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Introduction

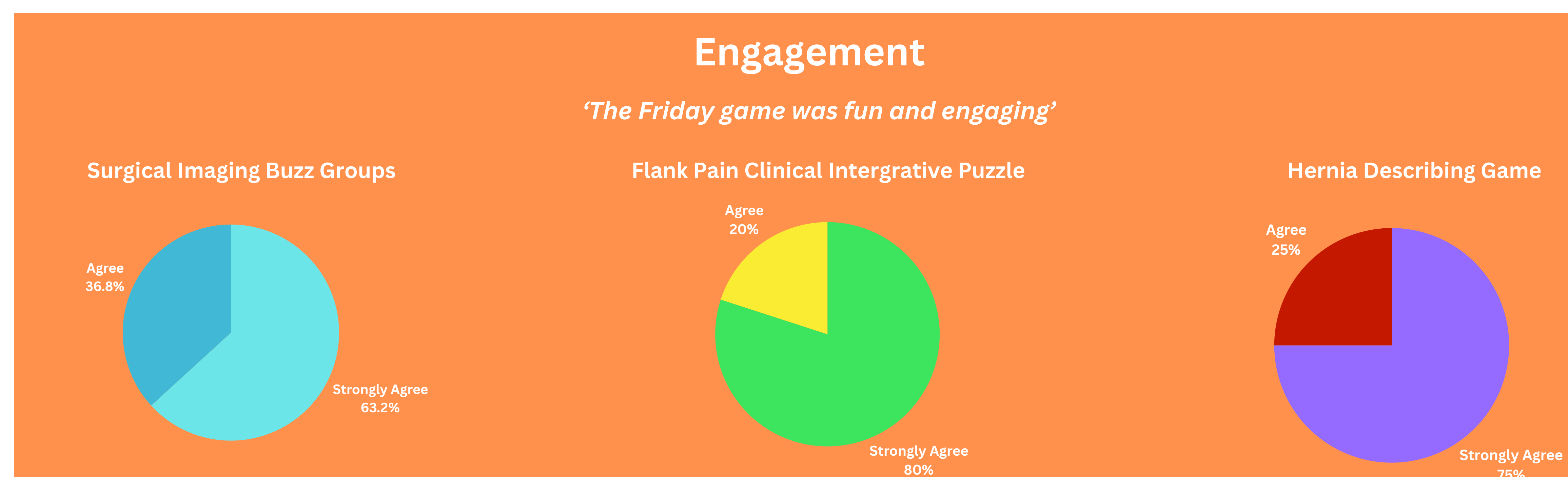
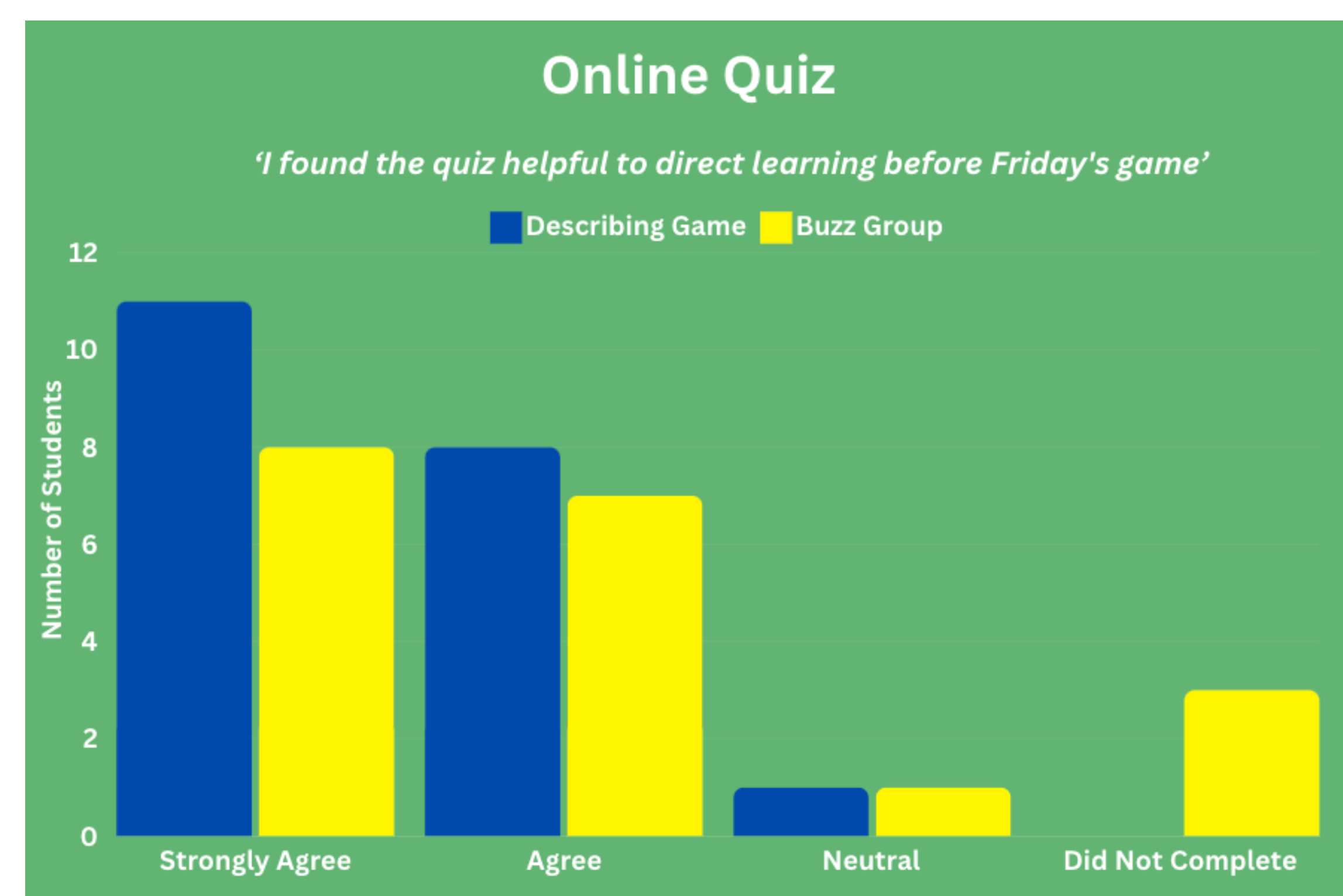
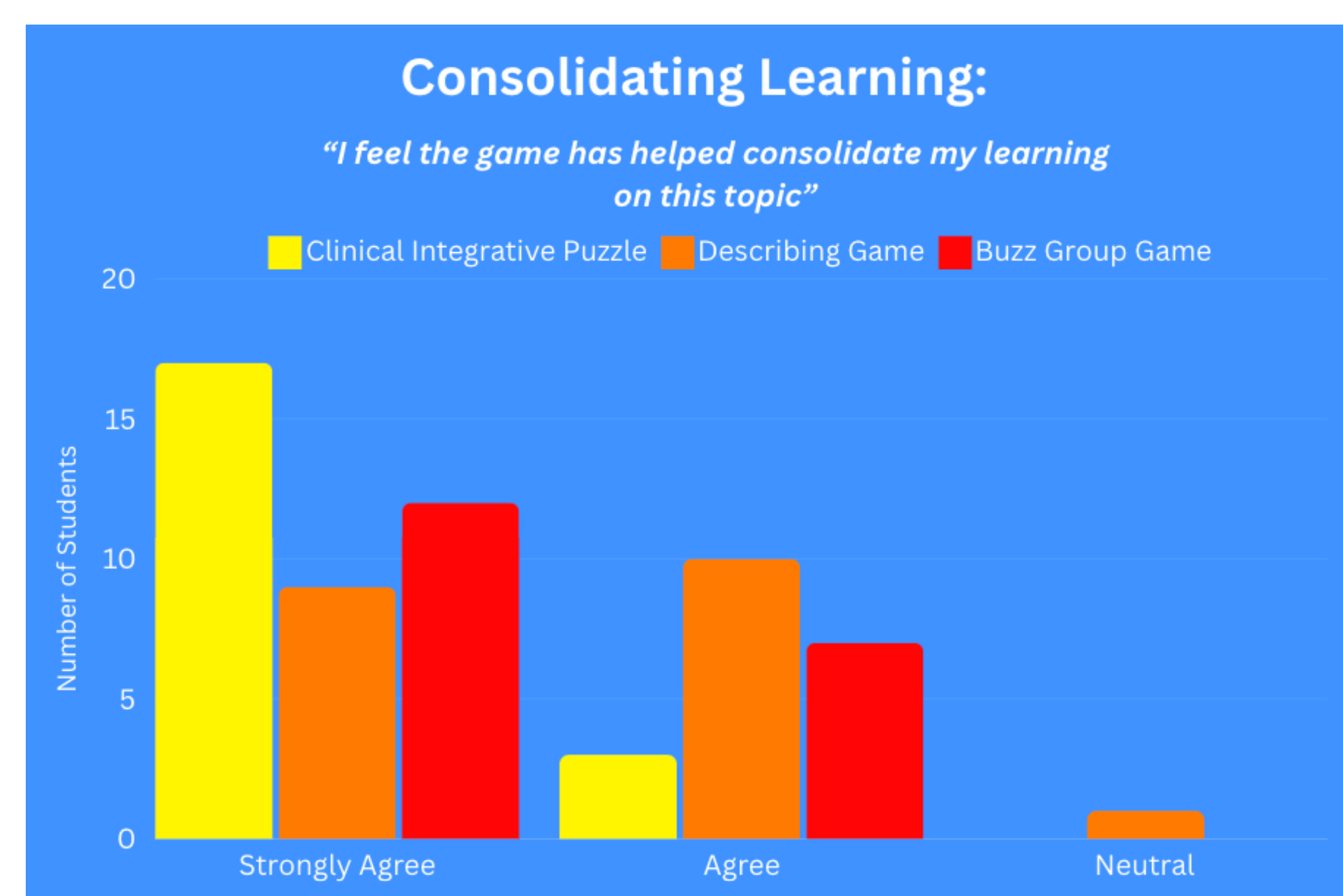
Learning requires the learner to listen, read, write, discuss or be engaged in solving problems (Chickering and Gamson). Active learning needs the learner to be more 'actively involved', by engaging in higher order thinking tasks such as analysis, synthesis and evaluation of ideas (Bonwell and Eison).

Therefore incorporation of active learning methods, including game-based learning, in teaching can be effective (Prince) and engaging (Grijpma et al) for students.

Aim

This study asks if combining different active learning methods improves self reported confidence in surgical topics in fourth year undergraduate medical students during hospital placement learning.

Results



Key Messages

Consolidating Learning - 100% agreed the clinical integrative puzzle on flank pain (n=20), and the surgical imaging buzz group quiz (n=19) helped to consolidate learning. 95% (n=20) agreed following the hernia describing game.

Online Quiz - Almost all students who responded felt the online quizzes on surgical imaging (n=19, 94.7%) and hernias (n=20, 95.0%) were useful for self-directed learning

Engagement- 100% agreed all games were fun and engaging.

Methods

3 surgically themed in-person games with corresponding online quizzes were created - a clinical integrated puzzle on flank pain (**Image 1**), a describing game on hernias (**Image 2**) and a buzz group quiz on surgical imaging. The quizzes were multiple choice questions delivered via an online platform, with immediate feedback available. 2 groups of 4th year medical students on surgical placement (total n=25) participated in the games and had access to the quizzes over a 5 week period.

Questionnaires assessed perceived usefulness, engagement and perceived knowledge improvement. A 5-point Likert scale was used scoring from 'Strongly Agree' to 'Strongly Disagree'. Questionnaires returned were: flank pain clinical puzzle t=20, surgical imaging buzz group t=19 and describing hernia game t=20.



Image 1: Clinical Integrative Puzzle on Flank Pain

Direct inguinal hernia Forbidden words Indirect	Umbilical Hernia Forbidden words Umbilicus Belly button	Hiatus hernia Forbidden words
Strangulated hernia Forbidden words Murder Throat neck	Inguinal ligament Forbidden words Hernia	Femoral Artery Forbidden words Femur Hernia

Image 2: Hernia Describing Game.

Limitations

Outcome measures: This research only assessed reported increase in confidence, a subjective measure. Future research could use objective assessment to consider efficacy of the teaching methods.

Verifying completion of tasks and feedback: We did not make doing the quiz or the feedback mandatory, therefore we may have introduced a selection bias in the feedback, as more motivated students may have been more likely to engage and give positive feedback.

Comparison of learning games: The social learning games used here were all different but only used once. This makes it difficult to draw conclusions about which game was more or less effective. A further study could more closely compare the methods, or just use one method to generate more reproducible data.

Conclusions

This data shows that the method, a quiz coupled with a game, improved self-reported confidence across three diverse surgical topics.

This implies that active and social learning methods, which also incorporate clinical reasoning are perceived to contribute positively to student learning. Furthermore the data showing perceived engagement and value to learning shows that this method is acceptable to medical students in this context.

Implications are that similar active learning methods and games could continue to be used instead of, or in conjunction with more traditional tutorial methods in the teaching of surgical topics.

References

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Acknowledgements: Thank you to Dr. Safiya Dhanani for her contribution to the clinical reasoning puzzle.

We have no potential conflicts of interest to report