EFFECTS OF PROBLEM-BASED LEARNING ON COGNITIVE, AFFECTIVE AND COMMUNICATION SKILLS IN LEARNING PEDIATRIC NURSING AMONG UNDERGRADUATES IN ISLAMIC AZAD UNIVERSITY, IRAN

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By

MOHSEN SALARI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

January 2016

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DEDICATION

To my love: my wife (Zahra)
To my compassionate mother and my late father, God bless his soul
To my beloved daughters and son

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

EFFECTS OF PROBLEM- BASED LEARNING ON COGNITIVE, AFFECTIVE AND COMMUNICATION SKILLS IN LEARNING PEDIATRIC NURSING AMONG UNDERGRADUATES IN ISLAMIC AZAD UNIVERSITY, IRAN

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January 2016

Chairperson : Associate Professor Rohani Ahmad Tarmizi, PhD
Faculty : Educational Studies

The nursing profession is faced with new challenges which necessitate the implementation of new and more effective educational strategies in order to enhance nurses and nursing trainees' essential competencies to cope with challenges effectively. A quasi-experimental, posttest-control group design with nonequivalent groups was conducted to investigate the effects of Problem-Based Learning on cognitive, affective, and communication skills in learning Pediatric Nursing among university students. The subjects of the study were undergraduate students who enrolled in Pediatric Nursing II course at Islamic Azad University in Iran. The experiment was conducted over a period of eight weeks, in which the nursing students met weekly over duration of one two-hour session and two two-hour sessions.

In this study, two experimental groups, namely the Traditional Problem-Based Learning (TPBL) and the Hybrid Problem- Based Learning (HPBL), and one Conventional Teaching and Learning (COTL) group were involved. The TPBL group underwent learning using the traditional problem-based learning approach with guided questions and a tutor; and the HPBL group underwent learning using problem-based learning approach with minimal lecturing, guided questions and a tutor. The COTL group underwent learning using conventional instruction utilizing full lecture. The three groups were compared on cognitive and affective performances, namely, overall nursing performance, mental effort, instructional efficiency, metacognitive awareness, motivation towards learning, and also, communication skills. Five instruments were used in this study, namely Pediatric Nursing Performance Test, Paas Mental Effort Rating Scale, Metacognitive Awareness Inventory, Instructional Materials Motivation Survey, and also, Communication Skill Checklist. The statistical analyses utilized were ANOVA, ANCOVA, and mixed between-within subjects ANOVA.

Findings of this study showed that the TPBL and HPBL instructional strategy in comparison with COTL enhanced students' overall performance in Pediatric Nursing, higher-order questions performance, and induced higher level of metacognitive awareness, communication skills, instructional efficiency and motivation toward learning with less mental effort invested during the learning. These findings indicated that the TPBL and HPBL are superior in comparison to the conventional instruction, hence implying that integrating the use of these approaches in teaching and learning of Pediatric Nursing lends higher efficiency than the conventional strategy. Therefore, it may be concluded that both forms of PBL were effective for student learning of Pediatric Nursing and also that PBL may be useful where there are shortages of instructors or faculty members in handling teaching and learning.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN PEMBELAJARAN-BERASASKAN MASALAH TERHADAP KEMAHIRAN KOGNITIF, AFEKTIF DAN KOMUNIKASI DALAM KEJURURAWATAN PEDIATRIK DALAM KALANGAN MAHASISWA DI ISLAMIC AZAD UNIVERSITY, IRAN

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MOHSEN SALARI

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Profesion kejururawatan sedang menghadapi pelbagai cabaran yang mana memerlukan implementasi strategi pendidikan yang lebih berkesan dan terkini supaya para jururawat dan jururawat pelatih dapat melaksanakan tugas mereka dengan lebih berkesan. Kajian kuasi-eksperimen dengan rekabentuk kumpulan ujian-pasca dan kawalan mengguna kumpulan yang tak seimbang (*nonequivalent)* telah dijalankan untuk menyiasat kesan pembelajaran-berasaskan masalah terhadap pemboleh ubah kognitif, afektif dan komunikasi dalam kalangan pelajar universiti yang mengikuti kursus Kejururawatan Pediatrik. Subjek kajian ini adalah pelajar Ijazah Pertama yang mendaftar dalam kursus Kejururawatan Pediatrik II di dua cawangan Universiti Islam Azad di Iran. Eksperimen telah dijalankan dalam tempoh lapan minggu dimana bagi setiap minggu, tiga sesi perjumpaan berlangsung iaitu satu sesi selama dua jam dan dua sesi selama dua jam.

Dalam kajian ini, dua kumpulan eksperimen, iaitu Pembelajaran-Berasaskan Masalah secara Tradisional (PBMT) dan Pembelajaran- Berasaskan Masalah secara Hibrid (PBMH), dan satu kumpulan kawalan (PKON) telah dilibatkan. Kumpulan PBMT menjalani pendekatan pembelajaran-berasaskan masalah secara tradisional dengan berpandukan soalan dan bimbingan tutor; dan kumpulan PBMH menjalani pendekatan pembelajaran-berasaskan masalah secara hibrid dengan syarahan yang minimum serta berpandukan soalan dan bimbingan tutor; dan kumpulan PKON menjalani pembelajaran menggunakan pengajaran secara konvensional iaitu dengan syarahan. Ketiga- tiga kumpulan ini telah dibandingkan ke atas beberapa pemboleh ubah iaitu, pencapaian dalam Kejururawatan Pediatrik, penggunaan mental, kecekapan pengajaran, kemahiran komunikasi dan motivasi terhadap pembelajaran. Lima instrumen telah digunakan dalam kajian ini, iaitu Ujian Pencapaian Kejururawatan Pediatrik, Skala Penilaian Mental Paas, Inventori Kesedaran Metakognitif, Senarai Semak Komunikasi Kemahiran, dan Skala Motivasi Terhadap

Pembelajaran. Data yang diperolehi di analisis dengan menggunakan ANOVA, ANCOVA, *Mixed between-within subjects* ANOVA.

Dapatan kajian ini menunjukkan bahawa pendekatan PBMT dan PBMH meningkatkan prestasi keseluruhan pelajar dalam Kejururawatan Pediatrik, prestasi dalam soalan aras tinggi, tahap kesedaran metakognitif, kemahiran berkomunikasi, kecekapan dalam pengajaran dan motivasi terhadap pembelajaran serta mengurangkan penggunaan mental semasa pembelajaran. Dapatan ini menunjukkan bahawa PBMT dan PBMH adalah lebih baik berbanding dengan pengajaran konvensional, oleh itu menunjukkan bahawa penggunaan pendekatan mengintegrasikan PBM ini dalam pengajaran dan pembelajaran Kejururawatan Pediatrik adalah lebih berkesan daripada pengajaran konvensional. Oleh itu, boleh disimpulkan bahawa kedua-dua bentuk PBMT dan PBMH adalah lebih berkesan untuk pengajaran dan pembelajaran pelajar dan boleh diguna pakai apabila terdapat kekurangan pengajar atau ahli fakulti untuk mengendalikan sesuatu kursus, khususnya, Kejururawatan Pediatrik.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
ARCS	Attention, Relevance, Confidence, Satisfaction
BRAT	Banana Rice Apple Toast or Tea
CL	Cognitive Load
CLT	Cognitive Load Theory
COTL	Conventional Teaching and Learning
CPR	Cardiopulmonary Resuscitation
CSC	Communication Skills Checklist
ECF	Extracellular Fluids
ES	Effect Size
GER	Gastroesophageal Reflux
HPBL	Hybrid Problem- Based Learning
IAU	Islamic Azad University
IEI	Instructional Efficiency Index
IMMS	Instructional Materials Motivation Survey
I&O	Intake and Output
IV	Intravenous
MAI	Metacognitive Awareness Inventory
ME	Mental Effort
NPO	Nothing Per Oral
ORS	Oral Rehydration Solution
PBL	Problem- Based Learning
PIS	Patient Information Sheet
PMER	Paas Mental Effort Rating
PNPT	Pediatric Nursing Performance Test
PNLP	Pediatric Nursing Lesson Plan
RBC	Red Blood Cell
SiP	Simulated Patient
SP	Standardized Patient
TPBL	Traditional Problem- Based Learning
UTI	Urinary Tract Infection
VUR	Vesicoureteral Reflux
ZCD	Zone of Current Development
ZPD	Zone of Proximal Development

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Nursing education has conventionally focused on lecture-based strategies. Improvements in teaching and learning over the years have led to an expansion of the pedagogies available to educators. There has recently been a suggestion for a move toward more learner-centered teaching strategies and pedagogies that can result in improvement in student learning (Ellis, 2016). Therefore, learner-centered teaching is nowadays considered as a specific teaching method such as group work or problem-based learning. It seems to be more comprehensive than a method. Learner-centered teaching is an umbrella framework rooted in constructivism that incorporates a number of various teaching strategies. These strategies make the constructivist-learning environment more feasible and easier among learners. Based on constructivism, students integrate new knowledge with the prior knowledge to know the world (Ellis, 2016; Brandon & All, 2010). Through constructivism, nursing students get engaged in an active process of discovering knowledge by working through the problems, issues and common scenarios in their profession. This process may help students to develop clinical reasoning skills (Brandon & All, 2010). In learner-centered teaching learners tend to construct understanding in an interactive, social context, and learn to think critically and have cooperative learning (Ellis, 2016; Schroeder, 2012; Candela, Dalley, & Benzel-Lindley, 2006). The following sections provide an overview of the related concepts in line with designing different instructional strategies for teaching and learning nursing.

1.1.1 Teaching and Learning in Nursing Education

The American Nurses Association (2010) defines nursing as follows:

> Nursing is the protection, promotion, and optimization of health and abilities, the prevention of illness and injury, and the alleviation of suffering through the diagnosis and treatment of human response and advocacy in the care of individuals, families, communities, and populations, (p. 3).

Every registered nurse is responsible to sustain all six standards of practice and nine standards of professional performance. The standards of practice include assessment, diagnosis, outcomes identification, planning, implementation and evaluation. Likewise, the nine standards of professional performance involve such elements as quality of practice, education, professional practice evaluation, collegiality, collaboration, ethics, research, resource utilization, and leadership (Aucoin, 2004).

In the information era with its increasing and rapid information change, education system should enable nursing students to prepare them for contemporary practice and to solve the problems of real world with such effective skills as critical thinking and self-directed learning (Martyn, Terwijn, Kek, & Huijser, 2014; Kek & Huijser,

2011). In addition, the world today needs graduates who can take advantage of their diverse skills and in-depth academic knowledge in order to benefit from professional problem solving and life-long learning. Hence, nurses encountering fast changes in the system of health care and education systems will realize that they are in a challenging and continually varying complex situations. So, education should be related and accommodated to the future profession and offers learning opportunities that correspond with curriculum to be successful (Yuan et al., 2011; Bengtsson & Ohlsson, 2010; Bastable, 2007; Tiwari, Lai, So, & Yuen, 2006).

Basically, nursing education needs to be a relational, generative practice that takes place formally and informally because it is viewed as a dynamic, interpersonal, generative, and caring practice (Bergum, 2003). Not only does the nursing education happen mostly between learner and teacher formally, but in today's world it also takes place between learner and the patient or client, the learner and the colleagues, the learner and peers, and the learner and experts of other disciplines informally. Such learning takes place in various situations such as the classroom, lab, clinical areas, and in hospitals as well as community setting (Young & Patterson, 2007). In addition, the most essential tools with which health care professionals can put the knowledge into practice is an effective interpersonal or communication skill (Ustun, 2006). For achieving positive health goals nurses need communication skills as a powerful therapeutic tool and nursing skill. Thus, effective interpersonal communication is an important aspect in health care (Jones, Epler, Mokri, Bryant, & Paretti, 2013; Jerlock, Falk, & Severinsson, 2003).

Hence, nursing trainees will require the latest strategies in their course of study in order to attain the required skills. Student-centered strategies are deemed necessary to change the center of teaching from the teacher and the content to the students in order to develop the professional nursing skills (Young & Patterson, 2007). This shift in approach has occurred in order to enable the educators to help learners to be actively involved in promoting lifelong learning, problem solving, critical thinking, group process skills, creativity, information literacy, student success, and empowerment (Young & Patterson, 2007; Gagnon & Collay, 2006). Such new approaches are contrary to the conventional modes of teaching in which the teacher is considered as the expert with source of knowledge who controls the learning experience through a "sage on the stage" or "didactic" approach. So, to have a process of constructing meaning (knowing), and to let the students to "uncover" new learning and apply new understanding, teachers need to design appropriate curricula and insist on learning rather than teaching by a "guide on the side" or "facilitative" role (Reeves & Laffey, 1999, p. 221). Students prefer new approaches due to such factors as being more enjoyable, and their potentiality to grow enthusiasm and interest in the students towards the course and its contents. Such an approach also tends to involve learners deeply in the leaning process (Loyens, Jones, Mikkers, & van Gog, 2015; Nie & Lau, 2010), enhance interactions between students and their instructors, and increase students' understanding of the course contents by creating knowledge (Muis & Duffy, 2013; Sangestani & Khatiban, 2013).

According to the conventional teaching approach, notions and ideas are presented to the students via lectures from the educators. Such an approach focuses on rote learning and mastery of particular materials that are assigned by the curriculum and are executed by the teacher. For such approach, there is little flexibility to modify the

content according to the needs of the learners (Young & Patterson, 2007; McParland, Noble, & Livingston, 2004). Hence final products of such teaching are doomed to be forgotten by the students or probably will be outdated since the world of the information is changing rapidly. Furthermore, such teaching strategies are not capable enough to get the students ready for future employments successfully. One of the main reasons for this issue is that the training provided and presented is not compatible with real experiences (Young & Patterson, 2007; O'Shea, 2003; Diekelmann, 2001).

Thus, the students will not be able to utilize the acquired skills in similar and new situations because they are passive recipients of information. The students seemed to be "empty vessels" to fill or "blank slates" on which the teacher writes his or her knowledge. In such approaches, students have not enough skills and ability to assess, and manage the real world problems that they encounter daily (Young & Patterson, 2007; Stinson & Milter, 1996). In contrast, in student-centered situation as a new training approach, the focus of teaching has moved from content and teacher to students and their needs for succeeding in future profession. As a result, the center of teaching is being changed from the teacher to the student by professional educators broadly (Gagnon & Collay, 2006; Dochy, Segers, Van den Bossche, & Gijbels, 2003). Contemporary educators should be able to facilitate learning through dynamic engagement, constructive communication and collaborative styles (Horsfall, Cleary, & Hunt, 2012).

Lecturing is the most usual teaching strategy in the nursing education, and problem based learning has not yet been of widespread use in Asia (Klunklin, Subpaiboongid, Keitlertnapha, Viseskul, & Turale, 2011; Yuan et al., 2011). In the current nursing educational context of Iran, the main focus of almost all the universities for nursing education is on the traditional teacher-based approach (Dehkordi & Heydarnejad, 2008). Such an approach will educate students who are actually not prepared for future employments and have little creativity in new situations. They are not capable enough to practically apply what they have learned through the classes mainly because such learning has not been in-depth (Sangestani & Khatiban, 2013; Cheraghi, Salasli, & Ahmadi, 2007; Tavakol, Murphy, & Torabi, 2006). Vahidi and Azamian (2007) had shown that the most important barrier for implementation of student-centered strategy in Iran was students' lack of knowledge and skills in group work and active interaction. Moreover, the necessities for completing the determined extensive curricula by the lecturers in a short period of a semester and lack of having professional facilitators to handle new student centered strategies are also the other barriers. However, since the traditional Problem-Based Learning is time consuming, and classes in Iranian universities often hold a large number of students, the approach has not been welcomed for specialized courses by the lecturers in Iran (Aien & Noorian, 2006).

1.1.2 Problem-Based Learning

Student-centered teaching aims to expand professional skills in students while involving them in a rational generative process. Among the professional skills that can be developed includes problem solving, group process, and lifelong learning skills (Spaulding, 1969). One strategy in which the attention shifts from teacher to

student is Problem-Based Learning (PBL). It first emerged as a curricular method in the late sixties at McMaster University's Medical School in Hamilton, Ontario. It was initiated as a pedagogical substitute to the traditional lecture-based methods (Dolmans, Grave, Wolfhagen, & Vleuten, 2005; Norman & Schmidt, 2000; Spaulding, 1969).

PBL is an appropriate strategy to get the graduates ready for the uncertainties of future managerial practice. It facilitates the students' construction and reconstruction of their own knowledge base (Patel, Groen, & Norman, 1993). In PBL, cases are mostly planned within clinical practice contexts and it requires self-direction and group collaboration in quest of knowledge. Since cognitive abilities such as problem solving, decision-making, and clinical judgment are required through the nursing performance, it is essential for nursing educators then to apply appropriate teaching methods to improve the students' performance of these tasks for clinical nursing (Baker, Pesut, McDaniel, & Fisher, 2007; Patel et al., 1993).

The main basic activity in PBL is small group learning. The PBL employs small groups that are centered on solving well-integrated learning problems instead of large groups as in conventional instruction (Choi, Lindquist, & Song, 2014). Educators need to apply a tutoring role in the context of small groups. Such a role is uncommon in traditional educational approaches. In PBL, educators are full partners in the learning process and not the major holder of knowledge (Yilmaz, 2008b). Educators struggle to enable the students through this partnership to expand skills such as problem solving, critical thinking, communication skills, group process, creativity, information literacy, and reflection that are not paid attention to in approaches in which the teacher uses the lecture as a main teaching strategy (Ustun, 2006). Thus utilizing PBL in nursing training helps to prepare potential nurses to deal with the speedy changes in health care. It also helps to access, organize, and interpret the existing knowledge, and finally assists to respond to the increasing intricacy of the information in discipline. PBL plays an essential role in many nursing programs because it helps student nurses to expand the required capacities needed for starting practitioners. It also helps in fostering the retention and lifelong learning skills that can be transferred into clinical practice (Young & Patterson, 2007). Lifelong learning has been obviously recognized an obligation for professional nursing. However, there have not been identified curricular elements to foster it. Teaching and learning practices should provide vast opportunities for learners to extend the abilities that are critical for lifelong learning (Davis, Taylor, & Reyes, 2013).

In addition, PBL has advantages such as helping students to make and keep the link between prior and new knowledge. It could also serve to improve the application of theoretical lessons in clinical practice (Sangestani & Khatiban, 2013). Such a thing is done through integrating basic and clinical sciences and increasing retention, interest, and learning motivation in the subject (Norman & Schmidt, 1992). Greater involvement of the students in learning, more self-direction, and higher levels of satisfaction in learning may result from the use of PBL. Moreover, clinical reasoning skills, clinical knowledge, and learning autonomy were also improved through PBL method of learning (Sangestani & Khatiban, 2013; Finucane, Johnson, & Prideaux, 1998; Thomas, 1997).

PBL is a departure from the traditional teaching approaches and consequently brings about challenges. In some researches, the results are mixed and although PBL learners performed as well or superior clinically and were more likely to enter family medicine, their performance on basic science examinations were sometimes lower (Eberlein et al., 2008; Jones, 2003). It is promising that PBL could help to bridge the gaps between education, practice, and knowledge development in professional schools including nursing, which is, in turn, able to prepare the learners for their future role as Registered Nurses (Staun, Bergström, & Wadensten, 2010). It is more possible for nursing education to close these gaps by converting nursing education from a teacher-centered to a learner-centered activity by establishing its teaching principles within the constructionist view (Young & Patterson, 2007; Barzak, Ball, & Ledger, 2002).

PBL as a student-centered strategy involves integrated, reflective and collaborative learning in small groups and also seeks out deep approaches to learning through engaging learners in self-directed research to address real world problems and make the learning directly relevant to practice (Martyn et al., 2014; Lin, Lu, Chung, & Yang, 2010; Choon-Eng Gwee, 2008). PBL has been recognized as "one approach to nursing education that supports contextualization of knowledge essential to nursing practice" (Applin, Williams, Day, & Buro, 2011, p. 130).

There are different types of PBL (Barrows, 1986). Some settings use the pure PBL strategy; some others modify the strategy by incorporating the traditional methods of PBL to address the new demands and opportunities placed on schools. The results of these modifications may result in a paradigm shift and improve the educational process for learners and instructors, or may result in unsuccessful attempts and a passing trend (Borhan, 2012). However, some researchers use traditional PBL versus the new form of PBL on internet platforms (Al-Dahir, Bryant, Kennedy, & Robinson, 2014). Based on Al-Dahir et al., (2014) PBL in medical education ranges beyond a specific educational method, presenting in several forms in the literature.

In this research, the adaptive form of PBL has integrated hybrid PBL with traditional PBL small-group settings. Based on different pieces of research, when PBL is new to learners, a hybrid PBL approach is suggested and there should be a movement toward gradual PBL throughout the academic years (Borhan, 2012). The students should also have access to a diversity of learning strategies and offering only one way of learning through PBL may disadvantage the learners. There are cases of institutions that have successfully implemented PBL as a hybrid curriculum combined with other learning strategies like lectures, practical classes, etc.(Gwee, 2009; Armstrong, 1997). In this strategy, educator as a facilitator strives to guide the students. It is often argued that, the idea of scaffolding in the zone of proximal development and the technique of facilitating PBL groups are complementary processes (Harland, 2003). This is because scaffolding takes shape through guidance, and develops faster to support students link between their existing abilities and the intended goal (Rosenshine & Meister, 1992). Thus, the tutors make attempts to guide the learners in order to reduce the cognitive load. Doing so, the learner can easily solve the problems which need high mental effort (Schnotz & Kirschner, 2007).

1.2 Statement of the Problem

Nursing students encounter many challenges in the current healthcare atmosphere (Cheraghi et al., 2007; Kessenich, Guyatt, & DiCenso, 1997). They are likely to find themselves in new situations for which they have no prior experience. In addition, traditional teaching methods may fail to enable them to cope with such situations (Creedy, Horsfall, & Hand, 1992), simply because in traditional training situations, information does not get internalized. These methods often fail to develop students' creativity and critical thinking skills to enable them to make appropriate decisions required by the unexpected conditions (Shahsavari Isfahani, Hosseini, Fallahi Khoshknab, Peyrovi, & Khanke, 2015; Vittrup & Davey, 2010; Young & Patterson, 2007; Creedy et al., 1992).

The Iranian nurses have been criticized with regard to their poor quality of patient care (Mehrdad, Salsali, & Kazemnejad, 2008). It has been argued that they cannot link theoretical knowledge with the clinical practices. They are also reported to have experienced anxiety due to feelings of incompetence in knowledge and skills throwing the discipline of nursing at risk (Adib-Hajbaghery, 2007; Cheraghi et al., 2007).

Hence, some new strategies must be developed that can equip the students with higher thinking strategies such as metacognitive and lifelong learning skills to enable them to make a correct decision and develop a viable solution to a defined problem in the new situation (Kang, Kim, Kim, Oh, & Lee, 2015; Savery, 2015; Shahsavari Isfahani et al., 2015; Marra, Jonassen, Palmer, & Luft, 2014; Hmelo-Silver, 2004; Wilen & Phillips, 1995). Subsequently, the raised concern calls for an alternative approach with higher efficacy in teaching nursing.

While motivation is considered advantageous for learning and achievement (Wijnia, Loyens, & Derous, 2011), traditional lecture-based strategy induces little or no motivation in Iranian Nursing and Midwifery students (Sangestani & Khatiban, 2013; Dehkordi & Heydarnejad, 2008). On the other hand, student-centered strategies tasks or clinical nursing problems are likely to trigger the learning process and motivate students and trigger interest to learning (Marra et al., 2014; Sockalingam & Schmidt, 2011). Besides, as "the nurses' creativity is affected by motivation", it is necessary to provide a "climate in which nurses engage in more creative and productive behaviors" (Shahsavari Isfahani et al., 2015, p. 132). Accordingly, instructors must find a way to increase students' interest to learn. Hence, instructors should try to find effective ways of engaging the students in learning pediatric nursing and acquire clinical abilities.

Pediatric nursing course is a core course in the curriculum given to third-year nursing students and focuses on caring for children during various physiological and organ dysfunctions or problems. Due to some problems that nursing students encounter in this course, there has been a call for methodology changes to prepare learners for improvement transfer of knowledge into practice by enhancing students' skills in nursing process along with developing self-directed study skills and students' presentation skills (Al-Kloub, Salameh, & Froelicher, 2014). Hence, the use of an instructional strategy which will support retention of knowledge and self-direct

learning which enables students to adapt to a changing practice environment will be deemed necessary.

It is often argued that development, learning, and higher mental functions take place through social interactions (Smagorinsky, 2013; DeVries, 2000; Vygotsky, 1978). Besides, by appropriate communication, collaborative learning environments will distribute cognitive load among the members of the group (Kirschner, Paas, & Kirschner, 2009; Hmelo-Silver, 2004). Doing so, the learner can almost effortlessly solve the problems which need high mental effort from the nurse (Chant, Jenkinson, Bandle, Russell, & Webb, 2002). Such ability not only develop through collaboration among the learners, but also through dialogues with the target community and in professional environment (Du, Su, & Jingling, 2013). The graduate nurse should have distinct communication skills and provide client- centered care and respond to health care needs so that he/she can reinforce the patient (Creedy et al., 1992).

Although communication is a critical element of nursing education (Kameg, Howard, Clochesy, Mitchell, & Suresky, 2010), and communication skills are vital for the nursing profession, evidence shows that nurses lack skills in communication due to inadequate training (Alasad & Ahmad, 2005), and the traditional strategies fail to provide the nursing learners to develop these skills. Therefore, it is important that new strategies be used to enable them to enhance communication, interaction and collaboration with one another at work to co-construct the required information and increase their understanding of nursing concepts and their clinical practices (Barnett, Hollister, & Hall, 2011; Gwee, 2009; Seren & Ustun, 2008; Hwang & Kim, 2006; Mamede, Schmidt, & Norman, 2006; Ustun, 2006; O'Donnell & O'Kelly, 1994).

It has been more than 40 years that PBL as a student-centered strategy has been substituted for traditional ones and there exists empirical research evidence in support of problem-based learning (Sangestani & Khatiban, 2013; Shin & Kim, 2013; Gwee, 2009; Hwang & Kim, 2006; Tiwari, Chan, et al., 2006). Nevertheless, findings of some studies and meta-analysis have revealed a number of gaps in the PBL literature. For instance, the results were mixed and the students' performance on basic science examinations were sometimes lower (Choi et al., 2014; Yuan et al., 2011; Kirschner, Sweller, & Clark, 2006; Dochy et al., 2003; Colliver, 2000). Also, little has been done to reveal what exactly take places in a PBL class to nurture nursing trainees the required skills.

Recent search of literatures also indicated that little investigation has been conducted on the applications of PBL in the educational system of Iran (Sangestani & Khatiban, 2013; Hassanpour Dehkordi & Heydarnejad, 2008; Vahidi et al., 2007). In particular, no research has been carried out on comparing of Traditional Problem-Based Learning (TPBL) and Hybrid Problem-Based Learning (HPBL) applications in the education of Pediatric Nursing. It should also be mentioned that no research has yet been done on the relevance of cognitive load theory and instructional efficiency in nursing education in Iran (Aien & Noorian, 2006). In addition, there are some barriers to administer the PBL strategy in Iran, namely, the large numbers of enrolled students and the lack of staff with sufficient skills and experience in PBL (Vahidi et al., 2007). In this regard, Borhan (2012) suggested the suitability of Hybrid PBL approach and a gradual PBL foreword throughout the academic years at times when PBL is new to students because hybrid course or a blend of PBL and traditional

lecture can develop learners' ability to solve problems in a large classroom setting (Klegeris & Hurren, 2011).

However, as mentioned above, most schools of nursing in Iran have not been able to do a complete curriculum change, chiefly because of inadequate evidence that shows advantages of the PBL methods in Iran. Therefore, an experimental study that looks over carefully and critically compares the impact on students' learning outcome of PBL variations versus the traditional lecture method in a large group in nursing field with one facilitator or floating tutor among several small groups seems necessary.

1.3 Purpose of the Study

The purpose of this study is to investigate the effects of three teaching strategies which include Traditional Problem-Based Learning (TPBL) strategy, Hybrid Problem-Based Learning (HPBL) strategy, and Conventional Teaching and Learning (COTL) strategy in Pediatric Nursing. Effects of the three strategies on students' cognitive related, affective, and communication skills variables were examined. Specifically, the subjects of this study were Pediatric Nursing students on learning of Pediatric Nursing Care and Organ Dysfunctions. The variables or constructs understudy include performance, mental effort, instructional efficiency, metacognitive awareness, motivation toward learning and communication skills. The objectives of the study are presented into three categories, namely the posttest phase, the delayed posttest phase and the repeated measures analyses.

1.3.1 Objectives and Hypotheses of the Study – Posttest Phase

In this phase, the effects of the three instructional strategies were examined. The effects of the TPBL, HPBL, and COTL strategies were examined based on cognitive related, affective and communication skills variables. Specifically, the objectives of the cognitive variables are as follows:

1.3.1.1 Research Objectives Related to Cognitive Variables – Posttest Phase

1. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' overall performance in the Pediatric Nursing;
2. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' higher-order questions performance in the Pediatric Nursing;
3. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' lower-order questions performance in the Pediatric Nursing;
4. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' invested mental effort in solving Pediatric Nursing problems;
5. To compare the instructional efficiency index in learning Pediatric Nursing between the TPBL, HPBL, and COTL instructional strategies;
6. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' overall metacognitive awareness in solving Pediatric Nursing problems;

7. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' metacognitive awareness subscales (knowledge of cognition and regulation of cognition) in solving Pediatric Nursing problems.

1.3.1.2 Research Hypotheses Related to Cognitive Variables – Posttest Phase

According to the above research objectives for the posttest phase of this study, the following research hypotheses were tested:

HA1 There is a significant difference in the mean overall performance in Pediatric Nursing between the TPBL, HPBL, and COTL groups.

HA2 There is a significant difference in the mean performance in Pediatric Nursing related to higher-order questions between the TPBL, HPBL, and COTL groups.

HA3 There is a significant difference in the mean performance in Pediatric Nursing related to lower-order questions between the TPBL, HPBL, and COTL groups.

HA4A There is a significant difference in the mean mental effort invested during learning phase in solving of Pediatric Nursing problems between the TPBL, HPBL, and COTL groups.

HA4B There is a significant difference in the mean mental effort invested during test phase in solving of Pediatric Nursing problems between the TPBL, HPBL, and COTL groups.

HA5 There is a significant difference between the TPBL, HPBL, and COTL groups in their instructional efficiency index.

HA6 There is a significant difference between the TPBL, HPBL, and COTL groups in students' mean overall metacognitive awareness when solving Pediatric Nursing problems.

HA7A There is a significant difference between the TPBL, HPBL, and COTL groups in students' mean metacognitive awareness related to knowledge of cognition subscale when solving Pediatric Nursing problems.

HA7B There is a significant difference between the TPBL, HPBL, and COTL groups in students' mean metacognitive awareness related to regulation of cognition subscale when solving Pediatric Nursing problems.

1.3.1.3 Research Objectives Related to Affective Variables - Posttest Phase

8. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' overall motivation towards learning of Pediatric Nursing;
9. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' motivation towards learning subscales (attention, relevance, confidence and satisfaction) of Pediatric Nursing.

1.3.1.4 Research Hypotheses Related to Affective Variables - Posttest Phase

HA8 There is a significant difference between the TPBL, HPBL, and COTL groups in students' overall motivation towards learning of Pediatric Nursing.

HA9A There is a significant difference between the TPBL, HPBL, and COTL groups in students' motivation towards learning for attention subscale of Pediatric Nursing.

HA9B There is a significant difference between the TPBL, HPBL, and COTL groups in students' motivation towards learning for relevance subscale of Pediatric Nursing.

HA9C There is a significant difference between the TPBL, HPBL, and COTL groups in students' motivation towards learning for confidence subscale of Pediatric Nursing.

HA9D There is a significant difference between the TPBL, HPBL, and COTL groups in students' motivation towards learning for satisfaction subscale of Pediatric Nursing.

1.3.1.5 Research Objective Related to Communication Skills Variable – Posttest Phase

10. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' communication skills in Pediatric Nursing.

1.3.1.6 Research Hypotheses Related to Communication Skills Variable – Posttest Phase

HA10A There is a significant difference between the TPBL, HPBL, and COTL groups in students' communication skills in Pediatric Nursing evaluated by the simulated patient.

HA10B There is a significant difference between the TPBL, HPBL, and COTL groups in students' communication skills in Pediatric Nursing evaluated by the facilitator.

1.3.2 Objectives and Hypotheses of the Study – Delayed Posttest Phase

In the delayed posttest phase, the effects of the three instructional strategies were examined based on overall performance, higher-order and lower-order questions performance, mental effort, and instructional efficiency variables. Specifically, the objectives of the delayed posttest phase are as follows.

1.3.2.1 Research Objectives Related to Cognitive Variables - Delayed Posttest Phase

1. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' overall performance in the Pediatric Nursing;
2. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' higher-order questions performance in the Pediatric Nursing;
3. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' lower-order questions performance in the Pediatric Nursing;

4. To compare the effects of TPBL, HPBL, and COTL instructional strategies on students' invested mental effort in solving Pediatric Nursing problems;
5. To compare the instructional efficiency index in learning Pediatric Nursing between the TPBL, HPBL, and COTL instructional strategies.

1.3.2.2 Research Hypotheses Related to Cognitive Variables - Delayed Posttest Phase

According to the above research objectives for delayed posttest phase of this study, the following research hypotheses were tested:

HA1 There is a significant difference in the mean overall performance in Pediatric Nursing between the TPBL, HPBL, and COTL groups.
HA2 There is a significant difference in the mean performance in Pediatric Nursing related to higher-order questions between the TPBL, HPBL, and COTL groups.
HA3 There is a significant difference in the mean performance in Pediatric Nursing related to lower-order questions between the TPBL, HPBL, and COTL groups.
HA4 There is a significant difference in the mean mental effort invested during test phase in solving of Pediatric Nursing problems between the TPBL, HPBL, and COTL groups.
HA5 There is a significant difference between the TPBL, HPBL, and COTL groups in their instructional efficiency index.

1.3.3 Objectives and Hypotheses of the Study – Repeated Measures at Posttest and Delayed Posttest

To support effectiveness of the three instructional strategies, the following objectives were considered:

1.3.3.1 Research Objectives Related to Cognitive Variables - Repeated Measures at Posttest and Delayed Posttest

1. To compare the effects of TPBL, HPBL and COTL instructional strategies on students' overall performance over repeated times;
2. To compare the effects of TPBL, HPBL and COTL instructional strategies on students' higher-order questions performance over repeated times;
3. To compare the effects of TPBL, HPBL and COTL instructional strategies on students' lower-order questions performance over repeated times;
4. To compare the effects of TPBL, HPBL and COTL instructional strategies on students' invested mental effort over repeated times;
5. To compare the effects of TPBL, HPBL and COTL instructional strategies on students' instructional efficiency index over repeated times.

1.3.3.2 Research Hypotheses Related to Cognitive Variables – Repeated Measures at Posttest and Delayed Posttest

HA1 There is a significant difference in the mean overall Pediatric Nursing performance between TPBL, HPBL and COTL groups over repeated measures at posttest and delayed posttest (across the two time periods).

HA2 There is a significant difference in the mean higher-order questions' performance between TPBL, HPBL and COTL groups over repeated measures at posttest and delayed posttest (across the two time periods).

HA3 There is a significant difference in the mean lower-order questions' performance between TPBL, HPBL and COTL groups over repeated measures at posttest and delayed posttest (across the two time periods).

HA4 There is a significant difference in the mean invested mental effort between TPBL, HPBL and COTL groups over repeated measures at posttest and delayed posttest (across the two time periods).

HA5 There is a significant difference in the mean instructional efficiency between PBL, HPBL and COTL groups over repeated measures at posttest and delayed posttest (across the two time periods).

1.4 Significance of the Study

In recent decades, instructional design has witnessed a major shift from behaviorism to constructivism due to a response to renovation and complexity in human knowledge. Accordingly, researchers have focused on some constructivism goals such as problem-solving, higher thinking skills, and practical use of knowledge by new teaching and learning strategies in the nursing classrooms (Shin & Kim, 2013; Parker & Myrick, 2009). However, a few of teaching methods and researches have been done without concordance with constructivism environment. According to the available researches, little investigation has been conducted on the applications of problem-based learning in the educational system of Iran (Sangestani & Khatiban, 2013; Hassanpour Dehkordi & Heydarnejad, 2008; Vahidi et al., 2007). In particular, scanty research has been found about PBL application in the education of Pediatric Nursing (Aien & Noorian, 2006). Thus, this study is focused on designing of valuable problem-based strategies for Pediatric Nursing course, based on the theories of constructivism. In fact, it would generate new findings using PBL for teaching and learning Pediatric Nursing course. The design of the PBL is implemented to enhance higher-order performance among learners and to fill the gap between theory and practice.

Applying PBL strategies can improve student's cognitive abilities and student's metacognitive awareness in problem solving (Kong, Qin, Zhou, Mou, & Gao, 2013; Sangestani & Khatiban, 2013; Rowan, McCourt, & Beake, 2009; Hmelo-Silver, 2004; Creedy et al., 1992). Considering the base theories such as constructivist learning theory, Vygotsky's theory, and cognitive load theory and knowing that the applied strategies in education rely on which aspects of these theories, we can design and develop effective educational systems (situations) through more proper strategies. More effective strategies and situations for education can be designed considering the Cognitive Load (CL) ability, the role and the limited capacity of the short-term memory, and the zone of proximal development boundary (Levykh, 2008;

Harland, 2003). It is expected that by using TPBL and specifically HPBL strategy in education and learning of Pediatric Nursing, CL gets reduced and the students will be able to have a better learning by guiding in zone of proximal development boundary and using their working (short-term) memory because we need to maintain the learner's CL in the least minimum amount and instruct the learners based on their zone of proximal development for keeping the effective learning environment. Moreover, the students will be able to control and lead their learning processes through different stages if they are active in learning and aware of the learning process. So, the findings from this study would be significant because this study takes a fresh look at different strategies from a new dimension, that of CLT. It is hoped that finding from this study can shed new light on the benefits of the use of TPBL and HPBL in nursing.

Future PBL researchers should specify how PBL is used in different disciplines, conditions and contexts (Dolmans & Gijbels, 2013; Shin & Kim, 2013; Ravitz, 2009). Because of the gap among the researches about TPBL (Yuan et al., 2011; Kirschner et al., 2006; Dochy et al., 2003), through this research, the researcher may find out that a suitable strategy based on CLT and appropriate classroom processes can have an effective role in education and learning. Therefore, the results of this study may help as a systematic design and implementation of alternative teaching and learning strategies, especially guidance in zone of proximal development by a facilitator in a large classroom in HPBL. It may offer learners more meaningful learning experiences in nursing process. In addition, the educational design of this study can be used for future research which aims to analyze the effectiveness of PBL in education by having a new perception of the CLT and the Vygotsky's ZPD as a feasible constructivism framework. It is a vital investigation into this issue, because many universities spend a lot of cost and time on running or accomplishment their PBL strategies. So, the researcher can investigate the previous contradictions by using the findings of this research.

Therefore, in response to the challenges of increasingly complex patterns of health care, the findings of the current study will provide information for curriculum development designers, and the educational policy of the Ministry of Health in Iran to apply the above materials and strategies in workshops, relearning and educational programs of nursing. Instructors need to shift their curriculum focus on process-oriented learning. One of the novelties is the inclusion of some credits in the program to provide an opportunity to incorporate knowledge, attitude, and skill in the analysis of practice problems. Hereof, problem-based learning can be applied as a method for these courses. PBL is a strategy of learning which uses authentic problems as a stimulus for students to learn problem-solving skills and obtain knowledge of the basic and clinical sciences. Accordingly, this study is useful to educators and teachers who are seeking to better identify the impact of instructional design on students' learning achievement. This study can also be particularly valuable to nursing lecturers to find some aspects of this study useful as they struggle to identify appropriate strategies for offering appropriate tutoring in a large classroom of PBL.

1.5 Limitations of the Study

As in other studies, this study has a few limitations which need to be taken into consideration. Firstly, four main topics of organ dysfunction with high prevalence in Pediatric Nursing syllabus were used in this study and the intervention was done over eight weeks of teaching sessions. The course was selected because the course contents are heavily emphasized in the nursing licensure examination. The selection of the PBL approach for presentation of this course was also suggested by previous researchers who suggested that the approach is very useful for teaching of nursing topics (Baker et al., 2007; Young & Patterson, 2007; Hwang & Kim, 2006; Ustun, 2006) to juniors learning the most common and less complicated topics such as respiratory and gastrointestinal systems and at latter stages more complicated topics (Zhang, 2014). Furthermore, these conditions turned out to be of higher frequency of occurrence among the children referring to the pediatric wards in the area of the study (Higher Council of Planning in Medical Sciences, 2007). Although the majority of the students benefited the mode of learning, the results might be suitably generalized only to courses of similar contents and level.

Secondly, since the researcher could not change the usual planning of the universities to randomize the assignment of the subjects to different groups, the study included only intact classes of third-year nursing students in a bachelorette program in two Universities of Islamic Azad University in Iran who had nursing students that had selected Pediatric Nursing course at the same time. However, results of prior performance test and pretest of metacognitive awareness indicated that the experimental (TPBL and HPBL) and COTL groups were homogenous. Therefore, it should be mentioned that the findings of the study can only be generalized to the similar population and not to the others.

1.6 Definitions of Terms

The definitions of terms used in this study are explained as follows. These terms include TPBL instructional strategy, HPBL instructional strategy, COTL instructional strategy, overall test performance, performance at higher-order questions, performance at lower-order questions, mental effort, instructional efficiency, metacognitive awareness, motivation towards learning, and communication skills.

1.6.1 Traditional Problem-Based Learning (TPBL) Instructional Strategy

PBL is an instructional strategy in which students learn through solving complex and real-world problems (Hmelo-Silver, 2004). Traditional Problem-Based Learning Strategy in this study refers to the use of the Traditional or full PBL in small-group setting without presenting lecture in the teaching and learning of Pediatric Nursing topics. Learning, in this strategy, began with presenting a problem in the form of a trigger or problem to the students. They learned through active participation in small groups in a large classroom where the problems of Pediatric Nursing course would be facilitated and managed by a floating tutor amongst several small groups. This floating facilitator allots 5-10 minutes to each small group in each cycle combined

with intermittent large group discussions during the PBL process. Normally, definite objectives provide a source for the problems or triggers through which stimuli are provided for students' thinking and learning. In such a class, in case of need, minimal guidance by the tutor was supplied.

1.6.2 Hybrid Problem-Based Learning (HPBL) Instructional Strategy

HPBL means combination of TPBL with other learning strategies such as lecture (Gwee, 2009). Armstrong (1997) stated that "hybrids usually display strength and adaptability" (p. 138). HPBL strategy in this study refers to the combination of conventional (lecture) and TPBL strategies for each main topic of the Pediatric Nursing. These subjects include general subjects such as biological development and assessing of child with highlighting of differences between children and adults, and also given one example on topic dysfunction that were presented by mini lecture in a constructive manner and specific subjects or diseases were presented by TPBL strategy. The lecturer through the mini lecture stimulates prior knowledge to be linked with new information. Assisting entering learners to elucidate their preconceptions may ease a more complicated view of consistency in PBL-based programs and may reduce early stress and anxiety (Landeen, Jewiss, Vajoczki, & Vine, 2013). Moreover, Carriger (2015) suggested blend approach in order to produce both knowledge attainment and knowledge application. Also, at the end of each HPBL lesson, a short feedback session and summarization of 15 minutes were provided to students by the lecturer. Summarization as a method can be an effective learning strategy for students who are already skilled at summarizing and it can improve students' learning, understanding, and retention of course content (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013).

1.6.3 Conventional Teaching and Learning (COTL) Instructional Strategy

Conventional Teaching and Learning (COTL) instructional strategy is a traditional subject-based and teacher-centered method in which the teacher decides what is important and tells students what to learn (Young & Patterson, 2007; Candela, Dalley, & Benzel-Lindley, 2006). According to the traditional teaching approach, notions and ideas are presented to the students via lectures from the educators (Young & Patterson, 2007). In this study, COTL is defined as a strategy through which the instructor presents all the Pediatric nursing course topics to the whole class through lecture without allowing for any small group discussion.

1.6.4 Overall Test Performance

Performance is "defined as the effectiveness in accomplishing a particular task; it is often measured by speed, accuracy, or, in educational setting, test scores" (Paas & VanMerrienboer, 1993, p. 738). The overall test performance in this study refers to students' overall performance based on the Pediatric Nursing Performance Test (PNPT) score. PNPT reveals the ability of students specifically to exhibit their understanding of Pediatric Nursing course topics learnt during the experiment. The PNPT included topics such as Fluid and Electrolytes Disturbance, Renal

Dysfunction, Respiratory Dysfunction, and Gastrointestinal Dysfunction. The overall test performance refers to the student's total score on higher-order questions (analysis, synthesis, and evaluation) and lower-order questions (knowledge, comprehension, and application) developed by the researcher. This classification has been made by the researchers (Park & Kim, 2015; Zheng, Lawhorn, Lumley, & Freeman, 2008; Stiller & Dunbar, 2007; Visschers-Pleijers, Dolmans, Wolfhagen, & van der Vleuten, 2005; Rothenberg, Mcdermott, & Martin, 1998; Ayaduray & Jacobs, 1997).

1.6.4.1 Performance at Higher-order Questions

Novel answers are needed for higher-order questions so that they cannot simply be recalled (Renaud & Murray, 2007). Performance at higher-order questions in this study matches the student's score on top three levels within Bloom's (1966) taxonomy educational objectives within the cognitive domain, that is, analysis, synthesis, and evaluation which was assessed by Pediatric Nursing Performance Test (Gronlund, 2004). This classification of cognitive process to lower and higher level objectives or thinking skills is similar to the original and revised Bloom's taxonomies (Woolfolk, 2008; Pintrich, 2002). In this taxonomy, as individual moves from the bottom levels up the hierarchy, the actions require more sophisticated thinking skills. Actually, "learning experiences focused around analysis, evaluation, and synthesis, develop skills in problem solving, inferring, estimating, predicting, generalizing and creative thinking" (Pappas, Pierrakos, & Nagel, 2013; Miri, David, & Uri, 2007, p. 355). Higher order thinking includes breaking down complex materials into simpler parts, identifying relationships, integrating new and familiar information creatively by rearranging components into a new whole or context, and combining and using all previous levels in evaluating or making criticisms and judgments (Omar et al., 2012).

1.6.4.2 Performance at Lower-order Questions

Lower-order questions are meant to elicit existing answers (Renaud & Murray, 2007). Performance at lower-order questions in this study means the student's score on bottom three levels within Bloom's (1966) taxonomy educational objectives within the cognitive domain, namely, knowledge, comprehension, and application which was assessed by performance test (Gronlund, 2004). Here, the learner understand the concept and uses meaningful information such as applying routine rules to familiar or novel problems in new situations (Omar et al., 2012). These "lower levels require less sophisticated thinking skills" (Pappas et al., 2013, p. 56).

1.6.5 Mental Effort

Mental effort refers to the amount of cognitive capacity that is actually allocated to hold the task (Van Gog & Paas, 2008; Kirschner, 2002; Paas, 1992; Paas, 1992). The amount of invested mental effort is defined by Salomon (1984) as "the number of non-automatic elaborations applied to a unit of material" (p. 648). In this study, mental effort was measured by a rating scale technique while participants were working on a task to translate their perceived amount of invested mental effort into a

numerical value. So, it can be considered to reveal the actual cognitive load. The task can be either an instructional task that is during the learning phase or a test task (after learning phase) designed to measure learning outcomes (Paas, Tuovinen, Tabbers, & Van Gerven, 2003). The nine-point symmetrical rating-scale technique is designed by Paas (1992) and Paas, Van Merrienboer and Adam (1994) and ranging from very, very low mental effort (1) to very, very high mental effort (9). This unidimensional 9-point symmetrical category rating scale provided participants with each item on which they had to translate their perceived amount of invested mental effort into a numerical value (Paas, Tuovinen, et al., 2003).

1.6.6 Instructional Efficiency

Instructional efficiency refers to a two- Dimensional index, that is, measure of mental effort and measure of performance, through which information on the relative efficiency of instructional conditions is measured. Mental effort in conjunction with task performance measures will give us a better, more delicate indicator of the quality of learning outcomes. Such information may help to avoid situations of excessive mental workload in the performance of complex cognitive tasks that happen frequently and to predict which configurations will maximize performance efficiency (Van Gog & Paas, 2008; Pass & VanMerrienboer, 1993). Instructional efficiency measures are calculated using Kirschner, Paas, Kirschner, and Janssen (2011; 2009) procedure of the two-dimensional (two-D) instructional efficiency index for each participant using the formula: $E= [(P-R)/2^{½}]$ Where P = performance and R = mental effort. High efficiency was indicated by a relatively high test performance in combination with a relatively low mental effort rating. In contrast, low efficiency was indicated by a relatively low test performance in combination with a relatively high mental effort rating.

1.6.7 Metacognitive Awareness

Metacognition is defined by Young and Peterson (2007) as a:

> Higher order thinking that engages thinking about thinking-reflecting on a situation, reviewing what is known, correcting hypotheses, deciding what needs to be learned/done, questioning new information, and deciding how new information fits with what is known, (p. 571).

Also Schraw and Denisson (1994) defined the metacognition as "the ability to reflect upon, understand, and control one's learning" (p. 460). In this study, metacognitive awareness refers to levels of students' awareness on two main metacognitive subscales namely, knowledge of cognition and regulation of cognition, during Pediatric Nursing problem solving stage that indicates the ability of learners to reflect, know, understand, and control their learning by different strategies that are assessed by 52-item Metacognitive Awareness Inventory (MAI).

Knowledge of cognition refers to students' knowledge about cognitive processes to control them and students' perceptions from their ability to organize the information related to the Pediatric Nursing problems, control over how to solve or process

Pediatric Nursing problems and recognize the most important information in the problems when they process Pediatric Nursing problems. Altogether 17 items with 5-point Likert scale rating were used to measure the level of metacognitive awareness for the knowledge of cognition subscale.

Regulation of cognition consisted of five self-regulatory mechanisms and control aspect of learning including planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. In this study, regulation of cognition refers to students' activities to oversee theirs learning and their perception from their ability to set and allocate resources prior to learning and organizing their time during Pediatric Nursing problems. It also indicate perception on checking several ways to process Pediatric Nursing problems and choosing the best answer, focusing on the meaning and significance of new information of the Pediatric Nursing problems and reviewing their problem solving process. Altogether 35 items with response in Likert scale were used to measure the level of metacognitive awareness for the regulation of cognition subscale.

1.6.8 Motivation towards Learning

According to Keller (2009), motivation refers to a person's desire to follow a goal or perform a task. Instructional design can influence motivation through systematic effort (Keller, 1979). Based on Keller (2008) learning must concern learner motivation and motivation can stimulate leaning and performance by valuable efforts. Instructors are more considered creating learning materials and environment that motivate learning (Keller, 2009). To maximize the motivational qualities of a learning situation it is helpful to use a systematic motivational design process like ARCS model (Attention, Relevance, Confidence, and Satisfaction), which provides direction in creating motivational tactics that match student characteristics and desires. This model is the most suitable instrument in the field of instructional design. In this design, Attention defined as capturing the interest and stimulating the curiosity of students to learn. Relevance factor guarantees to meet the personal needs and goals in order to be perceived a positive learning attitude. Confidence also defined as measure of the amount of helping the learners to believe and feel that they will succeed and control on their expectancy of success. Lastly, Satisfaction is related to reinforcing accomplishment which can also be influenced by some external factors such as instructor rewards, social values, superiority of instruction and availability of resources that allows students to feel good about their experiences (Keller, 2009). According to Keller instructors should choose motivational tactics based on the information and characteristics of the students, the situations, and identified motivational problems. So, motivational strategies may have been as closely targeted to the real motivational needs of students as would be desirable (Song & Keller, 2001).

In this study, motivation towards learning refers to the type of motivation the students have toward learning of Pediatric Nursing course that is stimulates through the materials of different strategies (COTL, TPBL, and HPBL) and was measured using Instructional Materials Motivation Survey (IMMS).

1.6.9 Communication Skills

The set of skills enabling students to convey information and have a dynamic verbal and nonverbal interpersonal relationship are known as communication skills (Light, 1989) which affects the quality of healthcare (Kurtz, Silverman, & Draper, 2005). In this study, the Communication Skills Checklist (CSC) was used to measure general students' interpersonal relationship through seven main competencies at the time they encounter the Simulated or Standardized Patient (SiP). This CSC was adopted from Bayer-Fetzer Kalamazoo consensus group (Makoul, 2001) as a baseline, then it was adapted with literature regarding nurse-patient relationship (Robinson-Smith, Bradley, & Meakim, 2009; Gude et al., 2005; Vessey & Huss, 2002; Makoul, 2001; Marita, Leena, & Tarja, 1999) to measure students' competency and sub-competency in communication skills.

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