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An educational advancement in the form of Andragogy based education: A comparison of two different peer assisted learning strategies

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Abstract: *Background:* The transition from Pedagogy to Andragogy in undergraduate Physiotherapy education necessitates addressing educational deficiencies. *Objective:* To evaluate the educational outcomes of two andragogical teaching approaches: Student-Led Objective Tutorials (SLOT) and Student-Led Socratic Seminars with Concept Mapping followed by Reflective Writing. *Materials and Methods:* A quasi-experimental cross-over study divided Phase 1BPT students into SLOT and Socratic Seminar groups (n=50). Four physiology modules were covered, and internal assessment scores were compared pre- and post-intervention. *Results:* SLOT group's mean pre-test marks were 55.4±7.31, with a post-test increase to 61.2±7.42 (6% increase). Socratic Seminar group's pre-test mean was 58.1±6.668, increasing to 67.9±8.19 (9% increase). Around (81%) students found SLOT very interesting, (97%) felt that SLOT improved their deductive thinking, (91%) felt it improved their analytical skills. Around (84%) of students felt that Socratic seminars helped them understand the practical applications of the content and a staggering (95%) of students felt Concept mapping allowed them to organize the flow of processes. The process of reflective writing in these students was highly appreciated. Feedback indicated high student interest and perceived improvement in deductive thinking, analytical skills, practical understanding, and concept organization. *Conclusion:* Both andragogical methods foster peer learning. SLOT enhances critical thinking, communication, and presentation, while Socratic Seminars promote higher order thinking. Both encourage deep learning through discussion and debate.

Keywords: Andragogy, Reflections, Student led objective tutorial.

Introduction

Significant advancements in healthcare and education have highlighted the need for quality education across related disciplines for holistic healthcare improvement. Despite its role in managing various medical emergencies, Physiotherapy education lacks robust foundation in basic sciences. The absence of small group teaching, aligned with adult learning principles, is conspicuous. While medical education has progressed, reforms in physiotherapy education outcomes have been minimal, especially in India. Physiotherapy institutes must now embrace blended learning modules that integrate effective medical education strategies, like small group tutorials such as SLOT [1]. Catering to different learning styles is important since it leverages student preferences and helps achieving learning outcomes [2].

Numerous studies have consistently demonstrated that interactivity with the student, faculty and environment can boost productivity [3]. With evolution of education there has been a shift transitioned towards lifelong active learning. Learner centric approaches produce better outcomes in terms of active learning and engagement. While CBME mandates small group learnings, such practices are evidently absent in the physiotherapy counterparts. Small group teaching fosters better learning, motivating active participation and critical thinking through peer-assisted learning [4-5].

However severe shortage of teaching staff, makes organization of small group tutorials for multiple courses a logistical challenge for the faculty. Privatization of medical institutes

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further intensifies this strain already limited faculty, adversely affecting the teaching quality. This issue is particularly acute in paramedical courses like physiotherapy, where small-group teaching is absent. Research indicates that dispersed group discussions are inadequate in delivering the topic to the students [6].

Enhancing cognitive capacity, through prior sensitization through structured didactic tutorials enhance knowledge consolidation, retention and the ability to synthesize topics in a supportive syndicate learning atmosphere [7]. To address this challenge, Andragogy is ideal, as it empowers students to become experiential learners. Small-Group Learning Objectives (SLOT) surpass traditional didactic tutorials, fostering systematic problem-solving. Sequential stimulus presentation enhances focus and critical analysis. Integrating visual aids with conventional teaching benefits androgogical learners. Gibbs's 1988 reflective cycle, highlights the importance of reflection in effective learning [8].

Insights gained from reflective practice support problem solving in novel scenarios. By engaging with Gibbs's six-stage cycle, students develop lifelong learning skills, drawing improvement from their experiences [9-10]. Reflective processes enhance adaptability and reflexivity, even in difficult situations [11]. Integrating these reflective practices with principles of andragogy provides the undergraduates with opportunities to build social skills, engage in practical learning hands-on learning, deepen comprehension, and strengthen teamwork. With educators acting as facilitators, students take ownership of their learning journey, aligning with adult learning principles. India faces a critical educational challenge with a severe shortage of teachers and high dropout rates, particularly in physiotherapy institutes. Progress in teaching and learning often suffer due to ineffective strategies.

This study seeks to overcome these limitations by introducing innovative teaching styles like SLOT, Socratic student-led seminars, and concept mapping. The findings from this study could inform policymakers and establish benchmarks for undergraduate physiotherapy education. This study aims to assess and compare the academic performance of students trained using two different Andragogical teaching styles (Student-Led Objective Tutorials with Socratic Student-Led Seminars and Concept Mapping).

Material and Methods

- *Type of Study* - Experimental Study.
- *Design*- Quasi Experimental cross-over.
- *Sample size*- 100.
- *Source of Data*- Phase 1 BPT students.
- *Sampling technique*- Purposive, sampling of students into [Experimental groups (n=50)] into Four groups [A and B (n=25)] by using their odd/even roll numbers.
  - Experimental group 1 Student Led Objective Tutorials (SLOT),
  - Experimental Group 2 (Socratic Student-Led Seminars with Concept Mapping)
- *Study Setting*- Physiology end module classes.
- *Inclusion Criteria*- Participation was voluntary.
- *Exclusion Criteria*- None.

Recruitments of subjects -brief sessions reassuring students that the test results would not be used in their evaluations were conducted for the andragogical styles.

The study's was conducted following IEC (MDC/JNMIEC/371), the entire purpose and procedures were explained to willing participants, who provided written informed consent. A cohort of 100 BPT students was divided into two groups of 50 each. One group underwent Student-Led Objective Tutorials (SLOT), while the other engaged in Socratic Student-Led Seminars followed by Concept Mapping on the same topic. Before tutorial sessions, students received a 60-minute didactic lecture on the topic. Tutorial groups, comprising 50 students each, met twice weekly for 2-hour blended sessions.

Methodological Considerations:

Student-Led Objective Tutorial (SLOT) [12]: The group of 50 students was divided into two (n=25). Each group was led by a designated leader elected on a voluntary basis. Utilizing a university question bank with pre- and post-validated MCQs, the groups engaged in peer-assisted learning. One group brainstormed and presented MCQs to the other, fostering active

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participation. Group leaders, trained for the conduct of SLOT, guided their teams through four modules covering four physiological systems. Subgroups selected and presented higher-order MCQs in PowerPoint format, with explanations provided for each question.

On displaying the questions, the second group was expected to respond while other groups observed. In a situation where the answer was incorrect, the question was passed on to the remaining class. Withstanding the nature of the response, the next slide displaying the correct answer was presented. The consecutive slide gave a thorough explanation along with reasoning as far as the objective of setting the MCQ was concerned. This process was repeated until all the groups completed their presentations. Through this interactive process, every group had equal opportunities to contribute, ensuring comprehensive engagement. Subgroups rotated weekly, facilitating diverse learning experiences.

Socratic Seminar-Led Tutorials: This initiative involved students presenting seminars on assigned topics, with a group leader coordinating subtopic allocation. Faculty support was provided for topic navigation, culminating in collaborative concept mapping using Visme concept map software. During seminars, students adhered to Socratic norms, sitting in concentric circles akin to a Fishbowl.

Inner circle participants (n=12) engaged in discussions, with an empty "hot seat" for eager contributors, while outer circle members (n=13) observed silently before interchanging roles. Faculty introduced different datasets for analysis, such as transport across cell membranes. Student-led seminar rules included electing a group leader and scribe, with faculty assigning anchor charts or diagrams a week in advance. The sub-topics were allotted by the group leader and each speaker would talk on a related matter for 5 minutes. At the end of the talk the member of the outer ring raised his hand to ask questions. There were 3 tiers of questioning which the next 3 members of the inner ring had to answer.

- *Literal Questions:* What does the data represent?
- *Interpretive Questions:* Does that data have consequences? Elicited to understand the implications of the graph or data and forms the core of the seminar.
- *Evaluative Questions:* What is the application?
- Debriefing sessions encouraged reflection, with group swaps occurring weekly to ensure batch-wide participation.

Feedback on the seminar styles was collected through a Likert scale questionnaire, with effectiveness measured via pre and post-test scores and internal assessments. The differences between the pre and post-test scores would be representative of knowledge acquisition and retention, while scores of the internal assessment marks would be considered as corroborative proof of recall.

Reflective Writing [10]: This was followed by Gibbs Reflective cycle consisting of 5 steps:

1) Description,
2) Feelings,
3) Evaluation,
4) Analysis, and
5) Conclusion which was anonymous in nature.

Brief structure of the 6 Steps in the Gibbs reflective process:

- *Step 1* – Description- brief description of the experience or event to set the scene and give context.
- *Step 2* – Feelings-Consider what you were thinking and how you felt before the experience.
- *Step 3* – Evaluation-The evaluation looks objectively at both positive and negative aspects of the experience.
- *Step 4* – Analysis-The analysis attempts to explain why the experience was positive or negative and should form the largest section of your reflection.
- *Step 5* – Conclusion- Focus on what you have learned.
- *Step 6* – Action Plan.

What specific actions can you now take to build on your knowledge or skills? The first 2 Domains were Descriptive, while from 3 onwards analytical, and the 5th Domain is executive in nature. In the Reflective process, the students had to fill out a questionnaire that

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had questions (closed as well as open-ended) addressing all the above domains. The students had to maintain a logbook of the reflections they wrote.

Data Collection Instruments: VARK Questionnaire [13-14] developed by Fleming and Mills is an acronym for Visual, Aural, Read-Write, and kinaesthetic consists of 16 questions with four options each for four perceptual preferences (V, A, R, and K) and is an instrument widely used to identify the learning modes of students with levels of reliability and validity of the VARK have been reported using factor analysis techniques. Version 8 of the VARK questionnaire was used. Students could choose more than one option for identifying their preferences for multiple learning styles. Perceptions of Mentorship Questionnaire A pre-validated and piloted 10-item questionnaire consisting of closed-ended questions with continuous variables rated on a Likert scale of 1-5 was used to assess the guided mentorship.

Statistical Analysis: The data was entered onto Microsoft excel and analysed using the SPSS; version 25. The Categorical variables were computed in the form of a frequency table. The numerical values were computed as Mean ± SD. The differences between the pre and post -test scores were analysed using paired Student t test. P values <0.05 were statistically significant.

Results

Table-1 shown the batch consisted of 66 females and 34 male students of mean age group of 18 years. The results show that around 33% of our students were Reading-writing-type learners, followed by 32% being visual learners, next were kinesthetics-type learners (21%) and (14%) students were auditory learners.

Table-1: Demographic Details of Participants and VARK Questionnaire Response-Learning Styles

Age	18 ± 2.11
Males	34
Females	66
Subtypes	**Percentages**
Visual	32
Auditory	14
Reading	33
kinaesthetic	21

Both the Andragogical style tutorials showed an improvement in the post-test results. The mean pre-test marks of students in the SLOT group were around (55.4±7.31) while the post-test marks scored were around (61.2±7.42) a 6% increase while the students in the Socratic student-led seminars had scored a mean pre-test mark of (58.1±6.668) who scored a 9% increase in the post-test marks (67.9±8.19)The first internal assessment results from both groups of students show the Socratic student-led seminar students scoring (66.8±5.16) while the student-led objective tutorial students scored (62±4.49) marks. Though the Socratic student-led seminar students scored higher the results were statistically non-significant (table-2).

Table-2: Comparison of scores of Andragogical student-led objective tutorials with Socratic Student-led Seminars and Concept Mapping

	SLOT(n=50)	**SLS(n=50)**
P value	0.004*	0.001*
Pre-test marks(100marks)	55.4±7.31	58.1±6.668
Post-test marks (100marks)	61.2±7.42	67.9±8.19
	SLOT(n=50)	**SLS(n=50)**
P value	0.06	0.06
First Internal Assessment marks (100 marks)	62±4.49	66.8±5.16
*- Statistically significant		

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Table-3: Student preferences for the Andragogical Student led objective tutorials (SLOT)						
Sr No		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1	This Objective type of tutorial was very interesting	81%	10%	09%	0	0
2	This type of Tutorial helped me understand the content underlying the MCQ	93%	05%	02%	0	0
3	This type of tutorial helped in answering MCQ which requires analytical thinking	91%	07%	02%	0	0
4	This type of tutorial required me to use deductive thinking	97%	03%	0	0	0
5	This type of tutorial enhanced my ability to collaborate and learn	87%	03%	10%	0	0

Table 4-Student responses to open-ended questions on SLOT and Socratic Student-led Seminars and Concept Mapping as well as Reflective writing		
	Questions	**Percentage**
Liked	There were better interactions and team dynamics in this type of tutorials	87%
	We understood the content in depth so could even answer double negative MCQ better	94%
	The MCQ needed to be pre-validated with the facilitator	91%
Disliked	There was no provision for revision	63%
	Socratic Student-led Seminars and Concept Mapping	
Liked	The typical classroom arrangement allowed for better chances of representation	83%
	The tutorial was inclusive as even the most introverted student was actively involved	88%
	The Concept mapping technique helped us with the hierarchy of processes	91%
	It is a very tiring process	97%
Disliked	Classroom arrangement is difficult	69%
	There are a lot of logistic issues	32%
	Reflective Writing	
It helps the students internalize what they already know, identify what they do not know Reflective writing is a metacognitive process A reflective narrative can help in the feedback process Reflective writing can help us diagnose challenges faced by students		

Table-5: Student preferences for Socratic Student-led Seminars and Concept Mapping						
Sr No		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1	This type of tutorial helped me understand the practical implications of the content	84%	04%	12%	0	0
2	This type of Tutorial helped me debrief and share my experiences with the faculty regarding the challenges faced	91%	04%	05%	0	0
3	This type of tutorial helped me understand that team success is related to my success	78%	22%	0	0	0
4	This type of tutorial required me to create Concept maps which helped me with the flow of content	95%	05%	0	0	0
5	The Concept mapping helped me with last-minute revisions	86%	14%	0	0	0

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Discussion

This study focussed on implementing small group tutorials, enabling BPT undergraduates to select their learning styles; while promoting experiential learning based on adult learning principles. The adoption of Andragogical learning styles by students, marked a transition from traditional pedagogy to heutagogy in an Indian context. This approach emphasizes student driven motivation, collaboration, and active engagement. Within these tutorials, students revisit concepts from theoretical lectures to collaboratively address new issues. They are encouraged to generate ideas and adopt self- directed learning approach [15-16].

Regrettably, many tutorials fall short of active student participation and employing innovative teaching methods. Introducing Student-Led Objective Tutorials stimulates student curiosity, encourages active engagement, and nurtures a questioning mind-set by having students present visual presentations to peers. In our study, approximately 81% of students found these tutorials innovative. The collaborative aspect enables teamwork and critical evaluation of content, with around 91% of students acknowledging the need for higher-order analytical skills to solve MCQs. Additionally, 97% of students recognized the importance of deductive thinking for future success (Table no 3). (Table no 4) Responses to Student-Led Objective Tutorials (SLOT) varied, with some students showing no improvement in post-test scores while others demonstrated significant progress [17-18].

Our students showed considerable improvement in the post-test scores for the SLOT Group (Table no 2), Active participation and interactive learning likely contributed to this improvement. Students engaged in thorough content reading and deductive analysis during MCQ framing, enhancing their reasoning skills. Additionally, preparing PowerPoint presentations for MCQ displays improved teamwork and communication skills [19]. Likewise, Socratic Student-Led Seminars incorporating concept mapping promoted peer team learning, with faculty serving as facilitators. This method increased student engagement and productivity, fostering deeper comprehension of course content and development of critical thinking [4].

Participating in Socratic seminar group also demonstrated improved post-test scores, which were attributed to strong team dynamics and emphasis on core topics. (Table no 2) This style of learning promotes self-regulation and self-directed learning [20], with 78% of students recognizing its value in teaching peer dynamics and teamwork. (Table no 5) Learner-centric teaching and learning methods are underutilized in fields like physiotherapy.

Analysis of VARK questionnaire results revealed student preferences for V (32%), A (14%), R (33%), and K (21%) learning styles. (Table no 1) Among andragogical approaches, students displayed a preference for Student-Led Objective Tutorials (SLOT) over Socratic Student-Led seminars with Concept mapping, possibly due to its uniqueness and time efficiency. Extensive research have shown that aligning learning methods to individual preferences leads to successful outcomes. The study capitalizes on learner preferences to customize andragogical approaches, potentially enhancing effectiveness. Reflective writing is integral in fostering deep understanding and facilitating lifelong learning. Through reflective writing, individuals can improve their self-awareness, refine professional expertise, strengthen critical thinking skills, and foster resilience [21]. Reflective practices offer valuable feedback for learners, allowing them to critically evaluate their performance and identify areas for improvement. Additionally, reflective narratives function as a tool for self-appraisal, empowering individuals to evaluate their progress and enhance their overall performance [21].

Reflections are a crucial tool for transition of a learner from a novice to an expert. (Table no 4) Therefore our integration of tailored learning styles based on their learning preferences combined with self-reflection for the first-year physiotherapy undergraduates provides a framework for future of paramedical and allied education. In essence, the comparison between Student-led objective tutorials and Socratic seminars underscores the importance of flexibility and adaptability in pedagogical approaches, by leveraging the

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strengths of each methodology and tailoring them to the specific context of the first-year physiotherapy students. By harnessing the strengths of both approaches and aligning them with the needs of physiotherapy undergraduates, this approach sets the stage for innovative educational strategies.

Conclusion

Heutagogical teaching methods were unfamiliar to BPT undergraduates, contrasting sharply with traditional didactic classes where students passively absorb information. This study effectively introduced students to preferred learning styles previously overlooked in the curriculum, fostering curiosity, academic, and social skills. By embracing these styles, students can become experiential learners, potentially enhancing learning outcomes in healthcare education. A balanced approach merging both methodologies could optimize learning experiences, particularly for students who have missed out on outcomes-based education (OBE) advantages.

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References

1. Partridge R. Learning styles: a review of selected models. *J Nurs Educ.* 1983; 22(6):243-248.
2. Toye M. Learning Styles. *Elsevier eBooks.* 1989; 226-233.
3. Hmelo-Silver CE, Eberbach C. Learning Theories and Problem-Based Learning. *Problem-Based Learning in Clinical Education.* 2011; 3-17.
4. Jones RW. Learning and Teaching in Small Groups: Characteristics, Benefits, Problems and Approaches. *Anaesthesia & Intensive Care.* 2007; 35(4):587-592.
5. Klopper C & Drew S. (Eds.), Teaching for Learning and Learning for Teaching, *Sense Publishers.*2015;1-11
6. Dolmans DH, Schmidt HG. What do we know about cognitive and motivational effects of small group tutorials in problem based learning?. *Adv Health SciEduc Theory Pract.* 2006; 11:321-336.
7. Nieminen J, Sauri P, Lonka K. On the relationship between group functioning and study success in problem based learning. *Med Educ.* 2006; 40:64-71.
8. Adeani IS, Febriani RB, Syafryadin S. Using Gibbs' Reflective Cycle in Making Reflections of Literary Analysis. *Indonesian EFL Journal.* 2020; 6(2):139-148.
9. Naidu T, Kumagai AK. Troubling muddy waters: problematizing reflective practice in global medical education. *Acad Med.* 2016; 91(3):317-321.
10. Paterson C, Chapman J. Enhancing skills of critical reflection to evidence learning in professional practice. *Phys Ther Sport.* 2013; 14(3):133-138.
11. Aukes LC, Geertsma J, Cohen-Schotanus J, Zwierstra RP, Slaets JP. The development of a scale to measure personal reflection in medical practice and education. *Medical Teacher.* 2007; 29(2-3):177-182.
12. Sivagnanam G, Saraswathi S, Rajasekaran A. Student-Led Objective Tutorial (SLOT) in Medical Education. *Med Educ Online.* 2006; 11(1):4610.
13. Mozaffari HR, Janatolmakan M, Sharifi R, Ghandinejad F, Andayeshgar B, Khatony A. The Relationship between the VARK Learning Styles and Academic Achievement in Dental Students. *Advances in Medical Education and Practice.* 2020; 11(11):15-19.
14. Michael SA, Prithishkumar IJ. Understanding your student: Using the VARK model. *Journal of Postgraduate Medicine [Internet].* 2014;60(2):183.
15. Pluta WJ, Richards BF, Mutnick A. PBL and Beyond: Trends in Collaborative Learning. *Teaching and Learning in Medicine.* 2013; 25(sup1):S9-16.
16. Seguna A. Effective andragogical strategies: What works with teachers? Reflection on practice. *New Trends and Issues Proceedings on Humanities and Social Sciences.* 2017; 4(1):239-246.
17. Arora K, Hashilkar NK. Effectiveness of student-led objective tutorials in pharmacology teaching to medical students. *Indian J Pharmacol*. 2016; 48(suppl 1):S78-S82.
18. Sukhlecha A, Jadav SP, Gosai TR, Balusamy D. Student-led objective tutorials in Pharmacology: an interventional study. *Indian J Pharmacol*. 2016; 48(suppl 1): S83-S88.
19. Towle A, Cottrell D. Self directed learning. *Arch Dis Child*. 1996; 74(4):357-359.
20. Sivagnanam G, Saraswathi S, Rajasekaran A. Student-led objective tutorial (SLOT) in medical education. *Med Educ Online*. 2006; 11(1):4610.
21. Jorwekar GJ. Reflective practice as a method of learning in medical education: history and review of literature. *Int J Res Med Sci*. 2017; 5:1188-1192.

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