

Original Research

Assessment of effective teaching strategies for learning style and academic achievement of students

Hemant Kumar Saini¹, Narendra Kumar Sumeriya², Hemlata Saini³

¹Associate Professor & HOD Department of Medical Surgical Nursing, University College of Nursing, BFUHS, Faridkot, Punjab, India;

²Prof. & HOD, Department of Psychiatric Nursing, Dasmesh College of Nursing, Faridkot, Punjab, India;

³Nursing tutor, Pediatric Nursing, Govt. College of Nursing, Alwar, Rajasthan, India

ABSTRACT:

Background: Effective teaching requires flexibility, creativity and responsibility in order to provide an instructional environment able to respond to the learner's individual needs. The present study was conducted to assess most effective teaching strategies for learning style, and the differences concerning their academic achievement of students. **Materials & Methods:** The present study was conducted among 150 teachers of both genders. 80 were science teachers and 70 were math teachers. We recruited 380 students in this study. Two lecturers implemented five categories of teaching strategies: the graphical organization of information, the cooperative learning, the investigation, the debate and the problem solving. Each strategy was implemented during about four hours within the same course. The students were divided into four categories: assimilators; convergers; divergers; accommodators. **Results:** 35 science teachers were assimilator learners, 15 were converger learner, 20 were diverger learner and 10 were accommodator learner. 25 maths teachers were assimilator learners, 15 were converger learner, 18 were diverger learner and 12 were accommodator learner. Achievement scores after applying each teaching strategy ranged from 6.91 (lowest) to 8.82 (Highest). There was statistically significant difference between the achievement scores obtained by three categories of learners (convergers, divergers and accommodators). There was a highly significant difference emerged after the implementation of cooperative learning strategy. The cooperative learning represents an effective strategy for Sciences convergers ($t=3.16$; $p<0.05$) and a strongly productive one for the Maths diverger ($t= -5.61$; $p<0.05$). **Conclusion:** Authors found significant differences between the two categories of students have emerged in relation with the most effective teaching strategies corresponding to each learning style.

Key words: Convergers, divergers, teaching strategies

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Corresponding author: Hemant Kumar Saini, Associate Professor & HOD Department of Medical Surgical Nursing, University College of Nursing, BFUHS, Faridkot, Punjab, India

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INTRODUCTION

Teachers play the most relevant role in the student learning process. As a result, researchers and policymakers worldwide are increasingly interested in analyzing which makes a teacher more successful, including many different aspects such as their background characteristics, their abilities to communicate or their beliefs and attitudes towards

teaching and students.¹ This type of analysis has blossomed in recent years with the availability of large-scale datasets that link teachers to students' test scores.² Effective teaching requires flexibility, creativity and responsibility in order to provide an instructional environment able to respond to the learner's individual needs.³ Pervasive uniformity in teaching fails many learners, there is reason in both theory and research to

support a movement towards an instruction attentive to students' variance manifested in at least three areas: the student's readiness, interest, and learning profile. One of the ongoing challenges the university teachers are facing is related to matching the teaching strategies with the students' learning styles in order to improve the academic achievement.⁴

All the educationists are well familiar with the fact that all the learners have a different learning style, whereas the problem lies in catering to all of them with an effective teaching strategy. Students learn in different ways as per their capabilities. Some learn by seeing, hearing, reflecting, modelling, reasoning, and drawing etc. Similarly there are different teaching styles as well. Some give lectures, some discuss the topic, some make their students work in groups, some use technology, some use textbooks and many more.⁵

Learning strategies are defined as "processes that, when matched to the requirements of tasks, facilitate performance". Learning strategies have been repeatedly demonstrated to be positively correlated with academic performance. They structure the processing of information by facilitating particular activities, such as the planning of learning tasks, goal setting, monitoring the progress toward these goals, making adjustments if needed, and evaluating the learning process and the outcomes. Kolb et al⁶ described four learning styles as assimilator, converger, diverger and accommodator. The present study was conducted to assess most effective teaching strategies for learning style, and the

differences concerning their academic achievement of students.

MATERIALS & METHODS

The present study was conducted among 150 teachers of both genders. 80 were science teachers and 70 were math teachers. We recruited 380 students in this study. The study was explained to all and their verbal and written consent was obtained. Ethical clearance was taken before starting the study.

The learning style of each participant was identified using a self-report questionnaire. Two lecturers implemented five categories of teaching strategies: the graphical organization of information, the cooperative learning, the investigation, the debate and the problem solving. Each strategy was implemented during about four hours within the same course. At the end of each four-hour interval, the students' academic achievement was evaluated through a summative assessment test. The measures Kolb's self-report learning style inventory was used to establish the students' preferred learning styles. The students were divided into four categories: assimilators; convergers; divergers; accommodators. The academic achievement scores of the students are represented by the grades obtained on the five assessment tests, which were applied after a certain category of teaching strategies was implemented. The grading system ranged from 1 (the lowest) to 10 (the highest). Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Academic achievement scores

Learning style	Group	No.	Achievement scores after applying each teaching strategy				
			Graphical org. of information (Mean)	Cooperative learning (Mean)	Investigation (Mean)	Debate (Mean)	Problem solving (Mean)
Assimilator	Science	35	8.52	7.14	7.01	6.93	7.42
	Maths	25	8.16	6.86	6.94	6.91	7.30
Converger	Science	15	7.09	7.96	7.94	7.62	7.78
	Maths	15	7.04	6.84	8.52	7.12	8.42
Diverger	Science	20	7.28	6.78	7.03	7.85	7.64
	Maths	18	7.30	8.82	7.34	7.56	7.44
Accommodator	Science	10	7.22	7.02	7.54	8.24	8.74
	Maths	12	7.34	7.24	8.68	7.46	7.46

Table I shows that 35 science teachers were assimilator learners, 15 were converger learner, 20 were diverger learner and 10 were accommodator learner. 25 maths teachers were assimilator learners, 15 were converger learner, 18 were diverger learner and 12 were accommodator learner. Achievement scores after applying each teaching strategy ranged from 6.91 (lowest) to 8.82 (Highest).

Table II Comparisons between the academic achievements

Learning style	Sciences vs Math									
	Graphical org. of information		Cooperative learning		Investigation		Debate		Problem solving	
	t	P	t	p	t	p	t	p	t	p
Assimilator	1.23	0.21	0.68	0.52	0.16	0.82	0.02	0.94	0.38	0.62
Converger	-0.08	0.94	3.16	0.00	-1.74	0.07	1.71	0.04	-1.94	0.07
Diverger	-0.03	0.98	-5.61	0.00	-0.95	0.34	0.67	0.52	0.56	0.59
Accommodator	-0.32	0.74	-0.54	0.59	-2.71	0.02	1.72	0.09	3.12	0.00

Table II shows that there was statistically significant differences between the achievement scores obtained by three categories of learners (convergers, divergers and accommodators). There was a highly significant difference emerged after the implementation of cooperative learning strategy. The cooperative learning represents an effective strategy for Sciences convergers ($t=3.16$; $p<0.05$) and a strongly productive one for the Maths diverger ($t=-5.61$; $p<0.05$). Another important effect is related to the problem solving strategy which seems more appropriate for the sciences accommodators than for the maths accommodators ($t=3.12$; $p<0.05$). When the investigation strategy was used, accommodators with maths major scored significantly higher as compared to Science colleagues ($t=-2.71$; $p<0.05$). There was no significant mean differences between the two groups of assimilators were found ($P>0.05$).

DISCUSSION

Teachers should align their professional experiences with their teaching practices and pedagogies in order to benefit their students. These days one of the major roles of the teachers is to ensure that the content delivered has achieved the learning objective, which can be considered a key challenge.⁷ Despite the years of teaching experience, there is always a room for improvement and innovation for the teachers to adapt as per their requirement. Demands and needs change time to time so the teachers should also undergo professional and personal development to benefit both, the students and themselves as well, both are the learners. There is no age limit for learning; it depends on priorities and awareness only.⁸ Teaching strategies vary from one age group to another. None of the method is the best. It depends on the learning style of students. Primary students take more interest in the activities performed in the class. In-class exercises work the best for this age group.⁹ Visual and auditory aids improve learning and performance. Whereas, for secondary and tertiary levels, lectures, projects, field work, group exercises and peer teaching are the most suitable strategies to help them. Howard Gardner's multiple intelligences are also being considered and integrated in the lesson plans for improved learning of each and every student.¹⁰ The

present study was conducted to assess most effective teaching strategies for learning style, and the differences concerning their academic achievement of students.

In present study we recruited 150 teachers of both genders. 80 were science teachers and 70 were math teachers. We recruited 380 students in this study. We found that Achievement scores after applying each teaching strategy ranged from 6.91 (lowest) to 8.82 (Highest). 35 science teachers were assimilator learners, 15 were converger learner, 20 were diverger learner and 10 were accommodator learner. 25 maths teachers were assimilator learners, 15 were converger learner, 18 were diverger learner and 12 were accommodator learner.

Donker et al¹¹ in their meta-analysis the results of studies on learning strategy instruction focused on improving self-regulated learning were brought together determined which specific strategies were the most effective in increasing academic performance. The meta-analysis included 58 studies in primary and secondary education on interventions aimed at improving cognitive, metacognitive, and management strategy skills, as well as motivational aspects and metacognitive knowledge. A total of 95 interventions and 180 effect sizes demonstrated substantial effects in the domains of writing (Hedges' $g = 1.25$), science (.73), mathematics (.66) and comprehensive reading (.36). These domains differed in terms of which strategies were the most effective in improving academic performance. However, metacognitive knowledge instruction appeared to be valuable in all of them. Furthermore, it was found that the effects were higher when self-developed tests were used than in the case of intervention-independent tests. Finally, no differential effects were observed for students with different ability levels.

We found that there was statistically significant difference between the achievement scores between convergers, divergers and accommodators. The cooperative learning represents an effective strategy for Sciences convergers ($t=3.16$; $p<0.05$) and a strongly productive one for the Maths diverger ($t=-5.61$; $p<0.05$). Tulbure et al¹² study aimed at comparing two groups of pre-service teachers (with Educational Sciences and Economic Sciences major) in order to

identify their learning style preferences, the most effective teaching strategies for each learning style and some possible differences between their academic achievements (N=182). A between subject design was used to analyze the data collected through a survey method. Significant differences between the two categories of students have emerged in relation with the most effective teaching strategies corresponding to each learning style.

We found that another important effect is related to the problem solving strategy which seems more appropriate for the sciences accommodators than for the maths accommodators ($t=3.12$; $p < 0.05$). When the investigation strategy was used, accommodators with maths major scored significantly higher as compared to Science colleagues ($t=-2.71$; $p < 0.05$). There was no significant mean differences between the two groups of assimilators were found ($P > 0.05$).

CONCLUSION

Authors found significant differences between the two categories of students have emerged in relation with the most effective teaching strategies corresponding to each learning style.

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