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Improving Primary School Students' Understanding in Unit Conversion Using the 1,2,3 BOX Method

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ABSTRACT

Many primary school students struggle to master unit conversion, particularly in converting meters to centimetres and vice versa. This study presents an innovative approach using the 1,2,3 BOX method to improve students' understanding and retention of the conversion process. Conducted at primary school in Keratong, Pahang, this innovation involved 58 students from Year 4 and Year 5. A pre-test and post-test design was used to evaluate the method effectiveness. The results showed a significant improvement in students' performance after implementing the method. Observations and questionnaires indicated enhanced engagement, interest, and confidence among students. The 1,2,3 BOX method is an effective visual-based strategy that simplifies complex numerical processes and can be extended to other units such as mass, time, volume, and money.

Keywords: 1,2,3 BOX method, Innovative teaching, Mathematics education, Primary education, Unit Conversion

1. INTRODUCTION

Unit conversion is a critical skill taught at the primary level, yet many pupils find it challenging due to abstract mathematical operations and a lack of effective pedagogical strategies (Skemp, 1989). One of the recurring difficulties is the conversion of measurement units, particularly between metres and centimetres, which often results in low performance and disengagement in mathematics.

Several alternative approaches have been developed in response to these challenges. For example, Canto López et al. (2022) introduced the Algorithm Based on Numbers (ABN) method in Singapore to support mathematical learning in primary education. Their findings revealed that pupils who underwent the intervention demonstrated greater understanding of fractions and achieved significantly higher scores, showing that innovative teaching methods can facilitate concept assimilation. Similarly, Sadono et al. (2025) designed the "pouch of units" as a tool to improve pupils' ability to count units of weight. Their results indicated not only improved understanding of abstract concepts but also increased active participation in the learning process. In another study, Nguyen et al. (2023) examined strategies for solving two-dimensional measurement unit conversion problems. They found that targeted conceptual tasks enhanced students' problem-solving skills and positively impacted their levels of knowledge.

Despite these efforts, many pupils continue to struggle with mathematics due to conventional

teaching approaches that lack creativity and fail to sustain interest (Abdul Manap, 2001). To address this issue, the present study introduces the 1,2,3 BOX method, a simple and visual technique aimed at improving pupils' conceptual clarity and retention in unit conversion, particularly between metres and centimetres. The main objective of this study is to investigate the effectiveness of the 1,2,3 BOX method in enhancing students' performance, confidence, and interest in learning unit conversion.

2. METHODOLOGY

This study was conducted at SK LKTP Keratong 6 and involved 58 pupils from Year 4 and Year 5. The methodology followed five main steps.

The first step was identifying students' problems. Discussions with mathematics teachers revealed that pupils were generally weak in basic operations, problem solving, and particularly in unit conversion. Since unit conversion underpins several topics such as length, weight, time, money, and liquid volume, it was selected as the focus of this innovation project. The second step was data collection. Students' workbooks were examined to detect errors and misconceptions, and a written test was conducted to measure their understanding of unit conversion. Questionnaires were also distributed to all 58 pupils to capture their perceptions of mathematics, while classroom observations provided insights into their engagement and difficulties when answering conversion-related questions. The third step involved choosing the method. Findings confirmed that students had poor results in unit conversion, which justified the introduction of the 1,2,3 BOX method. This innovation employs a visual, diagram-based approach that simplifies the process and aids memory retention. As highlighted by Buzan (1976), the brain learns more effectively through images and associations. For this project, the scope was limited to metre–centimetre conversions, with the expectation that the method could later be applied to other units such as mass, time, money, and liquid volume. The fourth step was designing and implementing the innovation. A detailed plan was developed in consultation with the mentor, covering the project timeline, participants, teaching strategies, and required resources. Pupils were introduced to the 1,2,3 BOX method through structured lessons, followed by guided practice sessions to ensure mastery of the technique.

The final step was assessment and analysis. An evaluation test of ten questions was administered after the intervention. Results were analysed alongside data from the pre-test, post-test, questionnaires, and classroom observations. These instruments allowed the researchers to measure the effectiveness of the innovation, identify improvements needed, and evaluate the impact on students' performance, confidence, and interest in mathematics.

3. RESULTS AND DISCUSSION

Before the project, 79% of students showed no interest in counting, 93% did not know how to convert units, and non-completed questions on time. However, after completing the project, 100% of students were engaged, confident, and eager to participate.

Table 1. Questionnaire Results

Statement	Pre (%) Yes	Post (%) Yes
Interested in mathematics/conversion	37.5	100
Conversion is hard	100	-
Remember unit values	27.5	100
Method is easy and fun	-	100

Based on Table 1, the questionnaire results demonstrated a clear improvement in students' interest, confidence, and retention after the implementation of the 1,2,3 BOX method. Before the project, only 37.5% of students expressed interest in mathematics, and all students found unit conversion difficult. After the intervention, 100% of students reported interest, confidence, and enjoyment in learning unit conversion. Students went from scoring an average of 1.8/10 to 10/10, with all students showing perfect scores after using the method. This indicates a clear gain in skill acquisition and confidence in unit conversion.

4. CONCLUSION

The 1,2,3 BOX method proved to be a simple yet effective innovation in improving pupils' understanding of unit conversion. Findings from pre- and post-tests, observations, and questionnaires confirmed that students mastered the skills of converting metres to centimetres, showing significant improvement compared to before the project. The method reduced the learning duration from about two weeks (6 hours of instruction) to just two days (2 hours), while also boosting students' confidence, participation, and interest in mathematics. Through this innovative method, students can master the topic length, thereby increasing student achievement in examinations and providing motivation for pupils to be interested in mathematics. Beyond length measurement, the 1,2,3 BOX method can be adapted to other conversion topics such as weight, liquid volume, time, and money, making it a versatile and impactful teaching strategy.

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REFERENCES

Abdul Manap, Y. (2001). Memartabatkan profesion keguruan tanggungjawab bersama. *Bestari Koleksi Guru Johor, JPN Johor*, 15-33.

Canto López, M. D. C., Manchado Porras, M., Piñero Charlo, J. C., Mera Cantillo, C., Delgado Casas, C., Aragón Mendizábal, E., & García Sedeño, M. A. (2022). Description of main innovative and alternative methodologies for mathematical learning of written algorithms in primary education. *Frontiers in Psychology*, *13*, 913536.

Nguyen, H., An, T., & Maher, E. M. (2023). Impact of Designed Task-Based Interventions on K-8 Preservice Teachers' Knowledge and Ability to Solve Measurement Unit Conversion Problems. *International Journal on Studies in Education (IJonSE)*, *5*(3).

Sadono, I., Riyadi, R., & Kurniawan, S. B. (2025). Analysis of the Impact of PBL Implementation Assisted by Pouch of Unit on the Ability to Count Units of Weight in Elementary School Learners. *Social, Humanities, and Educational Studies (SHES): Conference Series*, 8(1), pp. 382-391.

Skemp, R. R. (2002). *Mathematics in the primary school*. Routledge.