



## COMPARISON BETWEEN PEER – ASSISTED VERSUS SELF - DIRECTED LEARNING METHODS ON COGNITIVE DOMAIN IN BACHELOR OF PHYSIOTHERAPY STUDENTS.

### Physiotherapy

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### ABSTRACT

**Context:** Peer – assisted learning (PAL) and self – directed learning (SDL) are active, learner – centric approaches. There exists, a limited evidence of effectiveness of both PAL and SDL in Physiotherapy education. No study has evaluated the potential role of these learning methods on cognitive domain of Physiotherapy students. **Aim:** The present study aims to assess and compare peer – assisted versus self - directed learning on cognitive domain in second year Bachelor of Physiotherapy students. **Settings and design:** Thirty-six second year Physiotherapy students, from a private Physiotherapy academic institute, participated in this pretest – posttest experimental study design. **Methods:** Students were randomized into PAL and SDL groups. First six rankers from fourth year Physiotherapy class were recruited as PAL facilitators. They conducted four PAL sessions for PAL group in the ratio of 1 facilitator:3 learners. SDL group studied the topic by themselves according to the guidance given during the orientation session. Pre and post MCQ test were conducted and attitudes towards the learning methods were sought by pre – validated questionnaires. **Results:** Both PAL and SDL groups showed a statistically highly significant increase between pre and post - test scores ( $p < 0.0001$ ) while a statistically non – significant change in the post - test scores between PAL and SDL groups ( $p > 0.91$ ). Learners showed a positive attitude towards both learning methods. All PAL facilitators perceived several benefits of PAL program. **Conclusion:** Both PAL and SDL were equally effective in improving cognitive domain of second year Physiotherapy students. Further areas of research could explore evaluation of the possible use of both techniques in postgraduate training.

### KEYWORDS

Cognitive domain, Peer – assisted learning, Physiotherapy, Self – directed learning

#### Introduction:

Traditional classroom is a learning space in which the teacher provides face-to-face instruction to students. There are several drawbacks of this traditional classroom method, most important being, that all students are dependent on their teachers in every study related matter. Some students get intimidated and hence, suppressed, due to the presence of the teacher in the class and are unable to open up or participate in classroom activities leading to overall low academic achievement. Traditional classroom teaching has time and location constraints as it can be done only in educational institutions and within a stipulated time period every day. This method of teaching is also expensive as it can be delivered only by qualified educators.<sup>[1]</sup> Due to these drawbacks of the traditional classroom teaching, there was a need to explore alternative teaching – learning methods.

Several researchers have recognized the powerful influence of socialization with peers on student academic motivation and achievement. This recognition has led to the development of numerous classroom-based peer-assisted learning interventions aimed at enhancing learning, motivation, and, consequently, achievement.<sup>[2-4]</sup>

Peer – assisted learning (PAL) is defined as 'People from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching'.<sup>[5]</sup> It involves students (typically from the year above) facilitating discussion sessions for students from the year(s) below. It has the potential to benefit new students' transition into higher education and enrich their learning, by involving students who have relatively recently gone through the transition process themselves. It can aid both subject understanding and act as a platform for developing students' academic literacies and skills. For the PAL facilitators or leaders, the experience provides not only the opportunity to refresh their subject knowledge, but also to develop employability skills such as leadership, facilitation, project management, communication and inter-personal skills. The emphasis in PAL is on active discussion and cooperative learning within the framework of a partnership with the formal structures of the course.<sup>[6]</sup> Several studies and reviews have demonstrated its benefits in medical education to both tutors/facilitators<sup>[7,8]</sup> and learners.<sup>[9,10]</sup> Studies have also evaluated the role of PAL to improve academic performance<sup>[11]</sup> and to assess student perceptions regarding PAL in Physiotherapy education.<sup>[12]</sup>

Lounsbury et al. defined self – directed learning (SDL) as a "disposition to engage in learning activities where the individual takes personal responsibility for developing and carrying out learning endeavours in an autonomous manner without being prompted or guided by other people, such as a teacher, parent, or peer".<sup>[13]</sup> SDL has

been suggested as a promising methodology for lifelong learning in medical education. This learning approach increases the motivation of students to learn, and they experience a sense of independence while learning. SDL process keeps them engaged, since now they have to acquire knowledge on their own and apply it along with their skills to find solutions to their problems that evolve in learning and be encouraged for life-long learning. Few studies have evaluated the potential role of SDL in Physiotherapy education.<sup>[14,15]</sup> However, the concept of self-directed learning continues to be elusive, with students and educators finding difficulty in defining it and agreeing on its worth.<sup>[16,17]</sup>

Very few studies have independently evaluated both peer – assisted learning and self – directed learning methods in Physiotherapy education. No study, till date, has evaluated the potential role of these learning methods on the cognitive domain of Physiotherapy students. Since it is not established as to which of the two methods is a better adjunct to traditional classroom teaching, a need was felt for this study. Thus, this study was aimed to assess and compare peer – assisted versus self - directed learning methods on cognitive domain in second year Physiotherapy students. Secondary objective of the present study was to analyse the attitudes of the participating students regarding both learning methods in order to draw meaningful conclusions regarding them.

#### Materials and methods:

##### Study design:

The present study is a pretest – posttest experimental study design conducted in a private Physiotherapy institute. A prior approval was obtained from the Institutional Ethics Committee of the academic institute. Using the complete enumeration technique, all thirty-six students, from the second year Bachelor of Physiotherapy program were included in the study as peer learners. First six rankers from the fourth year Bachelor of Physiotherapy program, whose ranks were based on their last attempted University exam, were included as PAL facilitators. The purpose of the study and the procedure was explained, and an informed written consent was sought from all study participants.

Demographic profile like age, gender and previous year's marks in the subject of 'Kinesiotherapy' were obtained from second year Physiotherapy students. The topic selected for learning was a second year Physiotherapy topic of 'Humidification and Nebulization' which is included in the 'must – know' area of second year Physiotherapy syllabus in the subject of 'Kinesiotherapy'.

PAL facilitators were sensitized for peer – assisted learning through

orientation sessions conducted at the beginning of the study. These orientation sessions were divided into three parts:

**Part 1:** Brief introduction about peer – assisted learning technique and its uses in medical education was given to the PAL facilitators.

**Part 2:** Specific learning objectives were formulated and discussed with the PAL facilitators. Each PAL facilitator received study material on the selected topic of 'Humidification and Nebulization' in the form of notes, handouts, e – learning resources and a power point presentation of the topic matter during these sessions. A brief video of a peer – assisted learning class was shown and all doubts regarding peer – assisted learning were clarified.

**Part 3:** The selected topic was revised with the PAL facilitators. They were taught the technique of teaching their peers. Communication skill training was imparted to them through a structured workshop.

These orientation sessions were conducted two weeks prior to the actual PAL sessions.

All second year Physiotherapy students were randomly allocated into two groups by simple, random sampling method through computer – generated random number table. Group A formed the peer – assisted learning group consisting of 18 students while group B formed the self – directed learning group also consisting of 18 students.

#### Peer – assisted learning:

Students from group A were further randomly divided into six batches with each batch containing three students. Every batch consisted of one peer facilitator and three peer learners. The topic selected for teaching was divided into four PAL sessions with specific learning objectives formulated for each session. These sessions were conducted twice a week under the supervision of the faculty, with every session lasting for 60 minutes. Every PAL session began with discussion, by the PAL facilitator, of the specific learning objectives to be achieved in the session. It was followed by teaching of the selected topic by the PAL facilitator through a power point presentation. Interactive videos pertaining to the topic were shown to the PAL learners and e – learning resources were shared with them. PAL learners were encouraged to contact their respective facilitator outside the PAL sessions through direct communication, e mail, Whatsapp and Facebook for discussion of their doubts and difficulties pertaining to the topic.

#### Self – directed learning:

Students from group B participated in self – directed learning method. We conducted an orientation session for them, lasting for 60 minutes, as described by Malcolm Knowles.<sup>[18]</sup> The study material on the selected topic was shared with the participants from group B. Students of group B studied the topic by themselves, according to the guidance given during the orientation session. They were allotted a period of two weeks for self - learning. They met for bi - weekly sessions with the study investigators to solve their difficulties pertaining to the topic.

#### Assessment tools:

1. A 20 marks pre and post - test was administered in the multiple – choice question (MCQ) format to the second year Physiotherapy students of both groups, at the start and end of the study. The questions covered the entire content of the chosen topic and were aimed at testing the knowledge of the topic. One mark was assigned for every correct answer and the total score obtained was calculated. There was no negative marking for incorrect answers. The questions were pre – validated by two subject experts in the field of Kinesiotherapy, before administering to the study participants.

2. Attitudes from second year students about the respective learning methods and from fourth year students (PAL facilitators) about peer – assisted learning were analysed by self – administered questionnaires. They contained open as well as close – ended questions directed towards the learning methods. These questionnaires were pre - validated by two senior teachers. They were given the questions and asked to mark out those which were unclear, vague, or grammatically incorrect. These questions were improved upon conceptually, linguistically, and grammatically till an independent confirmation was obtained by both teachers about all questions being accurate and clear. This validation method is based on the method suggested by Sousa and Rojjanasrirat.<sup>[19]</sup>

#### Data analysis:

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics were used to present central tendency and spread of data. Data were reported as mean  $\pm$  standard deviation (SD). Data was checked for normality using the Shapiro – Wilk test. Since the data passed the normality testing, MCQ test score was assessed within each group using the paired t test while the score between each group was assessed by the unpaired t test.  $p < 0.05$  was considered as statistically significant. Attitudes regarding the learning methods were calculated in the form of proportions.

#### Results:

A total of 36 second year Bachelor of Physiotherapy students, 18 in each group with the mean age of  $18.75 \pm 0.44$  years in group A and  $18.73 \pm 0.59$  years in group B participated in the study. Demographic analysis showed a statistically non – significant difference in the marks in the previous Kinesiotherapy examination between groups A and B ( $P = 0.2935$ ,  $n = 18$ ) as well as statistically non – significant difference in their pre – test MCQ score ( $P = 0.2377$ ,  $n = 18$ ) thus, showing that both groups were homogenous in distribution.

#### Multiple choice test (MCQ) score analysis:

**Table 1 shows a comparison of mean MCQ test scores within and between PAL group (A) and SDL group (B).**

|                                         | Pre - intervention test score | Post - intervention test score | p value    |
|-----------------------------------------|-------------------------------|--------------------------------|------------|
| Group A (PAL)                           | $6.25 \pm 1.98$               | $15.87 \pm 1.62$               | $< 0.0001$ |
| Group B (SDL)                           | $7.2 \pm 2.39$                | $15.8 \pm 4.47$                | $< 0.0001$ |
| Between Group A (PAL) and Group B (SDL) |                               |                                |            |
| Post – intervention test score          |                               |                                | P value    |
| Group A (PAL)                           | $15.87 \pm 1.62$              |                                | 0.9139     |
| Group B (SDL)                           | $15.8 \pm 4.47$               |                                |            |

A statistically significant increase was found in the MCQ post - test score at 95% confidence interval in both group A ( $P < 0.0001$ ) and group B ( $P < 0.0001$ ). However, a statistically non – significant change was seen in the MCQ post - test scores between PAL and SDL groups ( $P = 0.9139$ ), thus signifying that post – test MCQ scores were comparable between the two groups.

#### Attitudes of PAL learners towards peer – assisted learning:

Around 81.25% ( $n = 13$ ) of the student learners perceived 'learning in a non – threatening atmosphere' as a major strength of PAL while 37.50% ( $n = 6$ ) felt that personal attention was given while learning during the PAL sessions. 31.25% ( $n = 5$ ) learners perceived openness in doubt solving as a major benefit of PAL sessions. PAL learners demonstrated a positive attitude towards the PAL sessions.

#### Attitudes of the student learners towards self – directed learning:

Majority of student learners - 86.60% ( $n = 13$ ) perceived self – directed learning to be beneficial as doubts were clarified whenever needed, while 33.30% ( $n = 5$ ) felt that this method of learning made them take extra effort to understand study content. A small percentage of learners also felt that they could study at their own time and convenience and there was no pressure while studying which made them study more comfortably. Few learners perceived increased confidence while studying which helped them study better.

#### Perceived benefits by peer facilitators:

All peer facilitators 100% ( $n = 6$ ) perceived 'increase in subject knowledge' and 'reinforcement of previous learning' as benefits of PAL program. 83.3% ( $n = 5$ ) facilitators felt an increase in confidence while 66.6% ( $n = 4$ ) perceived an improvement in rapport and communication skills with the PAL program. All peer facilitators felt that the PAL program helped them to develop presentation and communication skills and increased confidence while teaching their peers. Most of them felt to have developed problem – solving ability and a teamwork approach during the PAL program.

#### Discussion:

The present study is the first randomized trial in Physiotherapy educational setting to compare peer – assisted learning versus self –

directed learning on students' cognitive performance. It demonstrated both learning methods to produce a significant improvement in the students' performance in cognitive domain.

There are numerous documented benefits of peer – assisted learning programs both for peer learners and peer facilitators. PAL program helps to make an easy transition and adjustment in college life for the PAL learners. It allows informal questioning. Students are able to ask questions to their senior peers that they may not have had the courage to ask their teacher. It increases their awareness of course expectations and helps them to learn in a non – threatening comfortable environment. PAL program is a scaffolding technique to encourage students to rely less on the teachers, thus, encouraging independent learning. It also encourages peer support, builds confidence, and improves study skills which, in turn, can help students to achieve higher marks.<sup>[20]</sup> Several studies have established the benefits of PAL to both peer learners and facilitators.<sup>[7-10]</sup>

In the present study, peer learners perceived several strengths of PAL session. They found it easier to learn and understand concepts in the absence of the teacher. Since their tutors were their peers, they had more openness in clarification of doubts and felt that they were given personal attention while teaching. These factors could have helped in improving the marks obtained by them in the post – intervention test. PAL facilitators, too, perceived several benefits of this program. They felt that this program stimulated them to learn and reinforce their previous learning which increased their subject knowledge. This, along with an increased confidence gained while teaching, could have helped them to teach the concepts in a more simplified manner to their peers. Gisela Sole, *et al* explored student perception of peer – assisted study sessions in Physiotherapy education. Positive learning environment, good revision and mastery of skills, and improvement in clinical reasoning were identified as the main outcomes of PAL program while improved confidence was a common denominator throughout the students' feedback.<sup>[12]</sup>

Self – directed learning also brought about a significant improvement in the students' post- intervention test marks in the present study. This learning method has gained popularity in medical education as an effective learning tool for knowledge acquisition by medical students. Previous studies have also proved self – learning to be helpful in increasing knowledge about clinical medical management and a self – directed curriculum reflected in improving quality care of patients.<sup>[21,22]</sup> There are several documented advantages of self – directed learning like freedom of students in selecting topics, time, and space for self – learning. Our study participants perceived less pressure while studying as they could study at their own suitable time according to their convenience. This learning method made them take extra effort to understand study content due to which their learning was more organized and systematic. This, along with regular clarification of topic – related doubts by the teacher, could have been the primary reason for a significant improvement in test performance by the participants of group B.

The role of SDL is probably reduced in first year basic science setting, as faculty – guided discussions, could be needed to integrate basics with the applied aspects. Murad *et al* recommends considering SDL as an effective strategy for more advanced learners (from second year onwards).<sup>[23]</sup> Apart from the recommended textbooks, other learning resources like handouts and online learning material can be included in an SDL session.<sup>[24]</sup>

In our study, both PAL and SDL were equally effective in improving the cognitive domain of second year Physiotherapy students. Zainuddin Zayadi, in his study of comparison between PAL and SDL on basic clinical skill learning in medical students, observed a higher ability of procedural skill in the PAL group than the SDL group. However, there was no statistically significant difference between the two groups.<sup>[25]</sup> This result is in direct agreement with our study. No other study comparing PAL and SDL in Physiotherapy education was identified in the literature review.

#### Limitations and future directions:

Our study had a few potential limitations. Apart from the critical thinking and cognition, development of clinical hands – on skills is mandatory for the Physiotherapy graduates to provide successful rehabilitation to the patients. The present study assessed the effects of both PAL and SDL only on cognitive domain. However, there is a need

to assess the effects of different learning approaches on the practical and clinical skills. Thus, the psychomotor domain needs to be taken into consideration too.

Secondly, the present study was conducted for a short duration of two weeks with only a limited portion in Kinesiotherapy. A study of longer duration with wide – ranging content area could be carried out to ascertain the impact of PAL and SDL on traditional curriculum. Also, further research into the possible use of both techniques in postgraduate training can be done.

PAL program had to be conducted beyond college hours as it could not be accommodated in the academic timetable due to time constraints which proved tiring for the participants. This could have affected the study result for the participants of group A. There is a need to introduce time flexibility in the PAL model so that its benefits can be fully utilized.

#### Conclusion:

Both peer – assisted learning and self – directed learning were equally effective in improving the cognitive domain of second year Physiotherapy students. PAL learners perceived 'learning in a non – threatening atmosphere' as a major strength of PAL while SDL learners perceived regular clarification of doubts during sessions as the major benefit of SDL. PAL program helped to improve presentation and communication skills and develop confidence in the PAL facilitators.

In conclusion, both these learning techniques are highly beneficial tools and can be used as adjuncts for improving the cognitive domain in Physiotherapy education. The learning methods described in this study could be easily adapted and implemented at other Physiotherapy educational institutions for improving the theoretical understanding and cognitive aspect of the students. This analysis provides the groundwork for further investigation of the impact of both these learning methods on the cognitive aspect of the students.

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