

ORIGINAL ARTICLE

Evaluation of student engagement and agreement between student self-assessments and facilitator evaluations in Pediatric Advanced Life Support workshop among clinical year medical students

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Received:: 30 September 2025

Revised: 19 November 2025

Accepted: 23 December 2025

Abstract

Background: Student engagement is crucial for effective medical education, particularly in simulation-based settings like Pediatric Advanced Life Support (PALS) workshops. However, the dynamics of engagement during PALS training and the alignment between student self-assessment and facilitator evaluation are not well understood. This study aimed to evaluate engagement levels among medical students in PALS workshops and to determine the agreement between student self-assessments and facilitator evaluations.

Methods: The cross-sectional study was conducted with Year 5 and Year 6 medical students participating in PALS workshops at Hatyai Medical Education Center, Thailand, during the 2025 academic year. Student engagement was measured using a validated instrument adapted from the National Survey of Student Engagement, covering collaborative learning, cognitive development, and personal skills. Facilitator also evaluated students on the personal skills domain. Group differences were analyzed using independent t-tests, and the agreement between student self-assessment and facilitator evaluation was determined with Cohen's weighted kappa.

Results: All 92 students completed the survey. Prior PALS training was significantly more common among Year 6 students ($p < 0.05$). Year 6 students reported higher overall engagement scores compared with Year 5, with no statistically significant ($p=0.07$). Subdomain analysis revealed significantly higher personal skills scores among Year 6 students ($p < 0.01$). A moderate level of agreement was found between student self-assessments and facilitator evaluations for personal skills (weighted kappa = 0.563).

Conclusions:

Simulation-based PALS training was an effective platform for engaging medical students. Higher engagement among final-year students reflected the impact of clinical experience and maturity

on learning. Moderate agreement between student self-assessments and facilitator ratings highlighted the importance of integrating self-reflection with external feedback to promote professional development.

Keywords: student engagement; Pediatric Advanced Life Support; medical students; self-assessment; facilitator evaluation

Introduction

Student engagement has emerged as a cornerstone of effective medical education and has gained increasing recognition in both educational research and practice over the past decades.^{1,2} It is a multidimensional construct encompassing the behavioral, emotional, and cognitive domains, each of which is essential for meaningful learning. Behavioral engagement involves active participation in learning activities and development of personal skill; emotional engagement captures interest, motivation, collaboration and affective responses during tasks; and cognitive engagement reflects understanding, deep and strategic learning approaches.³⁻⁶ Student engagement influences motivation and teamwork, decreases burnout, ensures the quality of health profession education and improves academic performance by enhancing critical thinking.^{3,7-9} Recognized for its importance, high levels of engagement foster interactive discussions and active problem-solving in classroom teaching and affect readiness for professional roles.^{10,11} This active involvement transforms the classroom from a passive learning environment into a dynamic space that stimulates curiosity and motivates learners. Moreover, early formation of engagement habits in classroom settings primes students for simulation-based learning, clinical reasoning exercises, and patient care scenarios.

In undergraduate medical curricula, pediatric resuscitation training is increasingly

emphasized to prepare students for real-world clinical challenges. Simulation-based education has become an essential component of this training, as it provides an active learning environment that develops clinical decision making, improves learners' confidence, teamwork, and leadership skills. This occurs in a safe and realistic setting beyond what traditional lectures can achieve.¹²⁻¹⁶ Pediatric Advanced Life Support (PALS) workshops provide high-fidelity simulation training that equips medical students with life-saving skills for pediatric emergencies. These courses specifically aimed to provide medical students with the knowledge and practical skills necessary for managing pediatric cardiopulmonary arrests through scenario-based simulations, algorithm-driven decision-making, and team-based resuscitation strategies.^{17,18} Within simulation-based learning, engagement is paramount as it underpins knowledge acquisition, crisis management competence, and team communication. For medical students, especially in senior clinical years (Year 5 and Year 6), participation in PALS workshops provides a critical bridge between theoretical learning and clinical application.

Evaluating student engagement in PALS training is methodologically complex but essential for optimizing instructional design. Assessment strategies include both subjective and objective approaches. Student self-assessment surveys serve dual roles as professional development tools and methods for

subjectively evaluating emotional responses, self-efficacy, and cognitive engagement.^{19–21} Importantly, self-reflection encourages learners to critically appraise their own strengths and weaknesses, fostering lifelong learning habits. In a simulation setting, objective measurement encompasses performance-based assessments and adherence to algorithms. Facilitator evaluations provide external validation and valuable insights into behavioral engagement, including classroom participation, personal skill, teamwork, and leadership behaviors.^{21,22} Feedback from facilitators not only validates students' self-perceptions but also guides them toward targeted skill refinement, thereby reinforcing the accuracy of self-assessment and ensuring meaningful learning outcomes. The combination of student self-assessment and facilitator evaluation offers a comprehensive view of student engagement across all dimensions. However, concerns exist regarding the accuracy of student self-assessment in clinical training, particularly for practical skills.^{19,23} Measuring the agreement between student self-assessment and facilitator evaluation offers an additional dimension of educational quality, as concordance suggests that students are developing accurate self-awareness, while discrepancies highlight areas where teaching strategies and feedback mechanisms can be refined to strengthen engagement and learning effectiveness.

Although the educational benefits of student engagement are well-recognized,

its specific dynamics during PALS workshops and the agreement between student self-assessment and facilitator evaluation remain underexplored. This study aimed to evaluate the levels and characteristics of student engagement among Year 5 and Year 6 medical students participating in PALS workshops, and to identify the level of agreement between student self-assessments and facilitator evaluations.

Methods

This cross-sectional study was conducted at the Hatyai Medical Education Center, Hatyai Hospital, Thailand, from January to December 2025. The study population comprised Year 5 and Year 6 medical students participating in PALS workshops during the 2025 academic year. Ethical approval was obtained from the Institutional Review Board of Hatyai Hospital (HYH EC 006-68-01), and written informed consent was collected from all participants prior to enrollment. The study was powered to detect a difference in total engagement score between Year 5 and Year 6 students, using a two-sided comparison of means ($\alpha=0.05$, power=0.80, 1:1 allocation). Based on pilot data with the same instrument, an effect size of 0.58 was estimated for the between-year difference. The required sample size was calculated using G*Power software, yielding 38 participants per group for a total sample size of 76. The PALS workshops began with a theoretical review of pediatric resuscitation, followed by high-fidelity scenario-

based simulations incorporating “mega code” sessions. These simulations were designed to enhance both cardiopulmonary resuscitation skills and team dynamics. Immediately following the workshop, participants were invited to complete self-assessment survey on their engagement.

Student engagement was measured using The Survey of Student Engagement developed by Ahlfeldites et al.²⁴, a validated instrument that evaluates engagement across three domains: collaborative learning (4 items), cognitive development (5 items), and personal skills (5 items). Each item was rated on a 4-point Likert scale ranging from 1 (never/very little) to 4 (very often/very much). The original instrument, adapted from the widely recognized National Survey of Student Engagement (NSSE), demonstrated established reliability, and a pilot test conducted in our setting confirmed its internal consistency, yielding a Cronbach’s alpha of 0.85. In addition to self-assessments, facilitator evaluated each student’s engagement in the personal skills domain during workshop activities. After each simulation scenario, the facilitator conducted an immediate debriefing using a structured “Gather–Analyze Summarize” approach.²⁵ Feedback emphasized three key aspects: technical skills (adherence to PALS algorithms, accuracy of interventions), non-technical skills (leadership, teamwork, communication), and clinical reasoning (prioritization and situational awareness). Students were first

invited to reflect on their own performance, which was followed by facilitator feedback. This reflective discussion aimed to reinforce learning and identify areas for skill improvement. The session concluded with the facilitator summarizing key learning points.

Data were collected through anonymous questionnaires to ensure participant confidentiality. No personal identifiers were recorded, and all responses were tracked solely by anonymous study codes. Data normality was assessed using the Shapiro-Wilk test. Descriptive statistics were presented as frequencies, percentages, means, and standard deviations as appropriate. Differences in total engagement scores and subdomain scores between Year 5 and Year 6 students were analyzed using independent samples t-tests for normally distributed data or Mann-Whitney U tests for non-parametric data. The level of agreement between student self-assessments and facilitator evaluations in the personal skills domain was analyzed using Cohen's weighted kappa statistic. A quadratic weighting was applied to account for the ordinal nature of the data, assigning greater penalties to larger discrepancies in ratings. The kappa values were interpreted according to established benchmarks for agreement strength. A two-tailed p-value less than 0.05 was considered statistically significant. All statistical analyses were performed using STATA software (version 18.0; Stata Corp LLC, College Station, TX, USA)

Results

A total of 92 medical students completed the survey, achieving a 100% response rate. The sample comprised 38 Year 5 students (41.30%) and 54 Year 6 students (58.70%). Prior PALS training experience was reported by 54.35%

of participants and was significantly more prevalent among Year 6 students compared to Year 5 students ($p < 0.05$). Academic performance, as measured by mean GPA, was comparable between groups (Year 5: 3.36 ± 0.28 ; Year 6: 3.27 ± 0.30 ; $p > 0.05$) (Table 1)

Table 1: Student Characteristics

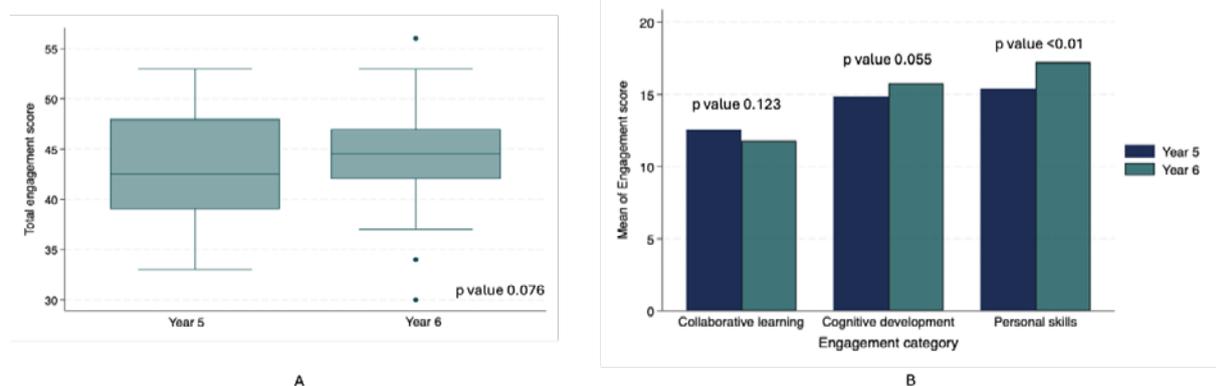
Characteristics	Year 5	Year 6	p value
Number of medical students; n (%)	38 (41.30%)	54(58.70%)	
Male; n (%)	8(21.05%)	23(42.59%)	0.031
Experience in PALS training; n (%)	6(20.69%)	44(89.80%)	<0.01
GPA (mean \pm SD)	3.36 \pm 0.28	3.27 \pm 0.30	0.638

Student Engagement Scores

Overall engagement scores demonstrated a trend toward higher levels among Year 6 students compared to Year 5 students; however, this difference did not achieve statistical significance ($p = 0.07$) (Figure 1A). Subdomain analysis revealed consistent patterns of higher engagement scores among Year 6 students across all domains. The most significant difference

was observed in the personal skills domain, where Year 6 students scored significantly higher than Year 5 students ($p < 0.01$). Trends toward higher scores among Year 6 students were also noted in cognitive development ($p = 0.06$) and cooperative learning ($p = 0.12$) domains, though these differences did not reach statistical significance (Figure 1B)

Figure1: A: Total engagement score by medical year, B: subcategory score by medical year

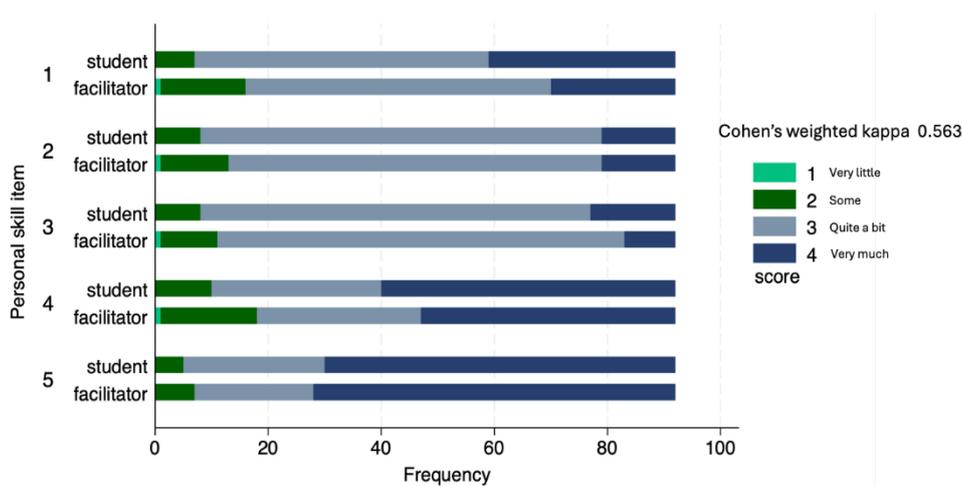


Agreement between student self-assessment and facilitator evaluation

Assessment of agreement between student self-assessments and facilitator evaluations in the personal skills domain yielded a Cohen's weighted kappa coefficient of 0.563, indicating moderate agreement between the two evalu-

ations. This finding suggests that students demonstrated reasonable self-awareness regarding their personal skills performance, with their self-assessments generally aligned with facilitator observations. However, some discrepancies were evident across individual items (Figure 2)

Figure 2: Agreement between student self-assessment and facilitator evaluation in students' personal skills



Discussion

Our findings revealed a significant difference in engagement levels between the two student cohorts. The sixth-year students reported higher total engagement scores, particularly within the personal skills subcategory, compared to the fifth-year students. This observation could be logically attributed to the structured and intensive clinical training embedded in the final year of the medical curriculum. With greater exposure to PALS training and real-world clinical settings, this enhanced clinical experience likely enabled them to engage with the simulation at a deeper level and with greater emphasis on performance, communication, and

team-work. These results align with existing evidence suggesting that prior learning experience enhances students' confidence level and performance on clinical skills.^{15,26,27} These results suggest that student engagement may naturally evolve with clinical training, and simulation-based courses such as PALS can provide an optimal platform to reinforce these developing competencies.

An additional key finding was the moderate agreement between students' self-assessment and facilitator evaluations in the personal skills domain. The weighted kappa statistic indicated that, while discrepancies were evident in some individual items, students were generally able to

reflect on self-awareness regarding their performance with reasonable accuracy. However, consistent with previous research, self-assessment alone is insufficiently reliable and must be complemented by external feedback to guide professional development and improve the students' confidence.^{28–30} Similarly, a study by Ward et al. showed the theoretical value of self-assessment, but its accuracy was poor.³¹ Our results therefore reinforce the importance of integrating self-assessment with facilitator evaluation, fostering a powerful learning cycle: self-assessment encourages students to become reflective practitioners, while expert feedback provides the external validation and targeted guidance necessary to refine skills and correct misconceptions. This dual approach is essential for supporting the holistic development of personal and professional skills. Effective reflection and feedback are essential components for medical graduates to develop professional expertise and lifelong learning.³² This is consistent with a study by Stoilov et al. that highlights the importance of facilitator feedback.³³ Taken together, these findings emphasize the educational value of combining self-assessment with structured facilitator feedback within simulation-based curricula. This study, however, has limitations that should be acknowledged. It was conducted within a single institution, which may limit the generalizability of the findings to other medical schools with different curricula, simulation designs, or learning environments.

Additionally, engagement was evaluated immediately after the PALS session; thus, the results may not capture the long-term retention of engagement or skill application in clinical settings. Addressing these limitations in future studies could enhance the robustness and applicability of findings across diverse educational contexts. Specifically, future research could expand upon these findings by implementing a longitudinal design to track the development of self-assessment accuracy and engagement over multiple simulation-based education sessions

Conclusion

This study demonstrates that simulation-based PALS training effectively engages medical students across cognitive, collaborative, and personal skill domains. Senior students showed higher engagement, reflecting the influence of clinical experience and maturity. The moderate alignment between student self-assessment and facilitator evaluation underscores the importance of combining self-reflection with external feedback to support professional development. These findings reinforce the role of simulation as a critical platform for enhancing engagement for future physicians.

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