

## Original Article

# Effectiveness of Self-directed Learning to Teach Biochemistry in Phase 1 MBBS Students

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The effectiveness of introducing Self-directed Learning (SDL) activity in teaching Biochemistry in Phase 1 MBBS Students was studied by measuring learning gain before and after SDL session. The SDL sessions were conducted among 3 groups of Students (Group A, n = 88; group B, n = 66 and Group C, n = 46; Total, n = 200) according to their learning needs. SDL was found to improve test scores significantly in all three groups. The perception of the Undergraduate Medical Students on SDL was also collated in this study by close ended question (in Likert scale) and open-ended questions. Perception analysis showed that majority of the Students agreed that SDL sessions are beneficial and interesting. However, thematic analysis showed that most of the Students considered SDL to be more time consuming. The questions were found to be reliable in present setting by calculating Cronbach's alpha coefficient (0.893). It seems to be essential to find out the topics where students need special guidance and which topics will be chosen for SDL.

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**Key words :** SDL, Biochemistry, Learning gain, Perception.

The introduction of competency-based Medical Education Curriculum in India has endorsed many new concepts, one of which is Self-directed Learning (SDL). In SDL, the students are expected to take the initiative to diagnose their learning needs, formulate their learning goals, identify resources for learning and evaluate their learning outcomes. Thus, SDL is primarily a higher order active learning technique where onus of learning lies with the Students<sup>1</sup>. The design of SDL sessions and their successful implementation is still a challenge. The effectiveness of the particular strategy must be evaluated properly to make sure that the process has been implemented successfully. Selection of competencies in Biochemistry that can be taught by SDL to Students of Phase 1, should be identified.

This study was undertaken to find out effectiveness of introducing self-directed learning activity in teaching Biochemistry in Phase 1 MBBS Students by measuring learning gain of the undergraduate medical students. Moreover, the perception of the Undergraduate Medical Students on SDL was also collated.

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### Editor's Comment :

- This study shows that SDL significantly improves scores of tests but it is much time consuming. Thus, it appears that it is not an alternative to didactic lecture but it is a supplementary to it.
- It is essential to find out the topics where students need special guidance and which topics will be chosen for SDL.

### MATERIAL AND METHOD

This cross-sectional study was conducted in a Government Medical College of West Bengal on the Phase1 MBBS Students, who after finishing the whole syllabus of Biochemistry approached the faculties to revise some topics. We planned to take some of these topics by SDL following the steps described by Badyal DK<sup>2</sup>.

The study was approved by Institutional Ethics Committee. All students of the 1st phase MBBS were introduced briefly to the objectives and the methodological workflow of the study by an interactive lecture. All willing students were included in the study. Those Students, who were absent on that day were excluded for the study.

Selection of topic: By discussion with the Students and reviewing competencies<sup>3</sup> in the curriculum, 3 suitable topics were selected for 3 groups (competency, BI 11.17):

- **Group A** : Explain the basis and rationale of biochemical tests done in Diabetes Mellitus (DM)
- **Group B** : Explain the basis and rationale of biochemical tests done in Thyroid disorder
- **Group C** : Explain the basis and rationale of biochemical tests done in Acute Myocardial Infarction

**1st contact session :** A pre-test on each topic was taken for each group. Then the topic was given to the students setting the learning goal and time limit.

**Intersession period :** During this time students were supposed to find and explore resources, read the topic and approach facilitator as needed.

**2nd contact session :** A post-test on the same topic was taken.

Then to collate the perception of the students on SDL, they were asked to fill out a pre-validated questionnaire, where 7 questions were given in Likert scale and 3 questions were open ended. For open ended questions, Students were supposed to write what they liked and disliked most regarding SDL session and their suggestion to improve the sessions<sup>4</sup>. This was carried out by Google Form.

### Statistical analysis :

All data were analysed using SPSS software version 22. To assess the effectiveness of SDL on the learning gain, marks of pre-test and post-test were tabulated and compared by student t test. P value <0.05 was considered as significant.

Perception analysis of the students were done by calculating frequencies with percentage for all response. For open ended questions, thematic analysis was performed<sup>5</sup>. Reliability was calculated by Cronbach's alpha coefficient.

### OBSERVATIONS

A total of 222 Students approached for SDL with following distribution. But ultimately a total of 200 Students (88, 66 and 46 respectively for Group A, B and C) completed all the sessions.

Table 1 shows comparison of score of pre-test and post-test, which shows significant improvement in all 3 topics. Table 2 shows Item statistics and Reliability Statistics (Cronbach alpha 0.893) regarding perception of students about SDL. Fig 1 shows the graphical response of student perception on SDL, as obtained on Likert scale. Table 3 shows Frequency distribution of response about perception of students regarding SDL.

More than half of the Students strongly agreed that SDL session is beneficial for their examination (54.5%), as well as their future study (55%). Almost half of the Students strongly agreed that SDL improved team work and they got adequate support from their facilitator. Though majority agreed that SDL causes better understanding of the subject, only 44% strongly agreed and 39% agreed the statement. Strong agreement was not found regarding improvement of leadership skill in communication ability.

Topic	Pre test Mean±SD	Pre test Mean±SD
Explain the basis and rationale of biochemical tests done in Diabetes Mellitus (DM) (n = 88)	9.37±2.05	12.37±1.84*
Explain the basis and rationale of biochemical tests done in Thyroid disorder (n=66)	8.23±2.9	12.01±1.73*
Explain the basis and rationale of biochemical tests done in Acute Myocardial Infarction (n = 46)	10.13±3.13	11.92±2.26*
OVERALL	9.16±2.69	12.10±1.9*

\*Significant at p <0.05

Question	Mean	STD. Deviation	Cronbach's Alpha
Question 1	4.4523	0.70100	0.893
Question 2	4.4523	0.72229	
Question 3	4.4422	0.72852	
Question 4	4.3568	0.76432	
Question 5	4.0603	0.93007	
Question 6	4.2663	0.77487	
Question 7	4.3568	0.77742	

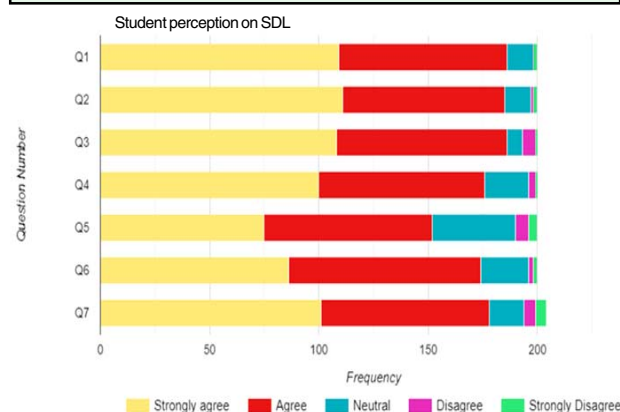


Fig 1

So far open-ended questions are concerned, the students revealed that SDL session cleared their concept, which they liked most (71%). Some commented that the topics dealt in SDL helped them in revision (19%), while some wrote that they became curious to read further (7%).

Almost 65% students found that SDL sessions take a lot of time, which they disliked most. Approximately 20% students wrote that questions set in tests were tough and some were out of syllabus. So, they had to work hard. Another point of disliking was "Non participation of some Students". The most relevant and common suggestions for improvement were inclusion of more clinically oriented topics and to conduct the sessions in smaller groups. Some suggested for provision of a Manual.

Table 3 — Frequency distribution of response in analysis of perception of students regarding SDL

Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I think it is beneficial for my examination	109 (54.5%)	77 (38.5%)	12 (6%)	0 (0%)	2 (1%)
I think it is beneficial for my study in future	111 (55.5%)	74 (37.0%)	12 (6%)	1 (0.5%)	2 (1%)
I think it causes better understanding of the subject	108 (44%)	78 (39%)	07 (3.5%)	06 (3%)	1 (0.5%)
I think it improves team work	100 (50%)	76 (38%)	20 (10%)	03 (1.5%)	1 (0.5%)
I think it increases my leadership skill	75 (37.5%)	77 (38.5%)	38 (19%)	6 (3%)	4 (2%)
I think it improves my communication skill	86 (43%)	88 (44%)	22 (11%)	02 (1%)	2 (1%)
I think I got adequate support from my facilitator	101 (50.5%)	77 (38.5%)	16 (8%)	05 (2.5%)	1 (0.5%)

### DISCUSSION

The learning gain of the students by SDL was found to be significant. Certain topics of Biochemistry demand integration of basic knowledge of Biochemistry with laboratory finding. In these conditions, SDL is supposed to work better. This finding is in accordance to the findings of Pai *et al*<sup>6</sup>.

Perception analysis shows that SDL is a good method for acquisition of knowledge, particularly among Phase 1 MBBS Students<sup>7</sup>. Studies have also shown that Case based learning by SDL is an effective method of introducing clinical correlation<sup>8</sup>. Previous studies on perception analysis showed that SDL causes better understanding of the subjects like Anatomy<sup>9</sup>, Physiology<sup>6</sup> or Biochemistry<sup>10</sup>. Our study is in accordance to this finding.

Agarwal *et al*<sup>10</sup> reported that majority of Students have found SDL more interesting, more enthusiastic and an enjoyable form of learning a topic in Biochemistry. Moreover, it provided sufficient opportunity to interact with the Faculty. Our study also supports the finding of Agarwal *et al*.

Thematic analysis revealing that SDL takes longer time appreciated by our study team also. So, though it clears concept, only some selective topics can be covered by SDL. We need to work hard to select the topics to be taken by SDL and to plan accordingly so that time can be utilised optimally.

In open ended questions they were also asked to give suggestion to improve SDL sessions. Most of the students were in favour of incorporation of case-based learning, which is appreciated as good suggestion. It was also reported by previous study<sup>11</sup>, but due to the threat of SARS Cov 2 infection, it could not be carried out.

Limitation of this study is that the result solely depends on Self-assessment of the students. We have no scope to verify whether it is correct or not. It must

be emphasised that questionnaire used to analyse students' perception of SDL was pre-validated by a number of subject experts and through a pilot study in 10 Medical Students. But a detailed Psychometric analysis of the items has not been done. This may be considered as another limitation of this study.

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