Original Research Article

A scintillating tale of the early stages of self-directed learning for future doctors in a growing medical college

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ABSTRACT

Background: Self-directed learning (SDL) is a pivotal element in modern medical education, encouraging learners to take ownership of their learning process. In response to the National Medical Commission (NMC)'s mandate, this study aimed to assess the influence of SDL among preclinical and paraclinical students at AMCH (Arunai Medical College and Hospital) Tiruvannamalai, Tamilnadu, India.
Methods: Through mixed research methods, we evaluated the awareness of SDL, faculty perceptions, and student learning outcomes. The study involved the implementation of an innovative assessment tool, AMAI (Arunai Metacognitive Assessment Instrument), to track progress in the SDL process and eliminate bias.
Results: The study revealed increased student engagement, reflective practices, and improvements in analytical thinking at the metacognitive level. The AMAI assessment tool played a crucial role in ensuring consistency and tracking student development.
Conclusions: This research highlights the effectiveness of SDL in medical education, demonstrating its impact on student performance and faculty involvement. The AMAI tool serves as a structured framework for evaluating SDL implementation.

Keywords: Self-directed learning, Medical education, Assessment tool, Metacognition, Competency-based learning

INTRODUCTION

Self-directed learning (SDL) is a fundamental aspect of contemporary education, highlighting the active participation of learners in shaping their own educational experiences. First introduced by Malcolm Knowles in 1975, SDL transitions from a traditional teacher-driven model to a learner-focused approach, promoting independence, critical thinking, and the pursuit of lifelong learning.[1-3] This approach crucial in the field of medical education, where constant advancements in medical knowledge require professionals to stay updates to provide quality patient care and make well-informed clinical decisions.[4] The National Medical Council (NMC), in its recent updated curriculum guidelines on Competency Based Medical Education (CBME) has included 250 hours of SDL to prepare Indian medical graduates (IMGs) with the essential skills needed for their roles.

Engaging in an educational project centred on SDL as this project not only fosters critical thinking and problem-solving abilities but also enables students to reflect deeply on their learning at a metacognitive level.[4] Such depth of understanding is particularly beneficial in modern teaching strategies like case-based learning and flipped classrooms. To ensure the success of SDL, regular and reliable assessment is vital.[5] In this regard, we have developed a validated tool-AMAI (Arunai Medical College and Hospital) to facilitate this evaluation process. With this SDL evaluation tool, SDL has been incorporated into phase I & phase II MBBS programs through well-structured frameworks designed to support students in their learning process. We believe, this approach will

empower learners to take responsibility for their education, seek feedback actively, and continually enhance their knowledge and skills and develop lifelong learning habits essential for ongoing personal and professional development.

Aim

To analyse the effectiveness of a self-developed SDL assessment tool (AMAI) in assessing effective implementation of SDL among undergraduate students and faculty in phase I and phase II MBBS program.

Objectives

To assess the awareness & perception of SDL among the phase I students & faculties. To evaluate & analyse the implementation of SDL & the learning outcome in phase I students. To develop assessment tool to bring in uniformity & absence of bias. To understand the progress of the self-directed learning

METHODS

Study type

This was a mixed-method study.

Study place

Arunai Medical College and Hospital (AMCH), Tiruvannamalai, Tamil Nadu, India.

Study period

The study duration was from September 2022 till August 2023.

Selection criteria

Inclusion criteria were all preclinical MBBS students enrolled in the 2023 cohort; exclusion criteria included students absent during key sessions.

Development and validation of SDL assessment tool-AMAI

An assessment tool was specifically developed for the purpose of self-directed learning (SDL) (6). It was created in consultation with the Phase I coordinator and faculty members from the Microbiology department, under the supervision of the Dean and the Medical Education Unit (MEU). The tool was subsequently validated by an MEU faculty member who is also a FAIMER fellow.

Implementation of AMAI

After developing and validating the self-designed SDL assessment tool, AMAI, its efficacy was tested with medicos in physiology and microbiology departments. A one-hour sensitization program on SDL and the importance of its assessment was conducted for both students and faculty of phase I and phase II. Physiology department from phase I and microbiology department from phase II accepted to adopt our assessment tool for checking the efficacy of SDL sessions.

Topics for SDL were selected by students based on clinical relevance with each topic having minimum four sub-topics. Objectives were established for those sub-topics and each topic was explored over a period of 4 weeks. Students were given directions on what and how to approach each topic.

During this learning phase, thought-provoking questions were introduced to help students achieve the set objectives. This promoted better understanding. Knowledge and comprehension gained were assessed before and after each session using MCQs. Feedback on SDL process was collected from the students and subsequently analysed.

The study followed a mixed-method approach, incorporating both quantitative and qualitative data collection. Institutional ethical committee approval was obtained prior to commencing the study. The study involved 150 preclinical students from the 2023 cohort at AMCH Tiruvannamalai.[7]

A validated pre-test questionnaire (Figure 1) was administered to assess students' awareness and readiness for SDL at the beginning of their foundation course. The questionnaire covered aspects such as self-discipline, time management, and learning strategies.

Faculty members from the preclinical and paraclinical departments also participated in the study, providing feedback on their perceptions of SDL and its implementation in their courses. Faculty sensitization was done as a preparatory, set induction technique. This triggered the mindset of the teaching fraternity to kick start the program.

The SDL sessions were conducted during the startup stage of the scheduled preclinical phase I curriculum, spanning for 12 months.[8] During this period, students selected topics based on gaps in their knowledge.

They were encouraged to prepare the specific learning objectives (SLO's). This was aligned with the goal through selected learning strategies and effective time management. Students maintained reflection logs that were regularly reviewed by their faculty mentors. At the end of twelve months, student learning outcomes were assessed using the AMAI tool, (Figure 2).

This provided a structured framework for evaluating the effectiveness of SDL. Regular monitoring and feedback loops were established to track both student and faculty engagement in the SDL process.

Ethical approval

Institutional ethical committee approval was obtained prior to commencement.

Statistical analysis

Data analyzed using descriptive statistics, Chi-square tests for categorical data, and paired t-tests for pre- and post-assessment scores using SPSS software.

RESULTS

Utility of AMAI was found to be effective through positive feedback from other medical colleges that utilized the tool.

The outcome of the university examination of phase I MBBS students supported our study's findings, The pass percentage in physiology was significantly higher compared to the other two courses in phase I MBBS program at our institute. In the physiology department, which implemented the suggested SDL method and utilized our AMAI assessment tool, only 3 out of 147 students did not pass the summative assessment. In contrast, 14 students failed in anatomy and 12 in biochemistry (Figure 6). Alongside the regular teaching and assessment methods, the improved results in physiology can be attributed to the effective implementation and evaluation of SDL sessions. This was further reinforced by students' feedback, where the acknowledged the positive impact of SDL.

SDL is learner oriented		SDL is teacher oriented		SDL has objectives		Effective time management				Effective learning process				Effective interaction with peers				Effective discussion with faculty/guide				Effective learning is goal oriented				My Final assessment has improved as per my reflection	
YES	NO	YES	NO	YES	NO	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	YES	NO

Foot Note:
1. Rarely
2. Some times
3. Frequently
4. Always

Figure 1: Pre & post-test questionnaire – i phase students on awareness & readiness of SDL.

Think -What are you trying to learn?	Execute -How did you learn?	Reflect, Reform &Rejoice -So what, what next?
Selection of subject & topic.	Preparation of SLO in alignment with goal	Attainment of goal -to broaden the goal for future learning process
Recollection of preexisting knowledge on the topic selected - *PRETEST*	Incorporation of preexisting knowledge with the topic selected, to check for the gain of new knowledge -*POST TEST*	Augmentation of new knowledge to integrate with other subjects with respect to related topics -to develop concepts & holistic view
Procurement of support	Peer /Expert -support Utility of standard text books, e learning , discussion with experts	Peer /Expert evaluation for **3 F's**: feedback, follow-up & fruitful learning.
Time management	Proper scheduling for the learning, discussion & completion of the learning process of the topic in the specified hours/ days.	Reflection of the entire learning process, including time management, gap analysis of pre & post test, To improve from the status of ordinary learner to Extra ordinary learner Documentation of the success story in Log book

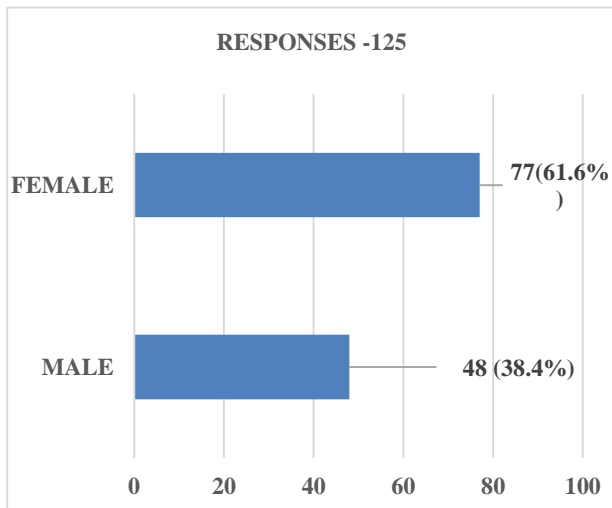**Figure 2: Arunai metacognitive awareness inventory (AMAI)-Phase I- TERRE.[16]**

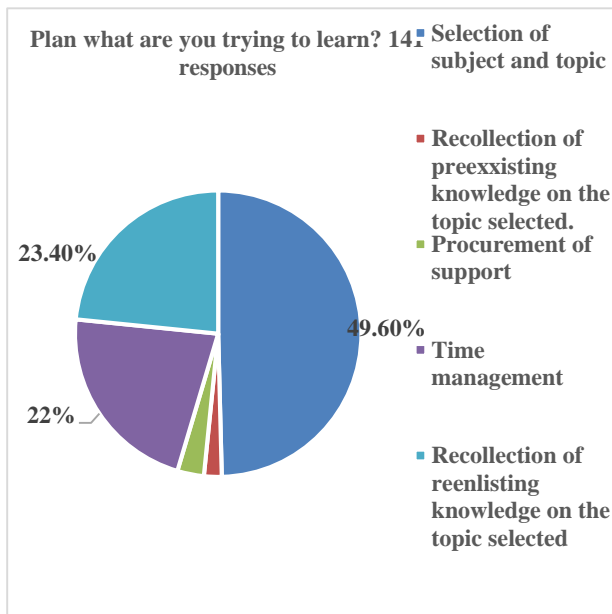**Figure 3: Participation of students.**

Figure 4: Initiative shown by students in selecting topics to address knowledge gaps.
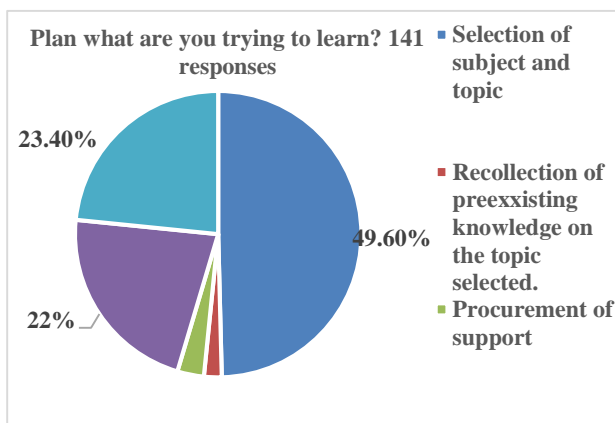

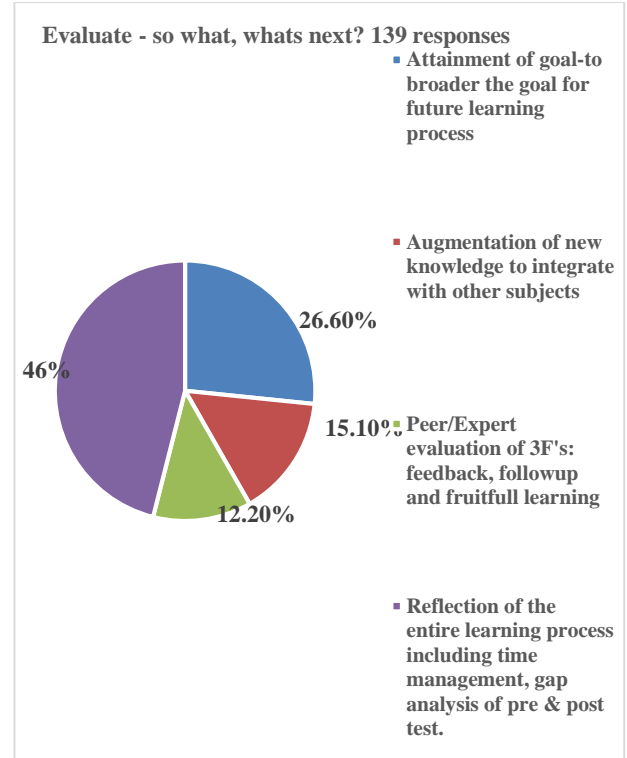**Figure 5: Percentage of students reflect on learning processes.**

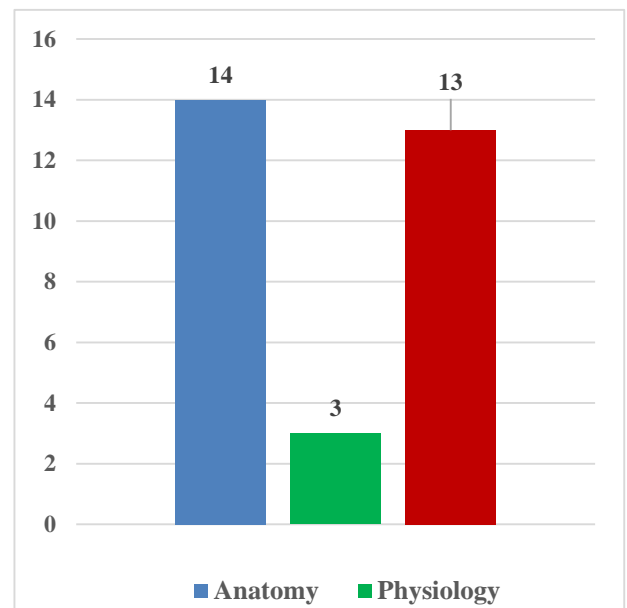**Figure 6: Percentage of students reflect on learning processes.**

Figure 7: Phase I University exam results.

The results from the study showed a high level of participation among the students, with 94% of preclinical learners actively engaging in the SDL program (Figure 3). Among these students, 49.6% demonstrated initiative in selecting topics relevant to their learning needs, which helped bridge gaps in their knowledge (Figure 4). Faculty members acted as facilitators, guiding the students through

the SDL process and ensuring that learning objectives were met.

Reflection logs maintained by the students provided valuable insights into their learning experiences. A total of 46.7% of students were able to reflect on their learning processes effectively (Figure 5) demonstrating an improved ability to analyze and synthesize new information. Faculty feedback indicated that the SDL sessions improved student-teacher interaction and encouraged students to engage in independent learning.

The AMAI tool was instrumental in assessing student learning outcomes, removing bias from the evaluation process, and ensuring consistency in student performance assessment. The AMAI tool allowed continuous monitoring and provided data on the progression of students' learning habits over time.

The students who were doing their SDL program with reflection & feedback correction (49.6%) had 100% successful completion in the phase I summative assessment examination. We confidently record our statement that 49% of the preclinical students got transformed from the dependent early novice state to advanced learner state as per Dreyfes model.[9]

DISCUSSION

The role of SDL in medical education is aligned with the five essential competencies of an Indian Medical Graduate (IMG): Clinician, Leader, Team Member, Communicator, and Lifelong Learner.[10] Our study confirmed that SDL is fundamental to foster the lifelong learner competency among medical students. This is particularly important in a rapidly evolving field such as medicine, where continuous learning is essential to stay updated with the latest developments.[10,11] Our program aimed to create IMG with necessary Knowledge, skills, Attitude, Values, Responsiveness, so that they function effectively & efficiently as the reliable "first point of health consultant".[12]

Our findings revealed that SDL has been successfully implemented in our institution, with students making significant progress in their learning journey. The gap analysis conducted by our team helped refine the SDL program and ensure better learning outcomes. The AMAI tool (Figure 4), developed by our team and copyrighted by the Government of India, (attached for reference) offered a structured assessment framework, facilitating an objective evaluation of student performance.

This tool was prepared for assessing the learners for their metacognitive awareness on the basis of three important criteria: think -what are you trying to learn, execute -how did you learn, reflect, reform & rejoice -so what? what next? Terre (Figure 5). Both qualitative and quantitative data from the study suggest that SDL has made a positive impact on student learning in our institution. The program will continue to evolve, with plans to expand SDL implementation into the second phase of the MBBS program. During this tenure, our team expect the learners to march forward with utmost ease from the advanced learner stage to early or a toddler stage of life long learner stage.

Learning is not only acquisition of knowledge & skills, but also change in attitude.[13] This attitude is vital, which forms the basis of communication to peers, patients in the health care area.[14]

The ability to learn independently, makes the learner to cope with the rapid changes & upgrading the knowledge with new information, that happens every second in the medical field globally. The changing health scenario due to the frequent global travel, mutating microbes, easy spread of infectious diseases precipitating frequent Pandemics, makes the medical student to constantly update their knowledge. "Learning how to learn is among the fundamental skills of life long learner". Being autonomous with clear cut goals & owning learning process makes a perfect self-directed learner eventually getting moulded into a lifelong learner.

Limitations included limited duration of follow-up to demonstrate lifelong learner quality.

CONCLUSION

This study underscores the pivotal role of SDL in medical education, demonstrating significant enhancement in student engagement, critical thinking, and academic performance. The validated AMAI tool provides a robust framework for assessing and fostering self-directed learning, offering a reliable model for integration in medical curricula to enhance lifelong learning competencies among future healthcare professionals.

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