RESEARCH ARTICLE

PARADIGM SHIFT OF LEARNING: PROBLEM -BASED LEARNING IN NURSING EDUCATION- REVIEW ARTICLE

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Manuscript Info	*Abstract*
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Problem-based learning (PBL) is one of the most important innovative, effective and valuable instructional teaching strategy in which students can draw upon prior knowledge, learn within the real-world context, and reinforce the knowledge through independent and small group work. It challenges students to "learn to learn," prepares students to think critically and analytically, and to find and use appropriate learning resources working cooperatively in groups to seek solutions to real world problems. This article provides framework for the development of problem- based learning with essential concepts.

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Introduction:-
A "Problem" is a trigger that acts as the starting point for any moment of learning in any of the creature in the universe and it is a nutritive agent in the process of effective learning. Learning is the pursuing experiences pervades in human life from cradle to grave across in almost every walk of our life. Traditional methods of teaching are teacher oriented, providing static information and failing to enhance the professional qualities of the scholars. New and innovative methods have been explored to enhance the quality of nursing graduates among the competitive world. [1] Problem- Based Learning (PBL) is one of the novel techniques which have been successfully implanted in majority of the health schools and colleges in developed countries. It is one of the unique and vital learning method which uses real practice situation problems as a starting point working, as a stimulus or trigger for the acquisition and integration of new knowledge.[2]The PBL adopts the philosophy of adult learners and lifelong learning. Lifelong learning means that every nurse has to continue learning throughout of their life; nurses are the sole responsibile for their own learning process.[3]

PBL is student-centered, energizer, rote learning method, and a motivating tool that encouraging the students to become more thoughtful problem-solvers. It promotes life-long habits of active learning: the most effective technique for learning, applying, integrating, and retaining information.[4] PBL is one of the most common innovative teaching approach that guides students to find the best solutions of real-world problems through cooperative group work.[5] PBL is intended to equip students with hands-on learning strategies to stimulate students to acquire and apply information to solve problems to help them meet their future responsibilities and establish a lifelong knowledge-seeking habit which is self-directed learning, self-appraisal, clinical problem-solving skills, teamwork, discipline,

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and integration of information through independent and small group work.[6]PBL is an approach to learning that focuses on dissection and discussion of problems or cases in small groups usually supervised by one or more expert tutor(s) or instructor(s). [7]

History of Problem -Based Learning:

Problem-based learning (PBL) as an innovative, effective and valuable teaching strategy and curricular design that originated at McMaster University in Canada and it was proposed by Barrows in the 1960s.[2]In early 2000s, administrators and educators at McMaster started the renewing process of the undergraduate MD curriculum. They first conducted an environmental scan that included input from medical residents (Lohfeld, Neville and Norman, 2005). They interviewed 17 medical residents, enrolled at McMaster at the time, who were graduates of 6 Canadian medical schools. The results of the study showed that PBL was well known even by graduates of non-PBL medical schools. Tutors are playing key components to a successful PBL program, should be knowledgeable about the content area under study and able to effectively facilitate groups. Students need to be prepared, willing to participate in peer teaching and supportive of the group learning process.[8]

This method of teaching and learning is considered as a quite fast method and within a few years of its conception, there were PBL curricula in the Netherlands, Australia, Israel and the United States. Now many schools offer some form of problem-based learning. In contrast to traditional, teacher-centered education, where learning is focused on discrete subject-related course, problem-based education is student-centered, in the context of a case-scenario Effective PBL Learning is driven by complex situations, open-ended problems and is facilitated by a tutor, and students work in small groups.[9]

Definition (s) of Problem-Based Learning:

According to John Dewey(1916) stated that PBL is a careful inspection of methods which are permanently successful in formal education.[10] As per H. Barrows and R. M. Tamblyn (1976) Problem -Based Learning (PBL) which is "the learning that results from the process of working towards the understanding of, or resolution of, a problem".[11] In the words of Barrows (1980) explained as "The learning that results from the process of working toward the understanding and resolution of a problem." [2] D.L Bound(1985) has said that, problem- based learning is student-centred leaning approach in which students collaboratively solve the problems and this reflects on their experience. In PBL, The starting point is a problem, a query, or a puzzle that the learner wishes to solve[12]. It is noteworthy that PBL "is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem". In viewing all the definitions, readers may understand the main aim of PBL is to help students to develop knowledge, problem-solving skills, and the motivation to learn, thus becoming independent learners.

Concepts of Problem-Based Learning:

1. We believe that problems are not meant for us; its' they belongs to someone, neither they should come in our life nor we are ready to face them. Individual with different dimension of the problems have great impact in their life. In Problem -Based Learning (PBL) method students use "triggers" from the problem case or scenario to define their own learning objectives.
2. In PBL students work in small groups to increase knowledge by identifying learning objectives, engaging in self-directed work & participating in discussion. It provides students with greater access to information, support, resources, flexible approaches to learning, collaborative learning activities and opportunities for self development so that can get results in higher levels of structural environment.
3. PBL is a student-centered approach: Student-centered and learner-empowering problem based learning curricula need to be relevant and meaningful to the individual learner, provide motivation for learning and facilitate the development of independent and inter-independent learning.
4. PBL is an innovative and instructional teaching strategy will boost the individual capacities at the maximum learning. This was supported the systematic review and meta-analysis was to evaluate the problem-based learning (PBL) method between the period from 1980 to 2016, a total of 1,057 relevant studies were initially searched, of which 21 studies were screened and included in the systematic review and meta-analysis. There was a significant difference in the scores (standardized mean difference [SMD]=0.80, 95% CI [0.52, 1.08], P<0.000) in favor of PBL, compared with the lecture-based method. The results of this systematic review showed that using PBL may have a positive effect on the academic achievement. [13]
5. It is a new method of interaction that enhances students' ability to critically apply cumulative knowledge to actual clinical problems. Through problem- based learning the learner would exercise the rational examination

of ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs, and actions. It helps students to think critically and solve problems. It helps students to be in charge of their own learning. It helps them to identify what they know and what they do not know.

6.   It is an instructional approach where students learn by solving challenging, open-ended problems. The problems are authentic tasks and are solved in socially and contextually based teams of students.

7.   Critical thinking and creativity are the two main expected results of the PBL. Creativity is important to explore the different possibilities of a solution to a clinical situation, aiming at a quality nursing care [14]. A systematic review and meta-analysis was done to estimate the effectiveness of problem-based learning in developing nursing students' critical thinking were undertaken to identify randomized controlled trails from 1965 to December 2012, Most studies were of low risk of bias. The pooled effect size showed problem-based learning was able to improve nursing students' critical thinking (overall critical thinking scores SMD=0.33, 95%CI=0.13-0.52, P=0.0009), compared with traditional lectures. It was found that problem-based learning might help nursing students to improve their critical thinking.[15]

Essential elements of Problem-Based Learning:
Problem- based learning involves certain essential elements in it, they are...

Design a learning environment:
A class discussion, group dialogue, or an individual reading assignment should be used to frame the topic or subject of interest. By illustrating or narrating, with background information to the students, they will be able to apply their new knowledge and previous experiences to the proposed task.

Dimension of the problem
Encourage the learners to understand and explore the problem with all dimension, process, and solution. Create and facilitate a learning environment to support and challenge learners' thinking: Encourage students to exhibit their own personal experiences and previous knowledge to the new problem. A cognitive conflict is meant to cause to questions their beliefs and to "dig deep" to find meaning and insight into the proposed issue. It is also imperative to recognize that you will most likely have a wide variety of learning styles in your classroom. Encourage students to use learning strategies and tactics that work best for them. Create a positive and welcoming learning environment by being approachable; open to new perspectives, and willing to adjust the different instructional style to meet a wide range of learning styles.

Develop skill in extracting problem
Problem-based learning narratives present students with specific information, a scenario, or a fact pattern. Identify the problem with inward and outward aspects are challengeable task. It is imperative that students be able to complete this crucial step in the problem-based learning process. Problem recognition helps students to develop a valuable diagnostic skill.

Design an authentic task
An authentic task has the potential to foster meaningful, intellectual accomplishment and learning since authentic learning activities are directly related to students' real-life experiences. All the time there is a common sentence of hearing from the students that they do not perceive the relevance of the academic learning tasks assigned. If the learning tasks are authentic, then students can make direct connections between the new material and their prior experiences. They can also apply the new material to their current practice and future activities.

Provide opportunity for support and reflection on the content and process
Allow students to reflect on their past experiences, new knowledge, and the solutions. This is a critical component of learning and determining what the next step is in implementing the new knowledge.

Characteristics of PBL
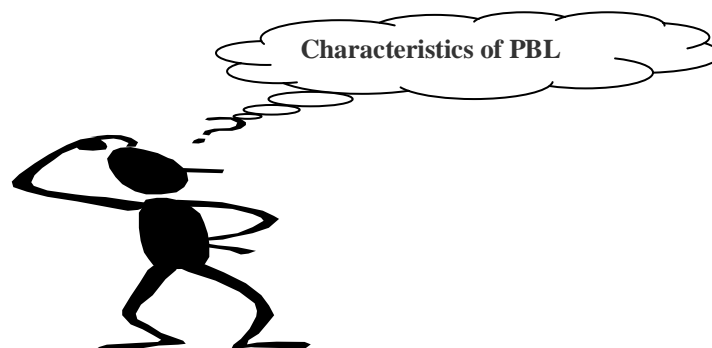
1. A problem is the stimuli, trigger, keys, crunching or squeezing compulsion tool for any start of learning.
2. Problems of a systemic nature requiring the collaboration of many different minds from a variety of backgrounds.
3. Problems are the transporter for the development of problem solving skills.
4. Problem focus from the outset Initial enquiry and identification of learning needs
5. Learning is student-centered and self-active centered.
6. Learner assessment is enhanced by self and peer assessment.
7. PBL creates an environment that permits students to work on the kinds of problems that professionals encounter and to use the perspectives, the knowledge, and the skills that professionals use in attempting to solve them.
8. New information is acquired through self-paced learning, self-interested, self-involved, self- understanding and self- realization learning.
9. The organization of learning processes in response to the problems and learning in small groups.
10. Learning of skills and knowledge in accordance with identified needs.
11. PBL activates students' previous knowledge and experiences.
12. Teacher acts as a meta-cognitive coach or facilitator or guides throughout the PBL process. Perhaps, they will provide the guidance as needed, but encouraging student independence in goal setting and decision-making.

Principles of Problem-Based Learning:
The learning principles of PBL are consistent and connected with philosophical principles of learning is given below:
Principle of Contextual learning:
Contextual Learning assumes that the mind naturally seeks meaning in the environment ie., where the person is located, why the incidents had happened before the person and it does so what kind of relationships that make sense and appear useful." (Hull, 1995). [16]

Principle of Collaborative learning:
New concepts are always embraced or tagged with the past concepts, experiences, individual identification, and personal realization through association or collaboration.

Principle of Conceptual / Constructive learning:
A concept is a general idea, universal in character. Conceptual learning is seen as a means for getting students to think more critically through analytical and synthesis ability about the new subjects, facts, objects, events, people, ideas, and situations they encounter, Learning, therefore, is unique to the individual learner. Constructivism is about learning being an active, contextualized process of constructing knowledge rather than acquiring it. Students adapt their models of understanding either by reflecting on prior theories or resolving misconceptions.

Cognitive conflicts triggers learning:
A stimulus from external or internal context may mimic the low order of thinking (knowing, understanding) or high order of thinking (analysis, synthesis, evaluation and creativity), so that it facilitates the continuous learning.

Principle of active learning:
Learning is an experience, which occurs inside the learner and is activated by the learner.

Principle of continuous and life-long learning:
All living creatures learn. At every stage of life journey the individual engages himself to learn more and more. At one point of the time the learning may be right one and when time moves it may not be adequate, it needs rectification, corrections or revisions. Time, space and context is different from one movement to another movement. So the principle of life-long learning and continuous learning is applicable for effective PBL.

Principle of goal oriented or purposeful activity:
All learning is goal directed. It is the definite of the aim and clear understanding of the purpose which makes an individual learn immediately the techniques of performing a particular task.

Development of lifelong learning skills:
Every moment and every day new problems are faced, new situations are created and it brings essential changes in the individual behavior.

Process of Problem -Based Learning /Steps of Problem-Based Learning

	Situation / Example /Problem/ Scenario/ Case study		
1.	**Identify and search the unfamiliar terms presented or liked with problem:** Problem should be clear, open ended , structured, well defined, and appropriate to the course and represents current challenge. Learner must read, discuss and analyze the various dimension of the problem , identify the key contents, concepts and components of learning. Example: Mr. Smith Xe, 43-year-old, road traffic police and comes to emergency department pain in her chest and shortness of breath that she found it difficult to walk. It has been a recurring problem in recent months and seems to be gradually worse.		
	Steps	**Duration**	**Situation**
2.	Define the problem clear	15 mts	Students may have different views on the issues, but all should be considered; records a list of agreed problems. Explore ideas, arguments, examples and opinions Problems should be appropriate to the stage of the curriculum and the level of the students' understanding - Use present tense , Describe the time, place, persons and roles - Focus on active way ,Explore the issues related problems The above case presentation , the problem would be chest pain, breathing difficulty.
3.	Generating and ranking hypotheses for above problem are listed	30 mts	Formulating questions and quiries(brain stroming)- explore the ideas, arguments and discuss the current knowledge and learning needs and structuring ideas. Is the dyspnea due to infection? Are the symptoms due to cardiac problems? What are the symptoms of allergic? In asthma, are there any symptoms of chest pain and breathing difficulties? Or it may be due to any rib problems?
4.	Organizes the explanations with need based or priority.	**30 mts**	- Problem is to be broad, open & need to stimulate discussion and encourage students to seek explanations for the issues presented. And also seek for additional information is required. e.g., Previous medical problems and relevant drug, family & psychosocial histories, physical exam, lab. Tests, life styles etc. Additional information - Further discussion with her GP reveals that Ms Smith's Xe, had chest pain and shortness of breath come on following exercise, particularly in a cold environment. When she becomes particularly short of breath, she starts to wheeze. She sometimes has a dry cough and has never had haemoptysis. There is no recent history of physical trauma and no personal or family history of heart disease. She had eczema in childhood but has never had asthma. She takes an oral contraceptive pill but no other medication. New information may be the reason of Asthma / Cardiac problem/ Anxiety attacks with hyperventilation/ Possible thromboembolic disease due to oral contraceptive use.
5.	Formulating learning objectives	15 mts	Learning objectives are focused, achievable, measurable, comprehensive, and appropriate. It gives the direction to What students know?What they do not know? What they need to know?to further their understanding of the underlying mechanisms, and their ability to solve the clinical problem. e.g., Students may identify gaps in their knowledge of the mechanics of breathing, anatomy of airways, mechanisms of oxygen delivery to tissues, or mechanisms of pain perception.

| 6. | Reporting back | one week | Conduct individual/group/research activities. All students should contribute to the report-back and their unique perspectives are incorporated into the process of knowledge building and understanding. |
| 7. | Integrating new knowledge | 30 mts -45 mts | Discussing and evaluating information for academic purpose and clinical practices.
Based on the principle that knowledge is consolidated more readily in context, students, guided by the tutor/facilitator, should relate new biomedical knowledge to the patient's problem.
Students are required also to extend their discussion beyond the biomedical and clinical sciences and consider the public health, socioeconomic, ethical and legal aspects of the case. |

Skills required for effective learning in Problem-Based Learning :
There are many soft and cognitive skills are required for bring the effective ways of learning through problem. such as follows: Listening, Teamwork, Presentation skills, reflective skills, cooperation, Recording, self directed learning and use of resources from lessons, exercises, training, media, experts, work places, online courses, library, Critical evaluation of literature etc.

Various roles & Responsibilities in Problem-Based Learning:
Facilitator Role:
The facilitator role allows the faculty member or student mentor to act as content and procedural resource person; Facilitator of group processes; Guide to additional resources.

Instructors role :
The instructor role, making sure students are staying on track and finding the resources they need; identify real-world, complex and open-ended problems such as might be faced in the workplace context or daily life; maintain a balance between providing direct guidance and encouraging self-directed learning; questioning to student groups that deepen the connections they make among concepts.

Students / participants role:
Address the problem, identifying what they need to learn in order to develop a solution and where to look for appropriate learning resources; collaborate to gather resources, share and synthesize their findings, and pose questions to guide further learning tasks for the group.

Various instruments used to assess the effectiveness of Problem-Based Learning
There are several tools or instruments are nowadays are available to assess or evaluate the effective of learning. While doing research work in nursing these tools or instruments serves better ways to assess the outcome of problem–Based Learning.
They are,
1. Dolman's short tutor evaluation questionnaire to assess skill in conducting PBL[17]
2. The generic skills of the students during the brainstorming and presentation sessions were assessed by the tutor using a separate, validated, modified version of standard checklists[18]
3. To evaluate graduates' perspectives regarding the implementation of PBL [19]
4. Assessing students' learning preferences in problem- based learning using VARK (Visual, aural, read, and kinetics)[20]
5. A tool to assess the quality of PBL problems [21]
6. The study aimed to validate a short questionnaire that can be used to assess the degree of complexity and structuredness of PBL problems. The results showed that students were able to distinguish PBL problems that were too simple and those that were too well structured, but found it difficult to distinguish problems that were too complex or too ill structured. [22]
7. Development of problem -based learning training module in nursing education. [23]
8. The short tutor evaluation instrument (11 items) is reliable and valid and can be used for formative and summative purposes. [24]

Advantages of PBL
PBL embraces the principles of good learning and teaching. It is student-directed (which encourages self-sufficiency and is a preparation for life-long learning), and promotes active and deep learning. Some of the advantages of PBL are,
1. PBL Method is an active and cooperative learning; it enhances the ability to think critically and in clinical reasoning.
2. It stimulates the students to use skills of inquiry and critical thinking.
3. It increases ability to apply knowledge in clinical situations.
4. It increases student responsibility for self directed peer learning, peer teaching and peer evaluation.
5. It helps in developing flexible knowledge that can be applied to different contexts.
6. This learning method helps in developing lifelong learning skills.
7. Development of effective self directed learning skills and increased student faculty interaction is facilitated.
8. Increased motivation for learning is the added advantage.
9. Promote collaborative learning, & group dynamics
10. It moves from a positive learning to an active learning becomes the act of discovery.

Disadvantages of PBL
There is no doubt that if the method is not supported wholeheartedly by the academic staff who are required to use it, then it will certainly be less effective. There are several disadvantages of PBL such as
1. Time – consuming assessment
2. If the group is large, it's very difficult to use as a teaching strategies.
3. Measurement of specific learning outcomes is not easy and sometimes may be subjective. Hounsell and McCune (2002)[25] mention that it was difficult to demonstrate positive effects of PBL on outcomes such as knowledge, critical thinking, reflective practice and teamwork, although it does seem to have positive effects on clinical performance, and on students' approaches to studying and motivation (Shin et al., 1993)[26].
1. All types of learning objectives are not comfortable with this method.
2. Effective and proper Training is required for facilitator and instructors.
3. Size of the group and cooperation of the group is important to achieve the learning effectively.

Conclusion:-
PBL is an effective learning method which involves active learning, adult-oriented, problem-centered, student-centered, collaborative, integrated, and interdisciplinary, utilizes small groups and operates in a clinical context. Problem - based learning is based on principles of adult learning theory, including motivating the students, encouraging them to set their own learning goals, and giving them a role in decisions that affect their own learning. When nursing students work in groups, they also can improve their cooperative learning skills. Problem-based learning requires students to think creatively and bring their knowledge to bear in unique ways. It is especially useful for projects that have no one correct solution.PBL may proceed with other traditional methods of teaching (hybrid curriculum) for exercising effective learning. PBL as a paradigm shift requiring fundamental changes in curriculum, delivery and assessment design as well as the conventional teacher/discipline-focused mindsets of institutions and faculties.

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