Effect of A Competency-based Health Education Course on Technical Nursing Students' Academic Achievement and Self-confidence

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Abstract

Background: *Technical nursing students are an integral part of nursing education as they are able to take on a variety of roles. Thus, it is imperative for them to possess competence in their field of practice, which can be ensured through competency-based education (CBE), an excellent technique for acquiring the essential nursing competencies.* **Objective:** *This study aims to determine the effect of a competency-based health education course on technical nursing student's academic achievement and self- confidence.* **Settings:** *This study was conducted at El-Qabari Technical Nursing Institute, in El-Qabari Hospital, Alexandria, Egypt.* **Subjects:** *A convenient sample of 60 nursing students, who were enrolled in the health education course, evenly and randomly divided into two main groups; control and study.* **Tools:** *Three tools were used: Tool one, "Technical Nursing Students' Knowledge Test", Tool two, "Technical Nursing Students' Health Communication Skills Observational Rubric", and Tool three, "Technical Nursing Student's Self-Confidence Scale".* **Results:** *The study showed a significant improvement in academic achievement and self-confidence in the study group more than in the control group.* **Conclusion:** *CBE is a powerful approach with several benefits and significant value for technical nurses.* **Recommendations:** *Competency-based approach should be integrated into nursing curricula; moreover, the culture of CBE should be popularized among all academics in nursing institutes and colleges using NARS.*
Keywords: *Competency-based education, health education, academic achievement, self-confidence, technical nursing students.*

Introduction

Health education is a quintessential element of nursing education, with a primary focus on cultivating healthy behaviors. It operates as a mirror reflecting the quality of healthcare constituting one of the fundamental tenets of holistic nursing care. Specifically, health education entails the conveyance of health-related information, and the development of attitudes, skills, and confidence that empower patients to take proactive steps towards improving their health within a nursing framework (Silva, et al., 2021).

In fact, nursing education field is responsible for preparing competent nursing students by improving their skills and attitudes, as well as providing essential knowledge, and predominantly, competences needed to take on different roles in delivering care; these roles include being caregivers,

planners, coordinators, facilitators, counselors, leaders and researchers (Lewis, et al., 2022).

The competencies for technical nursing education have been formulated based on the recent job descriptions in the Egyptian market according to the National Academic Reference Standards (NARS) 2018. In NARS 2018, technical nursing education competencies are structured in four domains: professional and ethical practice; holistic patient-centered care; safety and quality improvement; inter-professional communication and collaboration. These domains represent the role of technical nurses in the healthcare field (Ibrahim, et al., 2021).

However, most nursing students face some obstacles during providing health education. Consequently, more attention is required from nursing educators to deliver the curricula in a way that can actively engage the nursing students in the health education process, which can be done through utilizing innovative teaching strategies such as problem-based learning, brain-based learning, reflective learning and cooperative learning and adopting new approaches such as competency-based education (CBE) (Ward, et al.,2024).

Competency based education (CBE) is an emerging system that focuses on what students need to know and be able to do in professional nursing real work in varying and complex situations or settings. CBE is anticipated to be a great aid in the development of a multitude of learning activities as it can heighten nursing students' engagement, motivation, self-efficacy, self-assurance, and other learning capabilities that can in turn, improve their academic achievement in nursing education (Jung & Kim., 2020).

Academic achievement is also influenced by other factors such as self-confidence. It refers to individuals' trust in their abilities and qualities to attain desired outcomes, which is a crucial attribute for nursing students. Hence, nursing education must prioritize assisting students in gaining self-confidence to cultivate competent nurses. Consequently, higher education in Egypt is directed towards integrating CBE in nursing curricula to help students acquire the needed competencies (Cline, et al., 2024).

Aim of the Study

This study aims to determine the effect of a competency health education course on technical nursing students' academic achievement and self- confidence.

Research hypotheses

- Technical nursing students who study a competency-based health education course exhibit higher academic achievement score than those who do not.
- Technical nursing students who study a competency-based health education course exhibit higher levels of self-confidence than those who do not.

Operational definition:

- **Academic achievement**: It refers to the health education knowledge and health communication skills that are acquired and developed by technical nursing students at the end of the competency-based health education course.

Materials and Method

Materials

Design: A quasi experimental research design was used to conduct this study.

Settings: This study was conducted at El-Qabari Technical Nursing Institute, in El-Qabari Hospital in Alexandria, Egypt,where the technical nursing students received their clinical training.

Subjects: The subjects of this study were 60 technical nursing students, who were enrolled in the health education course, during the first semester of the second academic year 2022-2023, who were purposefully selected. The

students were randomly and equally assigned into two groups: study and control.

Tools: In order to collect the necessary data in the current study, three tools were used:

Tool I: "Technical Nursing Students' Knowledge Test" This test was developed by the researchers after a thorough literature review (Abbasi et al., 2018; Babcock & Miller, 2017; Lelorain, et al., 2019; Miller, 2021). It was used to measure the technical nursing students' knowledge of the health education course. It consists of 30 multiple-choice questions (MCQs), all designed to measure the level of cognitive skills application through using a problem-based approach, in the form of hypothetical situations. The response for each question was scored on the "Dichotomous Scale": (0) for an incorrect response and (1) for a correct response.

Tool two: Technical Nursing Students' Health Communication Skills Observational Rubric. This tool was developed by Anthony & Darryl (2016) to assess the effectiveness of physician-patient communication skills. It was adapted by the researchers to be applicable for assessing the technical nursing students' communication skills with the patients in the clinical training area. It consists of 9 dimensions. Each dimension is described in detail, with scores, to guide the researchers in assessing the student's performance objectively. The students' communication skills levels were categorized into 4 scores: poor (1), satisfactory (2), competent and mastery (3) and expert (4).

Tool three: Technical Nursing Students' Self-Confidence Scale: This scale was developed by Kaliyaperumal, et al., (2021) to assess nursing students' self-confidence during managing the simulated patients and nursing care activities. This tool was adapted by the researchers to match the study aim. It consists of 8 statements. Each item was rated on a five-point Likert scale, ranging from strongly agree (5) to strongly disagree (1).

Method

Approval of the ethics committee of the Faculty of Nursing was obtained. An official approval to conduct this study was obtained after providing explanation of the aim of the study. An informed consent was obtained from the students. The study tools were tested for content validity by 5 experts in the field of the study. The necessary modifications were done accordingly. A pilot study was carried out on 10% of the study sample in order to test the clarity and applicability of the research tools. Reliability of the tools was tested using Cronbach's Alpha test. Additionally, the reliability coefficient value was 0.88 for tool I, 0.91 for tool II, and 0.93 for tool III which is acceptable. Data was collected by the researchers over a period of 14 weeks, starting from October to January, during the first semester academic year 2022-2023.

The study was carried out in three phases: preparation and designing, conduction and evaluation.

Phase I: Preparation & designing

During this phase, the researchers prepared them self and their assistants, the course format, the learning environment and the students, prior to the implementation of the study.

A. Researchers and assistants' preparations:
- Before data collection, the researchers read recent research, books and online resources about the structure, designation and application of CBE approach, comprehensively. The researchers attended workshops about the CBE approach.
- The researchers selected two nursing educators from El-Qabari Technical Nursing Institute in Alexandria, Egypt, who taught the health education course the previous year. The researchers obtained permission from them to assist in data collection and from the institute's director to allow their assistance. The researchers explained the aim of the study, the CBE approach, their role in the study and the use of different evaluation tools and methods to help the researchers in conducting the study and assessing communication skills for both groups and in evaluating the study group's assignments and activities.

B. Course preparation:

For the control group:

- The researchers reviewed the pre-made health education course specification, including the traditional method of teaching (lecture) and materials and methods of evaluation. The schedule for the control group consisted of 1 lecture per week, 2 hours each, for a total of 12 weeks during the first semester using the traditional method (lectures).

For the study group:

- The researchers altered the health education course specification based on the National Academic Reference Standards (NARS) for Technical Nursing Education, NARS 2018. In addition, key elements, ILOs, course objectives, course outline, teaching methods, instructional materials and learning activities were planned.

- CBE health education course specification was revised by a jury of five experts in the Nursing Education Department to ascertain the suitability, validity and feasibility of the content. Modifications were made accordingly.

- The researchers prepared the course content in the form of PowerPoint presentations, videos, PDF files, audiovisuals and handouts to be used as references for the nursing students and this content was uploaded to Google Classroom, a teaching platform used by the researchers. All of the materials were given to the study group only, as soft and hard copies, at the beginning of the course.

- Alongside the mid-term and final exams, about 12 teaching-learning activities and assignments were required from nursing students during the course: 3 written assignments, 2 online assignments, 2 concept maps and other tasks.

- The researchers prepared authentic assessment tools for assessing students during the course. These tools were in the form of observation checklists, rubrics and peer assessments. Moreover, the researchers prepared quizzes in the form of MCQ and short essays. The researchers planned a flexible schedule, giving the students the option to attend lectures either online or face-to-face. Each lecture was conducted 3 times per week over the period of 3 days to give the students the opportunity to attend any lectures according to their pace and lectures schedule form.

- This schedule was settled in the timetable of the institute board and Google Classroom platform (A competency Health Education Course). Extra open lab hours and clinical training hours in El-Qabari hospital were considered in the schedule to allow students to apply the skills learnt in the CBE course.

C. Students' preparation:

- The researchers explained the aim of the study to both groups**.**
- Students' written consent to participate in the study was signed and collected from both groups.
- The researchers conducted an orientation session to inform them about CBE importance, the content of the health education course, assignments, activities, evaluation and lecture schedule, whether face-to-face, in the institute classroom), or online, on the Google Classroom platform and Zoom applications.
- Students were trained by the researchers to join Google Classroom and Zoom using their cell phones and electronic devices. The researchers also trained them to upload assignments and download course materials.

D. Learning Environment reparation:

- The researchers prepared the physical structure of the learning environment by providing an adequate number of chairs and good lighting and ventilation
- Moreover, the researchers ensured that the necessary technology infrastructure was available and functioning to support the CBE course implementation. This included reliable internet access and efficient electronic devices for training students in the computer lab.

Phase II: Conduction

- At the beginning of the course, the researchers assessed the knowledge and self-confidence of both groups using tools I and III.
- Both groups' students were divided into sub-groups of 6.
- The sub-groups prepared health education plans on topics, such as healthy diet for diabetic patients, cannula care, catheter care, shunt care, prevention of bed sores and so on. They presented these topics during health education with patients, where the researchers and the assistants supervised and observed their communication skills using tool II, with each student being assessed individually.
- The study group was taught the health education course through the CBE approach which was implemented via two parts, theoretical and practical.

Phase III: Evaluation

- At the end of the health education course, the sub-groups prepared health education plans, based on what they have learned during their course, and their communication skills, during the implementation, were reassessed by the researchers and the assistants, using tool II.
- The researchers utilized tools I and III for both groups to reassess their knowledge and self-confidence.
- Tool IV was used for the study group only to assess their CBE experience feedback.

Ethical considerations:

Witness consent was obtained from the head of the El-Qabari institute for observing the technical nursing students during the conduction of health education with patients in the clinical setting. Written informed consent was obtained from students after explaining the aim of the study. Students had the right to refuse to participate in the study or withdraw at any time. Patient's privacy was respected. Data confidentiality was ensured during the implementation of the study.

Statistical Analysis

Data was computed and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Quantitative data was described using numbers and percentages. The Shapiro-Wilk test was used to verify the normality of distribution of the Quantitative data, described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 0.05% level.

Results

Table 1 displays the distribution of technical nursing students in the study and control groups according to their personal and academic data. There was no statistically significant difference between the study and control groups' personal and academic data in all the dimensions except previous semester achievement ($p \leq 0.004^*$).

Table 2 illustrates that there was a highly statistically significant difference between both groups, in relation to their overall knowledge percentages and mean scores, after teaching the health education course using competency-based education ($p2 < 0.001^*$), in favor of the study group.

Table 3 shows that there was a highly statistically significant difference between both groups, in relation to their overall communication skills percentages and mean scores, after implementing the competency-based health education course ($p2 < 0.001^*$), in favor of the study group.

Table 4 reveals that there was a highly statistically significant difference between both groups, in relation to their overall self-confidence percentages and mean scores, after implementing the competency-based health education course ($p2 < 0.001^*$), in favor of the study group.

Figure 1 illustrates the correlation between knowledge and communication skills in the study group after the intervention. It can be noted that there was a strong positive correlation between the two variables.

Figure 2 displays the correlation between knowledge and self-confidence in the study group after the intervention. There was a strong positive correlation between the two variables.

Figure 3 shows the correlation between communication skills and self-confidence in the study group after the intervention. It can be noted that there was a strong positive correlation.

Discussion

Course design plays a crucial role in shaping students' academic outcomes as it concerns creating good learning environments and experiences for students. Therefore, it is of great importance to employ suitable tactics and approaches to ensure the creation of a good course .Among the various approaches to course design, Competency-based Education has been shown to be particularly effective (Lindig, et al., 2024).

Accordingly, in this study, competency-based education was implemented on a health education course for technical nursing students and the effect on academic achievement and self-confidence was observed. In the current study, academic achievement was measured through knowledge of health education acquired and communication skills developed by technical nursing students. The study reveals that there was a highly statistically significant difference between both groups in all the dimensions of knowledge, after implementing the course, in favor of the study group, which confirms the effectiveness of competency-based education.

This finding is in line with the study of Hakimi et al. (2021), who concluded that CBE is effective in significantly improving midwifery students' knowledge, skills and self-confidence for PPH management and hence, it is recommended for promoting their competence. Additionally, Ali et al., 2024 revealed that the implementation of competency-based education is effective in improving maternity nurses' total knowledge scores. Pueyo-Garrigues et al. (2022) also supported the current study findings.

Contradicting the previous result, a study done by Van Melle et al. (2021)

presented that the implementation of a competency-based undergraduate curriculum did not influence knowledge acquisition of the students as there was no observed improvement or advancement in their grades.

Moreover, the current results denote that there was a highly statistically significant difference in communication skills between both groups, in favor of the study group. These findings are in agreement with the study of Kotlyarova, et al. (2023) who concluded that modern innovative strategies used in CBE, such as online chatting and discussion, have a great value in improving communication skills competency among students.

Inversely, Chen, et al., (2022) reported that the nursing students had poor communication skills with patients during health teaching even when they were taught by the CBE methodology.

Additionally**,** the current results show that there was a highly statistically significant difference between both groups, in relation to their overall levels of self-confidence, after implementing the competency-based health education course, **in favor of the study group**. This is supported by Serafin, et al. (2022) mentioned that CBE applications in simulations or in real-life clinical practices assist nursing students in increasing their task competency and self-confidence.

On the other hand, Holmes et al., (2021) mentioned that nursing students had low self-confidence which is due to CBE not having enough activities and methods to upgrade their inner attitude and confidence.

The results of the study also displayed that there was a strong statistically significant positive correlation between the study group's knowledge and communication skills in health education, before and after the intervention. This is in congruence with Chen, et al., (2022) who discovered that the nursing interns, who had more knowledge, had better communication skills with patients during health teaching and care in clinical settings.

In disagreement with the recent result, Van Melle et al., (2021) reported that there was no association between the nurses' knowledge and their communication skills;

sometimes, nurses may be well-informed, but their skills are not developed enough.

Furthermore, the results of the study displayed that there was a strong statistically significant positive correlation knowledge of health education and self-confidence, for the study group.

These results are in line with Sefyana, et al., (2024) mentioned that there was a positive and significant simultaneous relationship between the knowledge and level of self-confidence among engineering students. Similarly, Pueyo-Garrigues et al., (2022) discovered that the nursing students, who had high levels of knowledge, had excellent levels of self-confidence.

Inconsistent with the previous result, El Manaseer, et al., (2023) illustrated that a weak correlation was observed between knowledge test scores and self-confidence

Concerning communication skills in health education and self-confidence, for the study group, there was a strong statistically significant positive correlation between the two variables. Similarly, a study conducted by Sefyana (2024) showed that, the higher the levels of self-confidence, the better the communication skills. Tapak et al., (2022) also reported that improving communication skills contributes to an increase in self-confidence and self-esteem.

Oppositely, Chua, et al., (2023) explained that a weak correlation was observed between students' management, communication scores and self-confidence. Most students have poor communication skills that may overshadow their actual level of their self-confidence.

Conclusion

Technical nurses are, undeniably, of great importance to nursing as they can take on countless diverse roles. Therefore, they should be competent enough to be able to perform their duties successfully. To ensure this competence, one of the best tactics to employ is competency-based education, which is a powerful approach with several benefits and significant values: it offers individualized learning paths and flexibility, promotes equity and emphases real-world knowledge and skills application. According to this study, where this strategy was applied to a health education course, competency-based education improves academic achievement (through increasing knowledge and enhancing communication skills) and grows self-confidence. These results further add to the value of competency-based education as a tool to help students through their journey towards competence.

Recommendations:

In line with the findings of the study, the following recommendations are suggested:

- Competency-based approach should be integrated into nursing curricula at Nursing Institutes and Colleges.
- Educational workshops should be conducted for nursing educators and students to increase their awareness of designing, implementing and evaluating competency-based courses.
- The culture of CBE should be popularized among all academics in nursing institutes and colleges using NARS.

Table (1): Distribution of the study and control groups according to their personal and academic data

Personal & academic data sheet	Study (n=30)		Control (n = 30)		χ^2	^{MC}p
	No.	%	No.	%		
Age						
17 $\geq$19	20	66.7	16	53.3	1.111	0.292
20 $\geq$22	10	33.3	14	46.7		
Gender						
Female	30	100.0	30	100.0	1.017	1.000
Male	0	0.0	0	0.0		
Marital status						
Single	29	96.7	29	96.7	0.000	1.000
Married	1	3.3	1	3.3		
Residence						
Urban	24	80.0	24	80.0		
Rural	0	0.0	1	3.3	1.065	1.000
Upper Egypt	6	20.0	5	16.7		
Previous semester achievement						
Excellent	22	73.3	19	63.3		
V. Good	3	10.0	5	16.7	1.647	0.004*
Good	3	10.0	5	16.7		
Fair	2	6.7	1	3.3		
Computer skills						
Poor	3	10.0	3	10.0		
Good	26	86.7	25	83.3	0.515	1.000
Very good	1	3.3	2	6.7		
Device used to obtain the course's online educational material						
Laptop	0	0.0	2	6.7		
Smart phone	30	100.0	28	93.3		
Tablet	0	0.0	0	0.0	2.069	0.492
P.C.	0	0.0	0	0.0		
	0	0.0	0	0.0		
Lab computers	0	0.0	0	0.0		

Table (2): A comparison between the study and control groups' overall knowledge before and after the competency-based health education course

Overall technical nursing students, knowledge about health education	Study (n=30)				Control (n = 30)				Study vs Control	
	Pre		Post		Pre		Post		P^1	p^2
	No.	%	No.	%	No.	%	No.	%		
Low (<60%)	30	100.0	0	0.0	30	100	6	20.0		$\chi^2=$ 41.601* (<0.001*)
Moderate (60 to 85%)	0	0.0	2	6.7	0	0.0	20	66.7	–	
High (>85%)	0	0.0	28	93.3	0	0.0	4	13.3		
MH (p_0)	**59.0* (<0.001*)**				**38.0* (<0.001*)**					
Total Score										
Min. – Max.	0.0 – 11.0		20.0 – 30.0		0.0 – 6.0		16.0 – 26.0			
Mean ± SD.	5.13 ± 3.0		27.23 ± 2.13		1.97 ± 1.67		20.23 ± 2.96		t=5.047* (<0.001*)	t=10.526* (<0.001*)
Median	5.50		27.0		2.0		20.0			
Mean percentage score	17.11 ± 10.01		90.78 ± 7.09		6.56 ± 5.57		67.44 ± 9.85			
t_0 (p_0)	**30.046* (<0.001*)**				**36.010* (<0.001*)**					

Table (3): A comparison between the study and control groups' overall communication skills before and after the competency-based health education course

Overall communication skills levels	Study (n=30)				Control (n = 30)				Study vs Control			
	Pre		Post		Pre		Post		Pre		Post	
	No.	%	No.	%	No.	%	No.	%	$\chi^2(p_1)$	FEp/MCp	$\chi^2(p_2)$	FEp/MCp
Poor (<60%)	30	100.0	0	0.0	30	100.0	4	13.3	–	–	53.236*	<0.001*
Satisfactory (60% ≤ 75%)	0	0.0	0	0.0	0	0.0	20	66.7				
Competent (75%-≤ 90%)	0	0.0	10	33.3	0	0.0	6	20.0				
Expert (≥90%)	0	0.0	20	66.7	0	0.0	0	0.0				
MH (p_0)	**70.0* (<0.001*)**				**42.0* (<0.001*)**							
Total Score												
Min. – Max.	9.0 – 17.0		30.0 – 36.0		9.0 – 12.0		9.0 – 30.0		U= 214.50*	<0.001*	U= 15.0*	<0.001*
Mean ± SD.	10.80 ± 1.75		33.33 ± 1.88		9.47 ± 0.97		25.97 ± 5.68					
Median	10.50		34.0		9.0		27.0					
Mean score percentages	6.67 ± 6.48		90.12 ± 6.97		1.73 ± 3.60		55.84 ± 21.03					
Z(p_0)	**4.797* (<0.001*)**				**4.786* (<0.001*)**							

Table (4): A comparison between the study and control groups' overall self-confidence scores before and after the competency-based health education course

Self Confidence	Study (n=30)				Control (n = 30)				Test for Study vs Control			
	Pre		Post		Pre		Post		Pre (p_1)		Post (p_2)	
	No.	%	No.	%	No.	%	No.	%	$\chi^2(p_1)$	FEp/MCp	$\chi^2(p_2)$	FEp/MCp2
Low (<60%)	22	73.3	1	3.3	22	73.3	5	16.7	1.034	1.000	34.572*	<0.001*
Moderate (60 to 85%)	7	23.3	2	6.7	8	26.7	20	66.7				
High (>85%)	1	3.3	27	90.0	0	0.0	5	16.7				
MH (p_0)	**54.500* (<0.001*)**				**31.0* (<0.001*)**							
Total Score												
Min. – Max.	8.0 – 38.0		24.0 – 40.0		15.0 – 34.0		16.0 – 40.0		U= 431.50*	<0.001*	U= 123.00*	<0.001*
Mean ± SD.	24.0 ± 7.10		37.27 ± 3.49		24.17 ± 5.13		30.37 ± 5.51					
Median	24.0		37.0		24.0		31.0					
% Score	50.0 ± 22.17		91.46 ± 10.92		50.52 ± 16.04		69.90 ± 17.22					
Z (p_0)	**4.642* (<0.001*)**				**3.991* (<0.001*)**							

Figure (1): The relation between study group' knowledge scores and communication skills levels after the competency-based health education course
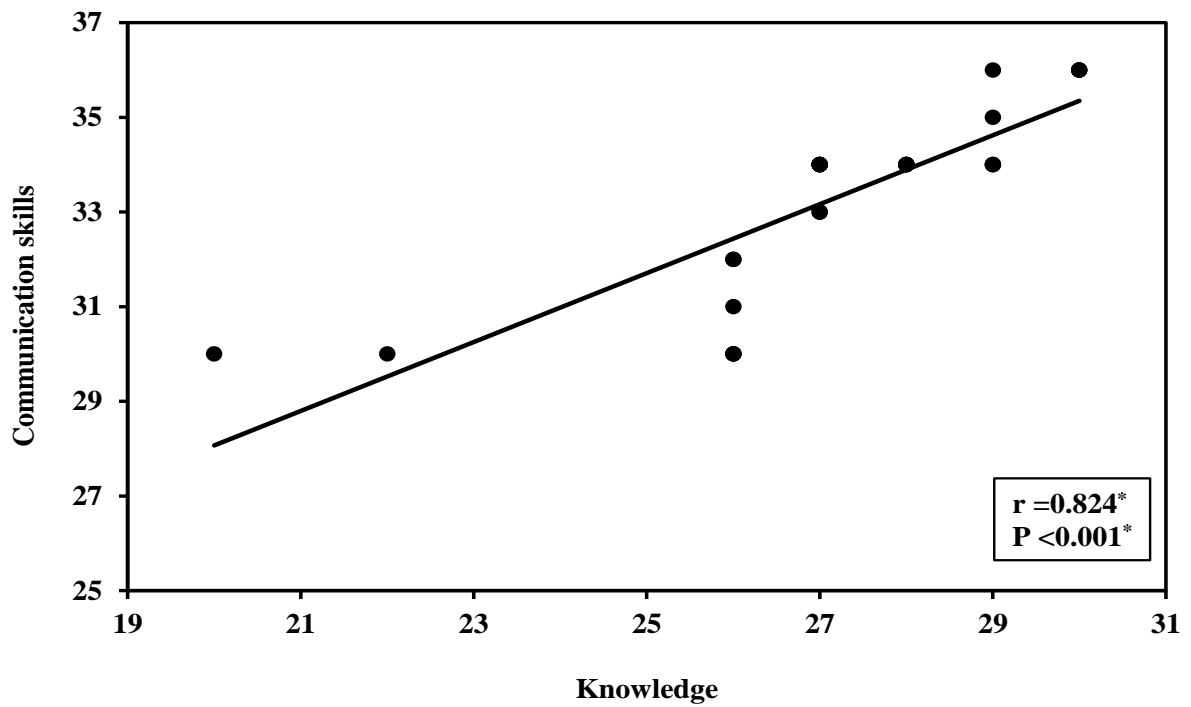

Figure (2): The relation between study group's knowledge scores and self-confidence levels after the competency-based health education course
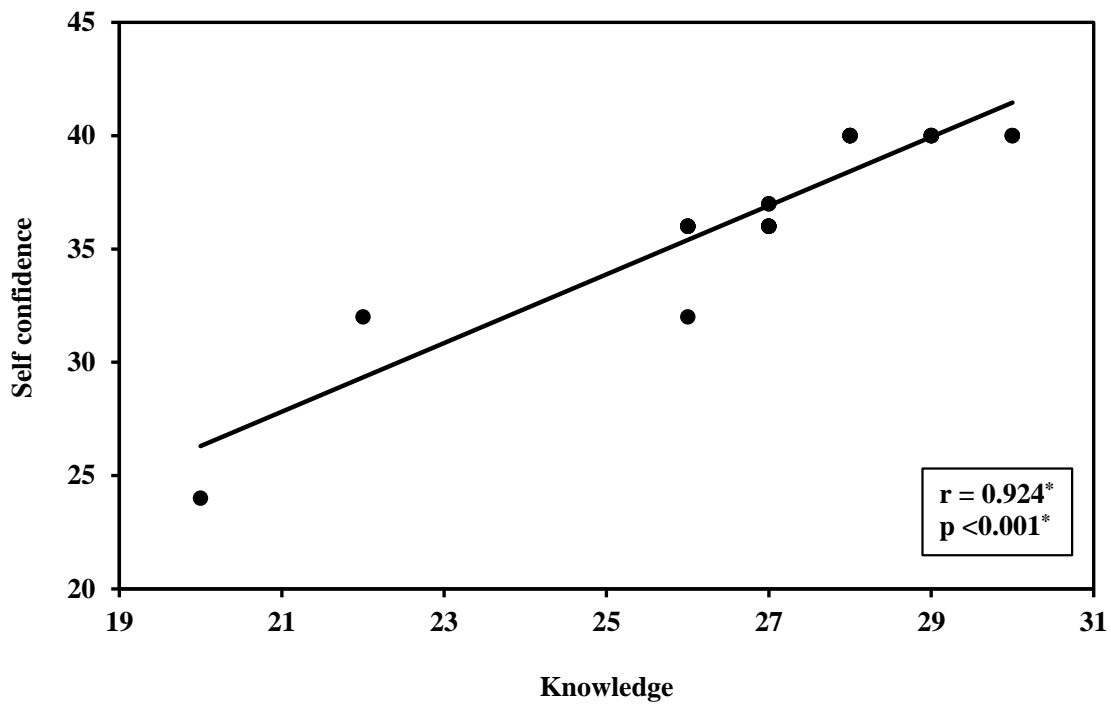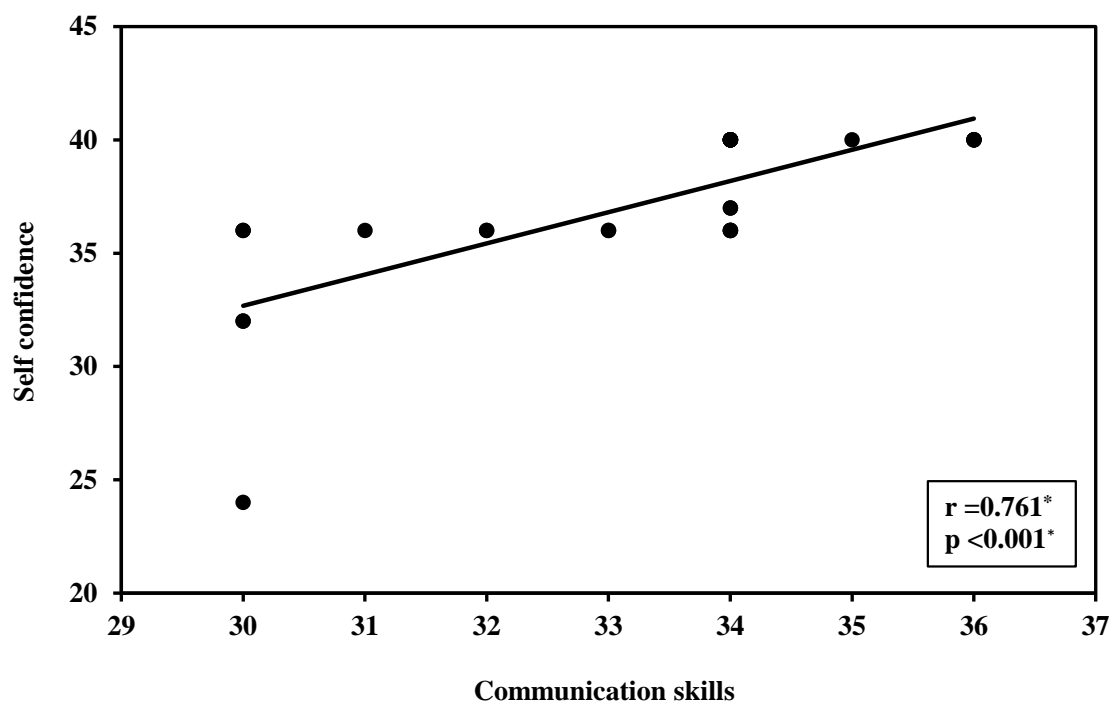
Competency-Based Education, Health Education, Academic Achievement, Self-Confidence

Figure (3): The relation between study group's communication skills scores and self-confidence levels after the competency-based health education course

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