

Effect of Self-Directed Learning Module and Assessment on Learning of National Health Programme by Medical Undergraduates – A Mixed Methods Evaluation

M Rajalakshmi, Kalaiselvan Ganapathy

Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India

Abstract

Background: Competency-based medical education (CBME) curriculum in India has introduced many new concepts like a foundation course, early clinical exposure, and self-directed learning (SDL). Sometimes SDL simply means self-study. Self-directed learning as defined by Knowles is a process in which individuals take the initiative with or without the help of others in diagnosing their learning needs, setting their own learning goals, identifying appropriate learning resources, and selecting appropriate learning strategies. SDL is seen as a prerequisite for life-long learners, especially medical graduates. We found poor uptake of SDL sessions in terms of learning and attendance by students. To develop and assess the effect of the SDL module in Community Medicine for Phase -3 MBBS students. **Materials and Methods:** The study design was a program development and evaluation design. The program development consists of free listing and Nominal Group Technique (NGT). The evaluation design consists of a formative assessment, an end-of-module assessment, and feedback from undergraduate students, postgraduates, and faculties. Data collection procedure: SDL module was developed, agreed and implemented among undergraduates of Phase – 3 MBBS students. **Results:** Free listing was conducted among undergraduate students who had completed the phase 3 MBBS examination and Nominal Group Technique was conducted among the faculties (n = 7) and Postgraduates of the Department of Community Medicine (n = 2) to explore the appropriate topics for SDL in Community Medicine. The topic with the highest ranking and which was finalized for preparation of the SDL module was “National Health Programme”. Three fourth 118 (75%) of the students scored $\geq 50\%$ at the end of the module assessment. Manual content analysis for the feedback was categorized into three themes such as facilitating factors, challenges, and solutions. **Conclusions:** Effective implementation and assessment of SDL sessions are one of the new concepts in the CBME curriculum.

Keywords: Community medicine, feedback, module, nominal group technique, perception

INTRODUCTION

Competency-based medical education (CBME) curriculum in India has introduced many new concepts like a foundation course, early clinical exposure, and self-directed learning. Sometimes SDL simply means self-study. Self-directed learning as defined by Knowles is a process in which individuals take the initiative with or without the help of others in diagnosing their learning needs, setting their own learning goals, identifying appropriate learning resources, and selecting appropriate learning strategies.^[1]

Although there are several definitions and interpretations, the essence of SDL remains in its words, i.e., self (learner-oriented), directed (facilitated and monitored), and learning (applicable to lifelong learning).^[2] Some of the examples currently

being used to cultivate skills of self-directed learning and reflection are problem-based learning, small group learning, self, and peer evaluation, self-study materials, library works, projects, and computer-assisted learning. Now we could see a movement from pedagogy to andragogy in this transformational learning model of SDL in medical education.^[3]

Address for correspondence: Dr. Kalaiselvan Ganapathy, Professor and Head, Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India. E-mail: kalaiselvanmd@gmail.com

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SDL adds variety to teaching-learning methods and provides an option for curriculum makers to choose this method in alignment with some learning objectives. The conduct of SDL is quite variable at different places.^[2,4,5] In several instances, it is confused with self-learning or just asking students to read from books but remaining unobserved. Students and teachers have shown apprehension about the freedom of learning in countries where teacher-oriented learning has been there for a long time.

SDL is an active learning approach with the teacher acting as a facilitator of learning. A medical graduate, being a lifelong learner, should instill the habit of SDL. SDL has been receiving increasing attention since the implementation of competency-based medical education (CBME) by the Medical Council of India (MCI).^[4,5] Even though dedicated time has been allotted to SDL in the CBME curriculum in each specialty, implementation of SDL is challenging and has become mandatory. Hence in the present study, we developed, implemented, and assessed module-based SDL sessions in Community Medicine for the current batch of students. The challenges faced in implementing the SDL module were also explored by qualitative technique.

METHODS

The study was carried out among medical undergraduates of Phase - 3, part 1 MBBS, postgraduates, and faculties of the Community Medicine Department in a private medical college located at Puducherry Union Territory. The college admits 150 undergraduate medical students per academic year and is affiliated with Pondicherry University. National Health Programme (NHP) is a part of the medical undergraduate's curriculum and only the must-know components mentioned in the syllabus are taught during lectures.

It was a program development and evaluation design. The program development consists of qualitative techniques like free listing and Nominal Group Technique (NGT). The evaluation design consists of a formative assessment, an end-of-module assessment, and feedback from undergraduate students, postgraduates, and faculties. The module was delivered to 158 Phase - 3, part 1 students of the academic year 2018, over a period of 2 months from November 2021 to December 2021.

The steps for the conduct of the SDL session are as follows:

Step 1: Selection of topic and development of module

Step 2: Actual conduct of the session

Step 3: End-of-module assessment

Step 4: Feedback

Step 1: Selection of topic and Development of module:

Free listing was conducted among undergraduate students who had completed the phase 3 MBBS examination to explore the difficult topics for SDL in Community Medicine. [Table 1]

A Nominal Group Technique (NGT) was conducted among the faculties (n = 7) and Postgraduates of the Department

of Community Medicine (n = 3) to explore the appropriate topics for SDL in Community Medicine. The technique was conducted by a trained Principal investigator in a place and time convenient for the participants using a semi-structured interview guide with a broad open-ended question. The question in the Nominal Group Technique was “*List the appropriate topics for SDL in Community Medicine for Phase -3 MBBS students*”.

Firstly, every participant in the study was asked to give their suggested list of topics for the SDL session. Secondly, all the participants were asked to proceed to rank the topics according to priority as 1st, 2nd, 3rd, 4th, and so on. Thirdly participants were encouraged to share and discuss the reasons for their choices. It helped to identify common ground and plurality of ideas and approaches by each participant. Fourthly, the rank for each topic received was totalled, and the topic with the highest (i.e., most difficult) total ranking was selected as the final decision for the development of the module. The topic with the highest ranking and which was finalized for preparation of the SDL module was “National Health Programme”. Then participants were again asked to rank all the National Health Programmes according to priority. Finally, among all the National Health Programmes, the top four National Health Programmes with the highest total ranking were selected for the preparation of the module. The top four National Health Programmes were National AIDS Control Program (NACP), National Tuberculosis Elimination Program (NTEP), the Reproductive and Child Health (RCH) program, and National Leprosy Eradication Program (NLEP) were included in the module. All the interviews were audio recorded and the transcripts were prepared verbatim in English [Table 2]. The module was drafted by the first author by following the competencies given by NMC. The draft module was shared with the faculties of community medicine for review and was approved by the curriculum committee. The module consists of subtopics under each National Health Programme with inbuilt self-assessments like Multiple choice questions, short answer questions, fill-in-the-blanks, and case-based or problem-based questions.

Step 2: Actual conduct of the session:

- **First contact session:** Orientation on the process of SDL like division of students into small batches, fixing of learning goals and the milestone by the students, sharing of resources during the intersession period, implementation of the self-directed module, and assessment at the end of each day of the SDL session was briefed to the students. The role of the facilitator was to help students find the resources, and the fixing of venue and timetable adjustments was also briefed. A Whatsapp group for coordination with the students was formed.

- **Intersession period:** During the intersession period documents and websites related to National Health Program (NACO, NTEP, NHM, NPCDCS) were shared through the Whatsapp group and SMVMCH Learning Management System to engage them in learning.

• **Second contact session:** Before the start of the second contact session, an interactive workshop was held for the facilitators (n = 10) using faculty guide on the implementation of the module and assessment. Through the second contact session, module-based SDL sessions were implemented in Phase - 3, part 1 MBBS students. Students were divided into five small batches. Each batch contains 30 students who were moderated by a faculty and postgraduate. The number of hours allotted for each NHP was six hours, total there were four NHPs and the total time allotted for all the NHPs was 24 hours. The content of each NHP in the SDL module includes important subtopics under each NHP followed by assessment in the form of multiple-choice questions, short answer questions, fill-in-the-blanks, and case-based or problem-based questions. Following the implementation of the module, debriefing was

also done by discussing answers to the assessment questions asked at the end of each NHP, and the modules were also marked by the facilitators with the areas to be improved and handed over to the students individually after the end of the module assessment.

Step 3: Feedback:

Feedback was collected from all the students and facilitators about the implementation of the SDL module. The online feedback was also obtained from the students who appeared in the final Pondicherry University summative examination.

Step 4: End-of-module assessment:

Students learning was assessed by,

- Written examination consisting of short answer questions and was evaluated with answer key by the principal investigator.

- Submission of all the completed modules.

Ethical issues: The present study was cleared by the Research Committee and the Institutional Ethics Committee (Human Studies) (Ref no: IEC No- EC/91/2021). Permission was also obtained from the Head of the Institution for implementing module-based SDL sessions. Students' marks were not displayed on the noticeboard and were communicated individually to students. Marks were stored separately in HOD's computer.

Data analysis: The following analysis was done in the study.

- The free listing data was entered and analyzed using the Visual Anthropac 1.0 software package and the salience value was calculated.

- Manual content analysis was done by the first author for feedback obtained from students, postgraduates, and faculties regarding the SDL session.

- For written assessment frequency was calculated and the Marks were categorized into less than 50%, 50 – 75%, and >75 percentage. The average of marks was also expressed in mean \pm SD.

Table 1: Perceived as difficult topics by students

Item	Frequency (%)	Average Rank	Salience
Health programmes in India	100	1	1
Communication for health education	100	2.2	0.82
Health planning and management & Health care of the community	70	3	0.484
Medicine and social sciences	70	4	0.376
Preventive Medicine in OBS, Peds, and geriatrics	70	5.14	0.276
Communicable diseases	60	5.33	0.194
Environment and health	50	6	0.143
Concept of health and disease	30	5	0.129
International Health	30	6	0.086
Health information and basic medical statistics	30	7	0.043
Health planning and management	20	3.5	0.129
Epidemiology	20	5	0.086
Health care of the community	10	5	0.043
Demography and family planning	10	5	0.043

Table 2: Consensus score by Nominal Group Technique

Topics	Score by each respondent				Total
	1	2	3	4	
Health programs in India	5	4	-	3	12
Environment & health	-	-	4	5	9
MDG to SDG	4	-	-	4	8
Surface infections	-	3	5	-	8
Preventive obstetrics, pediatrics	2	-	3	-	5
Health planning	-	5	-	-	5
Sociology	-	1	1	2	4
Health care of the community	3	-	-	-	3
Concept of health and disease	1	-	-	1	2
Rickettsial infection	-	2	-	-	2
Demography	-	-	2	-	2

RESULTS

Program development

Out of 158 students, 86 (54.4%) were females and 72 (45.6%) were males.

As shown in Table 1, an Exhaustive list of responses that were obtained during the free listing activity was fed into Visual Anthropac software, and 14 salient items were obtained with a Smith salient score. The topic with the highest Smith salient score was National Health Programmes in India.

The Nominal Group Technique was conducted among facilitators to obtain consensus for the selection of topics for the development of the SDL module. The topic which was obtained the highest consensus was National Health Programme in India. [Table 2]

Program evaluation

End of module assessment

At the end of all four modules, there was an end-of-module assessment for 50 marks. Out of 50 marks, 30 marks were given to written assessment consisting of structured short answer questions and 20 marks (five marks for each module) for the assignment submission i.e., submission of four completed modules. The average mark at the end of the module assessment was 64 ± 19 (standard deviation). Out of 158 students 25.4%, 41%, and 33.6% of students scored marks <50%, 50-75%, and >75% respectively. [Table 3]

Feedback from students, postgraduates, and faculties

In Table 4, content analysis of students, postgraduates, and faculties feedback was categorized into three themes, the facilitating factors, challenges, and solutions. The categories which were emerged under each theme were the SDL session, session frequency, module development, and assessment. The students felt that the module stressed difficult topics in the curriculum, the simple and easily understandable module, and discussion with peers during activities and assessment was the facilitating factors regarding the SDL session and facilitators felt that students learned new terminologies in NHP. Fewer case scenarios and less space for writing in the module were the few challenges in the module. This was the Kirkpatrick model of level 1, which assesses the immediate reactions of the stakeholders.

Feedback on the performance of questions on NHP in the University Exam (Kirkpatrick level 4)

Feedback was also collected from the students after the completion of the university theory and practical examination regarding the SDL module on the National Health Programme. Although the program was implemented on 158 students, feedback after the University examination could be obtained only from 50 students. The module helped to recollect relevant points and many abbreviations in NHP to perform better in university theory and practical examination was the feedback received from the students. This was the Kirkpatrick model of level 4, which analyzes the final results. A male student had given feedback that.

I was able to write two NHPs such as NPCDCS and RMNCH+A well only because of the SDL module, which helped me in last-minute revision and remembering the sub-topics under each program. [Table 5]

Table 3: End of module assessment scores of all modules of SDL

Gender of students	Mark category n (%)		
	< 50%	50-75%	>75%
Female	22 (55)	37 (57)	27 (51)
Male	18 (45)	28 (43)	26 (49)
Total	40	65	53

DISCUSSION

We developed, implemented, and evaluated module-based SDL on NHP. The current module-based SDL teaching demonstrated significant knowledge gains in National Health Programme among medical undergraduates. This was very well evident from the results of the end-of-module assessment, 118 (75%) students scored more than 50 percent. Further as informed by the students they could recollect and answer appropriately the questions related to NHP in the recently conducted summative examination by Pondicherry University. The facilitators felt

Table 4: Feedback from students, postgraduates, and faculties regarding the SDL session

Students	Postgraduates and Faculties
Facilitating factors	
<ul style="list-style-type: none"> Stressed on difficult topics for UG students Time allotment for each topic was sufficient Student-centered learning Discussion with peers during activities Avoids monotony of regular lecture classes Continuous sessions on SDL Module was simple and clear, easy to understand, simple language, well organized, easy to revise before exams Module has problem-based questions in the assessment Need a similar type of module for communicable diseases Daily tests can be conducted 	<ul style="list-style-type: none"> Students learned new terminologies in NHP Both learning and writing practice was given Marking of module and feedback by the facilitators
Challenges	
<ul style="list-style-type: none"> Only a few NHPs were included in the module. There was less space for writing in the module and also contains fewer case scenarios 	<ul style="list-style-type: none"> Students lost enthusiasm because of continuous SDL sessions
Solutions	
<ul style="list-style-type: none"> All topics in NHP can be included Need more space to write after each question Instruction page at the beginning of the module Discuss how to present each question in the examination 	<ul style="list-style-type: none"> SDL sessions can be scheduled once or twice a week. Consensus can be developed for the selection of questions in the module Questions in the module can be simplified. Binding of the module can be done Applied type of questions should be included more Credits in the form of bonus marks for successful submission of the completed module to motivate the students Post-test at the end of each day can be included.

that the module was simple, well-organized, and easy for the students to understand. Further, the problem-based questions in the module exercise were easy to understand and avoided the monotony of the lecture class.

According to NMC, the number of hours allotted for SDL in Community Medicine in second and third-year MBBS was 20 and 5 hours respectively and it has been made compulsory in the curriculum.

Similar SDL sessions were happening in the Department of Community Medicine in the Medical College of Delhi and CMC Vellore well before the new NMC curriculum.^[6,7]

Patra S *et al.*^[6] in Delhi found that students were satisfied and motivated to study the allotted topic further and they also felt that facilitators could have been more active in imparting knowledge and skills. Previous studies showed that the SDL willingness between batches of students was declining, hence the current curriculum should promote SDL by increasing teaching-learning activities. Factors such as curriculum, assessments, and culture do impact SDL readiness.^[8]

Teaching students regarding SDL usually takes place in the experiential or co-curricular setting, the skills necessary for SDL should be introduced and developed in the didactic portion of the curriculum, which allows students to develop scaffolding. Flipped classrooms have the potential to move students toward self-directed learning and it is one of the strategies to develop self-directed learners.^[9] A study showed that e-learning or blended learning requires SDL and may benefit students to know the goals of learning that may impact their engagement. In our study, we developed a module to facilitate SDL.^[7]

Kohan *et al.*^[10] stated that higher levels of self-direction are essential for successful online learning in higher education institutes. The factors such as information overload, mind wandering, role ambiguity, inadequate coping skills, heavy workload, and inadequate writing skills were the barriers to self-directed learning.

However, the study also identified facilitating factors, challenges, and solutions regarding SDL sessions. Some of

Table 5: Feedback on the performance of questions on NHP in the University Exam (Kirkpatrick level 4) (n=50)

- Module helped to recollect relevant points to perform better in university theory and practical examination. (18)
- Module helped in last minute revision of NHP and remember the subtopics in each programme in exam. (16)
- Two NHP such as NPCDCS and RMNCH + A were directly from the SDL module. (13)
- With the help of the Module on NHP we were not new to many abbreviations in NHP in examination. (11)
- Module helped to realize the importance of NHP at the level of UG. (10)
- Without SDL module it would have not been possible to write about NHP in paper 2 Community Medicine theory examination. (8)

the facilitating factors were a simple and clear module, which is easy to understand, simple language, well organized, easy to revise before exams and problem-based questions in the assessment. They also suggested the need for a similar type of module for communicable diseases. In the present study, the students felt that SDL sessions were effective which helped them to answer the questions on National Health Programme in the University examination. Facilitators felt that students learned new terminologies in NHP, they were given both learning and writing practice, and marking of modules and feedback by the facilitators was the facilitating factors. They also suggested developing consensus for the selection of questions in the module, simplifying questions in the module, binding the module, and including more applied types of questions. A study done in Delhi also reported positive feedback that sixty-seven percent of students were satisfied and 66% also reported as motivated to study the allotted topic further.^[6]

The gap between learners' cognitive development and scientific reasoning must be bridged as a way forward toward a more accurate and integrated understanding of self-directed learning.^[11]

Our educational project helped students to find the answers to the learning objectives decided by them by thinking, searching, and group discussion. We have used a qualitative design and involved the students and faculties in finalizing the topic for SDL. The problem-solving activities planned during SDL sessions made learners utilize available resources, read, discuss, and come up with solutions, which they might not have done otherwise following lectures or small group teaching. Assessing SDL, which was also included in the module, which usually not done in the didactic teaching-learning process. Each group of students with allotted facilitators identified their objectives, resources, and teaching-learning activities, which might have created experiences that were not uniform for all the students. However, each student was a unique learner with their learning preferences. The SDL sessions can be further improved based on feedback from students, postgraduates, and faculties.

Our study found that students enjoyed and were satisfied with the SDL sessions and the assessment methods. Factors such as simple and easily understandable modules, discussion with peers during activities, and assessment were the facilitating factors regarding SDL sessions. As recommended by the students, postgraduates, and faculties scheduling SDL sessions once or twice a week and a few changes in the module suggested were the prioritized action points to improve the SDL session further.

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Conflicts of interest

There are no conflicts of interest.

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