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RESEARCH ARTICLE

Libyan International Medical University the Libyan Pioneer in Problem Based Learning.

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Traditional methods of teaching are widely used; these methods are based on giving lectures to students. Besides, Problem Based Learning (PBL) is a modern teaching strategy and is widely used for medical teaching. The **L**ibyan **I**nternational **M**edical **U**niversity (LIMU) is attempting to contribute in improving the situation of higher education in the county, it has taken the challenge to do something new in Libya and make changes by implementing PBL to improving the quality of teaching and learning.
Through this article we will explore the initiation of LIMU as the first Libyan University that implements the strategy of PBL, we will also try to make some highlights on good practices that led to success of implementation.

Introduction: -

Theoretically Problem-Based Learning is based on constructive learning (Poikela, 2002), constructive learning theory explains that learning is an active, constructive and target process which contains problem solving. Therefor PBL has been defined as an educational method which carefully uses constructed clinical problems as a context for students to learn problem solving skills and acquire knowledge about the basic and the clinical sciences' (Albanese Mitchell, 1993).

Perhaps the best known original example for Problem Based Learning comes from American medical education 1960s (Barrows, 1985). The seminal event of PBL was the development of a new school of Medicine at McMaster University in Canada in 1969 (Campbell, 1970). The school introduced modern educational concepts into its curriculum and PBL became the cornerstone (Neufeld & Barrows, 1974). Soon after, a few medical schools such as those in Newcastle (Australia), Beer Sheva (Israel), Maastricht (the Netherland) and Albuquerque (USA) also adopted PBL- based curricula along the line of McMaster (Johnson M. S. &Flnucane M.P., 2000).

The uptake of PBL was rapid (Jonas et al., 1991), where many Universities and other pedagogical institutes adopted PBL as a strategic keystone of teaching, Franssila (2007) reported that: by 1991, 100 medical schools in USA were using PBL (Jonas et al., 1991). by 1997 several schools in the UK were in the process of adopting PBL (Bligh & Wilkinson, 1997), before 1998 five of Australia's 11 medical schools had PBL based curricula while others used PBL to some extent, PBL was also embraced by 1995 at Europe, the Middle East, and the Far East have PBL (Bligh, 1995).

Moreover, PBL is supported long-time by diverse bodies such as the World Federation of Medical Education (Walton & Matthew, 1989) and the World Health Organisation (Fulop, 1984).

PBL has been spread in various areas of teaching and science, for example architectures, economics, engineering, and mathematics (Poikela, Poikela, 2005), business schools (Milter & Stinson, 1993), schools of education (Bridges &Hallinger, 1992; Duffy, 1994); law, social work (Boud&Feletti, 1991); as well as in high schools (Barrows & Myers, 1993).

In general, PBL models can be categorised into two types, namely; pure and hybrid PBL model (Savin-Baden, 2007). The pure PBL model refers to the model that is implemented in fully problem based methodology, and based on the McMaster medical school PBL model. This implementation is generally without any lectures or tutorial sessions, and students typically work in small groups. The hybrid PBL model is in turn, embedded with lectures and tutorial sessions to support students' learning (Masek&Pahat, 2010).To date, many of these PBL models are adapted into a variety of new programmes and across all disciplines. As a result, the pure PBL model become difficult to be distinguished, and there is a tendency for Universities to adapt the hybrid PBL model in their curriculum. This is due to the nature of PBL approaches, which are easy to be adapted into different structures of institutional curriculum, and also according to the specific purpose of implementation (Savin-Baden, 2000).

Barrows (1980) defines PBL as: The learning that results from the process of working towards the understanding of a resolution of a problem. The original basic idea of using PBL in medical teaching was to give practical problems to students and to force them to find solutions to these problems in a group. This idea was to bring teaching and learning in the classroom as close as possible to the problem and case in a real medical environment, it was also to support life-long-learning because doctors and nurses could use the method of PBL in their real working environment. Therefor PBL was a revolutionary teaching method compared to the previous methods which were based on teacher focused lectures (Franssila, 2007)

According to Savery& Duffy (2001) nothing is simplified or pre specified for the learners in the learning process of PBL, where the problem is presented to the students first at the start of the learning process, before any other curriculum inputs. Different curriculum input such as lectures, labs etc. follow later in order to complement and enhance the work to understand the problems.

In a group of PBL, one of the students acts as a discussion leader; his/her role is to actively lead the group members throughout the discussion, allow opportunities to participate and to make sure that all group members are on the same track. At the same time another group member should acts as a scribe, his/her role is to structure a clear picture of the discussion by writing down all notes, ideas and conclusions made by the group on a white board or a flip chart. The two roles are to be rotated among all group members in order to assure gaining certain skills that contribute to leadership and teamwork. It is also important to note that all group members should take an active role during the discussion by sharing opinions and knowledge.

A tutor is assigned for each group of students, his/her responsibility is to expedite and bring students through the concept of "learning by doing". A tutor should also be capable in probing students with challenging questions, provoking, encouraging, and creating conducive environment for learning (Brodie &Gibbings, 2007). Moreover, it is necessary for the tutor to be an active listener, that is to follow, and when necessary to control the learning situation of the group.

Based on the philosophical principle of PBL it is described as a student's oriented method, where in PBL sessions students define their own learning issues; what they need to research and learn, they are also responsible themselves for searching appropriate sources of information. By doing so students will be aware of their prior-knowledge (Johnson &Flnucane, 2000); as well as their areas of ignorance regarding to the subject of the problem, thus students can identify both their personal learning needs and strategies required to address them. This process helps to develop skills for life-long learning (Franssila, 2007).

The goals in problem-based learning are to promote deep understanding of subject matter content and to simultaneously developing students' higher-order thinking **(**Ertmer& Simons, 2006). By PBL students acquire knowledge that is better retained, usable in a clinical context and integrated from many disciplines (Albanese &Mirchell, 1993).

The Maastricht version of PBL operates the problem solving process in tutorial sessions by using the "seven-jump" model (Masek&Pahat, 2010), Franssila (2007) briefly descried the model as follows: students receive the problem scenario as a written handout, then they manage the process of problem solving by going through the next steps:

1- Clarifying Concept: Students extract the key words (group work), that are important clues; examples, sex, age, fever, pain, sallow, swelling… etc.
2- Defining the Problem: Students identify problem and summarise it in a clear and concise way (Johnson &Flnucane, 2000). This step is the basic for the next step, and it should be done in a short time.

3- Brain Storming: Students are encouraged to form different explanations; the idea is to comment specific details and hypotheses of the given case.
4- Problem analysis: the idea is to find cause-effect and make relations among things that were found during the previous steps.
5- Formulating learning objectives: it is the last step of the first learning situation. All previous steps are based on this; as a result, students get their homework by preparing themselves for the next learning situation.
6- Self-studying: It is the time for each student to fill the gaps of knowledge he/she has noticed during the first learning situation, and to find explanations and solutions for the learning objectives.
7- Reporting: it is the second or last learning situation of the case, where each student will explain his/her findings and the group will formalise their view on the learning subject.

These seven steps are used in two different learning situations (Franssila, 2007). During the first learning situation "Brain Storming Session" steps 1-5 are used, while the last step is handled during the second learning situation "Debriefing Session".

Step 6 It is during the self-studying period, in the time between the two learning situations, it is for students' individual work to find explanations or solutions for the learning objectives. During the self-studying period students may also contact the tutor to clarify things if needed. The ideal time for this is one or two days (Franssila, 2007)

In the end each student has the possibility to comment on the learning case and the group work (Franssila, 2007). PBL adds interest and increases motivation to learn (Johnson &Flnucane, 2000). It enhances self-evaluation and encourages sensitivity to all the patient's needs (Barrows, 1983).

To get the most out of the PBL learning process a student needs to gain skills which attribute his/her good standing for life as a doctor. A student should be able to work with other students or independently, become a good communicator, also to research and discriminate between different qualities of information. Moreover, development of students' critical thinking abilities, clinical reasoning capabilities, and teaching and presentation skills will of course acquire student's enormous amount of medical knowledge and understanding. Hence it was clearly stated by Tynjala (1999) in PBL model "knowledge and skills are not automatically given by the teacher but it is necessary for student actively construct learning".

Many institutes and faculties have a long history of traditions certain way of working giving lectures for students. Traditional methods may have worked well; they are fully accepted and supported. It is a big challenge to try something new and make changes. Therefore, the implementation of new methods must be properly planned and executed (Franssila, 2007)**.**

Despite a relatively long history of successful PBL use in medical schools (Barrows &Tamblyn, 1980), PBL possess numerous difficulties for both teachers and students who are likely to be unfamiliar, as well as uncomfortable, with the new roles and responsibilities required by this type of open-ended learning environment **(**Land, 2000). Moreover, Land (2000), had specified the implementation challenges into: creating a culture of collaboration and interdependence, adjusting to change roles, and supporting student learning and performance (Ertmer& Simons, 2006).

A variety of resources is needed to support both teachers' and students' efforts. Thus teachers will need guidance as they adopt their new roles, facilitate students' inquiries, provide constructive feedback, and apply new types of classroom management strategies (Hannafin, Hill & Land, 1997). Reference to Mergendoller& Thomas (2005), "Teachers in learner-centered classrooms tend to have a broader set of management responsibilities than teachers do in more traditional classrooms". On the other hand, students will need to be supported as they learn to develop and implement their own strategies for addressing complex problems and for working with diverse others to negotiate solutions in a collaborative manner (Hannafin, Hill & Land, 1997).

However, Ward and Lee (2002) noted, "The philosophies supporting PBL are well established, but the 'how tos' are in short supply". Hence, when implementing PBL into teaching one must accept that it is not going to be perfect right from the beginning. More likely it is going to be a continuous process to advance step by step to the better results (Franssila, 2007).

In PBL, curriculum developments must integrate three compulsory elements; which include the understanding of contextual knowledge, skills competencies, and attitude. This integration is to exit certain outcomes of PBL curriculum; what to learn refers to the problem as the curriculum, how to learn refers to the PBL process and how much is learned refers to assessment (Wee, 2004).

Many lecturers claim that students will not do any work unless it is being assessed; by which it is awarded a mark. In Problem-based Learning, where students themselves determine what they already know and have to do, and as they identify the gaps in their knowledge and competence, assessment needs to be developed in a manner to encourage learners to be open and honest (Knight, 2000).

Assessment in PBL focuses on different aspects of evaluation, which is based on the main purposes of PBL inclusion. The assessment is typically conducted according to the purpose, either to measure processes or products (Young, 2005).

Often, an ongoing assessment is prominently important in ensuring that students' learning is always in the right path(O'Grady &Alwis, 2002). The process skills assessment is frequently conducted and distributed in parallel with the learning process. The targeted skills include; communication skills, teamwork, research skills, interpersonal skills, and professional skills. (Kolmoset al., 2007). It is reported that assessment in PBL is a part of the learning process (Foldevi, Sommansson&Trell, 1994). Therefore, ongoing process of feedback is an important way to support students' learning (Masek&Pahat, 2010). Also through several activities, tutors perform informal assessments; including probing, questioning, observation, which indirectly monitor students' skills development.

Multiple dimensions and methods are involved in the assessment process, including short presentation sessions, quizzes, MCQ tests, short-test of concepts, practical demonstrations, and poster presentations (Lennox, 2003).

On the other hand, the assessment to assess products, such as knowledge content and understanding, is typically scheduled at the end of the block or term through a written final examination and open-book test concept (Segers and Dochy, 2001; Wee et al., 2003)

Moreover, the assessment can also be conducted as a group-based or as an individual-based assessment. Students are typically awarded with an individual grade even though the assessment is conducted on group basis (Kolmos et al., 2007).

Whilst much has been written about approaches to PBL; curriculum design, the role of tutors and various other aspects, much less attention has been given to the purposes and principles of assessment (Savin-Baden & Major, 2004). However, rather than copying examples which may not fit with the used form of PBL, different assessment methods may be adopted in order to align both the learning and teaching approaches, and the desired learning outcomes. It is important to use methods that reflect the professional contexts of students' future (Macdonald, 2005).

As concluded by Franssila (2007), it is clear that PBL implementation is a continuing process. Thus corrections for the implementation progress and the contents of courses are annually conducted by carefully analyzing student's feedback and collected experiences.

Discussion: -

The Libyan International Medical University (LIMU) was founded in 2007 in the city of Benghazi. The University is the first private medical University in Libya. The idea beyond the foundation of the University, was that a number of University staff members, who believe in the possibility of providing a healthy educational environment and in improving the higher educational contexts in Libya to meet the (quality/ standard) of that in developed countries.
Being an independent University was a precious opportunity for the dream to become true, the quality of education at LIMU was not affected by any intervention of political nor by the increasing number of students that exceeds its capability.
From the very start LIMU has conducted many academic relationships with agencies, organisations and international prestigious Universities, in order to gain and exchange experiences, consultancies and academic cooperation.

In 2007 LIMU has adopted the traditional way of teaching, although attention was paid to consider involving students into some sorts of learning activities, and efforts were gradually conducted to make the shift toward an interactive process of teaching and learning.

In spite of the lack of support, LIMU's efforts were exploited to the optimal in order to take a major role in leading the higher education on national level. Thus in 2009 LIMU had again the first initiative among Libyan Universities to adopt the strategy of Problem Based Learning.

Guiding the change and leading a new strategy of learning; is really a big challenge. However, in order to assure a successful implementation of the new method, LIMUs' administration has considered many factors, including; spread the idea of the new method (what, why and how), communicated with some internationally and regionally wise early developers of PBL, gained the trust and commitment of other members, attained a proper plan for the implementation (Franssila, 2007).

Moreover, much literature stated that adaptation to the local conditions is an important key to success. As Graaff, (2008) indicated, "when PBL is implemented in an institute with long standing traditions on teaching and learning, this should involve a process of careful balancing between the innovative principles and the conservation of the old values and norms ". Even though, LIMU didn't have a long history of traditional teaching but it is the fact because of the local conditions, where all of University faculties, students, curriculum, staff, and facilities are based upon a traditional background of teaching". As Lahtinen (2005) reported "When implementing PBL, you face extensive changing processes which have effects on social, organisational and individual level", consequently it is important to consider changing of others' believes as a contributed issue for the successful implementation (Franssila, 2007).

While considering the proper planning as one of the major factors contributes to the achievement of a successful implementation, initial steps were taken to spread the message; "change is a must and it is time to take the challenge". As a beginning the message was spread all over LIMU's faculty members and students, since they are considered as major partners in leading the change. It was noted by Graaff (2008), "As most human systems resist change, the status has to be upsetting. In the initiation phase the leader must develop a vision recognizing the need for change".

Moreover, as the call for change was urgent, and as LIMU was insisting the importance in improving the higher education of Libyan. It was a grateful honor for LIMU to involve as much number of participants as possible; during the initial phase of implementation.

Again to say "spreading the message", this was done by several considerable communications with some early developers of PBL; such communications were conducted by site visits to some earlier established programs, and/or by consulting some experts (lectures, meeting and workshops). As concluded by Camp (1996), "Mentoring, I believe, has led to the successful implementation of PBL in many places". The main goal of this initial step was to shift beliefs of University faculty members and students away from traditional teaching and towards a wider role in providing an interactive environment of learning, which is known to be student centered. "In order to increase both teachers' and students' likelihood of PBL, a variety of supporting efforts were needed to be counted while planning for implementation" (Hannafin, Hill, &Land, 1997).

At this stage it was very important to stress on the role of a tutor; which is a newly added term to the vocabulary of the Libyan Universities, and also to assure making a clear distinction between different roles and responsibilities addressed by tutors and lecturers. Tutors at LIMU are newly graduated doctors, who are interested in academic career. Annually workshops were conducted to train tutors, at the beginning of the implementation these workshops were run in cooperation with some PBL experts, nowadays, workshops are run by LIMUs' faculty members to train new tutors; who wish to be employed. Regarding the continuously developments in different activities and responsibilities, and also to follow progress of tutors' role, even for previously employed tutors, it is compulsory to participate in these workshops. It is interesting to point-out that students play a role in these workshops, where; randomly, some of them are asked to express their opinions; to trainees, regarded as tutors acting roles as well as their capability of giving a proper feedback to students.

In addition, another important targeted partner was the University faculty members, who have been involved into different activities; including; workshops, conducting experts, open discussions… etc. The main goals were to

change their teaching behaviors and norms of learning from "teacher centered" to "student centered", and to prepare them to take the new role of teachers, by supporting students learning, and creating a cooperative and independence environment. Land (2000) reported that "Like other student-centered innovations, PBL possess numerous difficulties for both teachers and students who are likely to be unfamiliar, as well as uncomfortable, with the new roles and responsibilities required by this type of open-ended learning environment". At the era of implementation, LIMUs' students have had the chance to share the implementation process of PBL, by being through all means of training to accept the new strategy of learning.

Taking in consideration the passive way of teaching in secondary schools (in the country), it was necessary to arrange an orientation program for the new comer students. The program is designed to support students' efforts, as they will face difficulties to adopt the role of active learners. As stated by Hannafin, Hill & Land (1997), "Students, too, will need to be supported, as they learn to develop and implement their own strategies for addressing complex problems and for working with diverse others to negotiate solutions in a collaborative manner".

According to expectation, the orientation program; at its first time of implementation, was supposed to take the period of six weeks, surprisingly, students took the challenge, and were very interested to take the role of independency. Thus the period of the program was reduced to four weeks. Nowadays it doesn't last more than two weeks. Though, LIMU believed, that "when considering a change, students are not a problematic issue, the issue is the lack of stakeholder's wills, the resistance to change and the fright to take the challenge".

In addition, one of the necessary initial steps, was to make modifications and amendments to the buildings of LIMU that is to provide suitable physical facilities, including; small classrooms (where we can run the PBL sessions), which are occupied with; suitable furniture, computers, monitors, white boards, as well as some large halls with smart boards to accommodate a larger number of students while holding seminars or presentations.

As the implementation of PBL was mandatory to all of Faculties of LIMU, rules for running the PBL sessions, students' assessment, and grading system were constructed by general by-laws. While programmes specifications, curricula design, writing problem (case scenarios) and learning activities were assigned to Faculties councils.

However, LIMU has established the unit of "Medical Education" to be the first of its kind among all Libyan Universities; its major roles are to monitor and develop the: quality of teachers and teaching, faculty members, students' assessment …. etc. moreover, to heighten the norms and trends of a good practice of teaching, LIMU provided the chance to some of its faculty members to get started with higher professional programmes; such as, "Joint Master of Health Professions Education".

In general, the advice to different Faculties was to construct theme-based PBL curricula, where PBL integrates with an existing curriculum. Reference to Wee (2004), reveals that, one of the either ways used to change the existing conventional curriculum to be PBL integrated; is through the implementation of a theme-based PBL. This method requires a facilitator to craft a problem, which involves several related subjects in the same theme.

The applied curriculum refers to the model of hybrid PBL, where mini lectures should be used to fill in the gaps; which result from incomplete integration of subjects to some extent. However, it was mandatory to keep the number of lectures to the minimum.Masek&Pahat (2010), Have drawn the attention to the fact that, the theme-centric problem should be designed as a trigger, and mini lectures should be used to fill the gaps within theme-centric.

It is very important to write the problem scenario based on a real case; that is to get students to be familiar with the practice of a doctor. As Savery& Duffy (2001) indicates that, there are three reasons why the problems must address real issues. 1) Because the students are open to explore all dimension of the problem there is a real difficulty of creating a rich problem with a consistent set of information. 2) Real problems tend to engage learners more, where there is a larger context of familiarity with the problem. 3) Students want to know the outcome of the problem.
Usually problems last for one week, but at sometimes it may last for two weeks. In a PBL learning process; a group of 8-10 students, meet twice a week, at what is known as "Brain Storming and Debriefing sessions"; to discuss the problem by following the "seven- jump" model. A tutor is assigned to the group, his/her role is to control the PBL sessions, to guarantee the relevance of information with the problem issue and to give a considerable feedback to students; regarding their knowledge, attitude and performance.

Faculty of Basic Medical Science; which is one of LIMU's faculties, notices that, while constructing the integrated theme-based PBL curricula, an observable percentage of lectures is been reduced. Masek&Pahat (2010) points out that, "these studies replace the major part of the traditional lecture program. The faculty members do not teach in the traditional sense, but facilitate the efforts of the student group in understanding the cases for themselves".

Among all Libyan Universities, another unique way of teaching is used in LIMU, it is the early practice of students to the clinical skills, where students at different levels are assigned to practice certain clinical skills related to the topic of the problem under the study. These skills are conducted in small groups under the supervision of a tutor and are applied at the clinical skill labs; which are equipped with check lists, dummies and clinical furniture. Lahtinen (2005) makes clear that, "students are expected to be competent in problem solving, as well as hands-on in technical skills".

Moreover, at 2014 Faculty of Basic Medical Science adopted Research Based Learning for second year students, students were given the chance to play an active role in the research process "Tuberculosis: Newer trends in diagnosis and management". Results of a satisfaction survey showed that the method brought students closer to the edge of knowledge, helped to easy get transferable skills and help students to gain confidence and motivation.

Getting to the point of discussing assessment methods of PBL, makes us tackle a critical issue of concern for both students and University. As Camp (1996) noted "assessment of students' learning proves most problematic even for the most experienced teacher with change". Nevertheless, LIMU demanded general rules to assure Faculties adopting the proper methods of assessment to direct the aim of assessing both process and product by the continues assessment which provides an ongoing process to support students' learning and make variety in the types and timing of assessment.

Going further towards quality assurance, the quality of teaching and learning in LIMU is continuously evaluated by collecting and analyzing students' feedback. Evaluation of courses is conducted by questionnaires. Results of evaluations are intensely taken into account, for example, during the academic year 2012-2013, Faculty of Basic Medical Science achieved 3.75 as an overall average of students' satisfaction rate. Although, the achieved rate was higher than the targeted rate (3), Actions and efforts are still being taken to promote the process of improvement.

As early mentioned at 2007 LIMU was the first private Medical University founded in Libya, the idea beyond the foundation was to provide a healthy educational environment and to improve the higher educational contexts in the country to meet the (quality/ standard) of that in developed countries, therefore it is meaningful here to point out that in 2014 LIMU became at the 4^{th} place in the ranking of Africa's best top ten private medical schools on the continent "the University is reputed to have one of the best medical schools on the continent. One of its major points is its focus on international partnerships and meeting the level of other international medical teaching institutes. The teaching policy emulates those of many established Universities and is mainly problem-based learning.". Moreover, regarding the ranking of the Webometrics at 2015 LIMU is at the 1^{ST} place among all other Libyan Universities.

Conclusions: -

PBL possess a modern educational concept, it is the keystone in medical curriculum.
In comparison with early PBL adopters; internationally, Libya is more than 40 years behind. Nevertheless, looking at LIMU's results of doing, its communicating with experts, keeping-up working and hand in hand efforts, successful is achieved and continually efforts are conducted to reach higher levels of success.

The implementation process is to undergo certain stages:
Stage1: before implementation: only few of the administrative members; who are decision makers, are involved at this stage. Their role is to:

- Enhance their knowledge regarding the new strategy.
- Clearly determine causes and goals of implementation.
- Construct a vision.
- Consider local conditions.
- Define partners' roles.
- Design a proper plan.

Stage 2: advertising stage is to gain trust of others:
- Spread the message of change.
- Describe new roles.
- Conduct many activities to express the idea, and involve as much people as possible. (Activities: meetings, lectures, open discussions, workshops…. etc.)
- Invite some experts to participate and to talk about their experience (what, why, where & how).
- Work on changing others believes.
- Provide need physical facilities and modifications of buildings, to help in practicing a good implementation.

Stage 3: take the action and start:
- Encourage all partners to actively participate.
- Carefully follow-up the process, and don't allow any action of going back.
- Report notes and ideas; to be consider for a next trail.
- Collect and analyze feedback, and do improvement actions.

It is important to arrange an orientation program for the new comer students, believing that; when considering a change students are not to be a problematic issue, the issue is the lack of stakeholder's wills, their resistance to change and their fright to take the challenge.

Establishment of both Medical Education Unit and Clinical Skills Center is a good practice of stepping ahead.

Further studies including implementation developments, student's performance, assessment methods, curriculum design should be conducted to evaluate and enhance LIMU's performance.

It is believed that, in the near future the progress of such practices by LIMU; and if followed somehow by others, will expedite the pace to achieve improvement of the higher education in Libya.

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