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Original Research Article

Impact of Self-Directed Learning (SDL) in Anatomy among first year Medical Students in Competency Based Medical Education (CBME) Curriculum

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ABSTRACT

Background: The Indian Medical Graduate (IMG) needed to be a life-long learner by self-directed learning. Majority of the classes for first year medical students were taken by anatomy with a large number of competencies. So, it was of utmost important to know whether implementing self-directed learning (SDL) among first year medical students of anatomy had led them to self-directed learner? So, the objectives were to assess the impact of SDL in anatomy among first year medical students and to evaluate the attitude of them towards SDL.

Materials and Methods: This cross-sectional study was conducted among 100 first year medical students for 06 months. SDL orientation session on Anatomy was conducted followed by a pre-test on SDL by Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool in first session of SDL. Four SDL classes with assessment and evaluation of attitude of students on SDL was conducted. In the 6th SDL session, a post-test on SDL was conducted for evaluation of attitude on SDL.

Results: Statistically significant increase in post-test score was observed than pre-test score. Almost 1/3rd of students definitely needed guidance with specific changes and re-structuring the methods of learning. Majority of students were between moderate range on SRSSDL Tool scoring. In SDL Session 6, majority of the students (80%) had high score on that tool.

Conclusion: Majority of students were identified as half way to self-directed learner before commencement of SDL sessions. After completion of all the SDL sessions, majority of the students had become towards effective self-directed learner.

KEY WORDS: Competency Based Medical Education (CBME), Indian Medical Graduate (IMG), Multiple Choice Question (MCQ), Self-Directed Learning (SDL), Self-Rating Scale for Self-Directed Learning (SRSSDL).

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INTRODUCTION

Curricular changes had a major impact on students in learning anatomy. With this changing curriculum, Anatomy Departments had also developed many of active learning approaches in the classroom, dissection hall, practical hour classes along with alignment and clinical integration with other departments, and started promoting the lifelong learning skills in anatomy following which students were going to be lifelong learners.

"Self-directed learning was a process in which individuals take initiative with or without the help of others, in diagnosing their own learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating outcomes" [1].

Self-directed learning was a process in which the learner was initiating learning, making decisions about what and how to learn by self in order to achieve a particular task. This shifted the learning attitude from teaching by teachers to self-learning by students. The students could plan and participate in owns learning activities, to develop the capacity of learning and thinking of learner, to develop the sense of independence by enhancing learning, to develop problem solving approaches, to develop time management skills, to develop decision making skills, self-motivation and self-management by self-modification. The individual student could identify the problem and can develop the skill for solving problems [2].

In new competency based medical education curriculum for the Indian Medical Graduate, had emphasized on the topic of self-directed learning from 2019-2020 batch of MBBS which was important to made the students as lifelong learner of medical knowledge [3]. Initially when CBME curriculum was implemented, it was difficult how to implement it as a new teaching-learning method in classroom. Later on, due to the SARS Covid – 19 pandemic the implementation of SDL was very difficult for 2019-2020 batch. Even for 2020-2021 batch of phase I MBBS students, SDL classes were only partially tried to implement because of reemergence of SARS Covid-19 in 2021. So, there were lacunae for SDL implementation.

National Medical Commission (NMC) had allotted 40 hours of SDL in Anatomy curriculum but later on with amendment this had been reduced to 10 hours in this academic year. So, there was again a stringent period for implementing the SDL in anatomy curriculum. In the absence of any guidelines, many teachers and students find it difficult to apply the concept of SDL in routine undergraduate teaching [2].

So, it had become utmost important to evaluate the impact of SDL among phase I medical students which might have the impact on subsequent phases of MBBS in formulating SDL curriculum.

Aims & Objective: The study was conducted with a research question that whether implementing self-directed learning among first year medical students of anatomy led them to self-directed learner?

The objectives were to assess the impact of self-directed learning in anatomy among first year medical students and to evaluate the attitude of first year medical students towards self-directed learning in anatomy.

MATERIALS AND METHODS

This cross-sectional interventional study was conducted in the Department of Anatomy, Tripura Medical College & Dr. B.R.A.M. Teaching Hospital, Agartala, West Tripura for a period of six months with the approval of Institutional Ethics Committee (IEC/SFTMC/2023/5/005) and individual consent. One hundred first year MBBS students of 2023-2024 batch of Tripura Medical College & B.R.A.M. Teaching Hospital was included in study. Students who were not willing to participate and students less than 18 years of age were excluded. The data were collected. The study tools were used: questionnaire for pre-test/post-test regarding SDL (in SRSSDL Tool) [4], MCQs on the specific SDL topic (for pre-test/post-test questionnaire) and questionnaire for evaluation of attitude (in SRSSDL Tool for awareness) [4].

The students were oriented on SDL during the foundation course curriculum. The project work had involved six (06) SDL sessions in anatomy. In first SDL session, there was one pre-test for 30 minutes which was a paper-based questionnaire following Self-Rating Scale of Self-Directed Learning (SRSSDL) Tool [4], to evaluate the attitude of first year medical students towards self-directed learning in anatomy. This pre-test was followed by orientation regarding SDL in anatomy for 30 minutes. This was followed by four (04) of SDL classes (SDL 1, SDL 2, SDL 3, SDL 4)

on different topics from the anatomy CBME curriculum [5]. The topics were as follows: SDL 1 – Trilaminar germ disc and derivatives; SDL 2 – Cell and cell division; SDL 3 – Pericardium and features of heart; SDL 4 – Development of gut tube. Every session/class was followed by evaluation/feedback on students' attitude on the SDL topic. For each SDL class a lesson plan was prepared ahead of the class. For Class 1: An assignment was given one & half month prior to the class; Class 2: lecture class was taken two months prior to the class; Class 3: lecture class was taken followed by study with model one month prior to the class; Class 4: lecture class was taken one month prior to the class.

At the beginning of the class individual student was given MCQs (10 in numbers each carrying 01 mark; total of 10 marks) to answer as google forms. It was collected by google platform after 10 mins. Then SDL topic was asked to read for 30 minutes. Then the same MCQs sheet was given to students in google form to answer again by 10 minutes. After that, students were given one more questionnaire for evaluating the attitude on the particular SDL Topic for 10 minutes. This questionnaire was made in google form from the SRSSDL Tool (First Section of Awareness on SDL with 12 questions) [4]. The answer was taken for 10 minutes and a Google excel spreadsheet was created for each time. All the links of Google forms for conducting pre/post-tests and evaluation form were sent to students through a WhatsApp group. At the end of each SDL Class (1, 2, 3, 4) the feedback to students was given. Feedback answer keys of the questions of pre/post-tests and the answer keys were provided in WhatsApp group.

All the pre-test and post-test evaluation were pre-structured, content and validated by subject experts. The medical students were encouraged to give unbiased independent opinion regarding the questionnaires.

The individual evaluation was done with whether learning by SDL improved the knowledge of the student or not. In the 6th SDL session, the students were again given questionnaire of 1st SDL session (SRSSDL Tool) to evaluate the attitude of students towards self-directed learning on the topic for 30 minutes.

The scoring system of SRSSDL Tool was in Likert's Scale of five (05) point [Always = 5; Often = 4; Sometimes = 3; Seldom = 2; Never = 1]. Evaluation for attitude on SDL was done after post-test in the 6th class of SDL. The SRSSDL Tools questionnaire was compared as total score of pre-test and post-test to reflect the attitude of students towards SDL. The impact of all SDL classes was done by comparing pre-test and post-test evaluation of each SDL Class (SDL 1, SDL 2, SDL 3, SDL 4). The attitude of the students towards SDL on the topic was taken together in percentage to evaluate overall attitude of students for all the SDL classes.

Data analysis was done with Microsoft Office Excel 2007 and Statistical Package for the Social Science (SPSS) version 20 software to do statistical analysis. The data were calculated by Percentage (%), Mean and Standard Deviation, Median (IQR). The normality of the data sets was tested by using Kolmogorov–Smirnov. For any violation of normality, non – parametric test had been used. Wilcoxon signed rank test and Paired t-test were used for analysis. A p value <0.05 was taken as a significant.

OBSERVATIONS AND RESULTS

In the present study, the increase of post-test score was observed statistically significant.

So, during pre-SDL classes, the score of SRSSDL suggested that, almost 1/3rd of the students was with definitely needed guidance with specific changes and re-structuring the methods of learning. Majority of the students were between the moderate range on SRSSDL Tool scoring. This had suggested that, students were halfway to becoming a self-directed learner, areas for improvement must be identified, evaluated and strategy to be adopted with necessary guidance.

The result of pre-test and post-test evaluation score on SDL session/class 1 (pre-test) and SDL session/class 6 (post-test) shows Median (IQR) of 159.50 vs 239.00 [(134.75 – 204.00) vs (226.00 vs 248.50)]. This difference was found to be statistically significant [test done by Wilcoxon

Table 1: Results of pre-test and post-test of four (04) SDL sessions/classes (n = 100).

SDL session/class	Pre-test Score	Post-test Score	p value
SDL 1	Median (IQR)	Median (IQR)	0.00*
	3.50 (2.75 – 5.00)	6.50 (5.00 – 9.00)	
SDL 2	Mean ± SD	Mean ± SD	0.00**
	5.57 ± 1.19	6.05 ± 0.73	
SDL 3	Median (IQR)	Median (IQR)	0.00*
	5.00 (4.00 – 6.00)	7.00 (5.75 – 7.00)	
SDL 4	Median (IQR)	Median (IQR)	0.00*
	5.00 (4.00 – 6.00)	6.00 (5.00 – 6.00)	

[*Wilcoxon signed rank test, ** paired t test, p value <0.05 taken as a significant]

Table 2: Frequency of first year (Phase I) medical students with pre-test and post-test evaluation score on SDL in range by Self-Rating Scale for Self-Directed Learning (SRSSDL) tool (n = 100).

Scoring Range	Frequency and Percentage (%) for Pre-Test Evaluation Score	Mean ± SD	Frequency and Percentage (%) for Post-Test Evaluation Score	Mean ± SD
60 – 140 (Low)	32	120.22 ± 13.50	1	132
141 – 220 (Moderate)	58	180.19 ±25.95	19	208.42 ± 8.00
221 – 300 (High)	10	234.10 ±7.80	80	243.94 ± 12.79

Table 3: Frequency of first year (Phase I) medical students in average percentage regarding attitude (awareness) on SDL of the topics by Self-Rating Scale for Self-Directed Learning (SRSSDL) tool (modified) (n = 100).

Question No.	Questions For Evaluate Attitude (Awareness)	Percentage (%)				
		Always	Often	Sometimes	Seldom	Never
1.1	Identify my own learning needs	37	33	24.75	2	3.25
1.2	I am able to select the best method for my own learning	22.25	34.5	36.5	3	3.75
1.3	I consider teachers as facilitators of learning rather than providing information only	60	18.25	15.25	5.5	1
1.4	I keep up to date on different learning resources available	22.75	35	36	4.5	1.75
1.5	I am responsible for my own learning	55.25	22.25	17.75	2.5	2.25
1.6	I am responsible for identifying my areas of deficit	41.5	30.5	23.75	2.75	1.5
1.7	I am able to maintain self-motivation	19	24.25	46.5	8.5	1.75
1.8	I am able to plan and set my learning goals	22	34.25	37	5.75	1
1.9	I have a break during long periods of work	33	28.75	32.75	3.75	1.75
1.1	I need to keep my learning routine separate from my other commitments	36.5	31.5	26	3.75	2.25
1.11	I relate my experience with new information	34.75	34.75	25.5	3.75	1.25
1.12	I feel that I am learning despite not being instructed by a lecturer	23.75	24.5	34.75	13.25	3.75

signed rank test; p value <0.05 was taken as a significant]

However, it was observed that, after all SDL classes (1,2,3,4), in post-SDL Session 6, majority of the students (80%) had high score on SRSSDL tool. A statistically significant increase of score was observed with median (IQR) of pre-test score of pre-SDL session (class 1) and post-SDL session (Class 6). This suggested that after four SDL classes the SDL was effective.

In the present study, it was observed after four SDL classes that, 37.00% of students had identified their learning needs always and they (36.50%) are able to select best methods for their learning. 60% of the students had opined that, the teachers were always facilitators rather than providing informations. They (55.25%) were always responsible for their own learning and 41.50% of the students had the opinion that, they were responsible for identifying the area of deficit.

DISCUSSION

SDL was an educational concept that had received increasing attention since the implementation of competency based medical education (CBME). It had also developed all of the three cognitive, psychomotor, and affective domains of learning [6].

Self-directed learning was the process where medical students had taken the initiative, with or without the help of others, determined their

learning needs, set learning goals, identified resources for learning, had chosen and implemented learning strategies to acquire knowledge resulting in evaluation of learning outcomes [7].

The medical student was becoming self-directed learner with the competencies to be acquired by students, based on his understanding. Patterson et al. [8], and Patra, et al. [9] stated that, self-directed learners needed to identify of their own learning gaps in skills and to set the goal for learning with their self-awareness. They must evaluate the human and material resources for learning, they should grow the capacity for critical thinking, critical appraisal which would be reflected after the self-directed learning. The self-directed learning thus gave the potential for information management, teamwork, self-evaluation and peer evaluation.

By reflecting on experiences in the curriculum sessions, the students developed competencies of self-directed learning which further led for acquisition of professionalism [10].

Self-directed learning was the foundation of all learning, whether formal or informal, and the effectiveness of learning was related to individual motivation. All people were capable of self-directed learning with variable development level due to individual methods [11]. SDL allowed students to learn at their own pace and with their own learning style. Learners might not be preprogrammed for SDL in many situations where learners needed to have a desire to learn and ability to do so without direct supervision [12].

Badyal DK et al. [12] had notified that, before starting SDL session, the important steps were faculty training, selection of topics and placement in the curriculum, orientation of students to SDL program, gathering resources, formation of online group of the students with faculties, and actual conduct of SDL session with one hour duration where students had got a piece of information/trigger on a topic with a facilitator helping to find the resources, enhancing the learning, followed by intersession period and second contact session for 60 minutes including assessment by MCQs and various other methods.

Evaluation of SDL was done considering overall SDL program at the end of few sessions or all the sessions by grading, immediate assessment and feedback.

In the present study, the facilitator was trained by curriculum implementation support program (CISP) & revised basic course workshop (r-BCW). The topic were selected as in the CBME Curriculum; orientation of students were done with SDL orientation during foundation course sessions on SDL and at first session of this study on SDL, followed by gathering of resources for all SDL classes (1, 2, 3, 4) were given during the assignment, lecture class, small group discussion at least one month prior to the session as the session was only for 60 minutes and divided in small parts for pre-test evaluation, self-directed learning and post-test evaluation and feedback on attitude.

One of the seven roles of Indian Medical Graduate (IMG) was lifelong learner. To achieve the goal of lifelong learner, students must be motivated from within to learn by self. SDL was widely accepted as the students had achieved the skill and was able to apply those skills confidently being independent and becoming efficient in medical field [13].

In the present study, it was observed that, the post-test scores of SDL classes (1, 2, 3, 4) were more compared to pre-test scores. The differences between pre-test and post-test scores were statistically significant. Those suggested that self-directed learning on the particular topic immediately followed by pre-test had made improved in their score on post-test. This had reflected the increasing in knowledge after self-directed learning. Assessment of the level of SDL readiness in medical students was necessary to assess the teaching needs of the students and to make the required reforms to the curriculum and method of teaching delivery [14,15].

Many authors had conducted studies on self-directed leaning by using self-directed learning readiness scale (SDLRS). Manjunath SDE et al. [14], Wasim S et al. [15] had used a SDLRS scoring system ranging from 40 – 200 where it was consisted of 40 questions categorised in

three domains. A score above 150 was considered an acceptable level of SDL readiness. Both the author had observed that <150 score was obtained by 47% and 54% of the students respectively [14,15].

In our study, we had evaluated SDL program through pre-test and post-test scoring by SRSSDL Tool where 5 sections were there comprising of 60 questions. A moderate scoring range was observed by median IQR of 159.50 before commencing of SDL session. Self-Directed Learning readiness was observed among the students in post-test at last SDL session (6th session) with median IQR of 239.00. The differences of SDL readiness were statistically significant.

In our study, evaluation of attitude towards SDL among students by SRSSDL had suggested that before starting of SDL sessions 32% of the students had obtained low range of score whereas only 10% of the students had high score. Moderate score was obtained by 58% students. According to Williamson SN et al. [4], a low score category definitely needed guidance from the teacher, any specific changes necessary for improvement must be identified and a possible complete re-structuring of the method of learning needed to be done. According to this scoring, a moderate range student was half way to become self-directed learner. Here also, identification and evaluation must be done for improvement. A strategy adopted with teacher guidance was needed whenever necessary. For the high range group was indicated for effective self-directed learning which was supposed to be maintained by identifying strength and method for consolidation.

In the present study, after SDL 1 class the strategic changes were done by observing the median (IQR) pre-test score 3.50 and post-test score 6.50. For SDL 1 class the topic for SDL was initially given for assignment at the beginning of their MBBS curriculum. For SDL 2 and SDL 4 classes the topics for SDL were taken as lectures one month prior to the sessions. For SDL 3 class the topic was taken as lecture one month prior to the session along with peer discussion in groups among the students with the model. It was observed that with subsequent SDL classes the pre-test score increased as well as post-test score also had increased which was statistically significant. Those improvement of the score also was reflected in the attitude of the students while evaluating post-test score by SRSSDL Tool. In the last SDL session on 6th session majority of the students (80%) had been observed with high score, whereas the number of students with moderate score also was decreased. This was suggestive of that; students had acquired effective self-directed learning which was supposed to be maintained by identifying strength and method for consolidation.

A self-directed learner must be curious, must know to formulate questions based on curiosities, learnt to identify deficits and select resource materials to answer those questions and finally critically analyse answer [16]. In the present study, 55.25% of the students had opined that, they were always responsible for their learning, where 37.00% were always able to identify their learning needs and 41.40% students were always able to identify their areas of deficit.

In our study, Majority of the students (60.00%) had always considered the teacher as facilitator of learning rather than providing the information only. Whereas 46.50% were able to maintain self-motivation and were able to plan and set learning goals sometimes. Those students needed the faculties to support, motivate, and help the students with different teaching approaches and assessment strategies. These must be done by ensuring uniformity, among the students from diverse backgrounds with varying capabilities of self-directed learning as categorised under dependent learner, interested learner, involved learner and self-directed learner [2,16,17]. The teachers as facilitators and students had to work together to enhance students' SDL skills, especially time management and intercommunication skills [16].

CONCLUSION

Self-directed learning had many advantages regarding knowledge acquisition, retention and the development of skills. This was an essential component of new undergraduate CBME curriculum in medical education.

The present study had concluded that,

1. Self-Directed Learning was well accepted by the majority of the students

2. They had improved in their knowledge after Self-Directed Learning sessions

3. Majority of the students were identified as half way for becoming a self-directed learner before commencement of SDL sessions

4. Whereas, after completion of all the SDL sessions, majority of the students had become towards effective self-directed learner

5. At the end of all the sessions they had a positive attitude on Self-Directed Learning with awareness, their learning strategies, learning activities, self-evaluation and they had found easiness in maintaining in interpersonal relationship with peers and facilitators.

LIST OF ABBREVIATIONS

CBME – Competency based medical education
CISP – Curriculum implementation support program
IMG – Indian Medical Graduate (IMG)
IEC – Institutional ethics committee
IQR- Interquartile ratio
MCQ – Multiple choice questions
NMC – National Medical Commission
r-BCW – Revised basic course workshop
SARS – Severe acute respiratory syndrome
SDL – Self-directed learning
SDLRS - Self-directed learning readiness scale
SRSSDL - Self-Rating Scale for Self-Directed Learning.

Author Contributions

Nirmalya Saha – conception and design, acquisition of data, interpretation of data, drafting the manuscript

Vaibhav Anjankar – conception and design, revising it critically for important intellectual content, have given final approval of the version to be published

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