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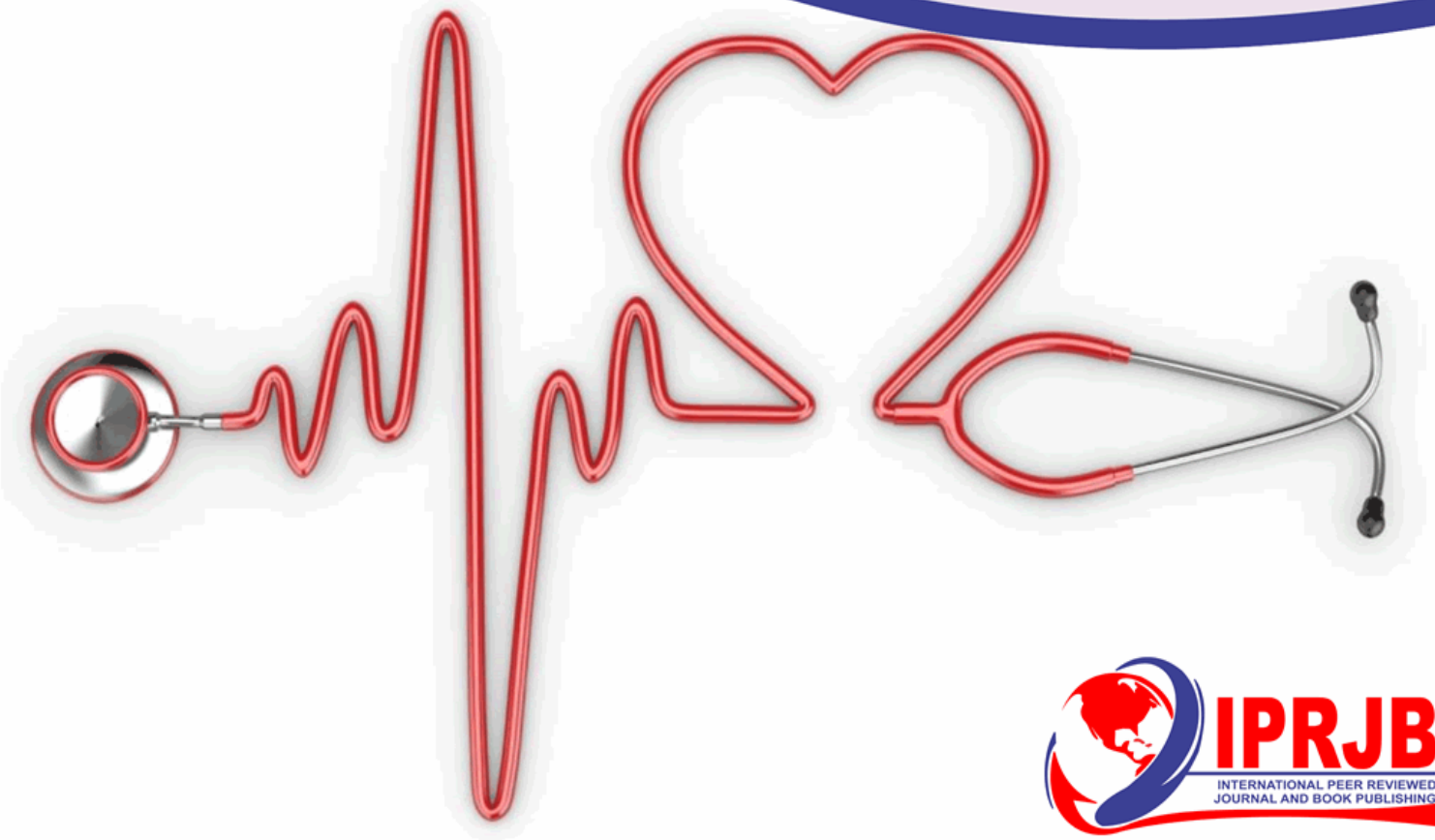

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EFFECT OF SELF- INSTRUCTIONAL MODULE ON KNOWLEDGE AND PRACTICE OF NURSING STUDENTS REGARDING TUBE FEEDING INSERTION

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Abstract:

Purpose: Learning is the process of developing active knowledge rather than absorption of passive information. Nursing educators should recognize the need to develop innovative teaching strategies that could enhance student learning. The study aimed to investigate the effect of self-instructional module on knowledge and practice of nursing students regarding tube feeding insertion.

Methodology: A quasi-experimental, one group pretest - posttest design was selected to accomplish the aim of this study. **Research hypotheses: H_1:** There is significant difference between the mean post-test knowledge scores of students after implementing self-instructional module and their mean pre-test knowledge scores. **H_2:** There is significant difference between the mean post-test practice scores of students after implementing self-instructional module and their mean pre-test practice scores. A convenient sample of 60 sophomore nursing students enrolled in Medical Surgical Nursing Practicum course was selected. Four tools were used, demographic data sheet, Pre-posttest knowledge sheet, observational checklist of tube feeding insertion and opinionnaire sheet.

Findings: There was significant difference between the mean post-test knowledge and practice scores of students after implementing self-instructional module and their mean pre-test knowledge and practice scores. The developed self-instructional module showed its effectiveness in improving nursing students' knowledge and practice regarding tube feeding insertion.

Unique contribution to theory, practice and policy: The study recommended that implementing the self-instructional module in the nursing faculties as an effective teaching strategy, and develops other modules in different topics.

Keywords*: Self- instructional Module, Nursing students' Knowledge, practice & Tube Feeding Insertion.*

I.0 INTRODUCTION

Nutrition is the sum of processes by which one takes in and utilizes nutrients. Nutritional status can be viewed as a continuum from under nutrition to normal nutrition to over nutrition. An alteration in the process of nutrient intake or utilization can potentially cause nutritional problems. If patients are unable to maintain or achieve adequate nutritional status, this calls for nurses' attention to be focused on the provision of alternatives to oral intake. One of these alternatives is the provision of enteral nutrition (Lewis, Dirksen, Heitkemper & Bucher, 2014, Mula, Ncama& Maluwa, 2014).

Enteral nutrition (EN) also known as tube feeding, defined as nutrition provided through the gastrointestinal (GI) tract via a tube, catheter, or stoma that delivers nutrients distal to the oral cavity. EN may be ordered for the patient who has a functioning gastrointestinal tract but is unable to take any or enough oral nourishment, or when it is unsafe to do so. EN is considered to be easily administered, more physiologically efficient, and typically less expensive (Lewis, Dirksen, Heitkemper & Bucher, 2014., Das, Patra & Pradhan, 2015). Enteral feeding can be administered via nasogastric, nasoduodenal, and nasojejunal tubes. Nasogastric tube feeding (NG) is the most frequently used method of enteral nutrition particularly if feeding is to be used for a relatively short period. NG tube is a thin, soft tube that is passed through nostril down the throat, through the esophagus into stomach used to feed the patient or to administer medication (Ahamed & Mondal, 2014., Mohammed& Abdel Fattah, 2018).

The nurse roles in delivering the NG tube feeding usually include insertion of the tube; maintenance of the tube, administration of feeding, participation in assessment of the patient's response to tube feeding, prevention and detection of complications associated with this form of therapy as gastric distention, nausea, bloating, vomiting and diarrhea. However, NG tube feeding insertion is a non-trivial clinical skill, applying excessive force during insertion may cause damage to the turbinates or nasopharynx (Radi, Aiad, Soliman & Ragab, 2016., Houston & Fuldauer, 2017). More seriously, NG tube insertion is a blind process in that the tube may reach other parts of the body instead of the stomach without the knowledge and skills of the nurse. Such misplacement has unfortunately resulted in unexpected complications as lung perforations leading to hydrothorax and pneumothroax due to the mistaken placement of the NGT into the pleural cavity (Choi, He, LimChiang & Deng, 2015).

Thus, the nurses' knowledge and skills regarding NG tube feeding insertion are vital issues to ensure patient safety (Choi, He, LimChiang & Deng, 2015., AL Kalaldeh , Watson& Hayter, 2015). Consequently, nurse educators should encourage their students to effectively acquire relevant and scientific knowledge based on evidence through an active learning technique and new teaching methods to assess their effect on students' acquisition of knowledge and skills. Active learning method shifts the focus from the teacher to the student and helps them to be an active participant with the course syllabus. Through an active learning technique, students shed the traditional role as passive receptors and learn how to apprehend knowledge and skills and use them meaningfully

(Akman, 2016). Active learning provides opportunities for students to actively listen, write, read, and reflect on the content, ideas and also increase their concerns of an academic content. Therefore, it is important to regulate the courses for steering the students toward knowledge, instead of directly transferring the knowledge, and employ different method-technique and approaches for achieving this learning outcome (Carr, Palmer & Hagel, 2015).

Self- instructional module is a form of active learning that gives learners an opportunity to work individually according to their special needs. It is an effective for learning in the cognitive and psychomotor domains where the goal is to master knowledge and apply it into practice. With self- instructional module, learners study by themselves using text books, scientific journals and hand out notes prepared by the teachers. It can also be effective for introducing principles and step by step guidelines prior to demonstration of professional skills. Moreover, it provides various strategies for self assessment, that enables students to evaluate their progress frequently and provides immediate feedback. (Mahmoud, 2015, Carr, Palmer & Hagel, 2015). So, the aim of this study was to investigate the effect of self-instructional module on knowledge and practice among nursing students regarding tube feeding insertion.

Significance of the Study

Nasogastric (NG) tube insertion is a common clinical procedure performed by nurses to access the stomach. Although an apparently simple procedure, it comes with its share of complications if proper technique isn't taken during insertion (Mohiuddin, Al Kaabi, Butt, Yakoob& Khanna, 2016). In relation to the NG tube insertion mistakes, Ni, Priest, Phillips and Hanna (2014) reported that for blind insertion, the rate of respiratory placement is usually 1-3%. Inadvertent tube placement in the esophagus was observed in 19 out of 100 blind NG tube insertions. Reported rates of tube misplacement on insertion and tube migration after right initial placement vary between 1.3% and 50% in adults**.**

Major attention must be focused on nurse's knowledge and performance regarding nasogastric tube insertion because nurses have the major responsibility for providing patients with their essential nutrients without causing complications. The improvement of nurses' knowledge and practices will directly or indirectly lead to reduce the complications and side effects related to NG tube feeding insertion in clinical practice, and will contribute to the quality of patient care (El-Meanawi, 2017).

Nurse educators should recognize the need to develop and employ innovative teaching strategies in order to prepare students for successful gaining of knowledge and practice (Bayoumy & Al Jadaani, 2015). Lack of specific previous research related to the effect of self- instructional module on knowledge and practice among nursing students regarding tube feeding insertion in Egypt, prompted this research study. Also, the opportunity to conduct this research study could provide more evidence to the usefulness of self- instructional module and if it can be a viable solution for the students to achieve success in the course of their nursing education.

2.0 THEORETICAL FRAMEWORK

The theoretical framework chosen to guide this research is self directed learning model by Knowles (1975). He described self directed learning model as a process in which adult learner take the initiative without assistant from others in diagnosing their learning needs, formulating learning goals, identifying human and material resources, and evaluating learning outcome (Kistner, 2015, Spies, 2015). Moreover, Knowles (1975) identified that self-directed learning is important because adult learners who take the initiative in learning, learn more and better than do learners who sit at the feet of teachers waiting to be taught and he also added that self-directed learning is more in tune with our natural processes of psychological development, so it is essential to be followed (Manning, 2017).

Principles of self directed learning model include the following: adult learners need to be involved in the planning and evaluation of learning process, adult experience provides the basis for the learning activities, learners are most interested in learning subjects that have immediate relevance and impact to their education level or personal life. Finally, adult learning is problem centered rather than content oriented (Palis, 2014). All of these principles were applied in the self instructional module, nursing students were had a positive role in preparing, planning and also evaluating self instructional module as an effective teaching method or not. Moreover, they can evaluate their knowledge through self evaluation test and check their answers. In addition, using the skill lab to watch educational videos related to tube feeding insertion, they had the freedom to choose from these alternatives which is suitable for their readiness and abilities. Finally, after studying self instructional module properly, they will have ability to develop their skill to insert NGT feeding for their patients independently without or with minimal guidance from their clinical instructors.

3.0 MATERIAL AND METHODS

Aim of the study

This study aimed to investigate the effect of self-instructional module on knowledge and practice of nursing students regarding tube feeding insertion.

Research hypotheses

In order to accomplish this study aim, two hypotheses were formulated:

H_1: There is significant difference between the mean post-test knowledge scores of students after implementing self-instructional module and their mean pre-test knowledge scores.

H_2: There is significant difference between the mean post-test practice scores of students after implementing self-instructional module and their mean pre-test practice scores.

Operational Definitions:

- **Effect:** It referred to the extent to which using self instructional module as an educational tool in clinical teaching, has its impact on nursing students' knowledge and practice, as measured by pretest, posttest knowledge and observational checklist.
- **Knowledge**: It referred to the correct answer regarding the questions of tube feeding insertion as measured by pre and post tests.

- **Practice**: It referred to the accurate performance of tube feeding insertion procedure steps as measured by observational checklist.
- **Self - instructional module:** It refers to the scientific information package or set of learning activities which provided to the nursing students regarding NG tube feeding insertion.
- **Nursing students:** Referred to the selected sample of sophomore baccalaureate nursing students (male and female) who were meeting the criteria for the study inclusion as being enrolled in Medical Surgical Nursing Practicum course (NUR 202) and studying in a selected Nursing Faculty in Cairo, Egypt.

Design

A quasi-experimental, one group pretest - posttest design was selected to accomplish the aim of this study.

Pretest- intervention- Posttest

O1 X O2

O1:Pre intervention assessment (Pre-test knowledge and practice score)
X- Intervention (self- instructional module)
O2- Post intervention assessment (Post-test knowledge and practice score)

Sample

The total sample size was 168 students; it was calculated by Epi Info program, version 7.2 at 95% confidence level. However, the researchers couldn't apply the research on this number of students because it was very difficult to collect all of them at the same time of the same day, they were divided into 6 groups in different days of the week according to the credit hour system of the selected faculty. So, the researchers selected one group of them randomly. A convenient sample of 60 sophomore nursing students (male and female), enrolled in Medical Surgical Nursing Practicum course (NUR 202, 4 credit hours) during the 1st semester, academic year 2018/2019 of a baccalaureate nursing program in a selected faculty was chosen as the study sample. Students who were repeaters, expectorates and who got more than 80 percent of pre- test score were excluded from the study sample.

Setting

The study was conducted at a selected nursing faculty in Cairo-Egypt using the classes that were regularly assigned to the sophomore baccalaureate nursing students.

Data collection tools

Data were collected by the following four tools in order to accomplish the aim of this study

1- **Demographic data sheet**: which included age, gender, place of residence, type of precollege school (governmental or private) and Grade of Success in the academic year 2017-2018 of study sample.

2- **Pre-posttest knowledge sheet**: was designed by the researchers in order to measure the students' knowledge before and after using self-instructional module. The test sheet was consisted of different types of questions as true and false, MCQ, complete and short essay. These questions were constructed according to different levels of Bloom's Taxonomy for educational objectives. They covered knowledge regarding the definition of NG tube feeding, indications of NG tube feeding, evaluation of proper placement of NG tube feeding,

contraindications of NGT, and complications of NGT. It consisted of 15 multiple choice questions, 10 true or false questions, 5 complete, and 5 short essay questions.

Scoring system:

For the knowledge items, the correct answer was scored (**1**) and the incorrect answer was scored (**0**), with total score of (**35**). Total score of knowledge items ≥ 75 % was considered high level, score ≥ 60 % and less than 75 % was considered medium level. While total score < 60 % was considered low level. Knowledge was considered satisfactory if the percent score 60% or more and unsatisfactory if less than 60%.

3- **Observational checklist**: It was designed by the researchers after extensive literature review to assess psychomotor skills of the students regarding nasogastric tube feeding insertion. It was consisted of **45** steps representing the following items:

A- Before tube feeding insertion (**10** steps) related to hand washing, check physician order, equipment, feeding preparation, patient's preparation for tube feeding and environmental preparation.

B- During feeding (**31** steps) related to confirm tube placement, record gastric residual feeding and feeding using syringe.

C- After tube feeding insertion (**4** steps) related to caring, patient's position and recording after feeding insertion.

Scoring system:

The items that were performed complete were scored (2), the incomplete items were scored (1) and the items which weren't performed were scored (0). The total score was calculated and converted into percentage score. The practice of tube feeding insertion was considered satisfactory if the percent score 75% or more and unsatisfactory if less than 75%.

4- **Opinionnaire Form:** It was designed by the researchers to assess satisfaction level of the students regarding self- instructional module. It was included 10 items asking students about their belief toward benefits of using self- instructional module and their satisfaction.

Scoring system:

Opinionnaire form was scored by using a three points likert type scale with three values; agree was scored (1), neither agree nor disagree was scored (2) and disagree was scored (3).

Self- instructional Module: the researchers developed self- instructional module of tube feeding insertion after extensive review of literature. Self- instructional module consisted of introduction, students' characteristics, instructions for the 2nd level students, behavioral objectives, instructional activities, self-evaluation questions and their answers and finally learning resources. In the introduction of the module, the students were asked to read the behavioral objectives carefully. To identify the scientific content and achieve the behavioral objectives of the module, the students were asked to carry out several instructional activities such as reading from the recommended books in the library, using the digital library for online searching, and using the skill lab to watch educational videos related to tube feeding insertion. The students had the freedom to choose from these alternatives which was suitable for their readiness and abilities. The students were also instructed to check their knowledge through self-evaluation questions. The student who got 80% or more in this test, had achieved the module objectives, and were ready for the posttest; otherwise, they had to restudy the module again.

Validity and Reliability:

Four tools were developed by the researchers were reviewed by a panel of five experts in medical surgical and education departments for ensuring face and content validity. Based on the experts' opinions, the researchers developed the final validated form of the tools. Regarding reliability, the internal-consistency coefficient reliability, Cronbach's alpha in pre-post exam questions was 0.80 and in the observational checklist was 0.85.

Pilot Study

After getting permission to proceed with the proposed study, a pilot study was conducted on 6 students to assess its clarity, feasibility, objectivity as well as, the applicability of the tools. Based on the results of the pilot study, the needed modifications were done. Students who shared in the pilot study were excluded from the study sample.

Procedure of data collection

This study was conducted through three phases as follow: **Assessment or preparing phase:** After obtaining an official permission from the head of Medical-surgical Nursing department and the vice-dean for undergraduate affairs of the selected faculty. The researchers started data collection through interviewing the students, who met the inclusion criteria and were willing to participate in the study, and explained purpose and aim of the study, in order to obtain their informed consent. At this phase, demographic data sheet, pre- test of knowledge as well as observational checklist were filled in order to obtain baseline data regarding students' knowledge and psychomotor skills pertinent to NG tube feeding insertion. Every student took thirty five minutes to fill out these forms.

Implementation phase: At this phase, the researchers asked the students to read and follow the instructions that settled in the module very carefully, the students had the chance to select from different available resources that mentioned at the end of the module which was suitable for their readiness and capabilities. Different available resources were offered to students as, references of books in the library , the digital library to watch videos relevant to tube feeding insertion, using the skill lab to demonstrate the insertion of tube feeding according to the steps of the observational checklist. The students were also instructed to check their knowledge through a self-evaluation test and check the answers with the answer key at the end of the module. When the score of the self- evaluation test was eighty percent or more, this indicated that the objectives of the module were achieved, so the student were ready for the posttest. While, the students who didn't get 80% of the self- assessment test, they were instructed to study the module again. The time allowed for studying the content of self-instructional module was three weeks; the students were informed that the researchers are available two days for 2 hours per week (Wednesday and Thursday) for two hours (12:00 to 2:00 pm) to clarifying and answering any related questions.

Evaluation phase: Post- test of students' knowledge and observational checklist were conducted in the skill lab after 3 weeks from studying self- instructional module. Each student was interviewed about 35 minutes to fill out the required tools.

Ethical considerations

A formal approval from the head of medical-surgical nursing department and the vice-dean for undergraduate affairs of the selected faculty was obtained. Students meeting the inclusion criteria for the study were invited to participate in the study. Measures were taken to

protect the subjects' ethical rights. Each potential subject was informed and signed an informed consent clarifying the purpose and the nature of the study. Voluntary participation, confidentiality and anonymity of responses were assured. Participants were reassured that the data will be confidential and will be used only for fulfilling the research aim. Codes were provided to the participants' study tools to ensure data confidentiality. Only the researchers had access to the names of the participants related to their respective codes. Participants were provided with detailed verbal and written explanations of the study and were informed that they can withdraw from the study at any time. They were reassured that their participation in the study would not affect their success in the course or in the nursing program.

Data analysis

The collected data were scored, tabulated and analyzed using statistical package for the social science (SPSS) program version 23. Descriptive as well as inferential statistics were utilized in analyzing data pertinent to the current study. Descriptive statistics were including frequency, distribution, means, and stander deviation. t- test and chi square test were used in comparing between results pre-posttests of the study participants. Level of significance was adopted at $p \leq 0.05$.

4.0 FINDINGS and DISCUSSIONS

Statistical findings of the current study were presented in three main sections. **Section 1**: Descriptive statistical findings related to demographic characteristics of the nursing students (Table 1**,** Figure 1-2). **Section 2**: Delineated hypothesis testing for being supported or not (Tables 2-3) and (Figures 3-4). **Section 3**: clarified the additional study findings as, response of nursing students to self-instructional module and correlation between (students satisfaction level of using self- instructional module, posttest knowledge and post observational checklist score) (Tables 4-5).

Table (1): Demographic characteristics of the nursing students (n= 60).

Variables	Category	Nursing students	
		No.	%
Gender	- Male	18	30
	- Female	42	70
Age	- 18-19 years	34	56.7
	- 20-21 years	24	40.0
	- 22-24 years	2	3.3
Mean ± SD	19.55 ± 0.964		
Place of residence	- Rural	26	43.3
	- Urban	34	56.7

Table (1) In relation to gender, more than two thirds of the nursing students (70.0 %) were female, (56.7 %) of the study participants their age ranged between 18 to 19 years with mean age (19.55 ± 0.964). As regards to place of residence, more than half of the study participants reside urban areas (56.7 %).

Figure (1): Percentage distribution of the type of secondary school (n= 60).

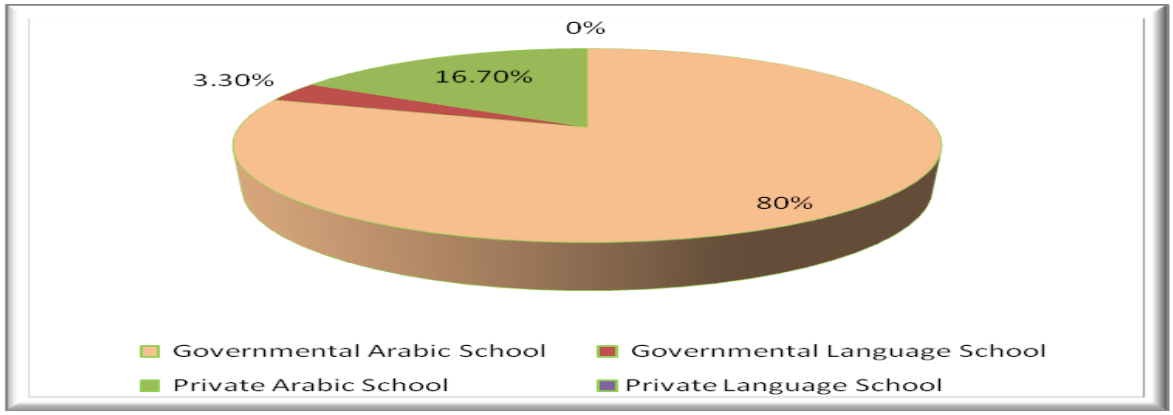

Figure (1): showed that 80% of the nursing students had the certificate of secondary school from governmental Arabic schools.

Figure (2): Percentage distribution of Success rate in the academic year 2017-2018 (n= 60).

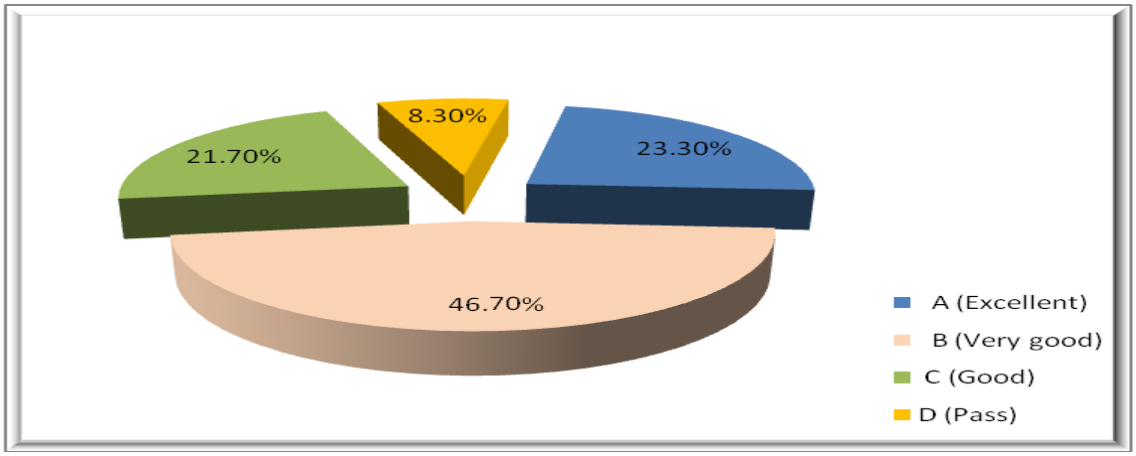

Figure (2): clarified that less than one half (46.70%) of the nursing students had a success grade of B (very good) in the academic year 2017-2018.

Table (2) Comparison of the mean pre test and post test knowledge scores regarding NGT feeding insertion of nursing students(n=60)

Knowledge score	Pre test Scores	Post test Scores	T-test	P- Value
	Mean ± SD	Mean ± SD		
- **MCQ Questions**	3.73 ±2.875	7.78 ± 2.218	8.889	0.000
- **True and False questions**	4.48 ± 2.376	7.63 ± 1.248	9.000	0.000
- **Complete Questions**	1.27 ± 1.103	2.88 ± 1.497	7.012	0.000
- **Short Essay**	1.62 ± 1.563	6.37 ± 2.584	12.598	0.000
- **Total**	11.10 ± 6.420	24.72 ± 5.330	12.640	0.000

P–Value is significant at ≤ 0.05

As can be seen in table (2), the total mean post-test knowledge score value was increased from 11.1 to 24.7. Also, there was a highly statistical significant difference in the main pretest- post-test knowledge scores regarding NGT feeding insertion among nursing students as (t=12.640, P=0.000).

Table (3) Comparison of mean pre test – post test scores regarding psychomotor skills of NGT feeding insertion of the nursing nursing students(n=60)

Psychomotor skills	Pre test Scores Mean ± SD	Post test Scores Mean ± SD	T-test	P- Value
- **Before NGT feeding insertion**	4.05±0.872	7.30± 0.926	25.121	0.000
- **During NGT feeding insertion**	12.08± 1.985	23.93±2.674	35.536	0.000
- **After NGT feeding insertion**	0.68± 0.537	1.98± 0.676	12.449	0.000
- **Total**	16.78± 2.233	33.22± 3.571	39.959	0.000

P–Value ≤ 0.05 is significant

Table (3) showed significant difference between mean scores of pre and post test of psychomotor skills regarding nasogastric tube feeding insertion before and after using self instructional module.

Figure (3): Percentage distribution of pre and post test regarding level of knowledge score of the nursing students (n= 60).

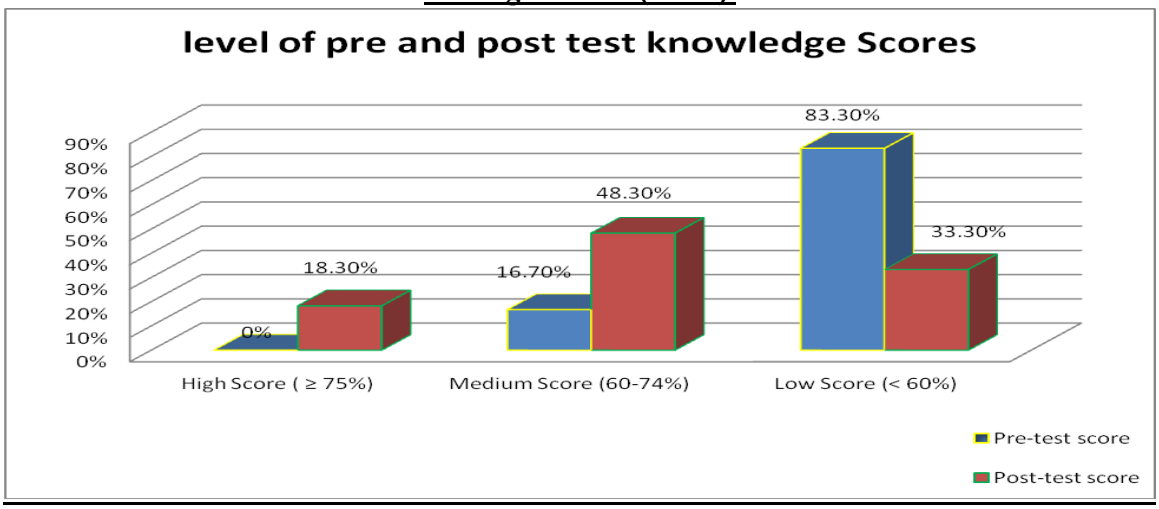

Figure (3): clarified that the majority of nursing students (83.30%) had low score (< 60%) in the pre-test exam. While (48.30%) of them had medium score (60-74%) in the post-test knowledge regarding nasogastric tube feeding insertion after using self instructional module.

Figure (4): Percentage distribution of satisfactory level of psychomotor skills of the nursing students (n= 60).

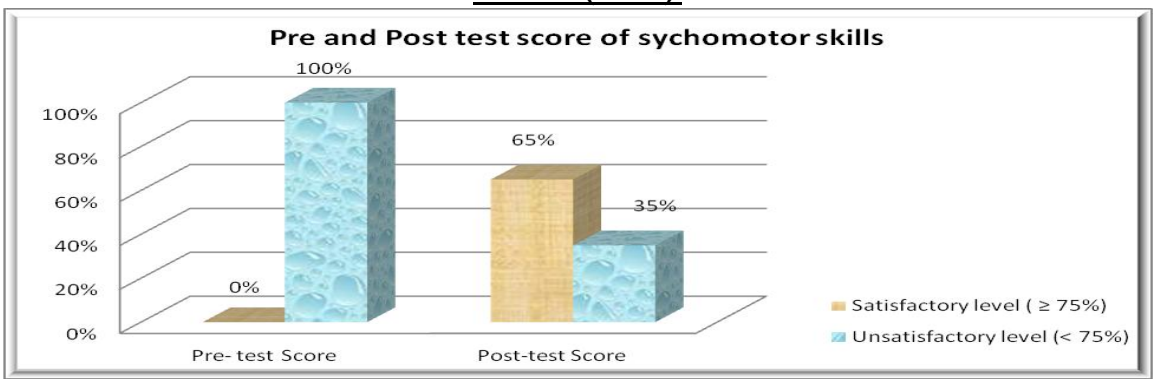

Figure (4): represented that all nursing students (100%) had unsatisfactory level (< 75%) in the pre-test exam of observational checklist. While (65%) of them had satisfactory level (≥75%) in the post-test exam of observational checklist which measured psychomotor skills of the nursing students regarding nasogastric tube feeding insertion after using self- instructional module.

Table (4) Mean and frequency distribution regarding opinion of nursing students related to self instructional module of NGT feeding insertion (n=60)

Statement	Mean(SD)	Agree		Neither agree nor disagree		Disagree	
		No	%	No.	%	No.	%
1- Develop independency of learning	1.28 (0.585)	47	78.3	9	15	4	6.7
2- An effective teaching method.	1.27 (0.548)	47	78.3	10	16.7	3	5
3- Contributed to use time efficiently	1.47 (0.676)	38	63.3	16	26.7	6	10
4- The language used is simple	1.38 (0.739)	46	76.7	5	8.3	9	15
5- Easy to understand	1.32 (0.624)	46	76.7	9	15	5	8.3
6- Cover all items of NGT feeding insertion	1.38 (0.691)	44	73.3	9	15	7	11.7
7- Encourage more reading for NGT feeding insert.	1.25 (0.571)	49	81.7	7	11.7	4	6.7
8- Test the knowledge of NGT insertion effectively	1.28 (0.585)	47	78.3	9	15	4	6.7
9- Web site videos facilitate the practice of NGT insertion more accurately	1.37 (0.688)	45	75	8	13.3	7	11.7
10- Satisfied with using this self instructional module	1.37 (0.688)	45	75	8	13.3	7	11.7

Table (4) illustrated that more than two thirds of the nursing students were agree regarding the benefit and importance of self instructional module as an effective teaching method , develop independency of learning, easy to understand and also encourage more reading. In addition, three quarters of nursing students (75%) were satisfied by using self instructional module.

Table (5): Spearman correlation between students satisfaction level of using self instructional module and post test knowledge score and post observational checklist score (n=60)

Post test score	students satisfaction level
1. Post test knowledge score	Correlation: 0.166 P-value: 0.206
2. Post observational checklist score	Correlation: 0.278 P-value: 0.031*

***Correlation is significant at the 0.05 level (2 – tailed)**

Table (5) showed that, there were weak positive correlation between nursing students' satisfaction level of using self instructional module and post observational checklist score.

IV-DISCUSSION

According to the theoretical framework of the self- directed learning model by Knowles (1975) the discussion was formulated to assess characteristics of the study participants, to identify the effect of self instructional module on their level of performance regarding knowledge and skills and also to assess their response and level of satisfaction in relation to using self -instructional module. **Section 1:** it was related to demographic characteristics of the nursing students **Section 2:** Delineated hypothesis testing for being supported or not. **Section 3**: clarified the response of nursing students to self-instructional module and relation between students satisfaction level of using self instructional module, post test knowledge and post observational checklist score).

Section 1: Sixty sophomore nursing students in their first clinical course comprised the sample for this study. Demographic variables included gender, age and place of residence. Two thirds of students were females. This high proportion of female nurses was most probably attributed to the fact that the study of BSN in the Egyptian universities was exclusive for females only till few years ago, so the profession of nursing in Egypt was mostly feminine. Also, it is worth mentioning that females comprised 90, 78% of the registered nursing personnel in Egypt while males comprised 9.22% (Ministry of Health and Population, 2013).

In relation to age, the study participants' age ranged between 18-24 years with a mean of 19.55±0.964 years. This meant that the participants were adult learners and were able to be self-learners. This finding matched with Shahin, Mohamed, and Sayed (2012), who found that three-quarters of nurses in their study less than 25 years old. Regarding pre-college schools, the majority of the study participants were enrolled in Governmental Arabic Schools before college. These findings came in consistence with the results achieved by The Ministry of Education, Egypt in the Education Egypt National Project (2014), which reported that the total number of schools in Egypt has exceeded 47 thousands schools accommodating more than 18 million pupils, of whom 99.1 % are enrolled in Governmental education (Education Egypt National Project , 2014).

Section 2: The mean score of the total knowledge regarding tube feeding insertion before introducing self-instructional module was 11/35 degrees. This finding reflected that the students' knowledge was low and inadequate before implementing self- instructional module. This finding was supported by Ahamed& Mondal (2014), who conducted a study for assessing knowledge and practice of nurses regarding ryle's tube feeding and found that two thirds of the nurses had inadequate level of knowledge. On the other hand, this finding was contradicted with Muneer, Ibrahim and Qalawa (2016), who conducted a study to assess nurses' knowledge and performance regarding feeding patients with nasogastric tube, and illustrated that nearly three-quarters of the studied nurses had a satisfactory total level of knowledge regarding NGT feeding.

To evaluate if there was significant difference between the mean post-test knowledge scores of students after implementing self-instructional module and their mean pre-test knowledge scores (H1), t test was done. Results indicated statistical significant difference in the mean pre-test post-test knowledge scores of students as (t=12.640, p=0.000). The students had an average increase of 13 points in the knowledge scores improvement. This difference in the post-test scores of knowledge might be attributed to exposure of the nursing students to recent updated knowledge about tube feeding insertion through self- instructional module. Based on these results, H1 was accepted. This finding was in consistence with Bourgault, Ipe and Weaver (2015), who implemented an educational package regarding nasogastric tube feeding on 50 nurses to evaluate its effect, the results showed significant increment in the mean score of knowledge after educational package implementation. As mentioned previously, in relation to psychomotor skills, the students had satisfactory practice level regarding tube feeding insertion if the percent score was 75% or more. In accordance with that, all the

students in the current study had unsatisfactory level of practice before, during and after nasogastric tube insertion before implementing self- instructional module, which implied unsafe and hazardous practice that may be reflected on the improvement of the patients' nutritional status and health condition. This finding was consistent with a recent study by El-Meanawi (2017), who assessed impact of implementing an educational program regarding care of nasogastric tube feeding on nurses' knowledge and performance, and reported that the study participants had unsatisfactory level of practice, and explained that this unsatisfactory level of nurses' practices regarding enteral feeding may be due to lack of available written protocols or resources of information to update the nurses knowledge and improve their practices. While the current study finding was in disagreement with Ahamed and Mondal (2014), who found that most of the studied nurses had a satisfactory level of practiced skill regarding NG tube feeding.

In relation to H2, the results of the current study revealed that there was significant difference between the total mean post-test practice scores of students after implementing self-instructional module and their total mean pre-test practice scores as (t= 39.959 ,p= 0.000).The students had an average increase of 17 points in the practice scores improvement. The researchers attributed this improvement of nurses' practice before, during and after nasogastric tube feeding insertion to the implementation of self- instructional module. Based on this finding H2 was accepted.

The improvement of nurses' practice as a result of implementing self- instructional module was well supported by recent study conducted by Mohammed and Abdel Fattah (2018), who concluded that the participants' practices mean score related to nasogastric tube feeding, reflect that the educational program had good effectiveness in the promoting the nursing practice related to nasogastric tube feeding. In a similar study established by El-Meanawi (2017), the findings revealed that there was a highly significant difference between pre and post evaluations scores in relation to nurses' performance after completion of the educational program and concluded that participation in the educational program for nasogastric tube feeding made differences in nurses' performance. On the same line, Chiou, Su, Liu, and Hwang (2015), highlighted that student-centered self-learning educational strategies are in accordance with the philosophy of nursing education and may foster the professional competence of nursing students.

Section 3: The result findings on the opinionnaire showed that more than two thirds of the nursing students believed that the self instructional module was an effective teaching method, it developed independency of learning, the language used was simple and easy to be understood. Moreover, it encouraged more reading for NGT feeding insertion and tested the knowledge of NGT insertion effectively. These findings were matched with Mali &Mali (2014) who reported that more than two thirds of the nurses believed that the self instructional module was a good source of learning and the language used in the self instructional module was simple to be understood. Moreover, the majority of them believed that the module helped them to understand the content. Finally, the findings of our study confirmed that self instructional module was a highly beneficial method of teaching according to the response of the students because it enabled them to learn more at their own pace without stress.

Limitations

However, the small sample size and the fact that the study was carried out in only one setting were two main limitations of worth mentioning, therefore the findings might not be generalized to other settings. Lastly, the fact that students were informed about the study and they were being examined might heightened the attention levels and cognitive retention of the fine details that might have been different if they were unaware of being part of the study. This matter could not, unfortunately, been obscured from them for the ethical concerns.

Conclusion

Nursing students' level of knowledge and practice regarding tube feeding insertion were inadequate with some unsafe practices. The developed self-instructional module showed effectiveness in improving nursing students' knowledge and practice. As well as the majority of the study sample were satisfied by using self- instructional module.

Recommendations

The study recommended the use of the self-instructional module in the nursing faculties as an effective teaching method and developing similar ones in different topics. Also, faculty members should be trained on the development, application of such instructional modules, and how to use these teaching methods in motivating students to use them. Moreover, further studies were needed to explore specific approaches for allowing students to take a more creative active role in the teaching– learning process.

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