Chapter
2

Learning Process and Domains of Learning

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INTRODUCTION

Medical education is the roadway to the evolution of the next generation healthcare providers, in whose hands the community's health will flourish. So, the medical educator's role is of paramount importance. The teacher leads the 'hand', opens the 'mind', and touches the 'heart' of his/her students. The challenges of teaching are many. It involves not only effective classroom teaching but also curriculum planning, feedback, assessment and evaluation. Moreover, the teacher, as a mentor, should also be in charge of the students' holistic well-being, which includes physical and mental health, morality and ethics, life-skills and recreation; an able teacher has to shoulder multiple responsibilities. Learners are the most important and core stakeholders in the education system. The students, with all their potential, sit before us, with hopes, expectations, and ambitions, which we pledge to fulfil. It is essential for every teacher to understand the basics of learning processes, particularly the nuances of adult education, in order to deliver the best as an educator, mentor, and counsellor. We must also keep in mind that every student is unique in terms of their physical, intellectual, social, and emotional characteristics and we should be able to provide for all through appropriate teaching–learning methods.

WHAT IS LEARNING?

Learning is defined as 'a relatively permanent change in behaviour resulting from reinforced practice'. Learning is the process of gaining knowledge, skills, understanding and behaviour, through study, experience, or teaching. It involves assimilation of information and refinement of existing knowledge or abilities, utilising one's cognitive skills. Learning can occur through not only formal education, but also through informal experiences, observation, experimentation, and interaction with others.

The process of learning can generally be broken down into three main steps: input, processing, and output. It involves a cyclical process of receiving input in the form of lectures, practicals, demonstrations, bedside-clinics etc.; processing it mentally, and finally demonstrating understanding or skill through output during assessments (formative or summative) and in the real-life during practice. Each of these steps is essential for effective learning and knowledge acquisition.

LEARNING PROCESS

In order to enhance student learning and achievement, competencies, objectives, curriculum, teaching–learning strategies, and assessment are all essential elements of the learning process. Each has a distinct function in directing instruction, promoting educational opportunities, and assessing the growth and achievement of students.

- ***Competencies:*** These are the behaviours, knowledge, skills, and abilities that people require in order to carry out particular jobs or responsibilities in a successful manner. Competencies describe what students should know and be able to do at the conclusion of a course or program in an educational setting. These can be more precisely described as task-oriented talents or as general, all-encompassing capabilities.
- ***Objectives:*** These are quantifiable, precise statements that outline what learners ought to know or be able to perform after completing their courses. Usually expressed in terms of observable behaviours, objectives should be completed within a set amount of time. They give teachers and students specific objectives and act as the curriculum's road map.
- ***Curriculum:*** The curriculum, which describes the objectives and organisation of the entire programme, serves as the general framework for educational programmes. It has norms for academic discourse and skill development and is more thorough and all-encompassing. It has a wider scope, more prescriptive and little scope for alterations.

On the other hand, a syllabus is a particular document that, within an educational programme, offers descriptive details on a single course. It contains information regarding the goals of the course, its content, assignments, regulations, and grading standards. It is more precise and comprehensive. It is highly flexible and has scope for alterations.

TL methods and assessment methods are discussed in detail in other chapters.

LEARNING CYCLE

The term "learning cycle" describes the mental process by which people pick up new abilities, behaviours, or knowledge. It includes many stages or phases that students usually experience in learning a new idea or ability. Although there are many other learning cycle models, David Kolb's experiential learning cycle (Fig. 2.1), which has four stages, is one often used paradigm.

- ***Concrete experience:*** In this phase, anything is actively experienced or done. Learners take part in activities that lay the groundwork for learning, get their hands dirty, or come across novel circumstances.
- ***Reflective observation:*** After engaging in an activity, students consider what they have experienced. Reflection helps students make sense of their experiences and promotes critical thinking.
- ***Abstract conceptualisation:*** During this phase, students draw links between the concepts or knowledge they already possess and their personal experiences. After analysing and drawing inferences from their findings, they formulate hypotheses or generalizations. This stage entails developing new notions and thinking abstractly.
- ***Active experimentation:*** Lastly, students put their recently developed ideas or concepts to use in real-world scenarios. They try out various strategies, put theories to the test, and look for chances to get more practical experience that will help them improve their understanding.

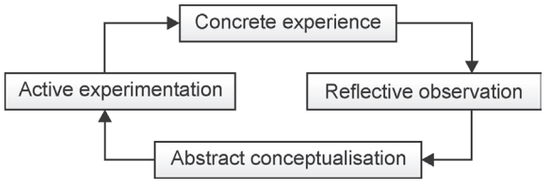

Fig. 2.1: Kolb's stages of the learning cycle

The learning cycle may not always be a linear process; there may be a back-and-forth movement between stages, and the cycle may repeat multiple times as the understanding and expertise deepens. This cyclical approach to learning promotes active engagement, critical thinking, and continuous improvement.

The teaching–learning process is an open-ended spiral. The learning spiral is a concept often used in education to describe the process of acquiring new knowledge or skills. It suggests that learning is not a linear process but rather a continuous cycle of gaining understanding, applying that understanding, reflecting on the experience, and then refining or expanding upon that understanding.

DOMAINS OF LEARNING

Learning occurs in three commonly recognized domains, viz., cognitive, affective and psychomotor.

- ***Cognitive domain:*** This domain involves development of knowledge and cognitive abilities of the students. The learning in this domain happens to acquire facts and concepts related to the medical field.
- ***Psychomotor domain:*** This domain in concerned with development of skills. A physician is known for the skills he/she possesses. Therefore, the learning in this domain happens to nurture our students to develop hands-on experience of basic clinical skills which would help them establish themselves as physicians of first contact in the community.
- ***Affective domain:*** This domain in medical education deals with development of attitude, ethics, moral values, altruism, empathy, professionalism and communication. Teaching and learning in this domain is very important to develop physicians who are true professionals.

Benjamin Bloom, an educational psychologist, proposed a classification of educational objectives in his 1956 publication "Taxonomy of Educational Objectives: The Classification of Educational Goals", where he divided these objectives into the above three domains of learning and provides further grades of learning in each domain.

The Bloom's taxonomy was later revised in 2001, to provide the learner clearer instructional goals (Table 2.1).

Cognitive domain consists of the following levels:

- *Remembering:* Recalling or recognising information.
- *Understanding:* Grasping the meaning of information.
- *Applying:* Using knowledge in new situations or practical scenarios.

Table 2.1: Bloom's taxonomy			
Cognitive (knowledge)		**Affective (attitudes)**	**Psychomotor (skills)**
Evaluation	Problem-solving	Characterising	Origination
Synthesis		Organising	Adaptation
Analysis	Interpretation	Valuing	Complex overt response
Application		Responding	Mechanism
Comprehension	Recall	Receiving	Guided response
Knowledge			Set
			Perception

In each set the proficiency builds up from below upwards.

- *Analysing:* Breaking down information into parts to understand its structure.
- *Evaluating:* Making judgments about the value of ideas or materials.
- *Creating:* Generating new ideas, products, or ways of viewing things.

Affective domain consists of five levels:

- *Receiving:* Willing to receive or pay attention to information.
- *Responding:* Participating actively or showing interest in a learning experience.
- *Valuing:* Demonstrating commitment or belief in the importance of something.
- *Organising:* Integrating new values with existing ones.
- *Characterising:* Acting consistently following the adopted values.

Psychomotor domain consists of the following levels:

- *Perception:* Use sensory cues to guide motor activity.
- *Set:* Is ready to act.
- *Guided response:* Imitates, follows instructions.
- *Mechanism:* Applies learned response habitually with increasing confidence.
- *Complex overt response:* Performs without hesitation/automatically.
- *Adaptation:* Modifies skills to fit special requirements.
- *Origination:* Shows creativity based on highly developed skills.

These levels can be understood with the example of learning how to drive a car, as shown in Table 2.2.

Table 2.2: An example to explain the different levels of psychomotor domain	
Descriptor	**Levels of psychomotor domain**
Observes car driving	Perception
Reads about car-driving, finds out where the accelator, brake and gear are	Set
Drives the car following the steps of the instructor	Guided response
Drives car regularly in the correct manner but thinks if her steps are right	Mechanism
Drives car correctly without thought	Complex overt response
Learns to troubleshoot in some situations	Adaptation
Constructs a new driving protocol for special circumstances	Origination

These domains provide educators with a framework for designing learning objectives and assessing student progress across a range of skills and abilities.

PRINCIPLES OF ADULT LEARNING

As medical educators, we are dealing with adult learners, so it is imperative that we realize the difference between the learning process of children (pedagogy) and that of adults (andragogy) and modify our teaching methods accordingly. The differences between pedagogy and andragogy are contrasted in Table 2.3.

Table 2.3: Differentiating the principles of pedagogy and andragogy

	Pedagogy	**Andragogy**
Knowledge and maturity	They are in the process of cognitive, emotional, and physical development Limited knowledge and experience	They have already reached cognitive maturity They have pre-existing knowledge and experiences that can influence their learning process
Motivation	Predominantly extrinsic	Predominantly intrinsic
Learning environment	Preferably structured	Flexibility and autonomy preferred
Teaching	Structured, teacher-led training	Can take more responsibility for their own learning Student-led learning
Feedback	Frequent and immediate	Constructive feedback

The principles of adult learning, andragogy, were initially formulated by Malcolm Knowles in the 1970s. These principles recognise that adults have unique characteristics and preferences when it comes to learning.

Some key principles are (Box 2.1):

1. Adults are selective learners, therefore, all educational opportunities for them must be pertinent and closely related to the duties of their jobs, e.g. medical students will only learn pathology with interest when they are made to understand the importance of the subject as a medical practitioner and not merely a subject which they have to clear in their second professional MBBS.

Box 2.1: Important principles of adult teaching–learning

- Ensure active participation of the learner
- Proceed from known to unknown
- Provide relevant knowledge
- Ensure clarity of objectives
- Have knowledge of results about performance
- Motivate the learners: motivated learners learns most
- Promote transfer of learning
- Teaching methods should appeal to multiple senses (e.g. speaking, writing, audio-visuals, clinical exposure)
- Favourable and comfortable learning atmosphere
- Repetitive practice for achieving perfection in skill

2. Adults require a great deal of drive. Unless they are very motivated and engaged in what they are studying, they won't learn. Usually, adult learns have intrinsic motivation but we as educators can extrinsically motivate them as well by exposing them to real life cases and problems for them to explore, analyse and solve. This would make them feel the real purpose for which they have come to learn and automatically get motivated.
3. Adults require a great deal of participation. Adult learners should be engaged in teaching and learning sessions whenever possible. Therefore, educators need to plan interactive sessions like buzz groups, think-pair-share, problem solving, etc. for them to engage, critically think and come up with reasonable answers. They may also be encouraged for seminars, peer teaching sessions which increases their participation as well as motivation to learn.
4. Adults are concerned about self-respect. They ought to be addressed by name and given respect as unique individuals. There ought to be a secure environment. Adult learners may experience self-doubts including anxiety about failing or looking foolish, as well as issues adjusting to other participants and educators. Instructors need to address these issues and make sure they don't upset adult students.
5. Adults require encouraging remarks. Adult learners should receive timely, encouraging feedback both verbally and non-verbally, and they should be made aware of their progress.
6. Adults come with abundance of prior experiences. During teaching–learning sessions, adult learners should be given the opportunity to voice their opinions and be encouraged to share their personal experiences. Instructors ought to allow students to absorb new information and abilities within the framework of their prior experiences.

By considering these principles, educators, and trainers can design effective adult learning programs that cater to the unique characteristics and preferences of adult learners, ultimately fostering a positive and engaging learning experience.

In case of adult education settings, we must ensure a safe, non-threatening environment, where the learner's self-esteem is honored. We need to build-up on their existing knowledge and provide relevant content. All the while, the learner should be considered as an active contributor to the process of learning, which is possible through a participatory mode. This ensures good involvement from the learners' end. It has been shown that adults retain 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they hear, see and say and 90% of what they hear, see, say and do. A problem centred approach makes learning interesting and evokes analytical ability in the learner. Self-directed learning proves effective among adult learners, as they are willing to take responsibility and prefer autonomy in learning.

CONCEPTS OF SUPERFICIAL, DEEP AND STRATEGIC LEARNING

In medical education, learning approaches are often categorised into superficial learning, deep learning, and strategic learning. Each approach influences how students engage with and retain knowledge, impacting their long-term understanding and application in clinical practice.

Superficial Learning

- ***Definition:*** Superficial (or surface) learning occurs when students focus on memorisation and rote learning without seeking a deeper understanding of the material. The goal is often to pass exams rather than to gain a thorough grasp of concepts.
- ***Characteristics:***
  - Students focus on isolated facts and details rather than underlying principles or connections.
  - They may lack engagement with the material, often driven by external pressures such as fear of failure or short-term goals like exams.
  - Knowledge is often forgotten quickly after the test or assignment is completed.
- ***Example in medical education:*** A student memorises drug names and dosages for a pharmacology exam without fully understanding mechanisms of action, interactions, or clinical applications.

Deep Learning

- ***Definition:*** Deep learning involves a thorough understanding of concepts, where students aim to relate new information to prior knowledge and apply it in real-life situations. This approach encourages critical thinking, problem-solving, and long-term retention.
- ***Characteristics:***
  - Students actively seek to understand how different concepts are connected and how knowledge applies to real-world clinical scenarios.
  - They reflect on what they've learned, ask questions, and seek to synthesize knowledge across disciplines.
  - Focus is on meaning and understanding rather than simply recalling facts.
- ***Example in medical education:*** A student studying pathology not only memorises disease classifications but also understands the mechanisms of disease processes and how they manifest in clinical symptoms, leading to better diagnostic skills.

Strategic Learning

- ***Definition:*** Strategic learning combines elements of both superficial and deep learning, with students focusing on achieving specific academic outcomes by using the most efficient study methods for the task at hand. They adopt both deep and surface learning strategies depending on the situation.
- ***Characteristics:***
  - Students tailor their learning approach based on the demands of assessments, assignments, or clinical duties.
  - They are highly organised and plan their study efforts to maximise grades or performance, optimizing time management and learning techniques.
  - While they may use deep learning for understanding complex concepts, they may also use superficial learning to memorise essential facts for exams.
- ***Example in medical education:*** A student employs deep learning to understand the pathophysiology of heart failure for clinical rotations but switches to memorising key lab values and guidelines for an upcoming exam.

Implications in Medical Education

- Superficial learners may struggle with clinical problem-solving because they lack the deeper understanding necessary for applying knowledge in patient care.
- Deep learners tend to excel in applying theoretical knowledge to practice, often developing strong clinical reasoning and decision-making skills.
- Strategic learners are adaptive and efficient but may risk focusing too heavily on exam success at the expense of deeper learning in some areas.

Educators in medical schools aim to encourage deep learning, fostering lifelong learning habits essential for the evolving nature of medical practice. However, a strategic approach can also be beneficial if balanced with a focus on deep understanding, especially in the fast-paced and high-demand environment of medical education.

SUMMARY AND CONCLUSION

Learning is the process of acquiring knowledge, skills, behaviours and attitude, which occurs through three main steps of input, processing, and output.

Competencies, objectives, curriculum, teaching–learning methods, and assessment are all integral components of the learning process, which, in turn, is an open-ended spiral. This cyclical approach to learning promotes active engagement, critical thinking, and continuous improvement.

Learning occurs in three commonly recognized domains, viz., cognitive, affective and psychomotor. In Bloom's taxonomy each of these domains have been further sub-categorised into five or six steps, where the student gradually advances from the lower and simpler level to a higher and more complex one.

In medical education, the aim is to promote learning in our students, who are all adult learners. It is imperative that medical educators should be conversant with the principles of andragogy, which refers to the theory and practice of educating adults, emphasising on a learner-centred, skill-based approach in a non-threatening environment, promoting self-directed learning.

Suggested Reading

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