

Original Article

Evaluating the Impact of Active Learning Strategies on Cognitive, Affective, and Psychomotor Domains in Undergraduate Allied Health Students

Usha G Shenoy¹, Deena Mendez²

¹Assistant Professor, Physiology, Sri Devraj Urs Academy of Higher Education and Research, Kolar, India

²Associate Professor, Biochemistry, Sri Devraj Urs Academy of Higher Education and Research, Kolar, India

ABSTRACT

Background: Active learning helps in having meaningful interaction between students and teachers, creating an engaging learning environment that boosts communication, confidence, and participation. Absence of such an environment may affect student productivity and learning outcomes. **Aim:** To determine the effect of active learning strategies on the cognitive, affective, and psychomotor domains in the allied health students and explore interrelationships between learner attributes. **Methods:** This is an observational cross-sectional study which included 150 first-year Allied health students after Institutional ethical clearance. The students were assigned with selected topics and asked to present them for 3–5 minutes before the first internal examination. For the Preparedness and performance assessment, for theory and practical with a validated self-report and interview-based Likert scale questionnaire. The scores were analysed across cognitive, affective, and psychomotor domains. Descriptive statistics, Pearson's correlation, and multiple regression analysis were performed. **Results:** Mean scores were 8.21 ± 3.12 for the cognitive domain, 5.15 ± 1.81 for the affective domain, and 7.41 ± 1.41 for the psychomotor domain. Pearson's correlation showed significant positive associations ($P < 0.01$) between confidence and fluency, content and body language. Multiple regression analysis demonstrated a significant negative relationship between teamwork and skill. **Conclusion:** Active learning strategies improved learner engagement across domains. Educational approaches should balance development of individual skills with collaboration and interpersonal communication to strengthen teamwork and group learning outcomes.

Keywords: Active learning, Allied health students, Cognitive domain, Affective domain, Psychomotor skills.

Corresponding Author:

Dr. Usha G Shenoy, Assistant Professor,
Physiology, Sri Devraj Urs Academy of Higher
Education and Research, Kolar, India – 563103

Email: ushaudupi@gmail.com

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INTRODUCTION

Participatory learning involves actively engaging students in the process of studying a subject.^[1] It helps for higher order thinking and in-depth comprehension of the learner. This method encourages active learning, where students interact meaningfully with their peers and teachers, creating a joyful learning atmosphere. Active learning involves designing, implementing, maintaining and promoting, learning within and outside classroom. It is an environment for learning, through creating opportunities for active engagement with the subject matter.^[2] Students participate by reading, understanding, thinking, discussing, investigating, and expressing ideas in their own words through writing and discussion.

A major challenge that can hinder student confidence and creativity is the lack of an active learning environment. This can significantly reduce the deficiency of student productivity, especially in language use, which is very important for classroom communication. Therefore, it is very important to create an environment where teachers implement strategies to promote active learning.^[1] In other words, the student may lack in their self-confidence and will have negative assumption about themselves regarding their ability.^[3]

Building an environment for shy or anxious students is a difficult task often due to low self-confidence and negative perceptions of their knowledge and skills. As a result, effective learning strategies are essential to be established for an active learning atmosphere. These strategies should create a challenging and engaging environment that enhances students' thinking and skill development. The idea is to convert the student from passive receiver of information to active participation, more involved in the learning process hence the aim of this study was to provide validated strategies for creating an active learning environment in the classroom.^[4,5]

The students who enrolled themselves for this course were from diverse educational backgrounds, and having average English language proficiency in the allied health course. This learning strategy was selected by the class teacher to bridge these gaps in academic knowledge and skill through structured classroom activities. This study was conducted to assess the impact of active learning strategies on the

cognitive, affective, and psychomotor domains in Physiology for Allied Health Science students, and to explore the interrelationships between learner attributes using a validated questionnaire.

MATERIAL AND METHOD

This is an observational cross-sectional study which included 150 first-year Allied health students after Institutional ethical approval bearing number SDUAHER/KLR/R&I/CEC/F/NF/31/2024-25. To explore the interrelationships between learner attributes using a validated questionnaire for active learning assessment. The primary tool was an expert-validated questionnaire. The Cronbach's alpha, score showed a high reliability coefficient of 0.915, indicating good internal consistency and reliability of the questionnaire

To understand the active learning mechanism various learning techniques were incorporated in our study to improve students' engagement, understanding, and examination preparedness including Interactive classroom sessions like discussions, think-Pair-Share, Student Seminar and Peer Learning. Selection of the learning resources like textbooks charts, diagrams flowcharts case studies previous years question paper and examination orientation helped the students to visualize physiological concepts, relate theory to practice, prepare for examinations, and actively participate during classroom discussions and practical sessions rather than being passive listeners.

After completion of the scheduled teaching of all physiology chapters, for the assessment of the theory component the staff members prepared the list of topics for 5marks question types which they would be able to speak for 3 minutes minimum and 5 minutes maximum which was important for examination- and repeated many times and covered in 1st internals. For the practicals the students were grouped into 5 members each and were asked to present the experiment as a team with following components as (1) the principle of the experiment, (2) the procedure and lastly the result as a teamwork. Students were instructed to prepare using standard textbooks and class notes.

Students were instructed to study regarding learning objectives and to explain the topic in simple and scientifically correct terminology based on definition,

basic physiology, mechanism, its clinical significance, as though in the class.

Assessment was carried out using a structured Likert scale on 1 to 5 grading. The questionnaire included both self-reporting and interview-based components. Students were graded based on their speech, confidence, and content for assessment of the cognitive domain. Fluency and body language were the tool for assessing the affective domain. The teamwork, presentation, and practical skills which were evaluated for the psychomotor domain. The assessment of theory was evaluated individually for the cognitive and affective domains. The assessment of the practicals was evaluated for the psychomotor domain. Based on their presentation of experiment, teamwork coordination and fluency in their speech and the demonstration skill they were graded. The data were analysed based on the cognitive, affective, and psychomotor learning domains.

The data was analysed using SPSS version 20. Descriptive statistics were performed, and the results were presented using bar charts. Pearson's correlation was performed to determine the strength and direction of association between learner attributes such as confidence, fluency, content, and body language. Multiple linear regression analysis was performed to determine the independent contribution of presentation-related variables to students' overall presentation performance.

RESULTS

Descriptive analysis of the three domains showed the highest mean score of (8.21 ± 3.12), for cognitive domain followed by (7.41 ± 1.41) for psychomotor domain and (5.15 ± 1.81) for affective domain as shown in Figure 1.

In the affective domain, fluency scored higher value of (3.0) compared to body language of (2.15), suggesting better verbal expression and learner engagement (Figure 3).

In the psychomotor domain, of teamwork was (2.81) and presentation skills showed (2.8) which was higher scores than practical skill performance of (1.8), reflecting the positive influence of collaborative learning activities on student participation and group interaction (Figure 4).

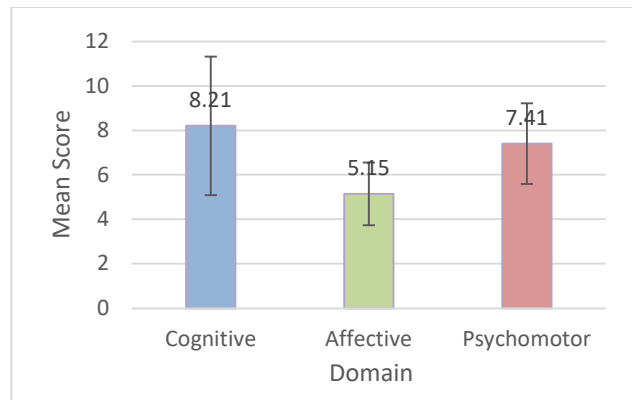


Figure 1: Mean score across different domains

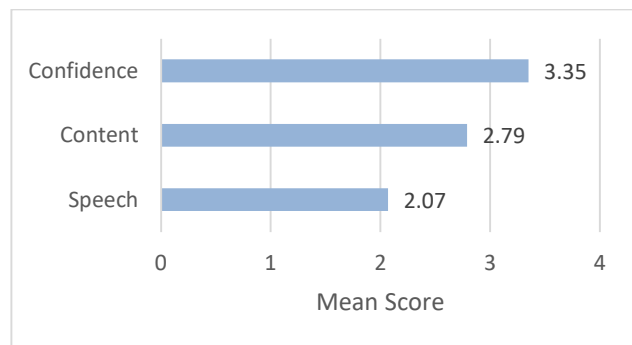


Figure 2: Scores of the Cognitive Domain

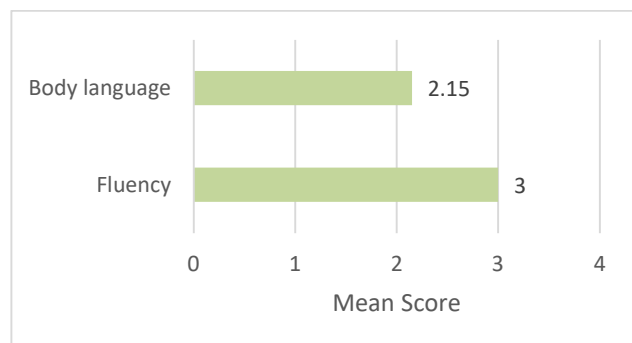


Figure 3: Scores of the Affective Domain

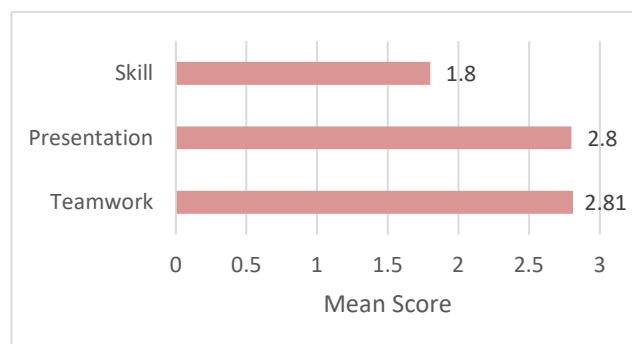


Figure 4: Scores of the Psychomotor Domain

Pearson's correlation analysis demonstrated that confidence was significantly and positively associated

with fluency, content, and body language ($p < 0.001$), whereas no significant association was observed with teamwork or individual skill.

Table 1: Correlation between Confidence and other factors

Variables	Correlation (r)	Sign.	Interpretation
Confidence vs Fluency	0.863	<0.001	Strong positive correlation*
Confidence vs Content	0.785	<0.001	Strong positive correlation*
Confidence vs Body language	0.660	<0.001	Moderate positive correlation*
Confidence vs Teamwork	-0.047	0.566	No significant correlation
Confidence vs Individual skill	0.004	0.963	No significant correlation

Our present study finding has demonstrated that active learning strategies had a positive influence across all three learning domains among Allied Health Science students. The cognitive domain showed the highest mean score (8.21 ± 3.12), indicating that active learning significantly enhanced students' knowledge, understanding, critical thinking, and ability to recall and present subject content. These findings suggest that activities such as selection of topic and short oral presentations before examinations helped students process information more effectively and improved academic preparedness.^[4] The affective domain had a moderate mean score (5.15 ± 1.81), which indicated that students developed positive attitudes, nonverbal skill like the body language and willingness to participate, though the emotional and attitudinal changes which were noticeably less significant compared to cognitive gains. The psychomotor domain also showed a comparatively high mean score (7.41 ± 1.41), reflecting improvement in presentation-related skills such as communication skill and speech fluency, in delivering the content and performance in classroom. This indicated that repetition of these speaking activities will strengthen students' practical expressive skills and non-verbal communication skills.

Pearson's correlation was performed to analyse the relationship between confidence and other presentation-related variables among Allied Health Science students. We found that a significant positive correlation was observed between confidence and fluency ($r = 0.863$, $p < 0.001$), confidence and content

($r = 0.785$, $p < 0.001$), and confidence and body language ($r = 0.660$, $p < 0.001$). These findings indicate that students with greater confidence tended to demonstrate better speech fluency, improved organization and presentation of content, and more effective body language during oral presentations. However, confidence did not show a statistically significant correlation with teamwork ($r = -0.047$, $p = 0.566$) or individual skill ($r = 0.004$, $p = 0.963$), suggesting that these aspects were influenced by factors other than self-confidence.

Multiple linear regression analysis was performed to determine the independent contribution of presentation-related variables to students' overall presentation performance. The overall regression model was statistically significant ($R^2 = 0.442$, Adjusted $R^2 = 0.414$, $p < 0.001$), indicating that 44.2% of the variance in presentation performance was explained by the variables included in the model. Among the predictors, skill ($\beta = 0.438$, $p < 0.001$) and teamwork ($\beta = 0.778$, $p < 0.001$) emerged as significant positive predictors of presentation performance. In contrast, confidence, content, speech, body language, and fluency were not statistically significant independent predictors after adjustment for the other variables.

Based on the regression coefficients the standardized multiple regression equation is:

$$\text{Presentation} = -0.103(\text{confidence}) + 0.124(\text{content}) - 0.002(\text{speech}) - 0.069(\text{body-language}) - 0.076(\text{fluency}) + 0.438(\text{Skill}) + 0.778(\text{Teamwork})$$

The multiple regression equation indicated that presentation performance was predicted by confidence, content, speech, body language, fluency, skill, and teamwork. The standardized regression coefficients were $\beta = -0.103$ for confidence, $\beta = 0.124$ for content, $\beta = -0.002$ for speech, $\beta = -0.069$ for body language, $\beta = -0.076$ for fluency, $\beta = 0.438$ for skill, and $\beta = 0.778$ for teamwork. Skill and teamwork were significant positive predictors of presentation performance ($p < 0.001$).

DISCUSSION

The present study demonstrated that active learning strategies positively influenced students' learning outcomes across the cognitive, affective, and psychomotor domains. Pearson's correlation analysis

revealed significant positive relationships between confidence and fluency, content, and body language. These findings suggest that students who were more confident communicated more fluently, organized their ideas more effectively, and demonstrated better non-verbal communication during presentations. Confidence may therefore play an important role in enhancing students' communication abilities and classroom engagement, which are essential competencies for future healthcare professionals.

Multiple regression analysis was undertaken to determine which presentation-related variables independently predicted students' presentation performance while controlling for the influence of the remaining variables. Unlike Pearson's correlation, which evaluates the relationship between two variables independently, multiple regression simultaneously examines several predictors and estimates the unique contribution of each variable after adjustment for potential confounding. This provides a more comprehensive understanding of the factors influencing learning outcomes.

In the present study, skill and teamwork emerged as significant independent predictors of presentation performance. These findings indicate that students who demonstrated stronger practical presentation skills and collaborated effectively with their peers achieved better overall performance. Although confidence, content, speech, fluency, and body language were positively associated with presentation performance in the correlation analysis, they were not significant independent predictors in the regression model. This suggests that these variables may share overlapping effects with skill and teamwork, reducing their independent contribution after statistical adjustment.

The regression analysis therefore provides additional evidence beyond simple correlation by identifying the factors that independently contribute to students' performance. Such findings emphasize that while confidence and communication behaviours remain important components of active learning, opportunities to strengthen practical skills and structured collaborative learning should be incorporated into educational activities to maximize students' overall learning outcomes. This may indicate that some students performed better individually than in group settings, or that unequal participation within teams may have affected the development of individual

skills.^[6] These results support the implementation of active learning strategies that promote not only knowledge acquisition but also the development of teamwork and practical competencies required in Allied Health education.

CONCLUSION

These findings suggest that incorporating structured active learning approaches into the curriculum can improve academic achievement, communication competence, collaborative learning, and professional preparedness, thereby preparing students to become competent and confident healthcare professionals.

DECLARATIONS

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