

Developing the teaching and learning of numerical reasoning

Do collaborative, real-life and engaging tasks that encourage the use of language improve learners' ability to reason mathematically?

Introduction

The action inquiry project investigated the impact of collaborative, real life and engaging tasks that encourage the use of language in learners' ability to reason mathematically. The aim of the project was to change from the practice paper test style reasoning questions given to learners previously and to provide them with rich, collaborative and engaging **tasks**. Furthermore, the aim of the project was to develop learners' ability to reason as well as developing their confidence, willingness and enthusiasm surrounding reasoning.

Mathematical knowledge, understanding and skills are increasingly important for everyday life (Estyn, 2015, p.1)

Numeracy is an essential skill. It is the ability to apply simple numerical facts, skills and reasoning to real-life problems. If pupils do not have a basic level of mathematical knowledge and understanding, they will not be able to develop effective numeracy skills. (Estyn, 2013, p.1)



Key Inquiry Findings

1. Nearly all learners benefitted from working collaboratively when reasoning in order to support, extend and challenge each other (although not **all** learners are yet equipped to work collaboratively).
2. Learners benefit from tasks that encourage the use of language to consolidate understanding, justify strategies and describe approaches.
3. Learners show that they are more likely to engage meaningfully and willingly in reasoning tasks when the tasks are real life, relatable, enjoyable or within a context that they can imagine and make sense of.
4. Consultation of learner voice is essential in order to improve learning and develop teaching and learning strategies for **your** learners.

Inquiry Design

- Four intervention tasks introduced on a weekly basis.
- All Year 5 pupils in my class involved. Six mixed ability focus learners selected for data collection.

Contexts of tasks

1. **Camping or Glamping-** Learners plan and budget a camping or camping holidays.
2. **Energy Drinks- Euro 2016-** Learners estimate, measure and compare amounts of sugar in energy drinks for Gareth Bale
3. **Turn your teacher into a frog!** Harry Potter theme, learners reach a target number of insect legs for a potion using different combinations of numbers.
4. **Football Kits-** Learners given a differentiated number of colours to find as many different combinations of football kit colour-arrangements as possible.

Data Collection Methods

- Surveys & Questionnaires
- Observations of learning
- Semi-structured interviews
- Textual analysis and images



Teacher: Do you think you were reasoning well during the tasks I set you?

Learner D: I didn't realise that I was getting better at reasoning at all.

Learner A: Yeah, we forgot about it and just carried on.

Learner B: If you did some maths work on paper, after a week I completely forgot about it but if you do something in real life in maths I won't forget about it.

Teacher: Should I make Maths about things you like?

Conclusive yes! Interjections of Football, Minecraft, Gymnastics, Rugby, Gareth Bale

Conclusion

Collaboration can be a powerful tool to support reasoning although work is needed to develop group work skills.

Learners must be engaged in a relatable context whether that be real life or imaginative.

Learners need opportunities to use language and describe their reasoning.

Key references

Dickinson, P. and Hough, H. (2012) *Using Realistic Mathematics Education in UK classrooms.*

Swan, M. (2006) *Collaborative Learning in Mathematics: A Challenge to Our Beliefs and Practices.* London: NRDC

