

Cultivating Lifelong Learning Skills During Graduate Medical Training

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Lifelong learning is referred to as learning practiced by the individual for the whole life, is flexible, and is accessible at all times. Medical Council of India has included lifelong learning as a competency in its new regulations for graduate medical training. Acquisition of metacognitive skills, self-directed learning, self-monitoring, and reflective attitude are the main attributes of lifelong learning; and all of these can be inculcated in the students by using appropriate instructional methodologies. It is time to deliberate upon the instructional designs to foster the lifelong learning skills and behaviors in medical graduates. In this communication, we aim to debrief the concept of lifelong learning, particularly in context with medical training and detailing the process that can be explicitly used to cultivate the attitude of lifelong learning in medical graduates.

Keywords: Medical graduate, Medical education, Metacognitive skills, Self-directed learning.

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The hardest conviction to get into the mind of a beginner is that the education upon which he is engaged is not a college course, not a medical course, but a life course, for which the work of a few years under teachers is but a preparation.

William Osler

Imagine the scenario of tertiary care medical practice in the 1980s in India. There was no boom of endoscopic surgeries, magnetic resonance imaging was unheard of, and super-specialization care was sporadic, even at tertiary care centers. Can we imagine medical practice at tertiary care level now, without these facilities? Diagnostic and treatment modalities even at primary and secondary care levels have reformed a lot. Medical science is a dynamic field; newer techniques are added every day, treatment protocols are updated regularly, reference diagnostic values change over a period of time. What was a good treatment protocol for hypertension in Joint National Committee-7 (JNC-7) recommendations may not hold good after JNC-8 report [1]. A person categorized as diabetic now, as per current reference range, may not had been marked as diabetic during last century. This dynamic nature of medical sciences mandates its ‘students to be learner for the whole of their life’ so as to remain ‘current’ in their knowledge and skills.

Though the trend of continuous medical education (CME) is picking up fast in India, particularly after State Medical Councils making it a mandatory criteria to earn specific credit hours for renewal of medical registration [2]; voluntarily participation for the whole session of the CME activity barely happens, thus making the whole exercise a futile effort.

This lacklustre attitude makes it imperative to conceptualize, and cultivate lifelong learning skills in medical graduates during training. Medical Council of India (MCI) too has emphasized the need for medical graduate to be lifelong learners by incorporating this as one of the five competencies for the Indian Medical Graduate (IMG), in its 2012 regulations on graduate medical education [3]. As per the guidelines, IMG must acquire certain sub-competencies during graduation to be a competent lifelong learner (**Box 1**). Similarly, other medical boards have also stressed on lifelong learning [4].

WHAT IS LIFELONG LEARNING?

The term lifelong learning initially featured in 1973 in the report of the International Commission on the Development of Education, a UNESCO body, linking-up lifelong learning with the idea of the learning society [5]. Subsequently, lifelong learning was recognized as a “continuous, constant, unending, lifetime quest, which starts with birth and concludes only at death” [6]. More recently, lifelong learning has been defined as a “learning

BOX 1 SUB-COMPETENCIES FOR THE CORE COMPETENCY OF LIFELONG-LEARNER AS PER MCI GUIDELINES

An Indian Medical Graduate, at the time of graduation must demonstrate ability to:

- Do an objective self-assessment of knowledge and skills.
- Continue learning, improve existing skills and attain new skills.
- Search and critically appraise medical literature.
- Utilize experiences, to improve personal and professional growth and learning.
- Apply the newly gained knowledge and skills in patient care.

that is carried for the entire life, is flexible, varied and accessible at all the times and in different places” [7].

The European Lifelong Learning Initiative defines it as “a continuously supportive process which stimulates and empowers individuals to acquire all the knowledge, values, skills and understanding they will require throughout their lifetimes and to apply them with confidence, creativity and enjoyment, in all roles, circumstances, and environments” [8]. Commission of the European Communities defined it as “all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective” [9].

The National Agency for Education of Sweden introduced the model of life-wide learning along with lifelong learning. Life-wide learning has been recognized as learning that incorporates learning from all the dimensions of life - the formal, non-formal and informal settings [10]. Lifelong learning has also been termed as ‘joined-up education’ - a strategy to learning which recognizes and thoroughly eradicates detrimental discontinuities between different phases and settings for learning with its holistic outlook [11]. The process of lifelong learning is based on four pillars of education for the future - learning to know; learning to do; learning to live together with others; and learning to be (human)[12].

CHARACTERISTICS OF LIFELONG LEARNING

Formal and informal education: Lifelong learning, most typically, involves both formal and informal education. Formal education occurs through traditional schools, colleges, universities and other higher educational institutes and results in certification; while informal learning can happen at workplace, home, club, organization etc through peers, family members, colleagues, media etc [13].

Life-wide learning: This dimension of lifelong learning is more complex. It not only identifies a range of settings resulting in lifelong learning like formal and informal, but also embraces different contexts at a given point of time during learning [8].

Self-motivated learning: This attribute involves two very important aspects – self directed learning and motivation. Lifelong learning is inevitably self-learning. Motivation and lifelong learning are in fact two inseparable constructs – a lifelong learner is always a motivated individual and motivated individual can be a lifelong learner [14].

Introspection and self-assessment: While doing self-assessment, students appraise the standards of their own work and learning, evaluate and scale the extent to which they have been able to achieve the learning goals, reflect on the strengths of their learning and learning gaps, and look for opportunities of improvement accordingly [15].

Interaction and fusion: Specific learning interactions and collaborative learning are valuable characteristics of lifelong learning environments. Interactions can be in family, with peers, at workplace, in social gatherings. These learning environments provide opportunities not only for discussing expectations but also providing feedback.

Application of knowledge and skills: Knowledge and skills gained without their application do not benefit self and others. Learning should always translate in to application. It not only promotes further interest and motivates the participants, but also raises more queries and desires to learn more.

Holistic approach and universal participation: The Organization for Economic Co-operation and Development has linked-up the universal involvement for learning with the financial demands of the 21st century. This model of universal involvement consists of learning for all purposes - learning for self improvement and understanding, learning for social reasons, and learning for economic well-being [16].

BENEFITS AND ATTRIBUTES OF LIFELONG LEARNER

The top ten benefits of lifelong learning are listed in **Box 2** [17]. Two skills which are helpful in achieving the competence of lifelong learning are – metacognition and self-directed learning. Metacognitive skills refers to taking responsibility and ownership of self learning, making strategies for learning and choose appropriate strategies, scrutinizing the growth of learning, taking corrective measures, evaluating the efficacy of learning strategies, and shifting to other learning strategies, whenever required [18]. As metacognition engrosses self-dictatorial and self-

BOX 2 BENEFITS OF LIFELONG-LEARNING

- Assists to sharpen natural talent
- Unlocks the intellect
- Builds an inquisitive, curious mind
- Enhance intelligence
- Makes the world a superior place
- Helps us espouse to adjust
- Helps in finding sense in life
- Keep us occupied as energetic member of the society
- Helps us make new friends and start new associations
- Lifelong learning leads to an enriching life of self fulfillment

controlling skills, it is said to have a constructive influence on problem-solving aptitude and lifelong learning, if developed during training. If not developed, students are stated to have faced problems in identifying learning gaps [19]. As stated earlier, self-directed learning skills are the cornerstone of being a lifelong learner.

Other two very important attributes of lifelong learner are – self-monitoring and reflective behavior. Students should be skilled enough to monitor their own progress and identify the learning gaps and look for improvements. Any understanding of learning that is lifelong and life-wide requires critical analysis of the learning; thus reinforcing the need to develop reflective behavior for lifelong learning [20]. Thus a learner having metacognitive skills, who is self-directed learner, monitors own learning progress, and possesses reflective attitude is more likely to be a lifelong learner (**Fig. 1**).

STRATEGIES FOR CULTIVATING LIFELONG LEARNING

The core competency of lifelong learning can be very well imbibed by the medical graduates if a holistic strategy which can target the three most important characteristics of lifelong learning – self-motivated learning, self-assessment, and application of knowledge and skills; along with training on time-management, is in place. These strategies should be designed to utilise the existing teaching-learning tools, optimally.

Identify individual learning styles: For lifelong learning behaviors to be cultivated, due consideration must be given to identifying learning styles and multiple intelligences of the participating students. Processing of information, retention, and recall are all directly related to the learning style of the individual. It must be considered

that students learn through various styles - by personal meaning, by conceptual learning, by knowing how things work, and by self-discovery. Similarly, students have different levels of intelligence in different areas like: verbal-linguistic, musical, logic-mathematical, spatial, kinesthetic, interpersonal, intrapersonal, and naturalistic [21]. The role of identifying intelligence area in lifelong learning success has previously been well established in psychological studies [22]. VARK (visual, aural, read/written, kinesthetic) questionnaire, with many available versions can be used to identify learning styles and multi-modal intelligence in learners. The version suiting a particular learning environment can be easily picked for use [23].

Set learning goals: Setting learning goals and attaining them can help with self-assessment and cultivation of lifelong learning behaviors. Development of learning goals may necessitate the analysis of many resource materials and compilation and scrutiny of information from many diverse sources [24]. Targeting interventions to develop characteristics associated with greater progress toward achieving learning goals may assist in developing lifelong learning. Learner confidence in developing and attaining learning goals can be improved through education on the creation and use of learning goals [25]. Reed, *et al.* [26] found that an explicit orientation to learning goals helps learners set goals, and reinforces the importance of lifelong learning.

Adopting reinforcing teaching-learning methods: Medical undergraduates already have prior learning experiences. Acknowledging their understanding and experiences and using appropriate instructional strategy accordingly, help in cultivating lifelong learning

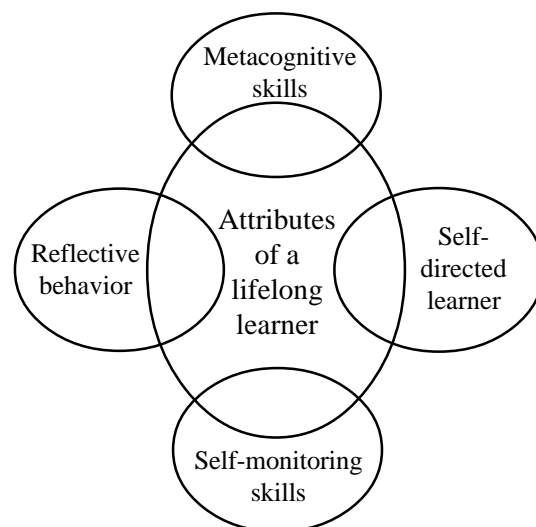


FIG. 1 Attributes of a lifelong learner.

behaviors. Educational and instructional strategies which incorporate the concepts of self-directed learning are the mainstay for reinforcement of lifelong learning. These instructional strategies are described in the next section.

Application: Graduates are motivated by favorable learning outcomes and always like to ascertain the role of the learning activity in achieving their learning goals. If the learning is relevant to their working environments, they are more likely to learn, and learn it for lifelong. Adults always want learning that is practical in pragmatic, real life scenarios [27]. For cultivating lifelong learning in medical graduates, there should be contextual match between the instructional strategies, learning goals, and their applicability in real life situations. The concept of applicability can be reinforced during graduate training by imparting more of hands-on training in simulated-environments, case-based scenarios and during clinical-postings.

Time-management: Graduates must be trained to prioritize their time and utilize it in the best possible way.

INSTRUCTIONAL METHODOLOGIES FOR CULTIVATING LIFELONG LEARNING SKILLS

Keeping track of newer advances, diagnostic techniques, treatment protocols, and information on updated reference-ranges is a precondition for making successful and immediate diagnostic and treatment decisions [28]. Instructional strategies that profess to foster lifelong learning behaviors by involving students in self-directed, self-assessed, problem-oriented learning experiences are outlined in *Fig. 2*.

Problem-based Learning

Learning is centered on a well-designed clinical problem

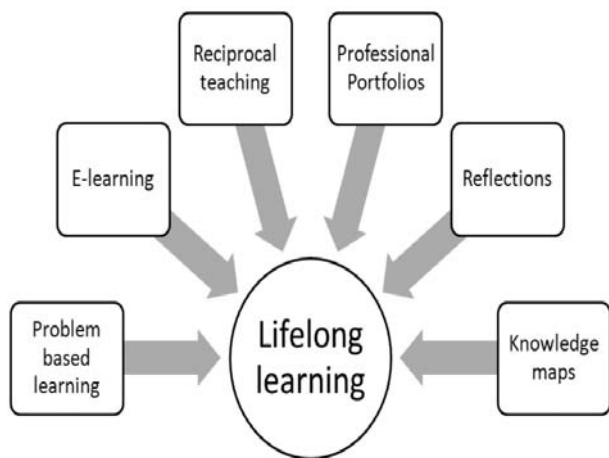


FIG. 2 Instructional methodologies for cultivating and promoting lifelong learning skills.

through which students identify their learning requirements, make an enquiry, and correlate the theory and the practice [29]. PBL is an educational cycle (running through 4 phases) that develops students’ lifelong learning skills because of their active participation *Fig. 3*.

- During Phase 1 (analyzing) students look through the presented problem, reasoning gaps, identify educational needs, formulate hypotheses, critically evaluate the comments of fellow students, and lay down learning goals and create strategies to achieve those targeted goals. Through such strategies, self-monitoring skills of students and thinking attitude, the essentials for being metacognitive, are improved.
- In Phase 2 (self-directed learning) students draft a timeline, determine required resources and execute strategies for learning by self-study; thus building upon the critical component of lifelong learning – self-directed and motivated learning.
- In Phase 3 (application) students correlate the learning to the problem and analyze the information sources and their personal research methods used during self-directed learning phase. This constant assessment of learning resources and personal methods help to develop lifelong learning skills.
- During Phase 4 (reflections) students recapitulate and share the knowledge gained and converse to apply that to solve problems faced in future. They constantly reflect on the educational experience they gained, and try to integrate new learning into their existing knowledge structures, thus improving the metacognitive skills required for lifelong learning [29].

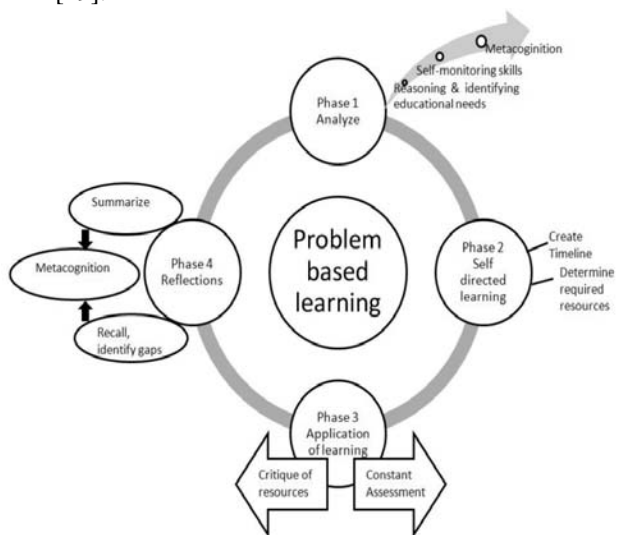


FIG. 3 Cultivating lifelong learning skills through Problem-based learning educational cycle.

PBL as an instructional strategy should be introduced to the students during initial days of undergraduate medical training itself. Foundation course, as stipulated in new MCI guidelines will be the ideal time to sensitize and expose students to self-directed learning and PBL. Early clinical exposure will provide another opportunity to reinforce PBL concepts, thus helping to adopt it in routine medical graduate training during subsequent years and cultivate lifelong learning skills.

E-learning

E-learning (electronic learning) includes all teaching-learning activities pursued by individuals or groups, functioning online or offline, synchronously or asynchronously through the use of computers and other electronic devices. E-learning is usually considered synonymous with web-based learning, online learning, internet based learning, computer aided learning, and mobile learning. It is more flexible and the learners, to a limit, are accountable for deciding the pace of their own learning.

These inherent qualities of e-learning coupled with e-assessment help to inculcate self-motivated learning, give chance of self assessment, reflection and determining learning gaps and promote lifelong learning. E-learning is the teaching-learning tool now being used widely for lifelong learning outside the boundaries of traditional and certified learning too [30].

Ram, *et al.* [31] have explicitly detailed the methods of introducing PBL through e-learning methods, thereby further opening the opportunities for lifelong learning during traditional teaching years as well as after finishing schooling.

As MCI has made it mandatory for every medical college to install facilities of virtual classrooms; e-learning will be a norm rather than exception in Indian medical training program. Faculty should start delivering a part of the curriculum at least through e-learning, thus guiding the students to use this self-study mode more frequently.

Reciprocal Teaching

Palincsar and Klenk [32] described reciprocal teaching as – “an instructional procedure that takes place in a collaborative learning group and features guided practice in the flexible application of four concrete strategies to the task of text comprehension: questioning, summarizing, clarifying, and predicting. The teacher and group of students take turns leading discussions regarding the content of the text they are jointly attempting to understand.”

It is an example of teacher-led collaborative

instructional structure with role-reversal – student act as teacher too. Typically, reciprocal teaching runs in two phases – in first phase teacher models presents the comprehension skills by articulating questions and summary that are associated with problem/excerpt detailed in the class and in next phase student act like model and deals with another problem in the same way the teacher model has done earlier. As reciprocal teaching promotes reading and comprehensive skills coupled with promoting enquiry, immediate feedback, critique skills; in a way it promotes inculcating of metacognition and self-directed learning with self-monitoring and thus promotes lifelong learning skills (**Fig. 4**).

Reciprocal teaching strategies can be adopted in graduate medical training by way of small group discussion, tutorials, and students’ integrated seminars.

Portfolios

The role of portfolios in medical education has also been discussed before [33]. A portfolio is a systematic and well-designed collection of the learner’s work. Portfolio continues to grow with the academic/professional growth of the learner and depicts the account of learner’s academic achievements, development, and progress over time. Portfolios can be used to cultivate lifelong learning skills by promoting self-learning [34]. Additionally, by

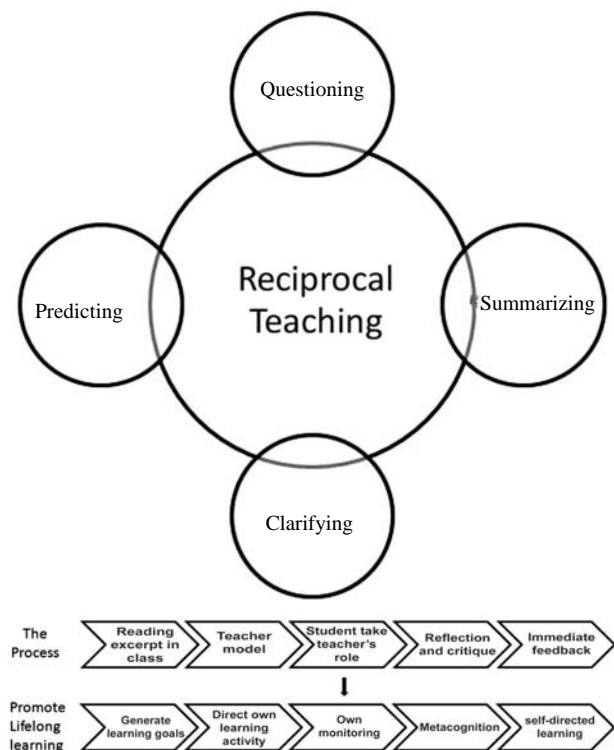


Fig. 4: *Cultivating lifelong learning skills through reciprocal teaching environments.*

using portfolios, students can improve their responsiveness towards their own learning, and thus help to inculcate the attitude of self-improvement. Also self-motivated learning improves with critique on one's achievements and learning gaps, which are integral to the portfolios [33]. Portfolios also help to promote collaborative learning, and supports self-assessment behaviors [35]. These inherent qualities of portfolios help cultivating lifelong learning skills.

Though, it is not possible to design a portfolio for entire undergraduate medical training, but internship is the ideal time when medical students should be trained and encouraged to maintain a portfolio of their work, learning and training. Even otherwise, logbooks are maintained by interns, in one or the other form; and these logbooks can easily be replaced with portfolios, thus helping to inculcate lifelong learning skills.

Reflections

Reflection is described as – “a cycle of paying deliberate, systematic and analytical attention to one's own thoughts and actions, feelings, thinking and in relation to particular experiences for the purpose of enhancing perceptions of and responses to current and future experiences” [36]. Regardless of the definition, reflection is critical thinking during the process of learning or after the process is over by linking new learning experiences and ideas to prior experiences in order to develop more complex concepts, and thus promoting higher order thinking. Reflection helps students to share more responsibility of their learning, which in turn can promote ‘reflective practice’ during professional life later on, and can help in promoting lifelong learning skills (*Fig. 5*).

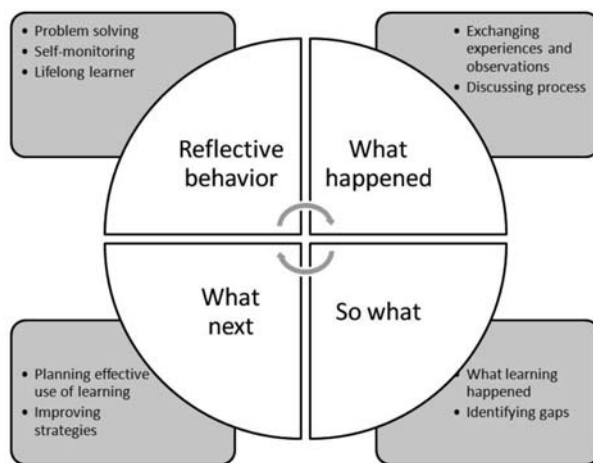


Fig. 5 Cultivating critical reflective attitude for lifelong learning skills.

Reflective learning is a critical component of PBL, reciprocal teaching, and learning through portfolios. At the same time one can reflect on any other independent learning experience and have self improvement, thus fostering lifelong learning. Edwards, *et al.* [20] proposed the use of theory of reflexivity, collaborating reflections for lifelong learning.

Medical students should be exposed to ‘reflective writing’ during early training period. Mentor-mentee program being run by some medical colleges can provide a good platform to encourage reflective behavior. Similarly, ‘student-doctor method of clinical training’ as laid down in new MCI guidelines will provide good opportunities for inculcating attitude of ‘reflective practice’ in medical graduates, thus fostering lifelong learning.

Knowledge Maps

Ebener defined knowledge mapping as - a process of surveying, associating items of information or knowledge, preferably visually, in such a way that the mapping itself also creates additional knowledge determining for example where knowledge assets are, and how they flow in the system [37]. Knowledge maps can be mind maps and concept maps. They can be made manually or digitally.

Use of concept maps for learning activities in which group discussion and interaction happens, student themselves generate assessment criteria, and peer assessment takes place; all help to inculcate lifelong learning attitude by improving self-monitoring skills by way of peer-assessment [38]. The construction of knowledge maps demands a lot of subjective-knowledge and understanding of the subject related concepts, students use analytical skills to solve the problem, communication is improved and skills of working in a team are inculcated, thus fostering lifelong learning skills [39].

CONCLUSION

Lifelong learning is a professional competency which must be fostered in the medical graduates. Four attributes of lifelong learner – metacognition, self-directed learning, self-monitoring and having reflective attitude can be cultivated by explicitly using ‘already in-use’ instructional strategies, as per institutional feasibility. Once these lifelong learning attributes are inculcated by the medical graduate, the medical practitioners will always be ‘current’ in medical knowledge and skills, and will be able to give better medical care.

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