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The Impact of Analysis and Evaluation Teaching by Virtual Newborn Model Learning Material on Analytical Thinking

Ratchanee Chaipradermsak *[1]

Faculty of Nursing, Suan Dusit University, Dusit District, Bangkok 10300

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Abstract

The research objectives were 1) to create analytical and evaluation teaching and 2) to evaluate the effectiveness of analytical and evaluation teaching. The sample were 78 2nd year nursing students who registered in Child and Adolescent Nursing subject. The research instrument included 1) Operational research instrument- analysis and evaluation lesson plan with virtual newborn model learning material and 2) Data collecting research instrument - the demographic data from and analytic thinking skill pre-test & post-test. Instrument was applied content validity & context validity test, analytical thinking skill of learner quiz. Index of item objective congruence was .63. Instrument reliability test, quiz. The instrument was tested with the 20 students who were not the sample group, Cronbach's alpha coefficient was applied. The result was .78. Data analysis applied frequency, percentage, mean, standard deviation and Mann-Whitney U test.

The demographic data were 78 students, 3 males and 75 females (ration of 1:25). The result showed that comparison of mean scores between pre - test and post - test was made by using the Mann-Whitney U test. There was significant difference on the analytical thinking skill score regarding analytical and evaluation teaching by virtual newborn model learning material compared to the pretest (86.91 vs 70.09; $p<.05$).

Introduction

Thailand's Ministry of Higher Education, Science, Research and Innovation main policy is to develop learners to be quality graduates and smart citizens (Office of the Higher Education Policy, National Science, Research and Innovation Council and the Office of the Science Promotion Commission Research and innovation, 2019). The Higher Education Commission set standards in education with the mission to develop knowledge, process analytical thinking through theory for learner outcome. For cognitive skills, learners apply situation analysis for decision making and problem-solving (Higher Education Policy Development Group Bureau of Higher Education Policy and Planning Office of the Higher Education Commission, 2008). The teacher has followed a policy to develop analytical thinking for students through classroom research. Analytical thinking has been defined as the ability to think deeply and flexibly about important issues (Dewey, 1933; Bloom, 1956; Halpem, 2001; Ku, 2009 as cited in

* Corresponding Author
e-mail: ratchanee_cha@dusit.ac.th

Alexander, 2014). The students need to improve their analytical skill in order to achieve the educational goal. (Brown, Afflerbach, & Croninger, 2014). The students were able to speak but fail to practice. (Brown, Afflerbach, & Croninger, 2014).

Analytical thinking is a part of critical thinking. According to a study of 101 senior student nurses, it was found that they had a medium level of critical thinking. The study suggested that students must develop an evaluative part of thinking in the classroom (Phromnoi, Phromthep, & Tasaneesuwan, 2012) In Quality monitoring, the nursing graduate report (2017) reported on the quality of graduates from the Faculty of Nursing, Suan Dusit University (2017). According to the study in 68 stakeholders (80 %), it was found that the cognitive skill level was at medium level of 3.37 from a maximum 5 score with a standard deviation 0.61. Cognitive skill level is the composition of system thinking, problem-solving and critical thinking. (Faculty of Nursing, Suan Dusit University, 2017). As previously mentioned, early intervention is needed to improve cognitive skills especially evaluative thinking.

Students who register in Child and Adolescent Nursing subject evaluated the patient's condition through materials for a virtual newborn model learning experience. Virtual newborn model learning material was shown at an exhibition that helps learners through visualization and kinesthetic activities. It is applied to analysis of symptoms and then learnt knowledge is applied in nursing management to solve issues of presented symptoms. (Hanucharoenkun, 1997).

Foronda, Liu, & Bauman (2013) reviewed 100 studies and 1 article. They synthesized the research regarding the evaluation of simulation in undergraduate nurse education. They reported the effectiveness of virtual models in several learning outcomes. It found that students developed confidence/self-efficacy and improved evaluative skills, problem-solving and critical thinking. Factors for success depend on the attention and motivation of instructor and learner (Cui, Lan, Zhang, Hu, & Wang, 2020). In this study, virtual newborn (newborn means infants born between 0 – 28 day of life) model learning material can activate attention and motivation students. Virtual newborn model learning material is completely realistic in shape and face, the body has moving limbs, with crying sounds and when using a stethoscope can listen to lung, heart and abdominal sounds. Students nurses applied data from observing virtual newborn model learning material then analysis and evaluation data.

Effective early intervention to improve analytical thinking skill in learners with lesson plan is applied thinking-Based Instruction teaching theory, which includes a situation analysis by using virtual newborn model learning material, discussion and summary. Virtual newborn model learning material shows behavior, changes of skin color, changes in level of crying tone and dyspnea symptoms of respiratory disorder. There are classroom activities to develop 21st century skills.

Objective

The pre-test and post-test scores were analyzed to measure the effectiveness of analytic and evaluation teaching by virtual model newborn learning material of the 2nd year nursing students registered in Child and Adolescent Nursing subject.

Literature review

The researcher reviewed the literature on teaching and learning methods. Meaning of analysis and evaluation components and how to improve analysis thinking skills. The role of the virtual newborn model learning material develops critical thinking skills. The results of this review link knowledge to research.

1. The meaning of the evaluation

Evaluation means compute data to consider with standard criteria for identifying level or degree of something (Provus, 1969, as cited in Monitoring and Evaluation Department, Department of Agricultural Extension, n.d.). Jamornn, Phithiyanuwat, Chantason, & Ngadkratok (2020) defines evaluation as to bring data together, then consider the relevant value criteria. Thongcharoen (2015) defines the decision making or diagnosis of data including goals set. Evaluation means to bring data to be processed, that considers compliance with the standard and then make a judgment or a diagnosis of data.

The nursing process is evaluation in symptom patient assessment. These involve data collection through physical examination and taking a health history. Accurate assessment requires skilled observation, data verification and differentiation of pertinent data (Smith, Duell, & Martin, 2012, as cited in Schub & Karakashin, 2018).

2. The meaning of Analytical Thinking skill

Analytical Thinking means searching data, finding, inquiry and explaining data with theory or the reasons why an event or action occurred (Coffman, 2013).

Analytical Thinking skill refers to the ability of the learner to identify what is accurate and to summarize the relationships between situations, questions, concepts, then offer explanations, data, or beliefs, rationality, opinion. This is a challenging skill in the 21st century (Prawita, Prayitno & Sugiyarto, 2018). Analytical Thinking refers to the cognitive process, by using steps of thinking to find the best result. There is a process of data inquiry data consideration in a situation so a check with the normal values is necessary. Critical thinking is essential when encountering challenging situations and students identify problems in order to fix the problem (Robbins, 2011). Analytical Thinking refers to cognitive thinking in compute data by searching for information, explaining reasons to check with the normal values. The student explains the reasons why the event or action occurred and they summarize the relationship between the data.

3. Elements of analytical thinking

Marzano (2001, as cited in Pinla, 2016) defined components of analytical thinking (Mazano, 2001; Sirisusawaraj, 2008, as cited in Pinla, 2016) as follows:

1. Classification skill is identifying data by using theories in order to classify severity of data, such as Grade 1 severity was mild, Grade 2 was more severe, Grade 3 and 4 increase of severity, respectively, classification, spread in cancer, etc.

2. Categorization skill is the ability of learners to classify patient symptoms and time to nursing management. The symptoms are caused by a similar system. The learner can sort differential infected disease and non- infected disease.

3. Connectivity skill is the ability of learners to correlate information in relation to each other, for example the symptoms of a pediatric patient are linked from environment, food, heredity and behavior.

4. Summary skill is the ability to capture key points and draw conclusions. Grasping the key points is where students need to process what is important.

5. Application skill is the ability to apply knowledge, principles and theories in different situations when it comes to changing situations. Student nurses apply it to nursing care of infants and children.

Skills of student nurses must have environmental observation skill such as the facial expression and voice of a patient. The patient's posture, walking, sitting, standing and lying posture can express unspoken symptoms in pediatric patients. Student nurses applied data from observing to fill in a form based on Gordon's functional health patterns that have patient's activities and nutritional information. One study showed that applying nursing assessment using the patient assessment form can improve the student's learning in developing the nursing process (Khatiban, Tohidi, & Shahdoust, 2019).

4. Teaching and learning management focusing in thinking process (Thinking - Based Instruction)

The instructor organized an activity to encourage learners to practice thinking skills. By which the teacher poses a quiz to train learners to practice comparing, interpreting, summarizing, etc. Teachers and learners used theories for discussion about ideas arising in the teaching process. These processes are based on cognitivism that emphasizes cognitive processes or thinking. So that students can find relationships meaning, extraction of information for actions in nursing care (Khammanee, 2010).

5. Strategy interpretation

In the qualitative study, Li (2015) reported on the strategy employed to the accuracy of interpretation and fluency of interpretation in the English language of successful learners who passed the Advance Interpretation Test (n = 3). They were students of the College of International Studies, Yangzhou University. This study found that they employed repeatedly-practicing-shorthand strategy, recitation strategy, literal-interpretation strategy, omission strategy and amplification strategy; and for technical terms interpreting, they employed technical-terms-accumulation strategy and substitution strategy.

6. Strategy questioning

Example of Questions in teaching in the classroom; "What does this mean to you? list three reasons that would prevent you from implementing this tip. What can you do to overcome these obstacles? How did they accomplish this?" (Richman, Permuth, & Richman, 2013). Analytic thinking is a part of critical thinking. Teaching strategies are derived from questioning to activate doubts of learners. Example of questioning that used for created analytic thinking;

− What, if anything, do you think should happen now?

− When instructors have some word: How, to your knowledge, has general thinking developed on following topics over time?

− Can you identify any important academic studies in these areas?

− How have these topics been reported on in

the news media?

− What, if anything, do you think needs to happen now in each case? (Bottomley & Peyjmachuk, 2018).

Teaching method created critical thinking in nursing students

7. Problem based learning (PBL)

Problem based learning means the students meet real situations and cooperate with the team to solve problems. It persuades students to doubt and the need to search for knowledge on their own. This method creates skills for lifelong learning (khammanee, 2010) This method allows students to work cooperatively with the teacher who acts as facilitator, not lecture (Schub, 2018).

8. The use of human patient simulation mannequins (HPSMs)

Schub (2018) conducted a systematic review of eight studies from 1999 – 2009 that found a positive relationship between the use of HPSMs in undergraduate nursing programs and critical thinking ability in students, but one study was not clear, quantifiable improvement in actual critical thinking skills. Simulation can be a gateway to improved critical thinking not just in student nurses, but in practicing nurses (Shubert, 2012, as cited in Schub, 2018).

9. Feedback strategies

Feedback is especially important where teachers and students face the greatest challenges in meeting these higher expectations for performance (Brown, Afflerbach, & Croninger, 2014). Samba, Achor, Bash, & Lortim. (2015) have found that feedback strategies enhanced students' achievement and critical thinking with graphic organizers. Rabab'ah & Belarimet (2020) have found feedback strategies such as correct/ incorrect, asking question, error flagging, topic contingent, response contingent, information tutoring, direct feedback, indirect feedback aided in the development of analytical thinking skills.

A study by Raterink (2011, as cited in Schub, 2018) focused on registered nurse and found workplace factors identified as promoters or enhancers to critical thinking include effective teamwork, staff support, staffing patterns that allow continuity of care and exposure to a variety of patient issue (Raterink, 2011, as cited in Schub, 2018).

10. The role of the virtual newborn model learning material in developing the analytical Thinking

The role of the virtual newborn model learning material in developing analytical thinking skill of nursing students uses the core concept of virtual technology. It is the development of technology that combines the real world and virtual reality together. The classroom becomes excited by using virtual technology (Phudensai & Srimuang, 2017). In a quantitative study, Sathonghon & Uunkrai (2017) reported on learning achievement after learning with virtual learning supplementary materials in science courses as follows;

1. Applying learning material using virtual technology stimulated the interested of the learner. Virtual technology learning materials complemented sound, motion and different light. Petcharat, Inthachak, & Rakkusol (2016) reported on significant effects of different learning materials and simulate environment and attitude on analytic thinking skill (n = 310).

2. Applying learning material showed virtual images enhanced the perception and understanding of the learner. Wattananuwat (2019) reported on significant effects of Koh Kaew Suttharam Temple Phetchaburi electronics exhibition and easy understanding, high level of perception in the content of the receiver.

3. Classroom activity where students participate in design learning activity enhanced achievement of learners. Virtual technology learning materials were controlled by teachers and learners; learning was designed by them to create understanding in the symptoms of simulation humans. Lertwitawatkul & Jindanurak (2015) reported on an outcome with positive relationship between virtual technology learning materials and achievement of learners (n = 66).

A study by Srimala & Wangruangsathit (2015) had a sample group of 157 nursing students in Year 2 and used VARK style teaching by V-visual visualization, A-aural listening, R- reading-writing, K-kinesthetic. The teaching focused on group practice to critically think and held group discussion. It was found that the score of achievement in newborn nursing was higher than before studying. The result reported a high satisfaction score with teaching and learning.

11. Features of the virtual newborn model

Advanced Newborn Patient Simulator, is completely realistic in body shape and face. A skin that covers the body organs that are soft and flexible, just like real skin and each joint can show movement and situation, divided into details as follows: 1) A realistic umbilical cord. Able to feel the pulse and give the substance water, 2) able to move such as blinking eyes, opening mouth, moving arms - legs, 3) crying, 4) showing seizures, 5) able to show breathing with chest movements various

pulmonary sound, grunting breathing. 6) Pulsed at Brachial, Femoral and Umbilical. 7) can show cyanosis, jaundice, paleness and redness abnormalities. 8) Capillary refill time can be set. 9) Capillary refill time can be measured. Push and hear Korotkoff sounds while measuring. 10) Abdominal distension, Bowel sound and 11) shows the vital signs of both waveforms and numbers (Guide to using Gaumard® super tory® s2220, 2017).

12. The principle of implementing the Virtual Model Newborn in authentic learning activities.

Implementing the Virtual Model Newborn for visualization, learning is a virtual model newborn that shows signs and condition of a patient. It is meaningful study because it is both beneficial to students and activates learning called authentic learning (Khammanee, 2012). One study using authentic learning, Gunes, Arikan, & Cetin (2020) examined the effect of authentic learning activities on achievement in studies and attitudes towards Geographic Information System (GIS). The results showed that students did not get bored. Students stated, "they could see the landforms they had not had the chance to see before and learned better thanks to the GIS software." The study used authentic learning activities by real – life experiences and learning material to achieve engagement in learning. The students became more willing to participate in classroom activities and deeply enjoyed the learning process (Gunes, Arikan, & Cetin, 2020).

13. Factors influencing teaching and learning

1. The cognitive development of each learner's brain affects learning outcome. That is caused by many reasons, such as nutrition, an illness that causes brain pathology, exposure to drugs that cause brain damage (Byrnes & Dunbar, 2014) and have the following factors (Srimala & Wangruangsathit, 2015).

2. Enthusiasm for studying of each learner and instructor effects learning outcome. Enthusiasm to focus on study is shown by reading books before class, waking up in the morning and going to bed early. This behavior can help learners deal with study. The enthusiasm for learning and the motivation to learn often coexist with the instructor. As a result, the boredom of studying decreased based on the positive relationship between student and instructor (Cui, Lan, Zhang, Hu, & Wang, 2020).

3. The ability of the instructor to develop critical thinking skills affected the learning outcome. One study surveyed student nurses (n = 157) and noted the characteristics of instructors who were satisfied with the results of deep learning (Srimala & wangruangsathit, 2015) as follows.

3.1 Instructors show a friendly personality to learners. Would make the students relaxed and not tense. Learners are encouraged to fully interact, such as asking the teacher, expressing their opinions without fear of being scolded. Students expressed different opinions that contrast with teachers; consequently, contributing to analytical thinking.

3.2 There are techniques for transferring knowledge that are easy to understand the knowledge. The instructors planned lessons that are appropriate with age and experience of the students. They prepared learning materials needed to create understanding for students.

3.3 Instructor can answer student's question. Characteristic of analytic teaching instructors, they are applied to many fields and always update knowledge and search evidence-based practice to explain accurately to students.

3.4 Instructors can transfer knowledge, it is a continuous thinking process and systems thinking process. Systems thinking processes applies knowledge categories and set priority of knowledge. Continuous thinking processes connects knowledge for learning.

3.5 Instructors are facilitating learners' learning. They provide equipment and media to contribute to learning outcomes.

Conclusion

There are many ways to develop critical thinking skills, Thinking - Based Instruction and authentic learning activities are used in this research. The principle of implementing the virtual newborn model learning materials used in this research was to show details of character of material in learning. The factor to implement the virtual newborn model learning materials in teaching and learning are both instructor and student. The literature review was performed for knowledge to create analytic thinking of the students in this research.

Conceptual framework

Thinking - Based Instruction and authentic learning activities are used in this study and are independent variables in the conceptual framework. This study purpose is to investigate effects of analytic and evaluation teaching by using virtual newborn model learning materials between pre – post mean score of analytic thinking of the 2nd year nursing students registered in Child and Adolescent Nursing subject.

Lesson plans are management interpreted processes for students, discussion and summarize with the instructor. The situation where the teacher use the virtual new born as a learning material came from the experience of the teacher.

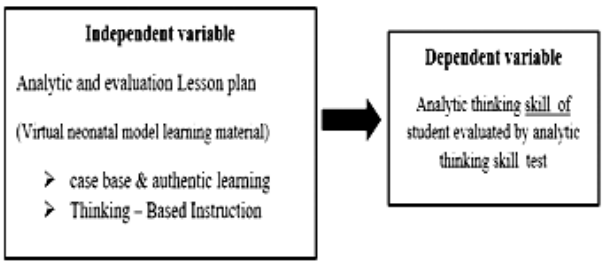

Figure 1 Conceptual framework

Research methodology

This research was classroom action research. This study investigated whether analytical and evaluation teaching is effective in improving the analytical thinking of students by using a single group Pretest-Posttest design.

1. Population and samples

Population were 2nd year nursing students enrolled in Child and Adolescent Nursing subject, totaling 118 students. The number of samples computed from two-tailed t-test statistics was thought to be at Power of test 0.80 because it was a social science research (Cohen, 1987, as cited in Munro, 2001) effect size 0.5. A total of 64 subjects (Cohen's tables) were included in the study from calculation. This was used for sampling according to 78 nursing students. Simple random samples were from the names of students who enrolled in Child and Adolescent Nursing subject.

2. Research instrument

Research instruments, reliability and validity of research instruments

were designed into 2 groups:

2.1 Proceeded research intervention instrument

a. Virtual newborn model

Tools or materials for researching virtual newborn models, criteria for selection of virtual reality media Is able to control with a mobile computer (Tablet) can show movement and show sound. The model was connected with a monitor screen. It shows the vital signs and laboratory results of pediatric patients. The researcher selected a virtual simulator with the trade name Advanced Newborn Patient Simulator which is completely realistic in shape and babyface. The skin that covers the body organs are soft and flexible like real skin and joints. The newborn model shows movement and the situation. Divided into details as follows: 1) a realistic umbilical cord and the ability to feel the pulse and give the substance water 2) can move such as blinking, open mouth, arms and legs move 3) can cry 4) show seizures 5) breathing is performed with chest movements. Various pulmonary sounds and grunting breathing. 6) brachial, femoral and umbilical pulses. 7) cyanosis, jaundice, paleness and redness abnormalities can be set. 8) capillary refill time can be set. 9) capillary refill time can be measured. Push and hear Korotkoff sounds while measuring 10) abdominal distension, bowel sound and 11) performing the vital signs of both waveforms and numbers.

b. Lesson plan for analysis and evaluation teaching skills

In the classroom, the instructor was given a case study data exercise that was written to evaluate student's analysis, next data came from observation by looking at the virtual newborn model, laboratory result and vital sign was shown on monitor screen. Learners were given data to interpret and analyze. The instructor had discussed a care plan with the learners for evaluating learning outcomes. Finally, the instructor summarized daily content. Example of a quiz given to students after being showed simulation is depicted in Table 1.

Table 1 Example of questions in lesson plan after students were shown simulation

No.	Question
1.	Which patient has an urgent symptom that needs help first for nursing management?
2.	What is the cause of the symptom?
3.	Who is appropriated for this nurse management?
4.	What is degree of pain do these infants have?
5.	What is part of the lung that has problems in these cases?
6.	What is the difference between crepitation and stridor lung sound?
7.	What is characteristic of dyspnea?
8.	What is the difference of the cry sound of an infant when diaper wet, hungry and in pain?
9	What causes high heart rate in this infant?
10	What is the most dangerous seizure in infants?

2.2 Data collection instrument

Analytical thinking skills of learners Pre and Posttest

The pre-test and post-test measured the analytical thinking scores of learners. The tests were designed as multiple-choice quiz. The test included 25 multiple-choice. Each question was worth 1 point, with

a possible total range of scores ranging from 0 to 25 points. The test was examined for content validity by using 1) nurses specializing in pediatric nursing; 2) expert teaching of analytical thinking 3) measurement and evaluation specialist. The result was a computed Index of item objective congruence (IOC), it reported 1st, 2nd and 3rd persons equal to .36, .6 and .6. Then repeatedly examined content validity by the same experts. The result reported IOC equal to .63 (Index of Item Objective Congruence criteria, the valid exam is a test with a value of .50 and above, Koonkaew, 2020). Reliability test of instruments was established with 20 students who were not a sample, it used Cronbach alpha coefficient to obtain a value of 0.78.

3. Collection of data

Instructor used a lesson plan in the classroom with students. This study was approved from the Human Research Ethics Subcommittee Research and Development Institute, Suan Dusit University. The researcher collected information at the Faculty of Nursing University Suan Dusit, the researcher found the sample group by performing the following steps

3.1 Students were divided into groups for studying group 1, total 40 people, group 2, 38 people by simple random sampling methods. They were divided into two groups because of ration appropriation in learning, the classroom was 1 model suitable for 30-40 students.

3.2 Students took a test to measure their critical thinking skills as a score before entering class.

3.3 After that, the teaching and learning analysis and evaluation were conducted by using the media as a virtual newborn model regarding the problem that the model can show, such as the respiratory system, gastrointestinal tract, seizures, pain symptoms in 2 hours study time and 3 hours outside study time.

3.4 Students were evaluated on the analytical thinking skills based on learner's test to measure analytic thinking skills after class and discussed with instructor.

Protection of research rights and ethics

The researcher requested approval to conduct research from the Human Research Ethics Subcommittee Research and Development Institute Suan Dusit The committee's opinion was that this study excluded scope of certification according to Project Code 081/2019, Certification No. SDU-RDI 2020-003 from 27 January 2020. Participants received information from the researcher and signed the consent form with willingness and could withdraw at any time.

4. Data analysis

The researcher analyzed the data by using a program:

4.1 Demographic information were analyzed by descriptive statistics, frequency, percentage, mean and standard deviation.

4.2 To compare the difference between the average score of analytical thinking skills of nursing students after teaching and learning analysis and evaluation using a virtual newborn model learning material data were analyzed in a single group pre-posttest. The data were not able to use the paired sample t-test statistical testing because the distribution of the data was not a normal curve. The test statistics were used as the Mann-Whitney U test.

Results

Demographics

The majority of the participants were female (n=75; 96.15%). The age ranged between 20-22 years with a mean age of 22 years. In terms of educational proficiency background, GPA were ranged between 2.83-3.43, indicating a mean GPA of 3.05.

Analytic thinking score

For preliminary analysis, Kolmogorov – Smirnov was used to determine the normal distribution of the data. It was found that there was not a normal distribution. Therefore, Mann-Whitney U test was used to compare between analytical thinking pre-post intervention scores among 78 sophomore nursing students (see table 2)

According to the hypothesis, there was significant difference on the analytical thinking skill score regarding analytical and evaluation teaching by virtual newborn model learning material compared to the pretest (86.91 vs 70.09; $p<0.05$). The mean score of post intervention was 18.86 while pre-intervention was 17.04.

Table 2 Comparison of analytic thinking skill scores between pre-intervention and infant simulation nursing model (n=78)

	n	Mean Rank	Sum of Rank	z	p
Pre – test	78	70.09	5467.00	-2.334	0.020*
Post - test	78	86.91	6779.00		

Notes : n = number of participation in study; p < .05.

Discussion

This study aimed to investigate the effects of analytical and evaluation teaching by virtual newborn model learning material on analytical thinking skills. All participants significantly improved analytical thinking skills. According to the hypothesis, there was significant

difference on the analytical thinking skill score regarding analytical and evaluation teaching by virtual newborn model learning material compared to the pretest (86.91 vs 70.09; $p < .05$). The first time this study was a plan to analyzed by t-test statistic, but the data's results were not a normal distribution. The researcher changed to analyze with non-para statistics. The cause may be from the researcher not assorting achievement outcome by GPA (Grade point average) of students in the sample group for this research. This was limited to a research result. The before and after score is not very different. The teaching of thinking skill in the classroom needs to be repeated to improve the analytical skill considering the increasing score. This study was limited to time management, it took time and the student did not like to discuss.

This study confirms Lamchang, Suklert, & Lamchang (2019) who found a significant effect of media material learning on achievement. Nursing students were reported as being enthusiastically alerted with lesson plans. One study by Lertwitawatkul & Jindanurak (2015) found significant effects according to this study that virtual material learning enhanced analytical thinking measurement by achievement in the subject.

Simulation and authentic learning used in lesson plans effected improved analytic thinking skills. The current f findings confirm those of Pichienwilai (2018) who found a significant effect of problem-based teaching on 30 student nurses.

The lesson plan and virtual model learning materials are important in teaching student nurses. The lesson plan is activated, evaluated and analytic thinking by simulated and authentic learning with virtual model learning materials can be used to create analytical thinking.

Suggestions

1. Nursing education is encouraged to set a lesson plan that includes virtual model learning material for the benefit of the learner.

2. Further studies are encouraged to add control groups and distributed GPA of students measured with achievement outcome in the subject per student.

3. The Head of the school could initiate the suggested training in order to increase the cognitive skill of the learner as a method of training.

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