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Strategies to neutralize the impact of factors that influence learning among medical students

Saurabh RamBihariLal Shrivastava[1,2*] and Prateek Saurabh Shrivastava[2]

[1]Associate Dean Research – Off Campus, Sri Balaji Vidyapeeth - Deemed to be University, Medical Education Unit Coordinator and Member of the Institute Research Council and [2]Department of Community Medicine, Shri Sathya Sai Medical College & Research Institute, SBV Chennai Campus, Shri Sathya Sai Nagar, Ammapettai, Chengalpattu District, Tamil Nadu, India

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Abstract: The medical curriculum is extremely vast and continues to expand further with each day, and this makes both the process of teaching as well as the process of learning extremely challenging. Moreover, we must acknowledge that it is not an easy process for all students to learn at the same pace, as each student differs from another and has their own set of concerns, motivating factors, and inhibiting factors to influence their learning progress. The purpose of the review was to identify the factors affect learning and then propose strategies to overcome these factors. An extensive search of all materials related to the topic was carried out on the PubMed and Google Scholar search engines and a total of 44 articles were selected based upon their suitability with the current review objectives. In our vision to produce a competent medical graduate, we have to give due consideration to all the above factors, so that the learning process continues among medical students. In conclusion, the learning styles and the factors that affect learning might vary from one medical student to another. As medical educators, we should take specific steps to neutralize the impact of external factors and even assist students in the process of modifying internal factors with the solitary goal to improve learning and attain learning competencies.

Keywords: Learning, Curriculum, Medical education, Assessments

Introduction

The medical curriculum is extremely vast and continues to expand further with each day, and this makes both the process of teaching (teacher's perspective) as well as the process of learning (students' perspective) extremely challenging [1]. Owing to the continuous developments in the field of medicine, the regulatory body in most nations has introduced lifelong learner as one of the core competencies expected of a trained medical graduate [2].

However, we must acknowledge that it is not an easy process for all students to learn at the same pace and attain all the desired subject-specific competencies by the set timeline, as each student differs from another and has their own set of concerns, motivating factors, and inhibiting factors to influence their learning progress [3-5]. The purpose of the review was to identify the factors affect learning and then propose strategies to overcome these factors.

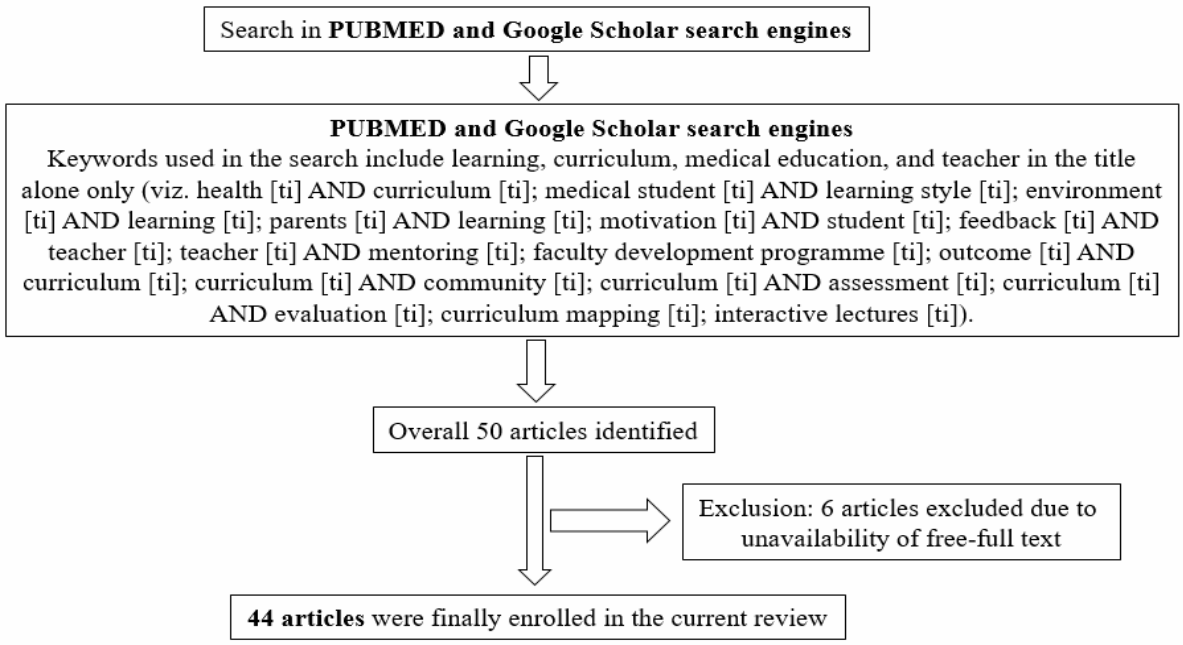
Methods

An extensive search of all materials related to the topic was carried out on the PubMed and Google Scholar search engines. Relevant research articles focusing on the factors affecting learning and strategies to improve learning that are published in the period 2005 to 2021 were included in the review.

A total of 50 studies similar to current study objectives were identified initially, of which, six were excluded due to the unavailability of the complete version of the articles. Overall, 44 articles were selected based upon their suitability with the current review objectives and analyzed. Keywords used in the search include learning, curriculum, medical education, and teacher in the title alone only (viz. health [ti] AND curriculum [ti]; medical student [ti] AND learning style [ti]; environment [ti] AND learning [ti]; parents [ti] AND learning [ti]; motivation [ti] AND

student [ti]; feedback [ti] AND teacher [ti]; teacher [ti] AND mentoring [ti]; faculty development programme [ti]; outcome [ti] AND curriculum [ti]; curriculum [ti] AND community [ti]; curriculum [ti] AND assessment [ti]; curriculum [ti] AND evaluation [ti]; curriculum mapping [ti]; interactive lectures [ti]). The articles published in only the English language were included in the review (Figure 1). The collected information is presented under the following sub-headings, namely Determinants of the learning process, Faculty Development Programmes, Curriculum, Teaching-learning methods, Meeting the needs of different learners, Feedback and Reflection, and Additional measures.

Fig-1: Flowchart for the selection of research articles



Determinants of the learning process

In order to ensure learning among medical students, a number of factors should be in alignment with each other. Broadly, these factors have been classified as intrinsic and extrinsic, and it becomes quite essential that as medical educators, we are aware of the same to expedite the acquisition of knowledge and skills [4-6].

These factors include motivation to learn, whether it comes from within (I want to learn because I want to improve myself) or it is due to an external stimulus (such as I learn because my parents want me to do, etc.) [7]. We must not forget that there are two categories of students, one who joins medicine, because they are passionate about the specialty, and another because their parents want them to learn medicine. The approach of both these categories of students might differ and it is bound to affect their learning [7-8].

In continuation, learning styles (like visual, auditory, read and write, and kinesthetic) of the medical students or learning environment (such as the influence of teachers, seniors, colleagues, and infrastructure available to support learning) also plays a defining role in impacting the learning process [9-11]. Further, the medical curriculum, including the planning and the nature of assessments is also expected to influence learning (as students augment their efforts toward learning either due to the fear of failure or as a reward). Moreover, support extended from parents and family members is also expected to influence the learning process [4-5]. In addition, the role of teachers in their ability to employ interactive teaching-learning methods, use e-learning tools, ensure active engagement of students, provision of constructive feedback, etc., also has a significant role in impacting the learning of individual students [12-13].

Strategies to neutralize the impact of these factors

In our vision to produce a competent medical graduate, we have to give due consideration to all the above factors, so that the learning process continues among medical students.

Faculty Development Programmes

The first and foremost intervention has to be to implement strategies to improve the abilities and capabilities of medical teachers [14-15]. This can be accomplished by strengthening the faculty development programs, wherein the Medical Education Unit can organize different training programs for improving the competency of teachers themselves. The planned training programs can cover the domains of interactive teaching-learning methods to empower teachers engage all types of learners, deliver effective and constructive feedback (to motivate students, rectify their mistakes, strengthen good practices, etc.), and to strengthen mentoring skills. In addition, teachers can also be trained in the use of technology and e-learning tools in medical education as online tools have become a part of students' lives [14-16].

Further, the teachers should be trained in reflection and motivated to encourage students to reflect to ensure long-term learning. The teachers should also be trained in the act of curriculum mapping and scheduling of classes, so that we can maintain the triangle of learning (viz. specific learning objectives, teaching-learning methods to be employed, and the assessment methods that will be used to assess the SLOs) [17]. Moreover, considering the fact that assessment derives learning, it is an indispensable consideration that teachers should be trained in assessment methods (to empower them to assess learning across all three major learning domains), plus also train them with regard to teaching and assessment of professionalism, teamwork, leadership skills, etc.) [15-16, 18].

Curriculum

The curriculum should be designed in such a way that it should clearly mention the expected competencies of the students in each subject [19]. In other words, the expected outcomes should be defined at the start and conveyed to the students, so that they own their learning process and work actively towards the attainment of the learning objectives [19-20]. It is quite essential that all the stakeholders (including the community, teachers, etc.) are involved in the process of framing the curriculum. Further, the designed curriculum has to be adapted to the needs of the local community, as it will not only aid in improving the health indices of the catchment population but also will provide practical relevance to medical students in their learning process [21-22].

It is important to communicate the tentative dates for formative and summative assessments, and the nature of the exams so that students can plan their learning at their convenient pace [23]. It is also essential that preference should be given to formative assessments, and conducting them often, so that fear of exams can go away from the mind of students [23-25]. Another effective strategy will be to adopt programmatic assessment (wherein weightage will be given to all formative assessments + classroom behavior of the students, and not only depend on the performance in summative assessments to take a high-stakes decision) [26].

The institution should carry out curriculum mapping each year and modify the implementation process accordingly [18]. Finally, the evaluation of the curriculum carries also immense significance, and thus a protocol should be adopted to obtain feedback from students/teachers on curriculum, and individual teachers (microteaching), so that based on the responses obtained curriculum can be modified to accommodate the concerns of students [27-28].

Teaching-learning methods

The success of employed teaching-learning methods in enhancing learning will depend upon the extent to which it can ensure the active engagement of students [29]. This essentially includes the addition of specific learning objectives at the start of the session (regardless of whether it is a theory or practical or clinical type of activity), so that students can remain focused [30]. Further, teachers should aim to provide a wide range of learning experiences for students and not limit to a single kind of stimulus, so that we

can meet the needs of all kinds of learners. It is also advised to incorporate the use of interactive e-learning tools or the promotion of virtual reality or even other innovative methods (like the use of simulation and standardized patients, etc.) [31]. In order to augment critical thinking, clinical reasoning, and problem-solving skills, the institution can include problem-based learning or case-based learning, or other methods in the curriculum [32-33].

Meeting the needs of different learners

As already mentioned, students differ from each other in their learning style and thus a separate set of initiatives should be taken to meet their needs rather than leaving them to their fate [3]. For slow learners, the concerned departments can initiate additional classes, extend psychological support (if required), start a buddy system (wherein slow learners can be paired either with a senior or a well-performing student from their own batch to discuss their problems), etc., [34]. There is a crucial need to strengthen the mentoring process, as the mentor and mentee can prepare shared action plans to improve and attain the learning competencies [35].

For advanced learners, it is crucial that they are encouraged to opt for additional courses in their areas of interest, encouraging them to participate in quizzes and other academic events (student enrichment programs), and providing them guidance on future career prospects [36]. In addition, all students should be given tips to perform better like the use of mnemonics, ways to present an answer, including the use of diagrams/flowcharts, citing references to the statements, etc.

Feedback and Reflection

Feedback and reflection are two of the most effective and important strategies to ensure long-term learning [37-39]. The feedback system can be strengthened or streamlined by the establishment of a feedback culture in the institution, which will remarkably aid in the learning process, as both students and teachers will seek feedback themselves to improve [40]. However, this will essentially require training of teachers in the intricacies of the provision of constructive feedback. This feedback delivery process will also assist in improving the self-efficacy of students by persuading them. With reference to reflection, teachers should train the students in the art of reflection, so that they themselves identify their strengths and areas that require attention [39].

Additional measures

In our aim to augment learning, we have to provide students with infrastructure support, including the initiation of online library support and a Learning Management System (LMS), as every student might not be interested to learn within classroom hours [41]. The provision of LMS will neutralize the traditional approach and will give students the freedom to work at their pace [41].

Furthermore, ensuring support from family members is also quite necessary, and the best approach for the same will be to involve parents during the parent-teachers meeting, and utilize this opportunity to inform them not only about academics but even other attributes so that everyone is working in the same direction [42]. Finally, we have to adopt standard quality assurance measures to improve the overall planning, implementation, and evaluation of the curriculum [43-44].

Conclusion

In conclusion, the learning styles and the factors that affect learning might vary from one medical student to another. As medical educators, we should take specific steps to neutralize the impact of external factors and even assist students in the process of modifying internal factors with the solitary goal to improve learning and attain learning competencies.

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References

1. Gouveia N, Ayres JRCM. Global health in the medical curriculum. *Clinics (Sao Paulo).* 2021; 76:e3073.
2. Fondahn E, Burke AE, Padmore JS, Ollendorff AT. Assessing for practice-based learning and improvement: Distinguishing evidence-based practice from reflective learning. *J Grad Med Educ.* 2021; 13:86-90.
3. Hernández-Torrano D, Ali S, Chan CK. First year medical students' learning style preferences and their correlation with performance in different subjects within the medical course. *BMC Med Educ.* 2017; 17:131.
4. Lambert CT, Guillette LM. The impact of environmental and social factors on learning abilities: a meta-analysis. *Biol Rev Camb Philos Soc.* 2021; 96:2871-2889.
5. Mbwayo AW, Mathai M, Kuria MW, Mutavi T, Stoep AV. Parents' and teachers' perceptions of factors affecting learning in Kenya. *Glob Soc Welf.* 2020; 7:245-256.
6. Sophonhiranrak S. Features, barriers, and influencing factors of mobile learning in higher education: A systematic review. *Heliyon.* 2021; 7:e06696.
7. Hayat AA, Salehi A, Kojuri J. Medical student's academic performance: The role of academic emotions and motivation. *J Adv Med Educ Prof.* 2018; 6:168-175.
8. Descals-Tomás A, Rocabert-Beut E, Abellán-Roselló L, Gómez-Artiga A, Doménech-Betoret F. Influence of teacher and family support on university student motivation and engagement. *Int J Environ Res Public Health*. 2021; 18:2606.
9. Alam MA, Rana S, Jafari FH, Alam MK. Identification of preferred learning style of medical and dental students using VARK questionnaire. *Biomed Res Int.* 2021; 2021:4355158.
10. Bhalli MA, Khan IA, Sattar A. Learning style of medical students and its correlation with preferred teaching methodologies and academic achievement. *J Ayub Med Coll Abbottabad.* 2015; 27:837-842.
11. Prashanti E, Ramnarayan K. Ten maxims for creating a safe learning environment. *Adv Physiol Educ.* 2020; 44:550-553.
12. Guo W, Zhou W. Relationships between teacher feedback and student motivation: A comparison between male and female students. *Front Psychol.* 2021; 12:679575.
13. Larose S, Tarabulsy G, Cyrenne D. Perceived autonomy and relatedness as moderating the impact of teacher-student mentoring relationships on student academic adjustment. *J Prim Prev.* 2005; 26:111-128.
14. Algahtani H, Shirah B, Subahi A, Aldarmahi A, Algahtani R. Effectiveness and needs assessment of faculty development programme for medical education: Experience from Saudi Arabia. *Sultan Qaboos Univ Med J.* 2020; 20:e83-89.
15. Kiran F, Ayub R, Rauf A, Qamar K. Evaluating the impact of faculty development programme initiative: Are we really improving skills in MCQ writing? *J Pak Med Assoc.* 2021; 71:2434-2438.
16. Chia CF, Nadarajah VD, Lim V, Kutzsche S. Transfer of knowledge, skills and confidence from a faculty development programme for health professions educators into practice. *Med Teach.* 2021; 43:S46-52.
17. Junod Perron N, Cullati S, Hudelson P, Nendaz M, Dolmans D, van der Vleuten C. Impact of a faculty development programme for teaching communication skills on participants' practice. *Postgrad Med J.* 2014; 90:245-250.
18. Herrmann T, Leggett T. Curriculum mapping: Aligning content and design. *Radiol Technol.* 2019; 90:530-533.
19. Homberg A, Krug K, Klafke N, Glassen K, Mahler C, Loukanova S. Consensus views on competencies and teaching methods for an interprofessional curriculum on complementary and integrative medicine: A Delphi study. *J Integr Med.* 2021; 19:282-290.
20. Foadi N, Koop C, Mikuteit M, Paulmann V, Steffens S, Behrends M. Defining learning outcomes as a prerequisite of implementing a longitudinal and transdisciplinary curriculum with regard to digital competencies at Hannover Medical School. *J Med Educ Curric Dev.* 2021; 8:23821205211028347.
21. Nguyen-Truong CKY, Leung J, Micky K. Development of a culturally specific leadership curriculum through community-based participatory research and popular education. *Asian Pac Isl Nurs J.* 2020; 5:73-88.
22. Dongre AR, Chacko TV. A critical review of new competency-based curriculum for community medicine using various curricular review frameworks. *Indian J Public Health.* 2019; 63:362-366.
23. Khonglah Y, Raphael V, Mishra J, Marbaniang E, Chowdhury Z, Dey B. Relooking the curriculum and assessment in undergraduate pathology. *J Educ Health Promot.* 2019; 8:116.
24. Tekian A, Ten Cate O, Holmboe E, Roberts T, Norcini J. Entrustment decisions: Implications for curriculum development and assessment. *Med Teach.* 2020; 42:698-704.
25. Badyal DK, Sharma M. Internal assessment in new MBBS curriculum: Methods and logistics. *Int J Appl Basic Med Res.* 2020; 10:68-75.
26. Wilkinson TJ, Tweed MJ. Deconstructing programmatic assessment. *Adv Med Educ Pract.* 2018; 9:191-197.
27. Carr SE, Noya F, Phillips B, Harris A, Scott K, Hooker C, et al. Health humanities curriculum and evaluation in health professions education: a scoping review. *BMC Med Educ.* 2021; 21:568.
28. Bruyneel AV, Beauviche J, Caussé B, Walters K. Curriculum development, implementation, and evaluation during the COVID-19 confinement period in France. *J Dance Med Sci.* 2020; 24:147-152.

29. Chiu HY, Kang YN, Wang WL, Chen CC, Hsu W, Tseng MF, et al. The role of active engagement of peer observation in the acquisition of surgical skills in virtual reality tasks for novices. *J Surg Educ.* 2019; 76:1655-1662.
30. Jalloh C, Collins B, Lafleur D, Reimer J, Morrow A. Mapping session learning objectives to exam questions: How to do it and how to apply the results. *Med Teach.* 2020; 42:66-72.
31. Venugopal V, Dongre AR. Effect of interactive lectures and formative assessment on learning of epidemiology by medical undergraduates - A mixed-methods evaluation. *Indian J Community Med.* 2020; 45:526-530.
32. Morrissey B, Heilbrun ME. Teaching critical thinking in graduate medical education: Lessons learned in diagnostic Radiology. *J Med Educ Curric Dev.* 2017; 4:2382120517696498.
33. Min Simpkins AA, Koch B, Spear-Ellinwood K, St John P. A developmental assessment of clinical reasoning in preclinical medical education. *Med Educ Online.* 2019; 24:1591257.
34. Frazier P, Gabriel A, Merians A, Lust K. Understanding stress as an impediment to academic performance. *J Am Coll Health.* 2019; 67:562-570.
35. Kotwal A. Innovations in teaching/learning methods for medical students: research with mentoring. *Indian J Public Health.* 2013; 57:144-146.
36. Powell JM, Murray IVJ, Johal J, Elks ML. Effect of a small-group, active learning, tutorial-based, in-course enrichment program on student performance in medical physiology. *Adv Physiol Educ.* 2019; 43:339-344.
37. Regmi K, Jones L. A systematic review of the factors - enablers and barriers - affecting e-learning in health sciences education. *BMC Med Educ.* 2020; 20:91.
38. Leung A, Fine P, Blizard R, Tonni I, Louca C. Teacher feedback and student learning: A quantitative study. *Eur J Dent Educ.* 2021; 25:600-606.
39. Ahmed WU, Mubashar T. Medical student reflection: quality over quantity. *Clin Teach.* 2019; 16:288-289.
40. Tariq M, Boulet J, Motiwala A, Saeed S, Awan S, Zehra T, et al. Strengthening the feedback culture in a postgraduate residency program. *Educ Health (Abingdon).* 2021; 34:96-100.
41. Back DA, Behringer F, Haberstroh N, Ehlers JP, Sostmann K, Peters H. Learning management system and e-learning tools: an experience of medical students' usage and expectations. *Int J Med Educ.* 2016; 7:267-273.
42. Round JE, Walker S. What do parents think about their children being involved in medical education? *Med Educ.* 2007; 41:920.
43. Sjöström H, Christensen L, Nystrup J, Karle H. Quality assurance of medical education: Lessons learned from use and analysis of the WFME global standards. *Med Teach.* 2019; 41:650-655.
44. Joshi MA. Quality assurance in medical education. *Indian J Pharmacol.* 2012; 44:285-287.

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*All correspondences to: Dr. Saurabh RamBihariLal Shrivastava, MD, FAIMER, PGDHHM, DHRM, FCS, ACME, M.Phil. (HPE). Professor, Department of Community Medicine, Shri Sathya Sai Medical College & Research Institute, SBV Chennai Campus, Shri Sathya Sai Nagar, Ammapettai, Chengalpattu District, Tamil Nadu - 603108, India. E-mail: drshrishri2008@gmail.com