students in practical skills of all procedures about cardio pulmonary resuscitation, bleeding, head and spinal cord injuries, seizure and chocking (P- value < 0.05). These finding agreed with *Xu et al. (2019)*, who studied "The Effectiveness of A Flipped Classroom on The Development of Chinese

Nursing Students' Skill Competence: A Systematic Review And Meta-Analysis" that conducted in China, (n=22) and found that; there was statistically significance differences in post intervention between the both intervention group and control group students compared in pre intervention. From the researcher points of view, this might be due to the intervention student group had opportunity to train on these procedures on real situation and practice effectively on lab using flipped classroom based on electronic mobile learning. However, these findings disagreed with *Kaplan et al. (2023)*, who studied "The Effect of the Flipped Classroom Model on Teaching Clinical Practice Skills", that conducted in Turkey, (n=42) and found that; there were no statistically significance differences in pre and post intervention between the both intervention group and control group.

Concerning to practical skills of the studied sample (intervention and control group students) regarding their total practices level pre and post intervention, the current study showed that; more than one third of the intervention group students had competent practice level pre intervention flipped classroom method based on electronic learning and then this percentage increased to the most post-intervention, **while** less than half of the control group from Community Health Nursing students had competent practice level pre intervention the traditional learning method and then increased slightly to more than two thirds in post intervention. **From the researcher points of view,** this finding might be due to view more videos about procedures pre- the class, solved more activities and practiced on different situations in-the class

than the control group were limited on lecture and training in the class.

Conclusion

Based on the results of the present study and answering of research hypotheses, the following can be concluded:

Application of electronic based learning (using flipped classroom method based on mobile application) succeeded in improving the practical skills among intervention group students compared by control group students using traditional learning method. Most of the intervention group students had competent practice level post-intervention using flipped classroom method based on electronic learning compared by more than one third pre-intervention, while more than two third of control group had competent practice level post-intervention compared by less than half pre-intervention.

Recommendations

- Implementing new learning strategies to be used in both theoretical and clinical curriculums.
- Provide adequate training programs to students on using flipped classroom method based on mobile application in nursing education.

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