SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 8.
Issue: 12
Page N. 137-141
Year: 2024

Review Article www.wjahr.com

INTEGRATION OF AI IN AYURVEDIC TEACHING- LEARNING METHODS

Dr. Tejaswini L. N.*

3rd Year PG Scholar, Department of Kayachikitsa Ramakrishna Ayurveda Medical College # 54/2 Ramagondanahalli, Yelahanka, Bengaluru, Karnataka 560064.

Article Received date: 06 October 2024 **Article Revised date:** 26 October 2024 **Article Accepted date:** 16 November 2024

***Corresponding Author: Dr. Tejaswini L. N.**

3rd Year PG Scholar, Department of Kayachikitsa Ramakrishna Ayurveda Medical College # 54/2 Ramagondanahalli, Yelahanka, Bengaluru, Karnataka 560064.

ABSTRACT

With exponential growth in globalization of the science of Ayurveda, interest to learn, adopt and make it a way of life is also increasing. This has invited the curiosity of students, and even the general audiences across the globe to explore the knowledge of Ayurveda and practice it as a lifestyle. With increasing flexibility of learning methods, the world considers understanding the Ayurvedic lifestyle by using technological advances, among which, AI plays a significant role. Apart from enhancing the process of studying, this study aims at improvising the quality of study, connecting teachers and students across the globe, increasing precision in the topic wise studies and more accurate references and cross references may be quoted and comprehended in the process of study, learning at student's own pace, in the way that best benefits them, i.e., either by hearing out the content or by reading them, setting up practical tasks, analytical tools and generating exams to assess the students and spontaneous result evaluation and declaration tools to motivate them, giving additional and quicker support to the teachers in analyzing the students for their betterment. AI, being a universally accessible tool is highly beneficial for students of different global zones, languages and those with visual or hearing impairments. The classical Ayurveda texts being scripted in Sanskrit, may sometimes pose difficulty in reaching the globe and hence, AI backs the TKDL in reaching the research groups to avoid the conflicts of patency. Hence, AI gives a notably significant contribution to the field of teaching and learning, research works and in the globalization of Ayurveda.

KEYWORDS: AI in TKDL, Ayurveda Globalization, AI Ayurveda.

INTRODUCTION

What is AI and Ayurveda?

IBM defines Artificial intelligence as "Artificial intelligence (AI) is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy".[1] The AI tools are built on the principles of Machine learning and deep learning.

The science of Ayurveda is illustrated as a science of life and the globe, which is now moving towards the Ayurvedic lifestyles by adapting the principles of Ayurveda, is keen on knowing more about it in a more comprehensive and practical way. Students across the Globe are showcasing high interest in learning the prognostic, diagnostic and therapeutic knowledge for a healthier and efficient life. As *Charakacharya* says, "*Swasthasya Swasthya rakshanam, Aturasya vikara prashamanam*[2]", Ayurveda primarily focuses on maintaining the healthy state of an individual and later on the treatment of diseases, thereby highlighting the concept of "Prevention is better than cure".

AIMS AND OBJECTIVES

In continuation and with direct reference to the above context, it is important that, Ayurveda reaches not just the medical professionals or Ayurveda aspirants, but it is equally important that it reaches the general public and take to them the do's and don'ts in everyday life, as per the Ayurveda principles, with the intention of preventing the public from falling prey to the various diseases.

It is here, at this stage, that the Ayurveda fraternity and its educators face challenges under various steps. Though Ayurveda is under the process of extensive globalization, it is important to use the technological advances to widen its field of adaptability and acceptability. Students and aspirants across the globe need to get access to the skillful and knowledgeable educators in the field, only then will the public receive dependable and authentic information. In order to bridge the gap between the teachers and learners, technologies such as Artificial intelligence need to be made use of, so that, there's extensive exposure to both. Therefore, it is of significant

importance to integrate AI in Ayurvedic teaching and learning process.

METHODS

AI in Education system

On a Global level

Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined by him as "the science and engineering of making intelligent machines".[3] United Nations Office for Outer Space Affairs (UNOOSA), proposes the SDG 4 i.e., Sustainable Development Goal 4, which aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all, and hence, the UNESCO believes that Artificial Intelligence (AI) has the potential to address some of the biggest challenges in education today, innovate teaching and learning practices, and accelerate progress towards SDG 4.[4] It also believes that, efficient comprehension and ethical application of AI, can bring in a large boon for the policy-makers in the education sector.[5] Machine Learning (ML) is the part of AI studying how computer agents can improve their perception, knowledge, thinking, or actions based on experience or data.

Statistical data on use of AI in teaching and learning process

- A Forbes survey reveals that 60% of teachers use AI in their classrooms.[6]
- In a survey by AIPRM of over 1, 200 undergraduates, HEPI analysed the use of AI in higher education and its potential impacts on student learning, which stated that more than 53% of the graduation students used AI for their academic writing work, and more than 36% of them used AI to explain concepts.[7]
- 73% of educators believe AI will improve student learning outcomes.
- 80% of students believe AI will help them better prepare for exams.
- 70% of higher education leaders believe AI is key to their institution's future competitiveness.
- 76% of academic leaders believe AI will fundamentally change the teaching and learning process.[8]

AI in the Indian society

In a country like Indian where education and knowledge play pivotal roles in the development of oneself and the community and country as a whole, blending of ICT (Information and Communication Technologies) with the knowledge and applications of AI can enhance not just the process of teaching and learning in the educational ecosystems, but also give a strong push towards meeting the demands of the 21st century developments to both the educators and the learners, as well as policy makers of the educational system. Every aspiring student in such a densely populated country, would get an opportunity to learn efficiently from across the country and across the globe.

Ayurveda, being native to India, seeks global recognition, thereby ensuring a wider population to reach to. Ayurveda scholars from India will be accessible to the aspirants from across the globe, which can take them and their science to a global platform with higher efficiency. Use of AI tools in the learning and teaching processes is a mutual advantage for both the teaching group as well as the learning group.

Traditional and contemporary methods of Teaching-learning process

The ancient education system followed the *Guru-Shishya parampara* in the *Gurukula* ecosystem, and the education in those days, aimed at overall development of the student i.e., physical, mental, moral, intellectual and spiritual development. Ayurveda, is no different and hence followed a systematic method of learning. To acquire knowledge, 3 steps were advised by *Charakacharya*[9] included

1. *Adhyayana* – Study/learning
2. *Adhyapana* - Teaching
3. *Tadvidya sambhasha* - Discussion

Similarly, the *Vedanta* also mentions 3 process of learning as

1. *Sravana* – listening to the lessons or knowledge
2. *Manana* – remembering and recollecting the learnt knowledge
3. *Nidhidhyasana* – deep contemplation and analysis the knowledge.[10]

The Yogic principles talk about the *Niyamas*[11], among which *Tapas*, meaning determination and discipline and *Swa Adhyaya*[12], meaning self-learning and self-analysis, can be effectively adopted as integral parts of learning methodologies.

Similar model of learning, is the Bloom's taxonomy, which comprises of 6 major categories for learning - Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.[13] The authors of the revised taxonomy, postulated these 6 categories in a revised manner as

1. Remember – Recognizing and recalling
2. Understand – Interpreting, Exemplifying, Classifying, Summarizing, Inferring, Comparing, Explaining
3. Apply – executing, implementing
4. Analyse – differentiating, organizing, attributing
5. Evaluate – checking, critiquing
6. Create – generating, planning, producing.

Hence, blending these principles and methodologies with the Artificial Intelligence and creating a learning and teaching ecosystem that meets the needs of the current generation, which is more technologically oriented, can pave a remarkable path in fetching Ayurveda knowledge to the prime platform of teaching and learning. Keeping the traditional methods alive and recreating their applicability in a technologically driven formula will

prove to be the key for an exceptional knowledge circulation.

AI in Ayurvedic education - students and teachers

The education system today has been more of marks oriented and less of knowledge oriented. In this process, the students tend to stress themselves, incompletely understand the concepts, take a step back in standing up for doubts, find difficulty in applying the concepts practically, lower their confidence in facing the patients and fail in diagnosis, treatment, and follow up, and finally end up with reduced efficiency and productivity.

In order to address these issues, the learning process may be amalgamated with some mind relaxing and personality development ideas, using AI tools such as content creation, task management and project planning, AI robotics, language translations, chatbots etc.

Use of AI tools

1. Content creation for students: Ayurveda is a science that requires multiple times of studying. Right from the *shlokas*, to understanding their meaning and comprehending their *Teekas* i.e., the commentaries require a lot of reading and self-analysis. It is during this stage that students require support. Hence, implementing the content creation tool for the students can help them revisit the contents, re-read them, write down their understanding and compare their comprehended content with the actual content, so as to self-analyse. Also, Ayurveda knowledge stands on the information given by classical texts of *Brihadtrayees* and *Laghutrayees*. Hence, understanding the concepts of all these, require recurrent cross referential study, so that, there is a wider mastery and comprehension of concepts. Therefore, using AI to prompt cross references from time to time, for concerned terms and concepts by provisioning all the information in the classical texts into the system, can help broaden the intelligence.

2. Task management and project planning: With multiple subjects in the study curriculum of Ayurveda, a proper planning and apt distribution of time is important. Students, using this feature of AI, can systematically plan their study as per their convenience and ease. With pre-recorded content of lessons, students can flexibly plan and study.

3. AI robotics: Application of AI robots in giving instructions, timely and repetitive schedules and cyclic monitoring of events and routine in learning, is an attractive tool. Conducting oral tests as per the instructions of the AI robot as a part of learning can help in frequent and prolific assessment. Also, keeping in mind that, the mental health of the students is equally important, AI robots may be programmed to instruct students to mentally relax by breathing exercises, drinking water, moving and stretching etc., in between the learning process. Also, since the Ayurveda texts and *teekas* are in the language of Sanskrit, AI robots can be used to convey the lessons and terminologies in the language preferred by the students. This helps them in easily understanding and remembering the subject with ease.

4. Language translations: Traditional Knowledge Digital Library (TKDL) is a pioneering initiative of India to protect Indian traditional medicinal knowledge and prevent its misappropriation at International Patent Offices. It is one among the most important sources for research and patency by Indian Herbal or Ayurveda research scholars across the globe. It integrates diverse disciplines and languages such as Ayurveda, Unani, Siddha, Yoga, Sanskrit, Arabic, Urdu, Persian, Tamil, English, Japanese, Spanish, French, German, modern science & modern medicine.[14] Therefore, any research scholar, who intends to study or work on any herbal preparations or medicinal plants, must first go through the TKDL portal. Integrating this TKDL portal with the AI, under considerate openness, will help the students working for a research project or academic writing in getting authentic and complete knowledge. The translation feature of AI robotics or AI language detectors and translators, help in comprehending the Sanskrit language texts into their preferred language.

5. Chatbots: helping the students find a topic they need in the vast ocean of Ayurveda can often be difficult. Hence, in order to get a quicker assistance, students will be facilitated to post their questions in the chat bots, which could be either addressed by the existing gateway or intimated by the respective teachers to address. This helps the students clear their doubts.

6. Identification of Medicinal plants, Herbo-mineral drugs and mineral drugs: with such massive biodiversity and ecosystem, it is difficult to identify and remember the names, properties, *panchabhautika* composition, *rasa*, *guna*, *virya*, *vipaka* and *prabhava*, chemical compositions, pharmacodynamics and pharmacokinetics etc., of each and every drug. Hence, AI has a major hand in easing this issue. "Automated plant identification is concerned with the classification of photographed plant organs into botanical species, using machine learning algorithms".[15] Hence, the application of DNN (Deep Neural Network) mechanism to identify the plant species based on images helps greatly to overcome this trouble.

Similarly, for teachers too, it is quite a tedious job to pay attention to each and every student and to make sure that the knowledge is rightly absorbed by the students. Thereby, making use of tools of AI can support in fruitfully addressing these issues.

1. Creating pre-recorded lessons: Generative AI for Ayurveda teachers can be best utilised for personalised instructions and teaching methodologies. Creating study materials in the form of notes, referential texts, *shlokas*, *teekas* with their meanings can help the students to

understand the concepts. Also, providing pre-recorded videos using AI generated video tools, can help the teachers as well as the students in expressing the subjects with energy-efficiency and effective streamlining.

2. Creating tests and assessments to assess the students: customised tests using tools such as Generative AI help the students to take up assessments as per their convenience. This facilitates the students to assess themselves and also for the teachers to assess the strengths and weaknesses of the students with respect to the subject matter.

3. Chat bots: Students posting their queries on the chat bots can be easily accessible to the teachers and addressable by them for systematic clearing of the doubts using pre-loaded information on the portals or those from external sources.

4. Case study discussions: implementing AI tools, such as AI algorithms, helps in creating a virtual classroom for the discussion of clinical cases with the students, so that there is a magnification in the interest of Ayurveda students. Creating a valuable system which invites the students to participate in the prognosis, symptoms, diagnosis, treatments, ayurvedic references and information, follow-ups, dietary regimes and other important clinical aspects along with the theoretical knowledge is the cardinal aim of Ayurveda education.

5. Quiz maker: teachers can personalise quiz portals to attract and assess students. Those preparing for competitive examinations, can be benefitted by these quiz questions and increase their thirst to study more.

6. Virtual seminars: organizing virtual seminars and discussion sessions over a specific topic, invites students to open up on their ideas, very similar to the *tadvidya sambhasha* as told by *Charakacharya*. Giving opportunity to discuss the diagnosis and treatments of the cases that the students have seen, will help in broadening their knowledge and get in new ideas and contributions.

Therefore, using AI tools in the process of teaching and learning Ayurveda, connects the traditional system of education with the current generation and enhances the learning experience, bridges the gap between the teachers and students and eases the process of understanding the complicated and detailed knowledge of Ayurveda.

AI in Ayurveda learning for general audiences

In todays's era, where even the non-Ayurveda fraternity is drawn towards the Ayurveda way, it is the responsibility of the Ayurveda fraternity to encourage their interest and use AI in taking the preventive areas of Ayurveda to them through tools such as AI video info, AI short courses etc.

Guidance regarding concepts such as *Dinacharya*, *Ritucharya*, *Aahaara vidhi vidhana ayatanam*, *Ashta vidha aahaara*, etc., can be given to the general public so that, they are able to imbibe the principles.

Teaching the general public regarding these concepts can be done through AI robotics loaded with pre-defined information. Those information which can be generalized, unlike the clinical, therapeutic and diagnostic information, can be presented to the general public with the view of community welfare.

Various AI tools used for teaching and learning process

- **Personalized Learning Tools**

1. Adaptive learning platforms
2. Recommendation engines.
3. AI-powered tutors.

- **Assessment and Feedback Tools**

1. Automated grading systems.
2. AI writing assistants.
3. Performance analysis tools.

- **Engagement and Support Tools**

1. Interactive learning simulations.
2. Game-based learning platforms.
3. Virtual reality (VR) and augmented reality (AR) experiences.

- **Accessibility Tools**

1. Text-to-speech tools.
2. Language translation tools.
3. Speech recognition tools.

- **Administrative Tools**

1. Chatbots.
2. Automated scheduling systems.

CONCLUSION

Artificial Intelligence being one of most sought after technologies in the current world has equal applicability and need for the field of healthcare and education systems. Ayurveda, being a growing and proliferating science in today's era, can grow exponentially at the global level with effective use of AI. The thirst for a healthy lifestyle is no new to this generation and hence, students and society are in need of a flexible, efficient and well organized system of education to comprehend this divine science of Ayurveda across the globe. More and more expertise in blending Ayurveda, teaching-learning process and in AI together, can be expected to contribute massively in brisk globalization of Ayurveda.

BIBLIOGRAPHY

1. https://www.ibm.com/topics/artificial-intelligence
2. Charaka Samhita, Sutrasthanam, Chapter 30, Verse 26.
3. https://aiforgood.itu.int/about-ai-for-good/un-ai-actions/unoosa/

4. https://www.unesco.org/sdg4education2030/en/sdg4
5. Miao, Fengchun; Holmes, Wayne; Ronghuai Huang; Hui Zhang; AI and education: guidance for policy-makers; https://doi.org/10.54675/PCSP7350; ISBN:978-92-3-100447-6; 2021.
6. https://www.forbes.com/councils/forbestechcouncil/2024/07/01/the-use-of-ai-in-education-understanding-the-students-perspective/
7. https://www.aiprm.com/ai-in-education-statistics/
8. https://wifitalents.com/statistic/ai-in-higher-education/
9. Agnivesha, Charaka, Dridhabala, Charaka samhita, Vimana Sthana, Roga Bhishakjitiya Vimana Adhyaya, 8/6, edited by Vaidya Jadavaji Trikamji Aacharya, Reprint ed. Chaukhambha Surabharati Prakashana, Varanasi, 2005; 262.
10. Taittiriya Upanishad, verse 1.9.1; Patanjali's Yogasutra, II(44).
11. *Hatha Yoga Pradipika*; Āgāśe, K. S., 1904.
12. *Pātañjalayogasūtrāṇi*. Puṇe: Ānandāśrama, 102.
13. Armstrong, P. Bloom's Taxonomy. Vanderbilt University Center for Teaching, 2010. Retrieved [todaysdate] from https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/.
14. https://www.tkdl.res.in/tkdl/langdefault/common/Abouttkdl.asp?GL=Eng
15. Mostafa Mehdipour Ghazi, Berrin Yanikoglu, Erchan Aptoula, Plant identification using deep neural networks via optimization of transfer learning parameters, Neurocomputing, 2017; 235: 228-235. ISSN 0925-2312.