Medical Education Teaching: A Review of Various Learning Style Tools and Its Characteristics

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ABSTRACT

The learning style (LS) provides insights into the preferences of the student learning process. There are various tools used to assess the LS either alone or in combination. Many researchers concluded that the usefulness of knowing LS is to provide better education, such as by changing the pattern of teaching to suit all learners or the majority of learners in the classroom. This also allows to change the curriculum and bring required resources in the library to encourage the students to use their preferred LS to understand the content. The teachers can implement active sessions such as team-based learning, problem-based learning, case-based learning, group discussion, project works, interactive sessions, fieldwork, hands-on training, etc., to cater every learner LS in making them to understand the subjects. Finally, the main goal of knowing LS is to improve the quality of education.

Keywords: Active session, Education, Learners, Learning style.

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INTRODUCTION

Learning is an important aspect of medical education. Every student's goal is to learn and do better in the examinations. Each student passes through various stages in the education process and learning style (LS) will be changing depending on the situation they have been exposed to.

A study has stated that higher education engages with a diversity of students with varied ethnic and cultural backgrounds, with different training programs and institutions, and most importantly with different LSs.[1] Various factors influence the LSs which include personal characteristics, previous experience, and the learning environment.[2,3]

Another study has quoted that, one of the potential learning obstacles is a mismatch between an instructor's style of teaching and a student's method of learning.[4–6] The quality and nature of teaching must play a prominent role in LSs, it makes the student acquire new LS. This is very crucial in medical education as faculty needs to adjust the different LSs of students to make them competent doctors.

The course requirement provides a key factor that makes students adopt various learning approaches apart from various factors such as curriculum, a technique of teaching, methods of assessment, learning resources present in the library, etc.

The LS basically represents that different learners learn the information in different ways. This concept has been gaining importance in recent years, especially in the education sector. Professional educators have shown intense interest in LS concepts to adapt their instructional approaches accordingly.

The present article focuses on what is LS and how LS assessment tools differ from each other. Also, the advantages and disadvantages in the use of these tools.

WHAT IS LEARNING STYLE?

The Curry L definition of "learning styles" is characteristic cognitive, effective, and psychosocial behaviors that suggest how learners perceive, interact with, and respond to the learning environment.[7] In simple words, different learners learn information in different ways.

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In 1999, Dunn and Dunn were one of the first to propose and describe LSs, stating that it is a process of concentration, absorbing, and retaining new information and is different in everyone.[8]

As previously stated LSs in students are inculcated with various factors. There are several potential scales and classifications used to access the LS but, neither of them alone will substantiate the LS. All focus on environmental preferences, sensory modalities, personality types, and/or cognitive styles of learners in general.[9]

Outline of Few Learning Styles Instruments

Many psychologists had an opinion that learning preference will be one of the most important factors for academic performance. This special significance in education has led to the emergence of various models and measures.

Some of them have been described in the following section:

- Carl Jung first described the first personality test, which later developed into the Myers Briggs Type Indicator Test (1962) and helped make occupational decisions.[10]

- Later in 1970, Kolb's LSs model, one of the most influential was developed and is one of the first LSs.[11]

Kolb's model[12] is associated with the Learning Style Inventory instrument (LSI) focusing on learner's preferences in terms of concrete *vs* abstract, and action vs reflection.

Learners were described into four categories as shown in Table 1.

Table 1: Kolb's model with their characteristic features

Category	Features
Divergers (feeling and watching)	• Imaginative, emotional, problem-solving, and sensitive • Diverse cultural interests • Interested in people • Listens with an open mind • Accepts personal feedback • Prefers to watch rather than do • Gathers information and brainstorm • Ability to see things from different perspectives • Produces ideas • Prefers group work learning
Assimilator (thinking and watching)	• Organizes information in a logical and clear fashion • Ideas and concepts are important • Creates theories • Less focus on people • Needs clear explanations • Prefers readings, lectures, and exploring theories • Requires time to think things through • Logical and concise approach to learning
Converger (thinking and doing)	• Problem solver • Prefers technical tasks • Experiment with new ideas • Looks for practical uses for problems • Ability to use learning to find solutions to practical situations • A tendency to dislike dealing with social or interpersonal issues
Accommodator (feeling and doing)	• "Hands-on" learner • Target driven. • Uses intuition rather than logic • Practical approach • Likes new challenges • Relies on experience and others for information and problem solving • Team worker

For more information on Kolb's four-stage learning cycle, see the following link: http://www.jcu.edu.au/wiledpack/modules/fsl/JCU_090344.html

- Honey and Mumford developed an alternative instrument known as the Learning Style Questionnaire (LSQ).[11] It differs from Kolb's model as it probes general tendency behaviors and categorizes them into four types of learners as shown in Table 2.

- The Canfield Learning Style Inventory (CLSI) describes LSs along four dimensions.[13] Following are their descriptions as shown in Table 3.

- The Felder and Silverman[14] introduced a LS assessment instrument that was specifically designed for classroom use and was first applied in the context of engineering education. The instrument consists of 44 short items with a choice between 2 responses to each sentence. Learners are categorized into four dichotomous areas.

  - Based on information perceiving patterns, they can be sensory or intuitive; visual or verbal.
  - Approaches to organizing.

Table 2: The four learning styles by Honey and Mumford with their characteristics

Category	Characteristics
Activists (learn primarily by experience)	• Optimistic and welcomes change • Preference for experiencing things hands-on • Flexible and open-minded • Ready to take action • Likes new situations
Reflectors (learn from reflective observation)	• Good at listening and dealing with information • Slow to form conclusions • Preference for reviewing experiences and mulls data over • Careful, thoughtful, thorough, and methodical
Theorists (learn from exploring associations and interrelationships)	• Preference for drawing conclusions • Logical, objective, and rational thinkers • Asks probing questions. • Disciplined in their approach • Looks at the "big picture"
Pragmatics (learn from doing or trying things with practical outcomes)	• Preference for planning the next steps • Prefers to test things out in practice rather than theory-based • Practical, down to earth, businesslike and realistic • Technique oriented

- The way of learners processes the information (active or reflective).
- The rate at which students' progress toward understanding (sequential or global).

- The relatively modern Approaches and Study Skills Inventory for Students (ASSIST), which has been used to measure LSs in undergraduate students[15] and been used by authors for their study.

This inventory defines the students into three main types of learners as shown below.

Type	Features
Surface (instrumental) apathetic learners	• Learners try to memorize and reproduce according to the requirement of the teacher • Knowledge is superficial • Learner thinks to learn only to fulfill the examinations • Short-term remembering of contents and later they will forget[16,17] • Accepts information and ideas of teacher (passive learning) • Understand simple descriptions and concentrate on assessment requirements • Inability to understand the purpose of learning • Focuses on facts and procedures • Reproducing material without analysis or integration • Assumptions that the knowledge comes "ready-made"[18–20]
Strategic (achieving) learners	• Learners know what they learn and why • Gives importance for assessment demand • Uses appropriate methods for a particular topic • Have a patchy understanding of subjects which leads to incapability to integrate across the topics[17]
Deep learners	• Learner intention is to understand the topic, concepts • Learners are motivated • Able to integrate the knowledge across different components.[16,17]

The importance of this questionnaire was highlighted by various researches that, deep and strategic LSs predict success in final examinations while surface learning predicts failure.[21,22]

The overall impression of surface learning is that it is consistent with the traditional teaching method which involves "the passive transfer of objective knowledge from teacher to student[23] and teacher is firmly in control of the students' learning and assessment".[24]

How to overcome this type of problem is by identifying the shortcomings and addressing with a specific solution, following are some of these:

- It depends on the teacher's method of delivery of content which is a modifiable factor.
- Requirement of more interactive sessions.
- Modifying assessment allows the student to attain higher order of learning.
- Clear explanation needed about the topic why they need to know and purpose. This enhances the student motivation in learning.

Table 3: The four learning styles by Canfield with their characteristics

Category	Characteristics
Conditions for learning	• Team worker and maintains good peer relationships • Organized • Sets own objectives and welcomes feedback • Compares with others' achievements to improve self • Friendly and understands the relationship • Finds specific information for work completion • Works independently • Likes a disciplined classroom and knowledgeable instructors
Area of interest	• Works with numbers, logic, and language • Likes hands-on training • Likes working with people—interviewing, counseling, selling, or helping
Mode of learning	• Listens to hear lectures, tapes, or speeches • Prefers to read books, articles, or bibliographic information • Interpret diagrams, movies, pictures, graphs • Learns by handling or performing, as in the shop, field, or laboratory classes
Expectation for course grade/ conditions for performance	• Outstanding • Above average • Average • Below average • Weighted

Retrieved from: https://paa.com.au/wp-content/uploads/2018/11/LSISample-Test-Report.pdf

Table 4: VARK learning styles and their characteristics

Learning mode	Characteristics
Visual	• Learn by demonstration and through the description
	• Students like to use figures, pictures, and symbolic tools such as a graph, flowcharts, hierarchies, models, and arrows which represent printed information[25]
	• Distracted easily even by movements or actions, but the noise doesn't[26]
Aural	• Learning by listening[26]
	• Give more attention to the words delivered by teachers
	• Discuss answers or by listening to the recording[25]
	• Distracted by noise[26]
	• Has loud reading habits
	• Usually read easily, narrate cleverly, write story or poetry effortlessly, learn a foreign language fast, have a good vocabulary, spell smoothly, like to write letters, and own strong ability in remembering names or facts[27]
Reading	• Prefer printed word and text as a method to gain information
	• Able to arrange lecture notes into sketch form, paraphrase classroom notes, and study multiple-choice exam questions[25]
Kinesthetic	• Learn by experience[25]
	• Dislike learning merely by listening and visual skills, and, typically, kinesthetic students are passive in class[26]

• Teachers should make students find answers rather than giving all explanations in classes.
• Teachers should encourage students to visit the library to analyze content, integrate, and learn.

McCune and Entwistle, 2000, defined the following characters for deep approach study which makes them superior in terms of learning:[28]

• Intention to understand.
• Active interest and personal engagement.
• Relating ideas.
• Gaining an overview.
• Creating outlines and structures.
• Questioning and using evidence critically.
• Seeking the central point.
• Drawing conclusions.
• Seeing the purpose of a task or seeing it in its wider context.

The deep approach uses the analytical skills of students[29] and is largely self-regulated.[30] So deep learning focuses on student's willingness to understand the concepts, interact with fellow students and teachers, bring their previous experience to provide logical arguments and conclusions The overall impact will be providing a space for lifelong learning.

A study by Zeegers[31] showed a positive relationship between the use of the deep approach and GPA in a sample of Australian science students. Other research also supports this conclusion.[32]

• The VARK Inventory:
Visual, aural, reading and writing, and kinesthetic (VARK) is one of the instruments which was used to determine the LSs by many researchers and developed by Fleming and Mills.[33] The VARK LS model is a LS that has been modified from the VAK model to the VARK LS by Fleming in 2006. This learning tool makes students learn education by experience, projection, contemplation, and accomplishment.[24]

Visual, aural, reading and writing, and kinesthetic LS model has been adjusted with four learning modes namely visual mode, aural mode, reading mode, and kinesthetic mode. It is based on those modes, where students can choose which is the most suitable learning mode for them during the learning process. The characteristics of VARK learning has been shown in Table 4.

DISCUSSION

Every child has a natural ability of learning and has been altered depending on exposure to a different situation. The students have different strengths, weaknesses, and preferences in acquiring the information. Some are comfortable with visual forms of information, others oral explanation, some prefer to learn actively, and others function more introspectively and individually.[34]

In medical education, we will encounter different forms of students with the characteristics mentioned above. Especially in the first year of joining, the students are new to the environment and are mentally, emotionally need time to adjust. The teachers should try to understand the LSs of students to have proper teaching methods applied to each batch in medical education. This allows comfort to students in the learning process and provides positive stimuli both environmentally and emotionally.

It is important to know the students LSs to make them effective learners and allow them to make responsible for their own learning. The LS and teaching match provide a good environment for the student to acquire knowledge and become a lifelong learner.

Many researches have shown the various advantages of knowing LSs. The learners will have more than one LS, the levels of using it can change.[35] It has been stated that learner knowing their LS will allow them to integrate into the process of learning and will learn easily with success[36] and will be effective problem solver having more control over their life.[37]

With these advantages, the LS tools have some problems such as commercialization of tools, some were done for a specific reason and were used across all areas and its overall usefulness is also questionable. Furthermore, some tools may not be accurate and the use of various combinations may overcome this issue.

These issues lead us to use the results as a base for student–teacher interaction and experience of teacher will decide on the type of teaching methods adopted to serve all type of learners in the classroom.

CONCLUSION

In medical education, quality depends on how much content is grasped by students to improve their knowledge. Knowing

student's LS would be beneficial to plan and improve the delivery of content. This efficient change for students will lead to enhancement of ability to adopt, encouraging continuous learning, provides knowledge and skills for students learning to be lifelong learners rather than be a passive learner.

Teachers play an important role in creating a proper learning environment to cater to everyone learning. The teacher should take the responsibility to have active student involvement in session, motivate and encourage the strengths by using a combination of teaching methods.

An in-depth understanding of modes of approach to learning would be beneficial for medical teachers to improve their delivery of learning materials. This will also lead to a better outcome in assessment and the overall impact of having a competent general physician to take care of patients in the community.

References

1. Bollinger L. The need for diversity in higher education. Acad Med 2003;78(5):431–436. DOI: 10.1097/00001888-200305000-00002.
2. Coles CR. Undergraduate medical curricula and the learning they generate. Med Educ 1985;19:85.
3. Newble D, Clark R. The approaches to learning of students in a traditional and in an innovative problem-based medical school. Med Educ 1986;20(4):267–273. DOI: 10.1111/j.1365-2923.1986.tb01365.x.
4. De Vita GD. Learning styles, culture and inclusive instruction in the multicultural classroom: a business and management perspective. Innovations Educ Teaching Int 2001;38(2):165–174. DOI: 10.1080/14703290110035437.
5. Cook DA. The research we still are not doing: an agenda for the study of computer-based learning. Acad Med 2005;80(6):541–548. DOI: 10.1097/00001888-200506000-00005.
6. Cook DA. Learning and cognitive styles in web-based learning: theory, evidence, and application. Acad Med 2005;80(3):266–278. DOI: 10.1097/00001888-200503000-00012.
7. Curry L. Learning preferences in continuing medical education. Canadian Med Assoc J 1981;124(5):535–536.
8. Dunn RS, Dunn KJ. The complete guide to the learning styles in service system. Allyn & Bacon 1999.
9. Cook DA, Smith DJ. Validity of index of learning style scores: multi trait-multimethod comparison with three cognitive/learning style instruments. Med Educ 2006;40(9):900–907. DOI: 10.1111/j.1365-2929.2006.02542.x.
10. Myers IB. Manual: The Myers Briggs type indicator. Consulting Psychologist Press; 1962.
11. Coffield F, Moseley D, Hall E, et al. Learning styles and pedagogy in post16 learning. A systematic and critical review. London: Learning and Skills Research Centre; 2004.
12. Kolb DA. Learning style inventory: self-scoring inventory and interpretation booklet. Boston, MA: McBer and Co; 1985.
13. Canfield A. Canfield learning styles inventory manual. Los Angeles: Western Psychological Services; 1992.
14. Felder RM, Silverman L. Learning and teaching styles in engineering education. Eng Educ 1988;78:674–681.
15. Approaches and Study Skills Inventory for Students (Short version) http://www.ed.ac.uk/etl/questionnaires/ASSIST.
16. Aaron S, Skakun E. Correlation of students' characteristics with their learning styles as they begin medical school. Acad Med 1999;74(3):260–262. DOI: 10.1097/00001888-199903000-00016.
17. McManus IC, Richards P, Winder BC, et al. Clinical experience, performance in final examinations, and learning style in medical students: prospective study. Br Med J 1998;316(7128):345–350. DOI: 10.1136/bmj.316.7128.345.
18. Biggs JB. Student approaches to learning and studying. Melbourne: ACER; 1987.
19. Ramsden P. Learning to teach in higher education. London: Routledge; 1992.
20. Laurillard D. Rethinking university teaching: a framework for the effective use of educational technology. London: Routledge; 1993.
21. Ramsden P, Entwistle NJ. Effects of academic departments on students' approaches to learning. Br J Educ Psychol 1981;51(3):368–383. DOI: 10.1111/j.2044-8279.1981.tb02493.x.
22. Kleijn WC, van der Ploeg HM, Topman RM. Cognition, study habits, test anxiety, and academic performance. Psychol Rep 1994;75(3 Pt 1):1219–1226. DOI: 10.2466/pr0.1994.75.3.1219.
23. Biggs JB. Enhancing teaching through constructive alignment. Higher Education 1996;32(3):347–364. DOI: 10.1007/BF00138871.
24. Boyle EA, Duffy T, Dunleavy K. Learning styles and academic outcomes: the validity and utility of Vermunt's inventory of learning styles in a British higher education setting. Br J Educ Psychol 2003;73(Pt 2):267–290. DOI: 10.1348/00070990360626976.
25. Murphy RJ, Gray SA, Straja SR, et al. Student learning preferences and teaching implications. Educ Methodol J Dent Educ 2004;68(8):859–866. DOI: 10.1002/j.0022-0337.2004.68.8.tb03835.x.
26. Drago WA, Wagner RJ. VARK preferred learning styles and online education. Manage Res News 2004;27(7):1–13. DOI: 10.1108/01409170410784211.
27. Armstrong AM. Instructional design in the real world: a view from the trenches. United States: Information Science Publishing; 2004.
28. Entwistle NJ, Tait H, McCune V. Patterns of response to an approaches to studying inventory across contrasting groups and contexts. Eur J Psychol Educ 2000;15(1):33–48. DOI: 10.1007/BF03173165.
29. Warburton K. Deep learning and education for sustainability. Int J Sustainabil Higher Educ 2003;4(1):44–56. DOI: 10.1108/14676370310455332.
30. Duffy TM, Jonassen DH, ed. Constructivism and the technology: A conversation. Hillsdale, NJ: Erlbaum; 1992.
31. Zeegers P. Approaches to learning in science: a longitudinal study. Br J Educ Psychol 2001;2(Pt 1):115–132. DOI: 10.1348/000709901158424.
32. Sutherland T. New conversations about learning: insights from neuroscience and anthropology, cognitive science, and work-place studies: part II. Account Educ News 2002. 7–10.
33. Fleming ND, Mills C. Not another inventory, rather a catalyst for reflection. To Impr Acade 1992;11(1):137–144. DOI: 10.1002/j.2334-4822.1992.tb00213.x.
34. Felder RM. Matters of style. ASEE Prism 1996(Issue 6):18–23.
35. Temel A. Do you know your learning style? Educat Sci 2002;48:6–9. http://www.basariyolu.com/yazarlar.asp?id=132.
36. Biggs J. Enhancing learning: a matter of style or approach? In: Perspectives on thinking, learning and cognitive styles Sternberg RJ, Zhang LF, ed., Mahwah, NJ: Lawrance Erlbaum Associates; 2001. p. 276. ISBN: 0-8058-3431-1.
37. Fidan N. Learning and teaching at school, concepts, principles, methods. Ankara: Kadıoğlu Publication; 1986. ISBN: 975-337-043-1.