Progress is Impossible without Change : Understanding 'Block-Based' Curriculum

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Abstract

Curriculum is a formal document, which is framed to enable the learners to achieve the outcomes of a given course. It contains the syllabus and details of course structure, along with the teaching and assessment methods. A curriculum must also contain details of the purpose of the course, the experiences required to fulfil the course purposes and details of evaluation method.

Educational institutes are providing quality education all over the world using various approaches. Many institutes have now shifted from traditional curriculum to a blend of various innovative approaches that includes, block-based, problem-based learning, competency-based, etc. that are more student centered. Due to these different approaches there is always a dilemma to select which approach is best.

The present study gives a detailed insight into the block-based curriculum. A curriculum block is a self-contained sequence of instruction and focuses attention on having a wide variety of "bricks" from which curricula can be assembled. The study also discusses the advantages and shortcommings of block-based design and compares it with the traditional curriculum with special reference to medical and dental curriculum. This study will help us identify areas in our curriculum design that needs to be modified or changed completely.

Keywords: Integrated Curriculum, Traditional Curriculum, Problem-based Learning, Competency-based Learning, Block-based Curriculum

Introduction

Curriculum is an ideological document, reflecting the local circumstances, which frames the learners' experience to enable them to achieve a given course's outcomes. It should contain both the syllabus, which means topics of learning to be covered, and details of course structure, including the teaching supervision provided and assessment methods (Grant, 2014). A curriculum should contain details of the course's purpose, the organization of the learning program, the experiences required to fulfill the course purposes (including details of supervision provided), and details of evaluation methods. The curriculum must also give a detailed description of the training structure, including entry requirements, duration of the program,

assessment systems, flexibilities, teaching, feedback, and supervision (GMC, 2010; Swanwick,2013). There are many curricula formats, depending on the curriculum designers' ideological basis and the local context and purposes.

Medical and Dental Curriculum differs from others as it involves teaching in a clinical setting and is directly related to patient care (Bligh and Brice, 2010). Medical and Dental educational institutes are providing quality education all over the world using various approaches. Many institutes have now shifted from traditional curriculum to a blend of multiple innovative approaches that include block-based curriculum, problem-based learning, core competency-based, etc., that are more student-centered. This article describes the curriculum and elaborates integrated block-based system.

History of Dental Curriculum

The history of formal independent dental education goes back to the early 19th century when the first dental school started in the United States, and in 1909 formed the first council on dental education to monitor the standards of dental degrees (Field, 1995). Until that time, dentists got training as apprentices in medical schools (Wu et al., 2010). There are dental schools worldwide, but their missions and goals vary, and all countries have their regulatory bodies.

With modernization and the advancement of dental science and technology, the dental curriculum needs timely updates so that the graduating dental students get the best training to face the community, work in collaboration and apply their knowledge to patient care (Whitney et al., 2010). Currently, few countries still use traditional dental curriculum. In comparison, many have shifted to a block-based integrated, competency-based curriculum. Some Universities follow a blend of both known as a hybrid curriculum (Perry et al., 2017).

Block-Based Curriculum

A curriculum block is a self-contained sequence of instruction. It focuses attention on having a wide variety of "bricks" from which curriculum can be assembled and have precise descriptions of blocks that will enable educators to make informed choices and placements in designing curricula (Curriculum Blocks, 2000). Traditional curriculum involves didactic teaching, and each subject is taught independently with initial years of preclinical work followed by clinical training. On the other hand, block-based integrated curriculum teaches basic science as theme-based; for example, the cardiac system theme will involve lectures on anatomy, physiology, and biochemistry (Perry et al., 2017).

Properties of curriculum blocks (Curriculum Blocks, 2000)

- Different curriculum blocks can have different time dimensions. If there is a block for 'Dental Education,' it might have two credit hours in the first year, but the block of 'Cell structure and function' might need five credit hours. In short, different topics can have different time dimensions (Table-1).
- A curriculum block can have any one of the several instructional formats. In addition to didactic lectures, every block needs different teaching methodologies for the particular topic/ subject the individual block covers. A single block may include a mix of teaching methodologies.
- A curriculum block can relate to one discipline or several. The blocks' content may feature a particular domain or explore other fields needed to understand a specific topic of the block completely. For example, the block for 'Head and Neck structure and function' will need to explore more than one discipline like anatomy, physiology, pathological aspect, and radiology.
- A curriculum block needs adequate description. A block description provides curriculum designers with sufficient information to enable them to make informed choices. Two chief items of information clearly describe the specific learning goals credibly targeted by the block and an indication of the degree to which the claimed results have been validated.

After finalizing the blocks according to the required targeted goals, the next step is to implement the action plan that needs operational requirements, evidence of achieved goals, and the working team. The Curriculum designing team finally selects particular blocks for a specific year that matches the particular level of education. Each University constructs its curriculum by a particular set of blocks. Different colleges could end up with varying arrays of blocks and still meet national, state, and local standards and the learning objective for a particular course. The curriculum undergoes continuous reform as a process of development. Each block has a block organizer and members associated with the discipline needed for the topic.

Example of a block: Block for Head and Neck structure and function will involve department of Anatomy, Physiology, Radiology, and Oral biology.

Assessment As a Component of Curriculum

The aim of the assessment must be clear and realistic. There must be a close link between the assessment task, the learning objectives, and the feedback. Different types of assessment measure different types of learning. Therefore, it is always advised to use a combination of assessment tool (Table-2).

Table 1: Showing the Timeline and Example of Block Distribution in Each Year

Year	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April
1st	**Block 1**		**Block 2**					**Block 3**	
2nd	**Block 1**			**Block 2**			**Block 3**		
3rd	**Block 1**				**Block 2**			**Block 3**	
4th	**Block 1**			**Block 2**					
5th	**Block 1**								

Source : Author's Computation

Table 2 : Matching the Learning Outcome to Type of Assessment.

Types of learning outcome	**Assessment method eg.**
Critical thinking	Essay, report, *MCQ, *SAQ, *PBL
Performing procedure	Demonstration, role play, lab report etc.
Knowledge and understanding	Written or Oral Examinations.*OSCE
Developing self	Learning journal, portfolio, group project etc.
Creativity	Designing project, presentations etc.
Managing information	Library research assignment, use of bibliography etc.
Communicating	Written or Oral presentation, discussions, debate etc.

Source : Author's Computation

***MCQ-multiple choice questions, *SAQ-Short answer questions, *PBL-prblem based learning, *OSCE-objective structured clinical examination**

Assessment is the main component of all educational processes (teaching, learning, curriculum design). The ultimate goal of medical assessment is to identify a competent doctor who will provide society services (Ferris and Flynn, 2015). Assessment in medical education is unique as it needs assessment of core knowledge and clinical skills. It needs to be more systematic as it finally relates to providing a competent doctor to society. Block-based curriculum uses formative assessment throughout the block in the form of quizzes, assignments, and written examination. Summative assessment at the end of a block is in the form of a written test.

The curriculums' ignored nonacademic aspects are leadership skills, communication, social behavior, values and ethics, and professionalism. These domains are called the hidden curriculum. Although all are part of competencies that society expects from a doctor, they are difficult to assess. The curriculum is divided into semesters and an internal block system. Students are not promoted to next block unless he /she fulfill the competencies needed for the previous block.

Teaching and Learning Theories in Curriculum Design

The topics of the blocks are so variable that no one method suits all. Therefore, a combination of different teaching methods is used. Learning theories inform curriculum development and implementation by providing a framework to select teaching methods and planning strategies to assess learning. Each individual has his learning style, and therefore, it is essential to consider different learning theories while planning any curriculum design. The ideas provide a framework that helps the stakeholders select the teaching-learning methods and plan the strategies for assessing learning for successful learning outcomes. The more the learning theories are considered during curriculum design and implementation, the better the learning outcome (Mugisha and Mugimu, 2015).

The fundamental theories that should be considered during curriculum planning are the;

- **Kolb's Theory of Experiential Learning :** This theory has four interrelated elements of learner's experience, reflection, forming concepts, and application. Kolb also emphasizes the importance of feedback in developing the learning process.
- **Social Constructivism :** The concept by Vygotsky states that we learn more in collaboration than alone. Group learning stimulates cognitive skills, critical thinking essential for the retention of knowledge.
- **Community of Practice (CoP) :** Lave and Wenger discussed this concept. According to this, when learners actively participate in the learning process with similar professional communities by periodic discussions, face to face or online, it enhances learning and keeps their knowledge updated.

There are many more theories through which various learning principles can be drawn and matched, and satisfied during curriculum design. In the medical/dental curriculum, apart from the prescribed syllabus, we use simulation, power-point presentations, small group discussions, team assignments, use OSCE to assess simulated scenarios, provide timely feedback and take timely feedback from the students. By using all these methods, the block-based curriculum almost satisfies all theories of learning.

Advantages of Block-based Curriculum: (Quintero et al., 2016)

- Integrated and multidisciplinary approach of a block–based curriculum makes learning enjoyable.
- Learning one topic from different aspects makes understanding and application more effortless and less stressful.
- Studies have found less attrition of students in block-based integrated curriculum.

The students experience learning and implementation simultaneously, which is of great importance in medical and dental education.

Limitations of Block-based Curriculum: (Quintero et al., 2016)

- Designing blocks needs expertise and a deep understanding of the facilities.
- Simultaneous interaction of different discipline leads to difficulty in communication and confusion among the teaching faculty.

Due to the fixed time allotted for each block, sometimes a particular topic has too many disciplines involved, leading to superficial information/knowledge delivery.

Comparison Between Block-based and Traditional Curriculum

A good curriculum design requires building a knowledge base for students at each level, stimulating critical thinking, suitable teaching methodologies, and motivating research work. The curriculum design should also be less stressful to the students and should help develop good student-teacher relationships. Below is the comparison of both curricula under different domains.

1. **Knowledge:** knowledge is the range of information or understanding and is essential to perform and compete. According to the literature, students found knowledge better with integrated /blocks than traditional design (While, 1994; Hussein et al., 2017).

2. **Critical Thinking:** The knowledge gained needs to be applied at the right place. These critical thinking skills are required for the medical curriculum. Critical thinking helps students to handle emergency and unavoidable situations efficiently. Jordan et al., (2011) and Akram et al., (2019), in their study, concluded that students with block-based integrated curriculum make better knowledge application than students with traditional design.

3. **Teaching Methodologies:** Traditional Curriculum primarily uses didactic lectures, which are a passive learning method. Block curriculum uses problem-based learning, case-based learning, and small group discussions and debates. All these innovative active learning techniques make learning interesting for students and develop critical thinking. By giving them real-life experience, students understand the problems better (Chambers, 1993), are satisfied, and get good scores (Ariana et al., 2017; Collis et al., 2010). These techniques used in block-based curriculum, according to Whipp et al., (2000), help students get better knowledge, help ethical decision making, and develop habit of life-long learning.

4. **Communication Skills:** Medical and dental students need good communication skills for better teamwork and dealing with patients. Interactive learning sessions like PBL and debates used in block-based curriculum help develop students' communication skills (Jardon et al., 2011; Meo 2013).

5. **Stress:** Students' stress can have a negative effect on their performance. However, curriculum design is not the only factor to be considered in stress management. Studies show variable results. Some associate more stress with traditional curriculum design and some with block-based (Slavin et al., 2014; Quintero et al., 2016).

6. **Student-Teacher Relationship:** Student-teacher relationship is multi-factorial and may vary according to culture and geographic location. Due to active learning methods of block-based curriculum, the teachers are more approachable, making student-teacher relations better (Hussein et al., 2017).

7. **Clinical Skills:** In a block-based curriculum, clinics are integrated, and therefore, students get completely involved in treatment planning and treating one patient thoroughly. Whereas in traditional, due to rotation posting, students do only one type of treatment at a time and do not get involved in complete treatment planning of one case. Arias et al. (2016) related better clinical skills with integrated curriculum.

8. **Personality Development:** Active learning process develops analytical skills and builds confidence in students with a block-based Curriculum (Marshal et al., 2014).

9. **Assessment Methods:** Assessments in a block-based curriculum consumes less time as it assesses multiple subjects in a single day, while for traditional curriculum, each subject needs a day.

10. **Research:** In the traditional undergraduate curriculum, research is taught in the form of a subject, only theory. Actual research is compulsory only during higher education. Whereas in a block-based integrated curriculum, research is a compulsive activity for all years during undergraduate studies in addition to the theory component.

Dental graduation/education in India is for five years. The first two years teaches basic medical and dental subjects through lectures and practical. Preclinical procedures are introduced during this period for all specialties of dentistry. The third and fourth years have equal lectures and rotational clinical postings. The fifth-year is of internship. During this, the students perform all complex and straightforward clinical procedures on patients under supervision. Assessment is done only for the first four years, including a written exam, orals, and assessing technical and clinical skills. In a study by Rao et al. (2014), it was found that the main difference in the Dental Curriculum of India and other developed countries was introducing clinical experience at a later stage. Also, in another study (Elangovan et al., 2010), it was found that less attention is given to treatment planning for a patient as a whole and problem-based learning in the Indian Curriculum. This pattern is adopted in post-graduate training but also needs to be introduced in the undergraduate curriculum itself. Table-3 shows few important differences in the traditional and block-based curriculum.

Discussion

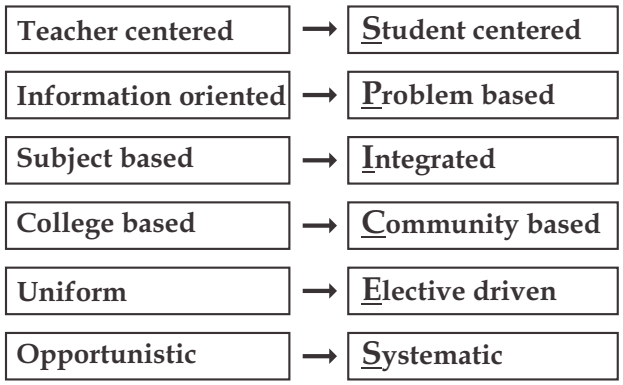
Curriculum refers to the lessons and academic content taught in a specific program (Curriculum-Glossary, 2021). Block-based designing is only the structure of the university curriculum. This framework helps the curriculum to meet the complex demands of the health system. The curriculum structure of the University under the block system integrates bio-psycho-social cultured concepts of health and illness. Apart from the basic core knowledge of dentistry, nonacademic components like value, ethics, communication, individual development, professionalism, social behavior are also included in teaching and assessment. Independent blocks are designed for all and incorporated in all the years of graduations. This type of approach reflects the SPICES model of curriculum design (Figure-1) that includes strategies such as student-centered learning, problem-based learning, integrated teaching, community-based education, elective programs, and a systemic approach (Quintero et al., 2016).

Table 3: Shows the Difference between the Block and Traditional Curriculum

Traditional Curriculum	Block based curriculum
Teacher-centered	Student-centered
Multiple topics are taught at the same time	One system is taught at one time
Doesn't focus on real learning and gives limited scope for independent study of any subject.	Focuses on content area and gain complete understanding by creating and continuity in students' learning.
Mostly uses lectures/diadactic teaching	Uses multiple methods like class presentations, group discussion,role play,simulation

Source : Author's Computation

Figure 1: SPICES Model



Source : Harden (1984)

Bligh and Brice, (2010) have also suggested a framework of quality curriculum design principles. This framework describes how medical education should be taught so that the students are trained perfectly for good medical practice. The acronym is RIFLE (Figure-2).

and they found that curriculum designs do not have much effect on student's performance. These inconsistent findings make it difficult to decide which curriculum design creates better graduates to fulfill society's needs.

Conclusion

'How' students learn is equally important as 'What' they learn. Therefore, understanding how they learn will contribute much more in improving what they learn. Here comes the vital role of curriculum design. The medical curriculum is now emphasizing professionalism and fitness to practice, for which we need students to engage with a robust curriculum effectively. Whichever curriculum design is followed, the outcome should be to produce young doctors who are 'safe beginners. They should be able to provide exemplary patient care. No curriculum remains

Figure 2: RIFLE framework for Curriculum Designing

R	Realistic	The curriculum is effective if the students can correlate its importance to patient care.
I	Integrated	Students learn better if the curriculum is planned in such a way that the students are taught a single topic by staff from different specialties so that they can relate their core knowledge with variety of disciplines.
F	Feedback	Feedback keeps the learners motivated and helps self assessment and reflection.
L	Learning	Learning process should involve interaction and must be made interesting and engaging for better outcome.
E	Evaluation	The curriculum should be regularly evaluated.

Source : Bligh J. and Brice J. (2010)

It is mentioned by Elangovanet al., (2010) that the students of India who study traditional curricula have an excellent theoretical quality as they need to refer to textbooks. The theoretical knowledge base of students was evident from the subjective exams. As traditional curriculum is subject-centered and less complicated to deliver, it is still preferred in many universities. However, aspects of critical thinking, problem-solving, and research are the strength of integrated curriculum, which is not well addressed in traditional design. Hecker et al., (2009), in their study, compared the scores of licencing exams with the formal medical curricula

static, and continuous changes are happening according to society's requirements and developments in medical and dental science/technology. The basis for any change in curriculum is always to improve the existing curriculum design. It ranges from simply flipping a subject from one year to another to introducing a completely new course (Johnson, 2015). Curriculum change is needed to keep the knowledge and technology updated with modernization, reconstructing according to learner ability and eliminating outdated teaching methods.

As sudden change in curriculum design is very difficult and also it is a long process, we recommend that initially institutes shoud start using innovative teaching methods that involves active participation of students. We also recommend including teaching and assessing the hidden curriculum domains like professionalism, ethics and communication skills.

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