



## Effectiveness of Self-directed Learning in Phase II MBBS Students In The Subject of Microbiology

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### Abstract

Self-directed learning (SDL) is a vital educational principle in higher education that has been promoted by various institutions due to its value in developing professionals to become lifelong learners. Increase the students' interest in the subject & Improvement in the students' performance in the formative assessment. The second years M.B.B.S Students were enrolled in the study. Class was divided in two groups and each group was sub- divided into four sub-groups for group discussion. Online SDL sessions were conducted. Pre-test, post-test & feedback forms were prepared by using Google forms. One week prior the session topic & the objectives of the topic were allotted to the students. During the session pre-test taken, then the discussion of the topic with one facilitator was conducted. At the end of the session post-test & feedback forms were collected and the perception was recorded by using a five-point Likert scale. There is significant difference in the score of students' pre-test (mean 5.53+/-1.89, 5.71+/- 1.87, 6.90+/- 1.54 and 6.76 +/- 1.10) & post-test (7.05+/-1.98, 7.80+/- 1.61, 8.75+/- 1.20, 8.69+/-0.76) with P value  $P < 0.0001$ . Graded improvement observed in pre-test of SDL sessions. Students' perception for SDL method was excellent (76%) for self-study, gaining interest in the subject. 20% students reported satisfactory whereas 4% neutral. Self-directed learning is one of the excellent methods to develop interest in the subject and help to become a lifelong learner.

**Keywords:** Group discussion, Lifelong learner, MBBS, Medical education, Microbiology, Self- directed learning

### Introduction

Self-directed learning (SDL) is a vital educational principle in higher education that has been promoted by various institutions due to its value in developing professionals to become lifelong learner's Medical education systems. In a constantly changing environment, SDL is essential to enable medical students to develop independent learning skills, increased responsibility, assertiveness and accountability which are key attributes to a medical professional's career<sup>(1)</sup>. SDL has been implemented now days so that medical students gain SDL skills to continuously equip themselves with relevant knowledge and skills in the ever-evolving world of medicine<sup>(1)</sup>. SDL is generally defined as learning on

one's own initiative, with the learner having primary responsibility for planning, implementing, and evaluating the effort<sup>(2)</sup>.

In a constantly changing environment, SDL is essential to enable medical students to develop independent learning skills; increased responsibility, assertiveness and accountability which is key attributes to a medical professional's career. During the pandemic period it was not possible for students and teachers to attend the college in person so avoid loss of studies the self-directed learning sessions were helped the students for improving their knowledge in the subject. There are many positive effects of SDL such as it provides the opportunity to students to teach themselves by using skills like

knowledge of how to learn rather than what to learn, application of skills and independent practice in comprehension strategies and students' perception to the SDL can be recorded with the help of Five point Likert scale<sup>(3)</sup>. Students spent more time in reading and writing the given topic. They can work according to their convenience (time), their work place like quiet room or library. They can study independently. Students can improve themselves from time to time feedback given by the assessor<sup>(4)</sup>.

The overall purpose of this study is to establish interest of second year medical students' in self-directed than average approach towards learning.

Increase the students' interest in the subject & Improvement in the students' performance in the formative assessment. Expected outcome should be student's satisfaction & better performance of students in formative assessment by self-directed learning process. Expected outcome should be student's satisfaction & better performance in formative assessment by self-directed learning process and to improve the self-learning skills.

### Materials and Methods:

The Phase II MBBS Students of the academic year (March-2021) was enrolled in the study. Study was carried out in Department of Microbiology, D Y Patil Medical College, deemed to be University Kolhapur. All present students were included in the study and the study was carried out for nine month. Ethical committee's approval was obtained in March 2021.

Project proposal for SDL intervention was prepared by interacting with Head of the Department & subject experts of Microbiology Department. Topics were selected from the recommended text book for Microbiology subject<sup>(5)</sup>. Each module of learning was evaluated with pre-test and post-test in the form of MCQs & validation of questionnaires was done by subject experts.

Class was divided into two groups. 'Batch A' & 'Batch B'. Each batch was subdivided into small sub-groups for group discussion with one facilitator to each group. Online SDL sessions were conducted by preparing what's app group & zoom links for the discussion. Evaluation was done by Pre-test, post-test (MCQs) by using Google forms & feedback forms were prepared by using Google forms. One-week prior the session topic & the objectives of the topic

were allotted to the students on what's app group. Such four sessions were conducted.

**Session I:** Topic discussed was an Antigen. The topic was already taught to the students in Phase I (1<sup>st</sup> year MBBS) so for 1<sup>st</sup> SDL session this topic was chosen to check cognitive domain (recall memory). Objectives were given the students: Define Antigen, Antigenicity, Determinants of Antigenicity, Antigen specificity, Biological classes of Antigens and Superantigens. **Session II:** Topic discussed was Plague and Brucella. According to CBME pattern, these topics are included in blood stream infections, also in clinical or applied microbiology as zoonotic infections, re-emerging infections. Objectives were given the students for study was morphology of the organisms, Pathogenesis and laboratory diagnosis of both organisms. **Session III:** Topic allotted was Viruses causing diarrhea. Topic is based on clinical microbiology. Objectives were given the students for study was Viruses responsible for the condition, Pathogenesis and laboratory diagnosis and prophylaxis. **Session IV:** Topic discussed was *Bacillus spp* (spore bearing aerobes). Topic is based on clinical microbiology and bioterrorism. Objectives were given the students for study was Morphology, Pathogenesis, clinical features, laboratory diagnosis, Bioterrorism & Bio-safety and prevention.

During the each SDL session the batch 'A' batch and 'B' batch was divided into four sub-groups respectively and online discussion with the students and one facilitator for each group on Zoom links were conducted. The session lasts for 40 min. Evaluation was done by conducting pre-test before starting the discussion by using Google form link, time given was 10 min in the form of MCQ test. 10 MCQs were given. After the discussion again the post-test was conducted by using Google form link, time given was 10 min in the form of MCQs. 10 MCQs were given.

The feedback forms were collected from the students by using Google form link at the end of the each session<sup>(6)</sup>. The student perception was recorded by a five-point Likert scale feedback questionnaire with open & close ended sessions at the end of the study<sup>(8)</sup>.

Data Analysis: the data was entered in MS excel sheet & applied for paired t-test, Kruskal Wallis test (one of the form of Anova test).

**Results:**

**Table I: Comparison of Pre-test & Post-test of SDL sessions**

	Pre-test Mean +/- SD	Post-test Mean +/- SD	P-value Paired t-test
Session I	5.53+/-1.89	7.05+/-1.98	P< 0.0001**
Session II	5.71+/-1.87	7.80+/-1.61	P< 0.0001**
Session III	6.90+/-1.54	8.75+/-1.20	P< 0.0001**
Session IV	6.79+/-1.10	8.69+/-0.76	P< 0.0001**

\*\* shows highly significant values

It is observed that there is significant difference in the score of students' pre-test & post-test as P value is P<0.0001 by Kruskal Wallis test (P<0.05 is significant), two stars represents highly significant results. It has been observed that there is significant improvement in students' formative assessment after SDL intervention.

**Table II: Graded improvement in pre-test & post-test of SDL sessions**

	Session I Mean +/- SD	Session II Mean +/- SD	Session III Mean +/- SD	Session IV Mean +/- SD	P-value
Pre-test	5.53+/-1.89	5.71+/-1.87	6.90+/-1.54	6.79+/-1.10	P<0.0001**
Post-test	7.05+/-1.98	7.80+/-1.61	8.75+/-1.20	8.69+/-0.76	P<0.0001**

\*\* shows highly significant values

The above mentioned table shows the significant difference in the pre-test of four SDL sessions P value is P<0.0001 which is highly significant (P<0.05 is significant) and also same with the post-test sessions P value is P<0.0001 which is highly significant (P<0.05) by One way ANOVA test. It has been observed that there is significant improvement in pre-test sessions of SDL which means that students were taking interest (readiness of students) in self directed learning and also significant improvement in post-test sessions of SDL.

**Figure I: Perception of students for SDL sessions**

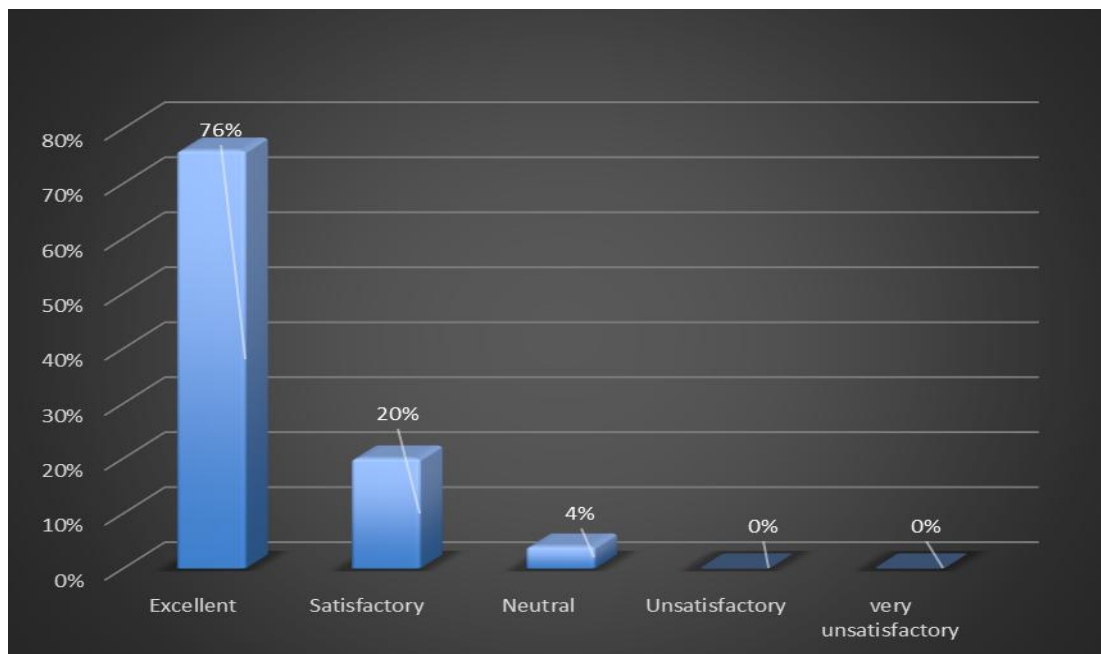


Figure 1- representing perception of students where 76% students gave excellent, 20% satisfactory and 4% neutral feedback for SDL sessions.

### Discussion:

Primary goal of the study is to develop student's interest, self-assessment of learning and improvement in their formative assessment in the II year MBBS subject Microbiology.

In the present study, it was observed that there is significant improvement in the students' formative assessment as improvement in post-test marks after SDL intervention sessions and also improvement in readiness to learn as there is increase in the pre-test marks in third SDL session. Cognitive domain was assessed by pre-test & post-test during the SDL sessions. In the present study pre-test mean  $\pm$  SD for three SDL sessions were 5.53 $\pm$ 1.89, 5.71 $\pm$ 1.87, 6.90 $\pm$ 1.54 & 6.76 $\pm$ 1.10 respectively and for post-test mean $\pm$ SD were 7.05 $\pm$ 1.98, 7.80 $\pm$ 1.61, 8.75 $\pm$ 1.20 & 8.69 $\pm$ 0.76 respectively. Similar results were reported by pre-test mean 6.49 $\pm$ 1.76 & for post-test 9.13 $\pm$ 1.55<sup>(8)</sup>. Significant improvement amongst students' performance in SDL session was reported<sup>(9)</sup>. SDL is helpful for students to know the clinical/applied Microbiology and correlate the Microbiology knowledge clinically, many previous studies also proved it<sup>(10)</sup>. Peer assisted teach in SDL sessions encouraged the students to improve their own learning skills<sup>(11)</sup>. Multiple methods of SDL will always help the students to become life-long learner, confident to treat the patients<sup>(12)</sup>. The most important challenge in SDL is to motivate the students for their own initiatives in study as teachers and students are accustomed to passive teaching-learning methods i. e. teacher centric methods. Availability of learning resources, understanding capability of the student is other important challenges in SDL<sup>(13)</sup>. To overcome these challenges the teacher and the student have to work together to improve SDL skills. 8 traits of self-directed learner: take self-initiative- confident to speak and share their ideas, do not afraid to group opportunities; explore independently- do not afraid of independence, use to know how to use their resources and depend on self not on others for study; accept responsibility: finish the work in time; have a healthy outlook in life-setback and failures are inevitable parts of any learning process, can cause stress to the learner so learner has to look towards the problem as a challenge not an obstacle; naturally motivated-

engaged in the activity for personal rewards like gaining skills not for sake of any rewards; to know basic study skills- creating questions, finding answers of those questions, self-explanation and practice tests; to know how to manage time-dealing with multiple tasks is a great challenge; should be self-aware-personality, values and goal of life<sup>(14)</sup>.

On the basis of five point Likert scale students' perception of SDL sessions was also improved. Most of Students' response was excellent (76%), 20% students reported satisfactory response, 4% students remained neutral and 0% students reported unsatisfactory and very unsatisfactory response. Almost 76% students reported that SDL was excellent method for self-study, developed interest in the Microbiology subject and it was proved by graded improvement in MCQ pre-test during consecutive SDL sessions, help to understand the integration and clinical applications of basic sciences (Phase I & Phase II MBBS subjects). 20% students noted satisfactory response on their own performance, better method for study Microbiology and interconnections of basic sciences for better understanding. 78% students responded that they were attentive throughout the class during the session whereas 18% students reported satisfactory attentiveness during the SDL sessions. 4% students' mentioned neutral response regarding usefulness of SDL method, development of interest in the subject and attentiveness throughout the SDL sessions and understating the interconnections of basic sciences. 80% students reported that SDL method was helpful to correlate the Microbiology subject clinically and to become a life-long learner. 19% students gave satisfactory response for correlating the knowledge clinically and to become a life-long learner. 1% students reported neutral response for the same. 90% students reported that SDL method stimulated students to think and correlate various aspects of the topics included during the SDL sessions and facilitators were supportive in clearing their doubts regarding the topics.

The result showed that teacher-student interaction during the session was more helpful to the students to improve their knowledge and the sessions were more enjoyable as compare to large group teaching.

Students' readiness towards the SDL was also increased in subsequent sessions. The learner should be more curious about the topic, can able to formulate the questions about the curiosities and able to find out the answers of those questions<sup>(15)</sup>.

**Conclusion:** The present study shows the significant improvement among the students in the SDL sessions as the mean of pre-test & post-test is increased. SDL has proved to be important task for knowledge acquisition for II MBBS students. SDL is a learning process which develops students' ability to monitor their own knowledge by self-assessment. As in our study significant graded improvement is seen in successive SDL session, students' interest & confidence regarding this learning method is improved. Students' perception of SDL session was excellent by five point Likert scale. In future the learner himself / herself can assesses his / her progress by self-directed learning.

**Limitations of the study:** Due to pandemic, only four sessions were conducted as all the online classes were online. Many other recommended books and resources can be used to increase the effectiveness of the SDL sessions.

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