

## Piagetian Learning Centers and Foundational Numeracy Development in Grade Two Classrooms in the UAE

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### INTRODUCTION & AIM

Extending beyond verbal instruction, mathematics is learned through seeing, touching, and doing (Ekwueme et al., 2015).

Grounded in Piaget's constructivist view of learning, this study views young learners as active constructors of knowledge who develop understanding through concrete, hands-on experiences. Since children in the preoperational stage (2-7 years) are still developing logical reasoning, learning centers provide developmentally appropriate opportunities to explore mathematical concepts through manipulation, interaction, and active practice (Babakr et al., 2019; Rabillas et al., 2023).

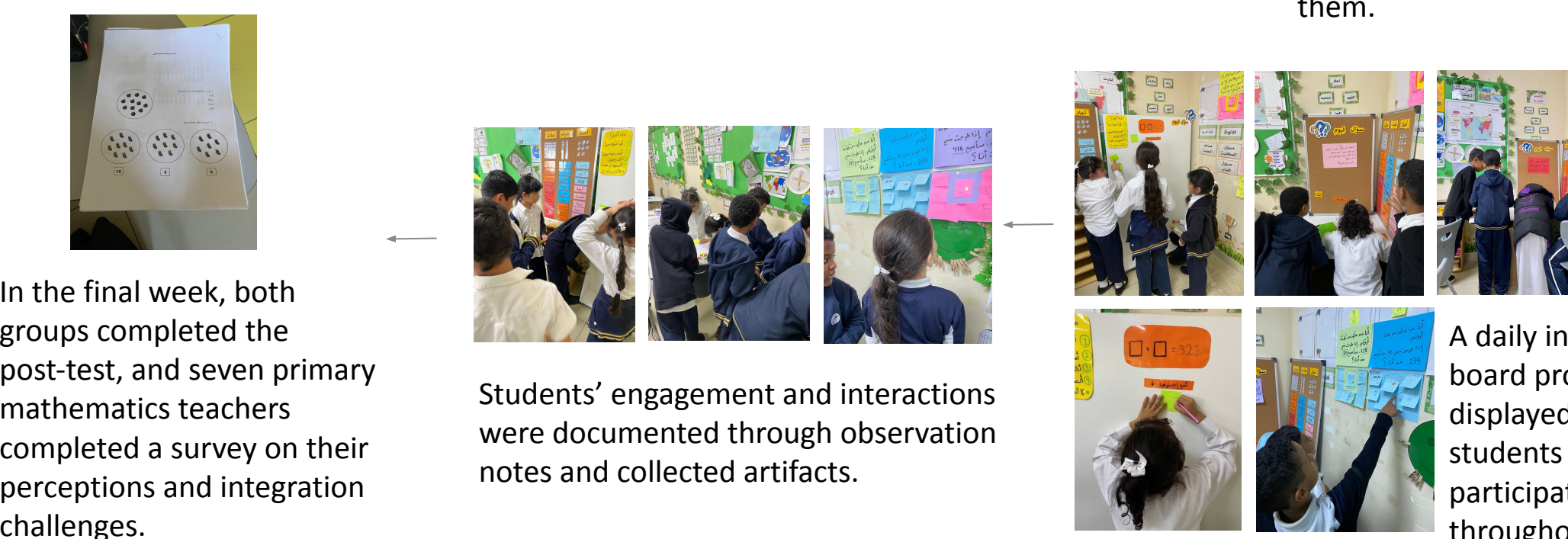
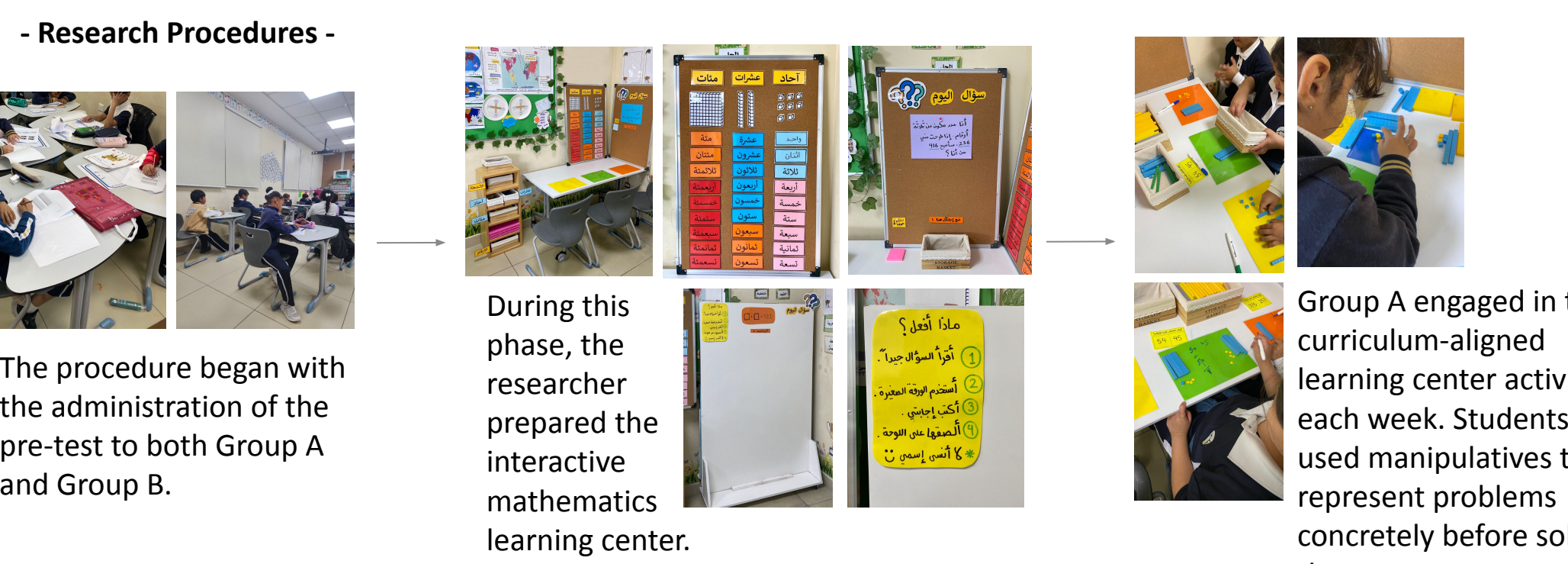
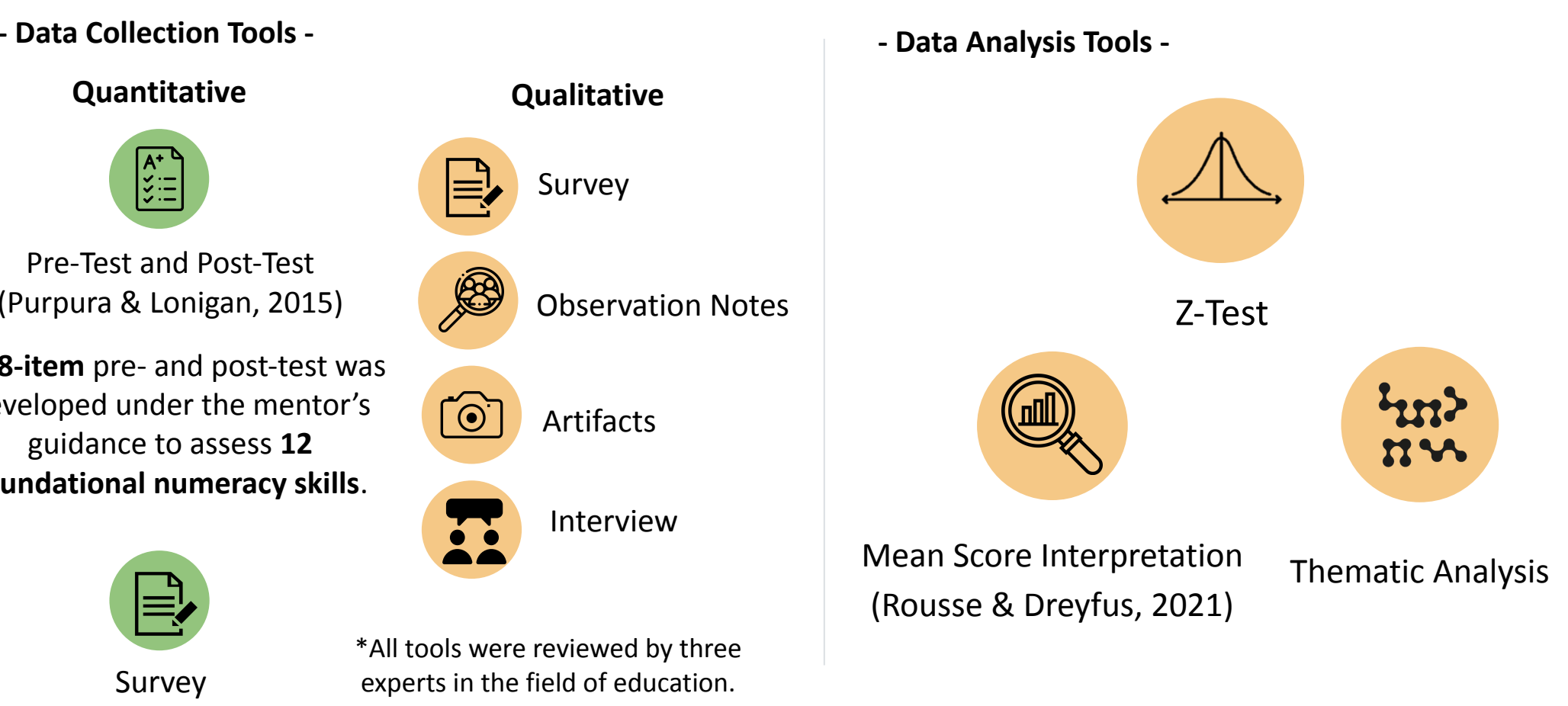
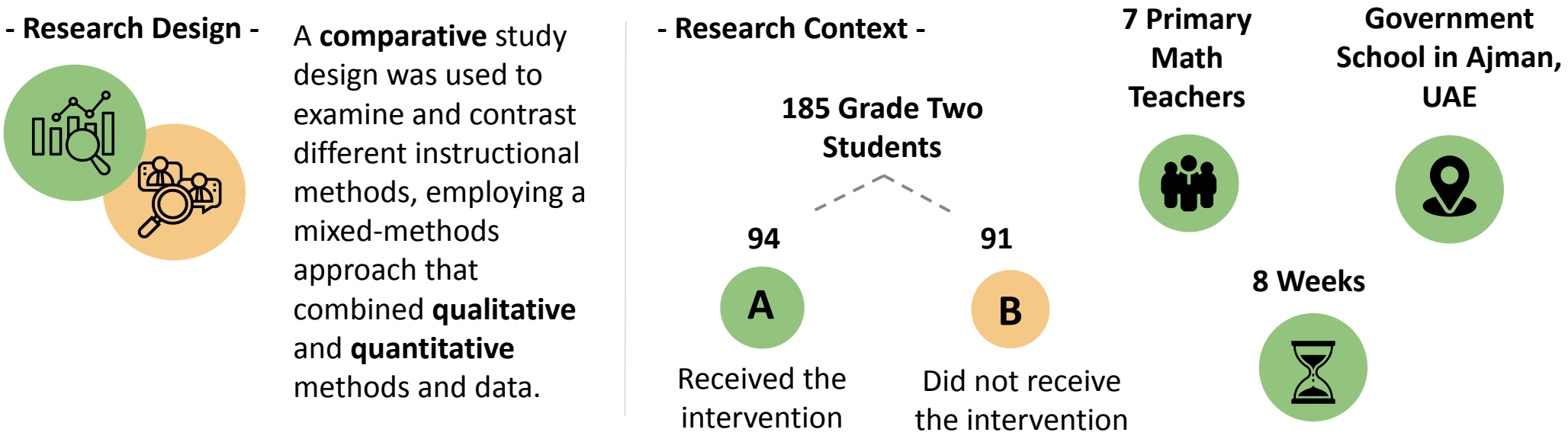
Learning centers are designated classroom spaces where educators organize interactive, concrete activities that combine play and instruction while aligning with curriculum objectives (Hamand, 2019; Aktulun & Kiziltepe, 2018). However, despite their value in kindergarten classrooms, learning centers are less commonly used in early primary grades, where mathematics instruction often shifts toward more formal, teacher-centered practices that may limit students' active participation and engagement.

To address these issues, this study seeks to investigate how Piagetian learning centers support foundational numeracy development in Grade Two classrooms in the UAE.

Specifically, the study aims to examine:

- RQ 1** The Effect of Incorporating Piagetian Learning Centers on Grade Two Students' Development of Foundational Numeracy in the UAE
- RQ 2** The Significant Difference Between the Performance of Group A Students, Who Underwent the Math-Targeted Intervention, and Group B Students, Who Received Traditional Math Instruction, in Math Basic Skills
- RQ 3** Teachers' Perceptions of Using Piagetian Learning Centers to Enhance the Quality of Mathematics Teaching in Grade Two Classrooms in the UAE
- RQ 4** The Challenges Teachers Face When Integrating Piagetian Learning Centers into Mathematics Lessons

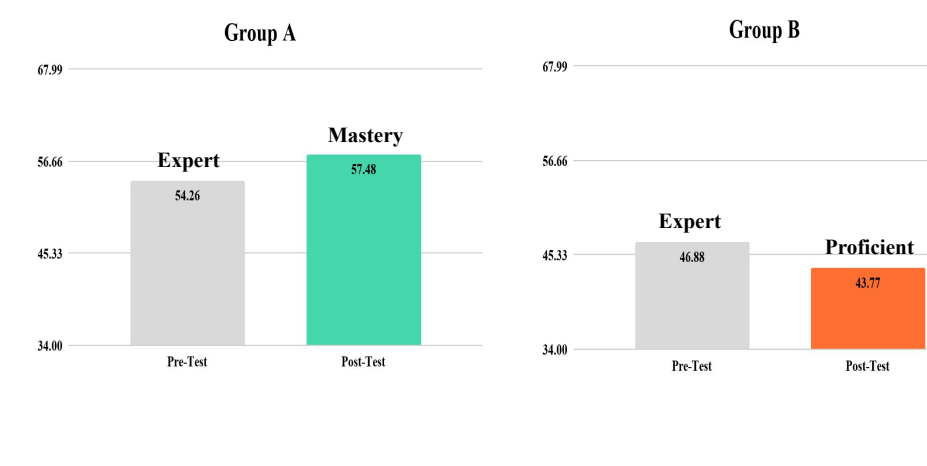
### METHOD



### RESULTS & DISCUSSION



#### The Effect of Incorporating Piagetian Learning Centers on Grade Two Students' Development of Foundational Numeracy in the UAE



Based on Rousse and Dreyfus' (2021) mean score interpretation, Group A progressed from **Expert** to **Mastery**, while Group B decreased from **Expert** to **Proficient**.

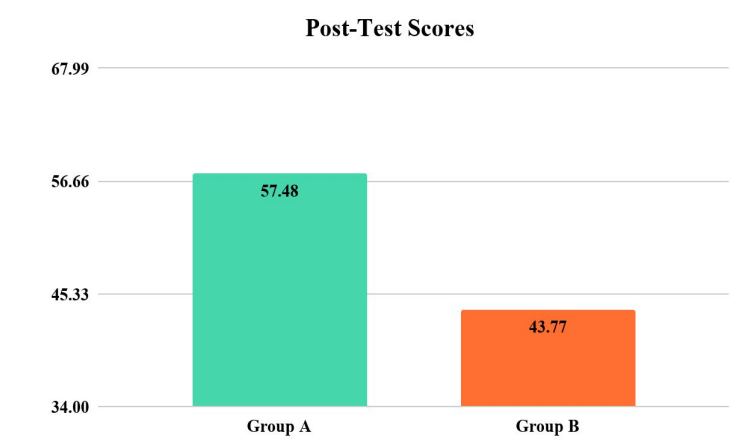
**Group A** showed a significant overall improvement from pre-test (M = 54.26) to post-test (M = 57.48),  $Z = 5.286$ ,  $p < .001$ .

**Group B** showed no significant overall improvement. The total score decreased from pre-test (M = 46.88) to post-test (M = 43.77), but this change was not statistically significant,  $Z = -1.533$ ,  $p = .125$ .

Overall, **Group A demonstrated stronger numeracy development than Group B**, suggesting a positive impact of the Piagetian Learning Centers intervention. These findings align with Romine's (2015) finding that mathematics centers positively impacted assessment scores.

#### The Significant Difference Between the Performance of Group A Students, Who Underwent the Math-Targeted Intervention, and Group B Students, Who Received Traditional Math Instruction, in Math Basic Skills

The post-test comparison revealed that **Group A significantly outperformed Group B** across most assessed areas. Most importantly, Group A achieved a significantly higher overall post-test score (M = 57.48) than Group B (M = 43.77),  $Z = 7.496$ ,  $p < .001$ .



These findings indicate that Group A demonstrated substantially stronger mathematical performance after the intervention.

#### Teachers' Perceptions of Using Piagetian Learning Centers to Enhance the Quality of Mathematics Teaching in Grade Two Classrooms in the UAE



All respondents agreed that Learning Centers help improve students' mathematical abilities. These findings support Korn (2014), who emphasized that the use of manipulatives in learning centers plays a critical role in enhancing students' mathematical comprehension.

**"The cubes helped students understand counting in a concrete way, which enhanced their numerical skills."**  
Teacher Maha

#### The Challenges Teachers Face When Integrating Piagetian Learning Centers into Mathematics Lessons

- Classroom Space Constraints (7 teachers)
- Lack of Resources (4 teachers)
- Time Constraints (4 teachers)

These findings align with the challenges highlighted in Hamand (2019), which suggests that the lack of resources and classroom space constraints are significant barriers to the effective use of learning centers.



### CONCLUSION

The findings suggest that Piagetian Learning Centers supported foundational numeracy development, as Group A progressed from Expert to Mastery with a statistically significant improvement, while Group B declined from Expert to Proficient with no significant overall change. The post-test comparison also showed that Group A significantly outperformed Group B, addressing the difference between the intervention and traditional instruction groups. These findings align with Korn (2014), who emphasized the value of concrete learning experiences in supporting students' mathematical understanding.

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