# Effect of Simulation versus Blended Learning Regarding Vein Puncture on Second Year Nursing students 'Performance

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**Background**: Blended learning increases the options for greater quality and quantity of human interaction in a learning environment. Blended learning offers learners the opportunity "to be both together and apart". A community of learners can interact at anytime and anywhere because of the benefits. **Aim of the study:** was to evaluate the effectiveness of simulation versus blended learning regarding to vein puncture procedure on second year nursing students 'performance at Faculty of Nursing, Benha University**. A quasi-experimental research design** was utilized to conduct the aim of this study **Subject:** A purposive sample 2nd year nursing students (320 students) in academic years (2017&2018) were recruited in this study and divided into control and study groups (160 students in each group) the control group were used SimMan and a study group were used Blended learning. **The study tools** used for data collection of this study; **First tool:** Nursing students' self-administered questionnaire. **Second tool:** Nursing students' practice observational checklist for vein puncture. ***Third tool*:** program satisfactory nursing student's opinionire .**The results** : there were highly statistically significant differences between mean score of students' knowledge & practice regarding vein puncture in both control and study groups (**P<0.001).** There was highly statistically significance differences regarding mean score of program satisfactory nursing student's opinionaire in both control and study groups (**P<0.001)**. In addition to there was no correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in in both control and study groups ( **P>0.05)** . **Conclusion** :The two used learning methods ( simulation & blended learning) had positive effect on 2nd year nursing students 'knowledge and practice but blended learning method had highly statistically significant effect on students' performance versus simulation. T**he study recommended** Additional researches are needed to be conducted on the use of blended learning in the nursing educational institution as a teaching- learning method to overcome the problems related to in availability of using simulators.

**Key words**: *blended learning, vein puncture,Simulation, SimMan , Nursing, Students*

## Introduction

Nursing education is an important issue that has attracted many health specialists and planners' attention. Development of human society needs, dynamic characteristic of training, and new health and medical policies are among the most important reasons for continuous changes in nursing profession and its related training methods ***(Ardalan, 2013).***

High-fidelity simulation is a relatively new area in nursing education and utilizes high technology simulation monitors and computers. This technology offers new avenues for teaching nursing students scenarios allowing for critical thinking and reflection on lived experience and practice. As an example for HFHPS; SimMan acts as a useful adjunct to teach clinical skills to nursing students by providing a simulated safe environment and thus aids in bridging the gap between the theoretic and clinical field in nursing education ***(Doolen, Giddings, Johnson, Guizado &Lysander.2014).***

Blended learning increases the options for greater quality and quantity of human interaction in a learning environment. Blen ded learning offers learners the opportunity "to be both together and apart". A community of learners can interact at anytime and anywhere because of the benefits. That computer mediated educational tools provide. It provides a "good" mix of technologies and interactions, resulting in a socially supported, constructive, learning experience***(Watson, 2015)***.

Through the use of advanced computing and telecommunication technology, learning can also be qualitatively different. The process of learning in the classroom can become significantly richer as students have access to new and different types of information, can manipulate it on the computer through graphic displays or controlled experiments in ways never before possible, and can communicate their results and conclusion in a variety of media to their teacher, students in the next classroom, or students around the world ***(Taylor, Lillis, LeMone &Lynn, 2013).***

## *Significance of the study:*

Learning is a major sector in Egypt. As a service provider, learning institutions have realized the importance of investing in technology to control cost, attract students, and fulfill customers 'needs for convenience and technical innovation ***(Abd El-Aziz, 2009)***. The question of online teaching programs versus traditional teaching programs isn't usually a question of which offers the better education, but which education serves the student's needs better. For those looking to integrate as teachers within a local community, traditional might be better, but for those who have concerns over a distance, convenience, or class participation, online classes may provide a solution that works for everyone ***(Online Teaching Degree, 2011; Abdelaziz, Kamal, Karam & Abdel-Rahman 2011).***

From the researcher experience there are many problem facing teaching staff colleges in the nursing educational institutes; increasing numbers of students and increasing the cost of using SimMan &in availability of the simulators. So they need to search about technology in nursing education & various teaching and learning methods to be applied for enhancing students' performance within the context of financial resources of their educational institution. Based on that the researcher will conduct this study to evaluate the effect of other learning methods as blended learning on 2nd year nursing students 'performance regarding vein puncture.

## *Aim of the study:*

The study aims to:

Evaluate the effectiveness of simulation versus blended learning regarding to vein puncture procedure on second year nursing students 'performance at Faculty of Nursing, Benha University through***:***

1- Assess second year nursing students 'knowledge and practice regarding vein puncture in both groups " study & control".

***2-*** Assess nursing students 'opinion regarding vein puncture procedure in both learning methods.

## *Research hypothesis:*

There will be a significant difference in knowledge & practice of nursing students exposed to simulation versus blended learning teaching methods.

## Subjects and method:

## Research design:

A quasi-experimental research design was utilized to conduct the aim of this study.

## Research Setting:

This study was conducted at Medical Surgical Nursing Department laboratory & laboratory of OSCE - Faculty of Nursing - Benha University.

## Subjects:

A purposive sample of 2nd year nursing students (320 students) in the academic year (2017−2018) were recruited in this study.They exposed to two the clinical teaching & learning methods regarding to vein puncture procedure. Using the SimMan for the half of students (160) as a control group, while using blended learning for another half of students (160) as a study group.

## Tools for Data Collection:

Three tools were piloted and used by the researcher to collect data including:

## Tool (1): Nursing students' Self administered questionnaire sheet:

It was developed by researcher based on current review of literatures. It consisted of 2 parts:-

**Part (1):Demographic characteristics** of 2nd year nursing students in both groups such as: age, gender, group, educational level, learning experiences and computer skills.

**Part (2): (A) students' knowledge regarding vein puncture:**

It contained (30) questions which designed by the researcher and adopted from previous research references after reviewing related literature.

**(B): Students' knowledge regarding case study**

It was included knowledge related to measures and precautions that should be followed by the nurse pre, during and post vein puncture procedure according to Mr Brown case study. It contained (4 essay questions).

## Tool (II): Nursing students' practice observational checklist for vein puncture.

It was constructed by the researcher after reviewing relevant literature .It was adopted from ***Doughter & Lister, (2013) . Josephson, D.L. (2015) and National Committee for Clinical Laboratory Standards (NCCLS). (2017)***. It was concerned with assessing the nursing students' practice regarding vein puncture related skills in both groups (study & control). The items of the checklist were checked as done correct, done incorrect or not done. This part consisted of (3) skills; drawing blood sample, administering intravenous medication directly via cannula and administering intravenous infusion therapy

## *Tool* III- Program Satisfactory Nursing Students' Opinionaire:

This tool was designed by the researcher and was used to assess students opinion toward program using two used learning methods. The opinionaire items were adopted from ***EL-Ansari and pearson, (2007); Liaw, Huang, & Chen, (2007); Selim, (2007); Akkoyunlu & Yilmaz-Soylu, (2008); El-Deghady & Nouby, (2008); Meehan-Andrews, (2009); Paechter, Maier & Marcher, (2010); Seok, Kinsell, Dacosta & Tung, (2010); and Lee & Tsai, (2011).*** It was used as post program evaluation for both groups (control & study).

The opinionaire included 3 main components related to program, instructor & environment .The program component items ; the aim (4 items), content of the program (7 items), organization and timing of the program (7 items), teaching methods (3 items), student activities (3 items), practical skills (5 items), evaluation (4 items) and feedback (2 items).The instructor components items; as a teacher (10 items), as communicator (5 items), checking for mastery and providing feedback (3 items), as a leader (4 items), as a manager (3 items) and overall approach of the instructor (2 items) and the environment components items; physical condition domains (5 items) and the Psychological condition (2 items).

The opinionaire form was divided into two columns, the first column included the 69 items, while the second part included student's response in form of five-point scale, where 5 is the highest score and indicates excellent, 4 very good, 3 good, 2 poor, 1 very poor which is the lowest.

**Pilot study:**

Pilot study was carried out on 10% of the studied subjects (32 students). The pilot study was done to ensure clarity, applicability, feasibility of conduction of the study tools, and time needed for each tool to be filled. Minimal modification such as rephrasing some tool items was done so the student included in the pilot study were included in the main study. This phase take one month.

**Administrative design:**

Approval to carry out this study was granted from the Dean of Faculty of Nursing, Benha University, and Head of medical surgical nursing department. The researcher done interview with the nursing students to explain the objectives and the nature of the study and then carry out the study with minimum resistance.

**Ethical consideration:**

The ethical considerations of this study included the following:

- The researcher clarified the purpose, requirements, duration and anticipated benefits of this study to the nursing students.
- The nursing students were informed that they are allowed to choose to participate or not in the study and they had right to withdraw from the study at any time.
- The researcher assured maintaining anonymity and confidentiality of the subjects' data.
- The research tools were not causing any harm or pain for the nursing students.

**Statistical analysis**

The collected data were organized, coded, computerized, tabulated and analyzed by using the statistical package for social science (SPSS), version (21). Data analysis was accomplished by the use of number, percentage distribution, mean, standard deviation, and correlation, coefficient.

## Result:

**Table (1) : Frequency & percentage distribution of the studied nursing students' demographic characteristics in both study &control groups.**

| Demographic characteristics | Control group (n=160) | | Study group(n=160) | | Test of significance | |
|---|---|---|---|---|---|---|
| | No | % | No | % | $\chi 2$ | P |
| **Age in years** | | | | | | |
| 19 years | 48 | 30 | 56 | 35 | 1.453 | 0.484 |
| 20 years | 108 | 67.5 | 102 | 63.8 | | |
| 21-23 years | 4 | 2.5 | 2 | 1.3 | | |
| Mean ±SD | 19.7 ±0.5 | | 19.6 ±0.5 | | 1.242 | 0.215 |
| **Gender** | | | | | | |
| Female | 120 | 75 | 124 | 77.5 | 0.276 | 0.599 |
| Male | 40 | 25 | 36 | 22.5 | | |
| **Computer skills** | | | | | | |
| Availability of computer to use at home? | | | | | | |
| Yes | 135 | 84.4 | 144 | 90.0 | 2.266 | 0.132 |
| No | 25 | 15.6 | 16 | 10.0 | | |
| Enjoy working with computer? | | | | | | |
| Yes | 100 | 62.5 | 112 | 70 | 2.013 | 0.156 |
| No | 60 | 37.5 | 48 | 30 | | |
| Rating your computer skills? | | | | | | |
| Fair | 16 | 10 | 24 | 15 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Good | 124 | 77.5 | 112 | 70 | | |
| Excellent | 20 | 12.5 | 24 | 15 | 2.574 | 0.276 |
| Availability of internet connectivity at home | | | | | | |
| Yes | 112 | 70 | 124 | 77.5 | 2.324 | 0.127 |
| No | 48 | 30 | 36 | 22.5 | | |
| Rating your internet search skills? | | | | | | |
| Fair | 16 | 10 | 24 | 15 | | |
| Good | 60 | 37.5 | 72 | 45 | | |
| Excellent | 84 | 52.5 | 64 | 40 | 5.394 | 0.067 |

**** Highly statistically significant at<0.001**

**Table (1):** demonstrates that the three quarter of the studied students in both control and study group were female with mean age (19.7 ±0.5&19.6 ±0.5) respectively and there was no statistically significant different between control and study groups regarding computer skills with P>0.05.

**Table (2): Comparison between the studied nursing students' total knowledge mean score regarding vein puncture in both study and control groups**.

| ***Know*ledge** | **Control group (n=160)** | **Study group (n=160)** | **Test of significance** | |
|---|---|---|---|---|
| | **Mean ±SD** | **Mean ±SD** | **Student`s T test** | **P** |
| General knowledge score (1st section) | 24.1 ±7.2 | 26.0 ±3.5 | 3.092 | 0.002* |
| Case study related knowledge score (2nd section) | 8.2 ±2.6 | 8.9 ±1.1 | 3.214 | <0.001** |
| Overall knowledge score | 32.3 ±9.5 | 34.9 ±3.5 | 3.339 | <0.001** |

****Highly statistically significant at <0.001**

**Table (2):** demonstrates there was highly statistically significant difference between the studied nursing students' total knowledge mean score regarding vein puncture in both study and control groups with P<0.001.

**Table (3): Comparison between the nursing students 'total practice mean score regarding vein puncture related skills in both study and control groups**.

| Procedure | Control group (160) | Study group(160) | Test of significance | |
|---|---|---|---|---|
| | Mean ±SD | Mean ±SD | Student's T test | p |
| Drawing blood sample. | 23.8 ±1.3 | 23.9 ±1.2 | 0.360 | 0.719 |
| Administering medication directly via cannula. | 22.8 ±1.0 | 23.2 ±0.6 | 3.932 | <0.001** |
| Administering IV infusion therapy. | 28.7 ±1.4 | 29.5 ±0.7 | 6.678 | <0.001** |
| Total practice mean score. | 75.3 ±1.8 | 76.6 ±1.6 | 6.5 | <0.001** |

****Highly statistically significant at <0.001**

**Table (3):** demonstrates highly statistically significant differences between the nursing students 'total practice mean score in both control and study groups regarding vein puncture related skills with P<0.001. Except during drawing blood sample there is no statistically significant differences in both groups with P>0.05.

**Table (4): The mean score of the program satisfactory nursing student's opinionaire in both study and control groups.**

| Items | Control group (n=160) | Study group (n=160) | Student's t test | |
|---|---|---|---|---|
| | Mean ±SD | Mean ±SD | T | P |
| **The program** | 112.1 ±16.8 | 116.6 ±6.6 | 3.158 | 0.002* |
| **The instructor** | 89.2 ±12.2 | 92.1 ±5.3 | 2.782 | 0.006* |
| **The environment** | 22.8 ±4.3 | 24.6 ±2.1 | 4.893 | <0.001** |
| **Total score** | 224.0 ±32.1 | 333.3 ±11.3 | 3.449 | <0.001** |

****Highly statistically significant at <0.001**

***Statistically significant at <0.05**

**Table (4):** shows that there is highly statistically significance differences in students 'opinion mean score regarding to the environment of teaching in both control and study groups with P<0.001.Whereas,the mean score of students'total scores in study group was more than the mean score of control group (333.3 ±11.3, 224.0 ±32.1) respectively.

**Table (5): Relation between the nursing students' total knowledge mean score regarding vein puncture & their demographic characteristics in both study& control groups.**

| Demographic characteristics | Total students' knowledge | | | |
|---|---|---|---|---|
| | Control group | | Study group | |
| | Mean ±SD | Test of significance | Mean ±SD | Test of significance |
| **Age in years** | | | | |
| 19 years | 36.4 ±2.7 | | 35.9 ±2.2 | |
| 20 years | 30.5 ±10.9 | F=7.061 | 34.4 ±4.0 | F=4.547 |
| 21-23 years | 31.0 ±0.0 | P<0.001** | 29.0 ±0.0 | P-=0.012* |
| **Gender** | | | | |
| Female | 34.2 ±6.7 | T=4.623 | 35.4 ±2.5 | T=2.838 |
| Male | 26.6 ±13.7 | P<0.001** | 33.5 ±5.6 | P=0.005* |
| **Computer skills** | | | | |
| Availablility of the computer to use at home | | | | |
| Yes | 31.0 ±7.2 | T=5.832 | 35.4 ±3.3 | T=5.828 |
| No | 23.0 ±14.3 | P<0.001** | 30.5 ±1.6 | P<0.001** |
| Enjoy working with computer | | | | |
| Yes | 35.2 ±3.2 | T=5.448 | 35.1 ±3.7 | T=1.027 |
| No | 27.4 ±13.7 | P<0.001** | 34.5 ±3.2 | P=0.306 |
| Rating of computer skills | | | | |

| | | | | |
|---|---|---|---|---|
| Fair | 36.2 ±1.9 | | 37.3 ±1.4 | |
| Good | 31.4 ±10.6 | F=2.631 | 34.7 ±3.9 | F=7.646 |
| Excellent | 34.3 ±2.2 | P=0.075 | 33.8 ±1.3 | P<0.001** |
| Availability of internet connectivity at home | | | | |
| Yes | 34.6 ±3.6 | T=5.226 | 35.4 ±3.6 | T=2.838 |
| No | 26.7 ±15.1 | P<0.001** | 33.5 ±2.9 | P=0.005* |
| Rating your internet search skills | | | | |
| Fair | 37.0 ±1.3 | T=1.514 | 36.7 ±1.3 | T=0.483 |
| Good | 35.8 ±3.0 | P=0.134 | 36.5 ±1.8 | P=0.630 |

****Highly statistically significant at <0.001**

***Statistically significant at <0.05**

**Table (5)** : illustrates that there is highly statistically significant relation between the nursing students 'total knowledge mean score regarding vein puncture & age , gender , availability of the computer to use at home & availability of internet connectivity at home in both study and control groups with P<0.001.Also there is highly statistically significant relation between the nursing students 'total knowledge mean score & enjoy working with computer in control group with P<0.001.While there was statistically significant relation between their total knowledge mean score and internet connectivity at home in study groups with P<0.05.

**Table (6): Relation between the nursing students' total practice mean score regarding to vein puncture & their demographic characteristics in both study& control groups.**

| Demographic characteristics | Total students' practice | | | |
|---|---|---|---|---|
| | Control group | | Study group | |
| | Mean ±SD | Test of significance | Mean ±SD | Test of significance |
| Age in years | | | | |
| 19 years | 75.3 ±1.7 | | 76.6 ±1.7 | |
| 20 years | 75.3 ±1.8 | F=0.547 | 76.5 ±1.5 | F=0.113 |
| 21-23 years | 76.3 ±1.3 | P=0.580 | 77.0 ±1.6 | P=0.894 |
| Gender | | | | |
| Female | 75.4 ±1.8 | T=0.155 | 76.6 ±1.6 | T=0.030 |
| Male | 75.3 ±1.8 | P=0.877 | 76.5 ±1.5 | P=0.976 |
| Availablility of the computer to use at home | | | | |
| Yes | 74.8 ±1.8 | T=1.796 | 76.7 ±1.8 | T=0.335 |
| No | 75.4 ±1.7 | P=0.074 | 76.5 ±1.5 | P=0.738 |
| Enjoy working with computer | | | | |
| Yes | 75.5 ±1.6 | T=1.418 | 76.6 ±1.5 | T=0.659 |
| No | 75.1 ±1.9 | P=0.158 | 76.4 ±1.6 | P=0.511 |

| | | | | |
|---|---|---|---|---|
| Rating of computer skills | | | | |
| Fair | 75.4 ±1.9 | | 76.4 ±1.7 | |
| Good | 75.3 ±1.8 | F=0.048 | 76.7 ±1.5 | F=0.908 |
| Excellent | 75.4 ±1.7 | P=0.953 | 76.3 ±1.7 | P=0.405 |
| Availability of internet connectivity at home | | | | |
| Yes | 75.4 ±1.7 | T=0.508 | 76.5 ±1.6 | T=1.545 |
| No | 75.2 ±2.0 | P=0.612 | 76.9 ±1.4 | P=0.124 |
| Rating your internet search skills | | | | |
| Fair | 75.6 ±2.0 | T=0.383 | 76.9 ±1.2 | T=1.138 |
| Good | 75.4 ±1.7 | P=0.703 | 76.4 ±1.7 | P=0.258 |

**No statistically significant at >0.05**

**Table (6)**: shows no statistically significant relation between nursing students' total practice mean score regarding to vein puncture & their demographic characteristics in both study& control groups with P>0.05.

**Table (7): Relation between program satisfactory nursing students 'opinion mean score & their demographic characteristics in both study& control groups.**

| Demographic characteristics | Total students 'opinion | | | |
|---|---|---|---|---|
| | Control group | | Study group | |
| | Mean ±SD | Test of significance | Mean ±SD | Test of significance |
| Age in years | | | | |
| 19 years | 301.3 ±30.7 | | 300.9 ±16.3 | |
| 20 years | 289.9 ±32.7 | F=2.582 | 303.1 ±7.3 | F=0.776 |
| 21-23 years | 278.0 ±0.0 | P=0.079 | 298.0 ±0.0 | P=0.462 |
| Gender | | | | |
| Female | 294.3 ±31.5 | T=0.887 | 301.9 ±12.4 | T=0.838 |
| Male | 289.1 ±33.8 | P=0.376 | 303.7 ±6.2 | P=0.403 |
| Availablility of computer to use at home | | | | |
| Yes | 294.4 ±20.8 | T=0.237 | 305.0 ±7.4 | T=1.017 |
| No | 292.7 ±33.8 | P=0.813 | 302.0 ±11.6 | P=0.311 |
| enjoy working with computer | | | | |
| Yes | 298.1 ±33.0 | T=2.633 | 301.8 ±12.8 | T=0.774 |
| No | 284.5 ±28.8 | P=0.009 | 303.3 ±6.4 | P=0.440 |

| | | | | |
|---|---|---|---|---|
| Rating of computer skills | | | | |
| Fair | 264.0 ±39.8 | | 303.7 ±3.7 | |
| Good | 298.5 ±29.4 | F=10.790 | 301.0 ±12.7 | F=2.725 |
| Excellent | 281.8 ±27.0 | P<0.001** | 306.7 ±5.7 | P=0.069 |
| Availability of internet connectivity at home | | | | |
| Yes | 294.6 ±29.2 | T=0.968 | 302.6 ±12.3 | T=0.769 |
| No | 289.3 ±38.1 | P=0.335 | 301.0 ±7.0 | P=0.444 |
| Rating your internet search skills | | | | |
| Fair | 279.3 ±34.1 | T=3.115 | 304.0 ±4.3 | T=1.294 |
| Good | 304.5 ±37.4 | P=0.003* | 299.9 ±15.1 | P=0.199 |

****Highly statistically significant at <0.001**

***Statistically significant at <0.05**

**Table (7)**: shows that there is statistically significant relation between program satisfactory nursing students 'opinion mean score with computer skills with P <0.001 & good internet search skills in control group with P<0.05.

**Table (8): Correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in control group**.

| Items | P-value | Total level of knowledge | Total level of opinion |
|---|---|---|---|
| **Total level of opinion** | R | 0.103 | |
| | P | 0.193 | |
| **Total level of practice** | R | 0.024 | 0.122 |
| | P | 0.760 | 0.160 |

**Statistically significant at <0.05**

**Table (8):** clears no correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in control group with P>0.05.

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**Table (9): Correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in study group**.

| Items | P-value | Total level of knowledge | Total level of opinion |
|---|---|---|---|
| **Total level of opinion** | R | 0.060 | |
| | P | 0.448 | |
| **Total level of practice** | R | 0.038 | 0.047 |
| | P | 0.636 | 0.554 |

**Statistically significant at <0.05**

**Table (9):** clears no correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in study group with P>0.05.

## Discussion:

Regarding age, the study results indicate that the majority of the students in control and study groups were with age (20) years with mean age of 19.7 ±0.5&19.6 ±0.5 years, whereas a minority of them was found in age (21-23) years old. This result may be explained by the fact that all the students admitted to any faculty at this age. This finding supported by ***Abd Allah, Abd El Sapour& Mohamed,*** **(2016)** who conducted the study entitled the effect of educational program for cardiopulmonary resuscitation using SimMan versus traditional manikin & reported that the majority of the control and study groups were with age ranged between (19–20) years.

Regarding to gender, the current study results revealed that the majority of the studied sample were females. This could be due to that in the Egyptian culture; females were commonly working in nursing field than males . This finding is congruent with that of ***Abd Allah, etal. (2016)*** , which reported that the majority of the studied sample were females. Also this result coincides with ***Kipsang and Bruce, (2013)*** in their study entitled comparison of cardiopulmonary resuscitation competence between two groups of advanced practice student nurses at a medical training & reported that the majority of study group were females **(71.8%).**

The present study results showed that, there was no statistically significant difference regarding demographic characteristics (age & gender) in both control and study group. This means that students in both groups were matched and homogenous. This result is in agreement with ***Al Hadid and Hassan, (2012)*** who reported that were no statistically significant differences among the participants regarding demographic characteristics as gender and level of education **(*p*> 0.05).** Results of the present study showed that nursing students' knowledge mean score related to vein puncture in the study group was higher than mean score of students in the control group. This may be due to the effectiveness of the the two teaching & learning methods; blended learning versus simulation. This may convey that blended learning is an effective teaching method and should be used in nursing education.

The current study results revealed that there was highly statistically significant difference between the studied nursing students' total knowledge mean score regarding vein puncture of study group using blended learning as compared to control group. From the researcher points of view that this improvement might be related to blended learning is leading to enhancing and restoring the nursing students' knowledge and giving them opportunity for feedback about the acquired knowledge and availability of lecture and power point on the CD and hard copy so it considers an effective learning method for them.

This result was in agreement with ***Abd Alla, Ahmed & Hamza, (2012)*** who conducted study entitled effectiveness of using blended learning versus traditional teaching on the nursing students 'performance & represented that there were highly statistically significant differences between both groups in post test, and at follow up, with blended learning group was achieving higher scores, which may convey that a blended learning which combines face –to-face learning with a mixture of online activities, has been introduced as a convenient alternative to the traditional classroom experience, as identified by ***Bart (2010) .***

These findings were in accordance with ***Tsai, etal, (2016)*** who reported that there was a highly statistically significant difference between groups in post test with

computer assisted learning (CAL) group was achieving higher scores of knowledge. In the same line ***Abd Al-Rahman (2009),*** detected that there was a highly significant difference among post test scores between the control and the study groups, which conveys that E-learning is an effective teaching method and can be used in nursing education .

Concerning student's practice regarding vein puncture related skills , the result of this study revealed that majority of students in the study or control groups had got satisfactory score with significant difference between both groups, this could reflect the positive response of both groups to the practical methods of teaching & learning either simulation and blended learning methods. In addition the blended learning had positive effect on students' performance versus simulation this may be due to the students in study group have an option of watching the video about vein puncture related skills on the internet or in CD, which allow them to experience more practice and concentrate more which gives the learners the possibility to study in their own place, concentrate more and provide opportunities to follow their own learning style and allow them to learn more practice. This opinion supported with ***Tepas, De Nijs Landman, and Stomilovic (2010).***

As regards comparison between the study and control group's opinion regarding the program using both teaching & learning methods, the findings revealed that there was a significant difference between both groups regarding their satisfaction toward program, instructor and environment components related items. From the researcher points of view the satisfaction of study group is driving from the used blended learning method may give more interaction, more activities, and more interesting. This study finding is in agreement with ***Abd Alla, etal. (2012)*** who reported that there was a significant difference between control group (traditional method) and study group (blended learning) regarding satisfaction toward program, instructor and environment**.**

One of the most important strength found in the program as reported by most of the students in the study group, was the integration between face-to-face and internet method, also the guidance of teacher and assistance when needed, the feedback and activities were strong and constrictive. The students in both groups reported that the information was presented in organized manner and within systematical arrangement .They found the e-learning and lecture are good methods to receive the program in a relaxing way without anxiety, worry or distress. These findings were in accordance with ***Liaw,etal. (2007)*** who reported that students believe that e-learning environments are an efficient learning tool. The students reported that the multimedia and computer & internet aided methods pleasant to use and effective.

As a final point, the present study showed that SimMan & blended learning should be becoming rapidly accepted as an advanced teaching tool for nursing educators in all clinical training skills. Finally,there were many recommendations provided by many researchers in different studies suggesting the use of blended learning as ***Abdalla,etal.(2011)*** , who stated that the blended learning which is an integration of e-learning and face-to-face instruction in the classroom is recommended for improving students' learning.

In relation to the nursing students' knowledge and their age and gender the finding of the current study revealed that there was statistically significant relation between the nursing students' total students'

knowledge mean score regarding vein puncture & age as mean score increased in the are group 21-23 years in the control and study group versus the students with age 19&20 years. This may be due to increased ability and readiness to learn usually present with increased age. This result agreed with ***Aly, (2010)*** who found that there was significant relation between age and total basic life support knowledge scores. While, this result disagreed with the study conducted by ***Parajulee and Selvaraj, (2011)*** about knowledge of nurses towards CPR in a tertiary care teaching hospital in Nepal and reported that there was no significant association between the total knowledge score and age of the study group.

The current study showed that there were no statistically significant relation between the students' practice mean score and their demographic characteristics (age, gender and computer skills) in both control and study groups with **p>0.05.** This may be due to significant improvement in the practice for majority of the students in both group regardless their demographic characteristics.

This result also was incongruent with ***Abd Allah,etal. (2016)*** who represented that there were no statistically significant relation between the mean score of students' practice and their demographic characteristics (age, gender and educational level) in both control and study groups with p>0.05. In the same line with ***Kipsang & Bruce, (2013)*** they studied a comparison of CPR competence between two groups of advanced practice student nurses at a medical training college in Kenya, the study reflects that an age, gender and experience had no significant effect on CPR performance between control and study groups.

Concerning the relation between program satisfactory nursing students 'opinionaire mean score & their demographic characteristics in both study& control groups. The study result shows there is statistically significant relation between program satisfactory nursing students 'opinion mean score with computer skills with P <0.001 & good internet search skills in control group with P>0.05. All student are satisfied with program regardless their computer skills .This may be due to clarifying and administering attached material used with blended learning method and the researcher teach students how to use this materials as how to open the website of vein puncture including power point, videos and how to interact using chatting room .

Concerning correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in both groups, the findings of current study showed that, no correlation between total satisfactory level of nursing students ' knowledge , practice & opinion in both groups. This may be due to all nursing students have high level of knowledge which reflect positive effect on their practice and overall of students' were more satisfied with the two methods of learning which reflect no correlation between satisfactory level of opinion with knowledge or practice. Which goes on the same line with ***Abd Alla, etal. (2012)*** who reported that there was no significant correlation between knowledge and skills in the control group (traditional teaching) and the study group (blended learning)**.**

Also, this result is in agreement with ***Gould and Wilson, (2007)*** they studied nurses' infection control practice: hand contamination and reported that there was no relation between nurses' knowledge and practice. ***Hoadley, (2009)*** who studied Learning advanced cardiac life support: a comparison study of the effects of low- and high fidelity simulation. The study reflected

that no significant relation for resuscitation knowledge or skills between the study participants.

This finding is also in contrast with ***Elazazay et al., (2012)*** who study the effect of CPR training program on nurses knowledge and practice and indicated a positive significant correlation between nurses' knowledge and practice related to CPR with **p < .001**. Also this study finding is not in accordance with the study conducted by ***Hauber, Cormier and Whyte, (2015)*** about an exploration of the relationship between knowledge and performance-related variables in high-fidelity simulation and found that positive correlation between knowledge and practice.

**Conclusion**

In the current study, the researcher found that the two used learning methods ( simulation & blended learning) had positive effect on 2nd year nursing students 'knowledge and practice but blended learning method had highly statistically significant effect on students' performance versus simulation. Also there was highly statistically significance differences regarding mean score of program satisfactory nursing student's opinionaire in both control and study groups Whereas, the mean score of students'total scores in study group was more than the mean score of control group.

**Recommendations:**

***Based on the study findings and conclusion suggested the following recommendations are :***

***Recommendations for nursing education:***

-The blended learning which is an integration of e-learning and face to face interaction is recommended to be applied in the nursing educational institutions for improving teaching & learning process for the students .

-It is mandatory to establish a well design computer lab and internet access at nursing educational institutions to enhance the effectiveness of using the blended learning.

-Increasing the awareness of the teachers in the nursing educational institutions about the blended learning and how to apply it.

***Recommendations for future studies:***

-Further studies should be carried out to assess factors which hinder application of the blended learning in the nursing educational institutions.

-Replication of this study on a larger probability sample and different settings is recommended to generalize this study results.

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