Enhancing Multiplication Fact Fluency in Year 6 Through Pattern Play

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An Action Research Study

Many Year 6 learners struggle to recall multiplication facts automatically, despite repeated exposure. This action research explores how a pattern-based strategy can support fluency development.

FOCUS

Purpose: To explore if the Pattern Play strategy improves multiplication fact recall and automaticity.

Intervention Framework: Response to Intervention (RTI)—Tier 2, advocates early screening and targeted interventions (Gersten et al., 2009)

Sample: 11 students from Year 6 identified as struggling with 4, 6, 7, and 8 times (through class data).

Intervention Schedule: Basic Skills and Enrichment sessions for 2 weeks.

RESEARCH QUESTIONS

> Primary:
> Does Pattern Play improve retrieval accuracy and speed of 4, 6, 7, and 8 times tables in Year 6 learners?
>
> Secondary:
> Does it support automaticity in verbal fact recall?

LITERATURE REVIEW

- Fluency gaps hinder reasoning and confidence (Caron, 2007)
- Automaticity = recall within 3 seconds (Baroody, 2006)
- Struggling learners need differentiated, multimodal strategies (Tomlinson, 2001; Lose, 2008)

Four times table pattern - 4X

Eight times table pattern - 8X
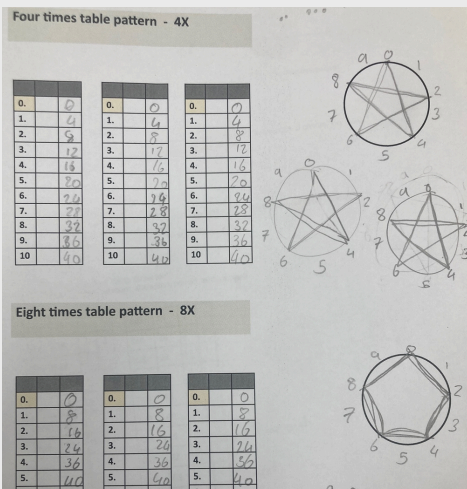
INTERVENTION STRATERGY

EZ Times Tables – Pattern Play (Biesanz, 2011)
Key Characteristics: Utilises rhythm, structure, and visual patterns
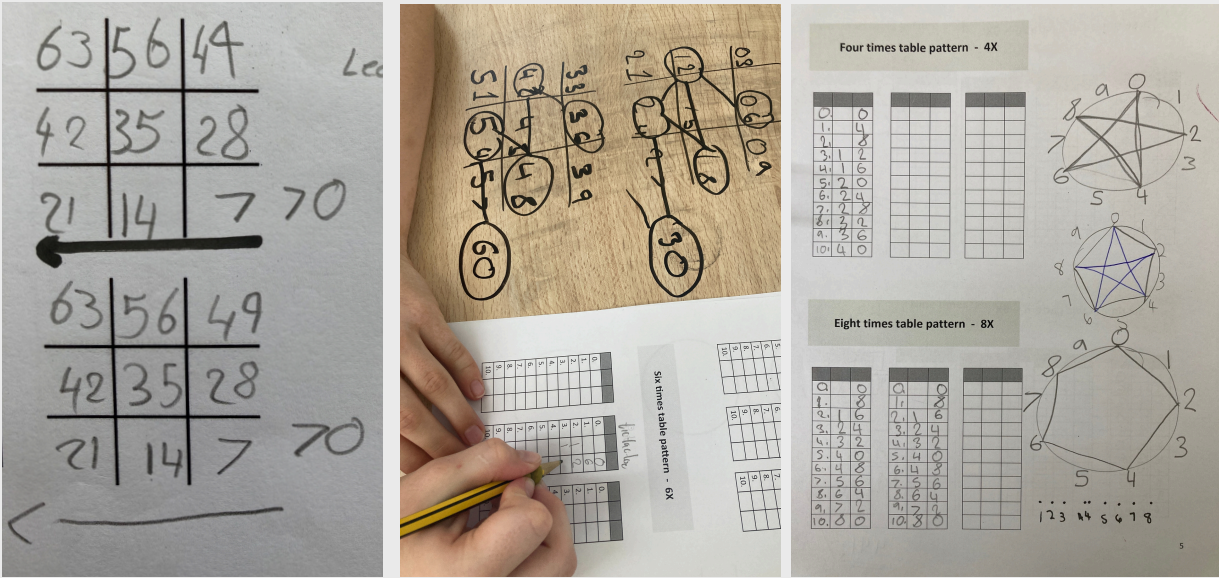

METHODOLOGY

Mixed Methods: both quantitative and qualitative data to triangulate findings and ensure comprehensive analysis.

Data Collection Tools:

- Pre/Post Written Tests – Retrieval Accuracy and speed

- 2-Minute Timed Fluency Test – Evaluated fact recall and automaticity of 24 mixed facts of the 4,6,7 and 8

- Learner Questionnaire – Likert-scale and open-ended reflections on confidence and strategy perception

Most Improved: Student E
Written Retrieval:
Accuracy ↑ 300%, Speed ↑ 44%
**Verbal Recall: Accuracy ↑ 22%**
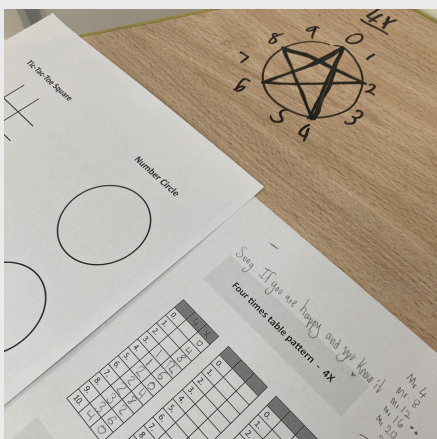
CONCLUSION

- **Significant improvement** in **written fact speed** and accuracy, reducing use of inefficient strategies *(Caron, 2007; Steel & Funnell, 2001).*

- Verbal recall gains modest — **below the automaticity** threshold of 3 seconds *(Baroody, 2006).*

- Student reflections show **increased confidence** and **reduced maths anxiety** *(Tomlinson, 2001; Wong et al., 2019).*
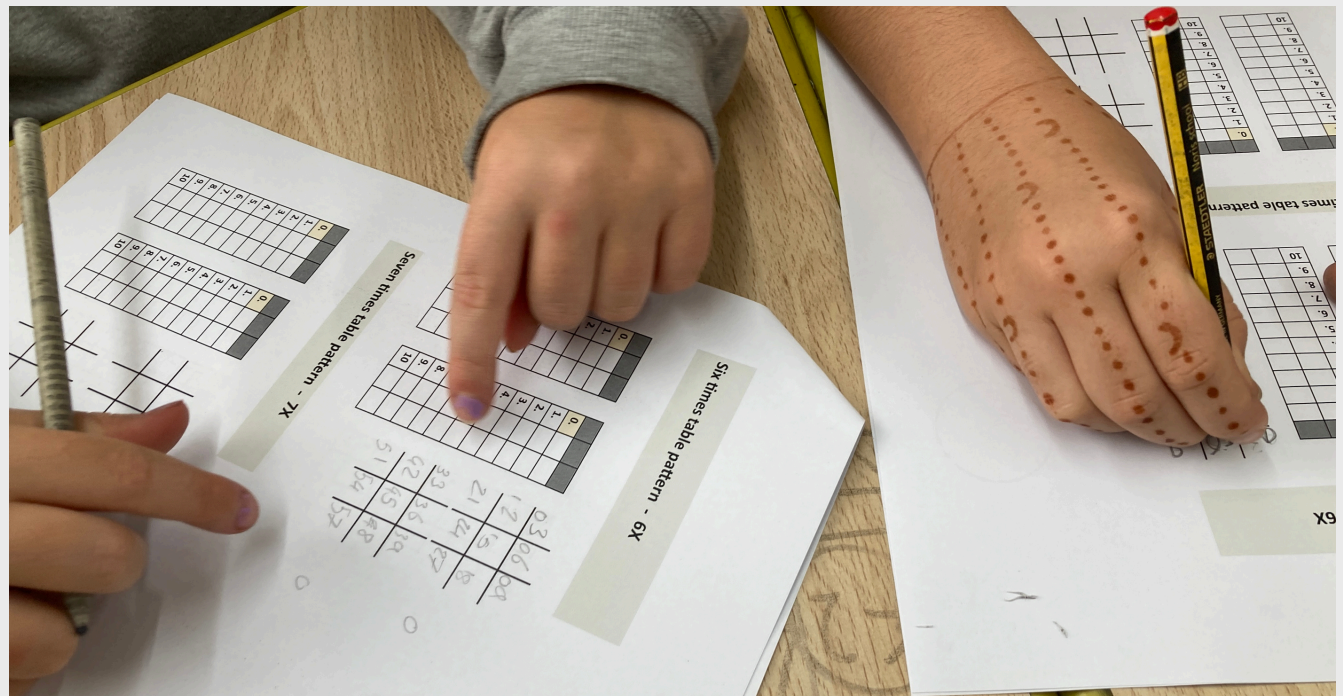
ANALYSIS

RETRIEVAL SPEED AND ACCURACY

Pre and Post Test Retrieval Time

Paired t-test
p = 0.00122
Significant at α = 0.05
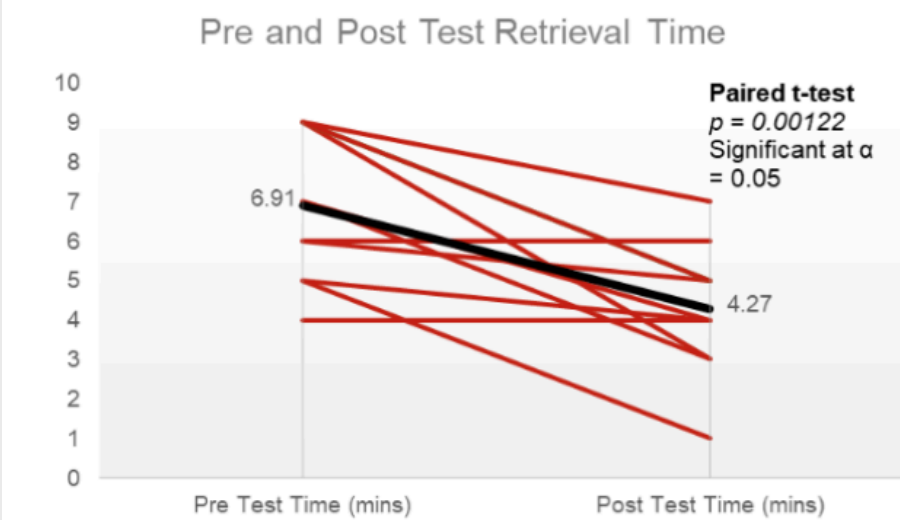
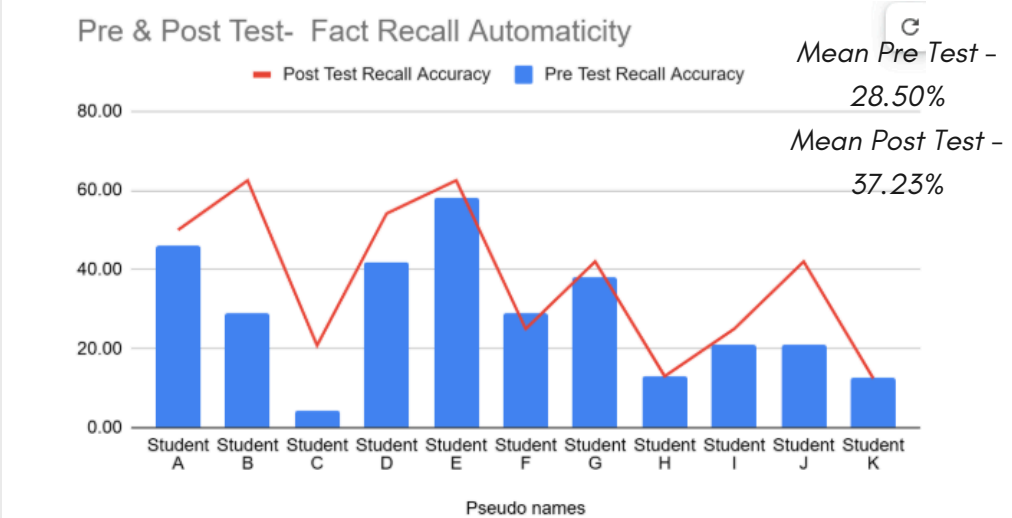*Effect Size: Cohen's d = 1.34 (Large)*

Substantial and practically significant impact

RECALL ACCURACY AND AUTOMATICITY

Pre & Post Test- Fact Recall Automaticity

Paired test :
p = 0.026

Mean Pre Test - 28.50%
Mean Post Test - 37.23%

Effect Size: Cohen's d = 0.78 (Medium to Large)

Statistically significant impact

IMPLICATIONS AND NEXT STEPS

This **short-term study** with a **small sample** limits generalisability. It suggests a promising, **low-cost, and inclusive strategy** for improving multiplication fluency. The impact on **neurodiverse vs. neurotypical** learners was not assessed.

A longer, more layered intervention may strengthen automaticity (Gersten et al., 2009).

Next steps: **replication, retention assessment, and teacher training.**

Write the multiplication facts of 4, 6, 7 and 8 times tables