Developing in Situ Problem-Based Curriculum at The University of Bisha, College of Medicine, Saudi Arabia

Masoud I, E. Adam, MB, BS. MSc. MD, PhD. MHPE* Jaber Alfaifi** Alamri Mohannad Mohammed S*** Muffarah H.A****
Ali M.S. Eleragi***** Rezigalla A.A****** Ayman M. El-Ashkar*******

ABSTRACT

Problem-based learning (PBL) as a student-centered instructional approach is spreading and becoming famous worldwide, including the Kingdom of Saudi Arabia (KSA). This study aimed to describe and share the experience of the University of Bisha, College of Medicine (UBCOM) in developing, implementing, monitoring, and evaluating a problem-based learning (PBL) hybrid curriculum. The medical education unit (at the time of curriculum inception, now the Department of Medical Education) was responsible for leading the process of in situ developing and implementing an innovative medical curriculum. An agreed-upon action plan was developed. SPICES model (S: Student-centered, P: Problem-based, I: Integrated, C: Community-based, E: Elective, S: Systematic) was chosen, and a PBL hybrid curriculum and system-based courses were found suitable for the context. A PBL committee as a subdivision of the curriculum committee was formulated to develop, implement, monitor, and evaluate the PBL curriculum under the supervision of the medical education unit. PBL and other teaching and learning methods were designed and implemented. Ill-structured real-world problem scenarios were provided to drive learning. Continuous monitoring, evaluation, training, feedback and reporting, and other factors were vital for a successful PBL hybrid medical curriculum.

Keywords: Curriculum; Medical Education; Problem-based learning; student-centered; System based courses; University of Bisha

INTRODUCTION

PBL is a student-centered instructional approach [1,2] where a professionally constructed problem scenario teaches learning [3]. There are several variations of the process in PBL, but it is clear that all are following a similar series of steps and sequences [2]. Historically, PBL was introduced in the 1960s at McMaster University in Canada [4,5]. Since then, it has become popular and used increasingly in KSA [6] and other countries.

The College of Medicine at the University of Bisha (UBCOM) was established in 2014 as part of the Bisha branch of King Khalid University in Abha, where traditional medical education has been adopted since its establishment as many other medical colleges in the Kingdom of Saudi Arabia (KSA).

Since its inception, UBCOM decided to develop an in situ innovative contextual outcome-based medical curriculum to equip and empower its students to address each patient's and societal needs and fulfill the program mission, chosen graduate attributes, and program goals. The medical education unit (at the time of curriculum inception, now the Department of Medical Education) was responsible for leading the in situ development, implementation, monitoring, and evaluation of an innovative medical curriculum. An agreed-upon action plan was developed. SPICES model was decided, and a PBL hybrid curriculum and system-based courses were found suitable for the context. Important perquisites for such a medical curriculum are integration, outcome-based and spiral nature, and early clinical exposure. An essential issue was to get the continuing support and encouragement of the college and the university administrations. The curriculum consists of three phases in addition to the first year, which is a preparatory year. Year one is mainly used to prepare medical students for phase one. The importance of year one arises from the fact that the student's mother tongue is Arabic, and the language used in medical education is English, so there is a need to improve the student's English Language abilities through intensive courses. In addition, the students are selected from those

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*	Department of Internal Medicine, College of Medicine University of Bisha, Bisha 61922, Saudi Arabia.
**	Department of Child Health, College of Medicine University of Bisha, Bisha 61922, Saudi Arabia.
***	Department of Family and Community Medicine College of Medicine, University of Bisha, Bisha 61922, Saudi Arabia.
****	Department of Family and Community Medicine College of Medicine, University of Bisha, Bisha 61922, Saudi Arabia.
*****	Department of Microorganisms and Clinical Parasitology College of Medicine, University of Bisha, Bisha 61922, Saudi Arabia
******	Department of Anatomy College of Medicine, University of Bisha, Saudi Arabia.
*******	Department of Microorganism and Clinical Parasitology College of Medicine, University of Bisha, Saudi Arabia Email: aymanpara@yahoo.com

completing general education, which is designed to prepare students for all specialties, so a little more general sciences and an introduction to biomedical sciences are vital as part of preparing the students for the PBL curriculum. Phase one spread over year two and consisted of eight integrated blocks: Introduction to Medicine and Medical Education, Structure and Function of Human Body, Biochemical and Genetic Basis of Human Body, Man and His Environment, Nutrition and Metabolism, Principles of Diseases, Behaviour science and Doctoring, and Growth and Development. Phase two spread over years three and four and consisted of sixteen system-based integrated blocks. Paraclinical courses, pharmacology, epidemiology, and public health were also delivered in this phase.

Moreover, this phase teaches transitory courses, e.g., clinical skills and basics of non-communicable diseases. Furthermore, this phase prepares the learners for phase three (clerkship phase). These blocks were designed and organized to ensure good experience in the practice and the problem-solving process (logic sequence and length of blocks) and early clinical exposure.

PBL was planned as the principal instructional method for phases one and two. Phase three includes years five and six and is designed to accommodate all clinical rotations where PBL is not used; instead, problem-solving was adopted [7,8].

To achieve the task of a PBL hybrid curriculum, a PBL committee as a subdivision of the curriculum committee was formulated to develop, implement, monitor, and evaluate the PBL curriculum under the supervision of the medical education unit. This committee included in its membership representatives of the college administration, medical education unit (now Department), and representatives of the curriculum phases in addition to others. The process of developing such a curriculum started with the development of an action plan that included the following: Preparation of the learning environment, preparation of the tutors-facilitators, preparation of the students, instructional design of the PBL curriculum, construction of problem scenarios, assessment of students' performance during PBL session, and monitoring and evaluation [9–13].

Preparation of the learning environment

The preparation of the learning environment started with designing small group discussion rooms (24), each consisting of round tables around which ten chairs for the students and one for the facilitator were seated. These were supplied with a projector in each room, a laptop, a flip chart, a smart board, and free internet access. These rooms are well-enlightened and, to some degree, sound isolated. In addition, electronic and classic libraries and photocopiers were ready for students' use. It is worth mentioning that each student group has its small group discussion room to be used for tutorials and other group activities such as collective preparation. In addition, study areas and stations were designed and established to accommodate all students and serve the self-directed learning (SDL) approach.

Preparation of the tutors-facilitators

Staff preparation has been one of the crucial issues since the first days of the program establishment, since recruited and expected future teaching staff members are from the traditional system. Hence, a well-thought-out training program was created. A fundamental point was to have a medical education unit led by experienced medical educators. The first teaching staff members who joined the program were trained outside in specialized workshops conducted within the Kingdom and designed and delivered by international experts. Then, staff training

was planned to continue in-house. For this purpose, a special training venue and the program were created to suit this purpose and the Faculty Development Program. This venue consists of two large rooms for lecturing and workshops, and an electronic laboratory was designed and supplied with all needed facilities, including audiovisual aids, smart boards, flip charts, free internet access, suitable rounded tables, and comfortable chairs. Then, lectures, workshops, and small and large group discussions were conducted within the college, initially guided by invited experts and then by the college's experts. To ensure high-quality PBL facilitation, a continuous training program was implemented based on the need assessment and report of the evaluation process [14].

Moreover, a training program for the new faculty who joined the program was designed and made ready to be implemented. Feedback from the staff is collected annually through direct individual and group feedback and surveys. The data is used for improvement.

Preparation of the students

As the students are selected from general education secondary schools, they must acquire the theoretical and practical skills to succeed in their journey in the College of Medicine. Hence, a block titled Introduction to Medicine and Medical Education was designed and developed. This course aims to prepare medical students enrolled in the program to be able to take on their responsibilities and fulfill their tasks. The block is the first in semester one of year two (phase one) of the curriculum. This block spreads over three weeks and consists of theoretical and practical hours. The students were taught the theoretical base of PBL and trained to take it by the most senior and well-trained tutors/facilitators. Students are also taught and instructed about other teaching and learning activities in their daily and weekly timetables, such as TBL, SDL, student-led seminars, interactive lectures, peer teaching, structured feedback, portfolios, and information search and retrieval. In addition, the learner's responsibilities in innovative student-centered curricula, study skills, introduction to learning theories, and others were included. Other needed knowledge and skills are organized in a step ladder way through the years and phases of the curriculum. These include medical ethics and professionalism, teamwork, critical thinking, time management, self-regulation, and reflection. Student feedback is collected annually through direct individual and group feedback and surveys.

Instructional design

The instructional design involved two components (curriculum and course) and five phases (analysis, design, development, implementation, and evaluation) [15]. Teaching and learning strategies to achieve learning outcomes are authentic learning, student-centered learning, PBL, team-based learning (TBL), integration, community-based, and community-oriented medical education. Teaching and learning strategies are based on the following principles:

1) Evidence-based medical education. 2) Outcome-based curriculum that meets the principles of social accountability and the graduate competencies, which prepare the graduates for their future profession. 3) Use of authentic teaching and learning techniques. 4) Teamwork. 5) Emphasis on measurable skills. 6) The spiral nature of the learning experiences. 7) Learner-centeredness parallels with support for each learner to achieve skills and master competency across all phases of the curriculum. 8) Empowerment of learners. 9) Institutional partnership with all stakeholders. 10) Fostering research culture and evidence-based practice.

The teaching and learning activities in the weekly timetable consider

these principles and do not exhaust the learners. In addition, students' preferences are respected, and they have input in the development of schedules.

Teaching and learning methods include PBL, TBL, Student-led seminars, Interactive Lectures, SDL, DSL, Practical, and clinical skills teaching. Teaching and learning occur in the class, PHC, secondary hospitals, and community. Distribution of learning experiences as appears in the weekly timetable across phases: In phases one and two, 13% of the teaching and learning time was allocated for problem-based learning (PBL). In phases one and two, 20% of the teaching and learning time is allocated for self-directed learning (SDL). In phase three, 13% of the teaching and learning time is allocated for directed self-learning. In all phases, 6.7% of the teaching and learning time is allocated for team-based learning (TBL). 6.7% of the teaching and learning time was allocated for student-led seminars in all phases. 6.7% of the teaching and learning time is allocated for case-based learning (CBL) in phase two and more in phase three, depending on the duration and nature of the block. 6.7% of the teaching and learning time is allocated for panel discussions in all phases. 6.7% for panel discussions designed to support PBL and student feedback. 6.7% for portfolio and mentoring. The remaining time is used for activities depending on the nature of the courses, such as interactive lectures, and practical and clinical skills teaching (Table 1).

The PBL sessions are student-led and facilitated by a well-trained facilitator. The students of each batch are divided into small groups of eight to ten members. In each PBL tutorial session, the group members select a leader, scribe, and timer, so all students should play these roles in different PBL sessions. Every week, students discuss one problem scenario using the seven jumps model.

Every course in years 2, 3, and 4 (phases 1 and 2), including those in epidemiology and research, public health, and pharmacology, was planned with two weekly PBL tutorial sessions, lasting two hours each. To provide students adequate time for thorough preparation, both PBL sessions were scheduled in the morning at the start and

conclusion of the week. Six hours were also set out for self-directed learning between the two sessions. For each academic level following the second session, a weekly two-hour panel discussion is held to fill gaps, clarify complicated ideas, and tackle contentious topics. PBL facilitators included members of the department of clinical disciplines and subject- and non-subject-experts.

Construction of problem scenarios

For each problem scenario, a multidisciplinary problem team is created by the head of the PBL committee. This team is responsible for constructing problem scenarios and conducting both PBL sessions, including students' performance assessments. An ill-structured problem scenario is used to drive the learning process. The problem scenario is reviewed and approved by the head of the Medical Education Department (MED) to be ready for use. The content to be discussed in the PBL session is integrated and based on the course-specific learning outcomes selected by the course and curriculum committees for each PBL session as part of the course study guide [16].

Assessment of students' performance during PBL session

In each PBL tutorial session, the students' performance is assessed, and the result of the assessment is submitted to the block coordinator to be included in the final continuous assessment of the learners. The block coordinator submits the results of all activities, including PBL, TBL, seminars, logbook, etc., of each learner to his mentor to be discussed with him for encouragement and remediation. Self-assessment, student peer assessment, and tutor assessment for each learner are practiced weekly [17,18] **(Table 2).**

Discussion

Governing rules and guidelines to ensure appropriate implementation of the PBL hybrid curriculum were created, approved, and disseminated. The curriculum committee and MED supervise the whole process. PBL scenario teams are created in a way that is homogenous, interdisciplinary, and supportive of each other. The team held two

Table 1. Distribution of the student-centered nature of the curriculum and multiple teaching techniques

	08: 00 – 09: 00 am	09: 00 – 10: 00 am	10: 00 – 11: 00 am	11: 00 am – 12: 00	12:00-1:00 pm	01: 00 – 02: 00 pm	02: 00 – 03: 00 pm
Sunday	PBL session 1		SDL 1			Interactive lecture 1	Interactive lecture 2
Monday	TBL		Interactive lecture 3	Interactive lecture 4	BREAK	Practical 1	
Tuesday	Seminar		Skill lab			SDL 2	
Wednesday	PBL session 2		Practical 2			Portfolio & mentoring	
Thursday	CBL		Panel discussion			SDL 3	

Table 2. Rubric for the assessment of the student's performance in the PBL tutorials

Course Title	Date / Time
Course Code	Name of Tutor
PBL No.	Signature

			Assessment Items/Score											
			1st session				2nd session							
No.	University ID	Student's name	Attitude & punctuality	Group skills	Participation	Critical thinking	Preparedness	Attitude & punctuality	Knowledge	Group skills	Participation	Relevance of resources	Critical thinking	Overall Score
			5	10	10	10	5	5	20	10	10	5	10	100

meetings for each problem scenario: pre-conduction to review the scenario and agree on the conduction techniques and post-conduction meeting to evaluate both sessions and develop a report on the problem scenario, conduction, difficulties faced by the tutors and the learners, students' performance, and recommendations. Difficulties and obstacles facing the curriculum implementation and recommendations and new suggestions are discussed monthly within the faculty development forums. Peer evaluation for tutors' performance was practiced using video recording. Then, the recorded materials were reviewed and evaluated at the faculty development sessions for training and gaining experience. A biannual report is developed and submitted to the program leaders and college administration. This agrees with O'Neill (2008) who adopted strategies for applying group work in large classes as inquiry-based learning (EBL). EBL develops a learning environment that encourages students to work in groups and is supported by a facilitator. PBL is one of the applications of EBL[19]. This aligns with Jin and Bridges (2014) who proved the great impact of technology on the quality of PBL implementation in Medical colleges [20].

CONCLUSION

To ensure the achievement of the goals of developing and implementing a hybrid PBL medical curriculum we believe that the following are important factors to be considered: committed experience leadership, continuous institutional support, teamwork, dissemination of culture of innovation and quality in medical education, development and dissemination of regulations, policies and guidelines, preparation of tutors, preparation of learners, preparation of PBL venues, integration, well-constructed real-world interdisciplinary problem scenarios, avoidance or reuse of the same scenario and the specific learning outcomes in the subsequent year, use of electronic materials (projected scenario, etc.), designing of SDL in between PBL tutorials, designing of weekly sessions for the whole batch (large) for solving learning difficulties that face the learners (controversies, difficult content, etc…), continuous monitoring, evaluation, discussion and feedback, assessment of the learners performance, assessment of the facilitators performance, immediate feedback to the learners and facilitators, use of the result of assessment and evaluation for improvement, continuous faculty development program, and conduction of educational research.

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