Key Action 2 – Erasmus+ Strategic Partnerships for School Education
Cooperation for Innovation and the Exchange of Good Practices

ENHANCING DIFFERENTIATED INSTRUCTION AND COGNITIVE ACTIVATION IN MATHEMATICS LESSONS BY SUPPORTING TEACHER LEARNING (EDUCATE)

Utrecht, 7 February 2019

Combining Differentiation and Challenge in Mathematics Instruction: A Case from Practice

SEÁN DELANEY & ANN MARIE GURHY

Funded by the
ERASMUS+ Programme
of the European Union

Educate
Erasmus+KA2

ACKNOWLEDGEMENTS

- **This project, entitled "Enhancing Differentiated Instruction and Cognitive Activation in Mathematics Lessons by Supporting Teacher Learning (EDUCATE)", has been funded with support from the European Commission. This publication [communication] reflects the views only of the author(s), and the Commission cannot be held responsible for any use which may be made of the information contained therein.**

Erasmus+

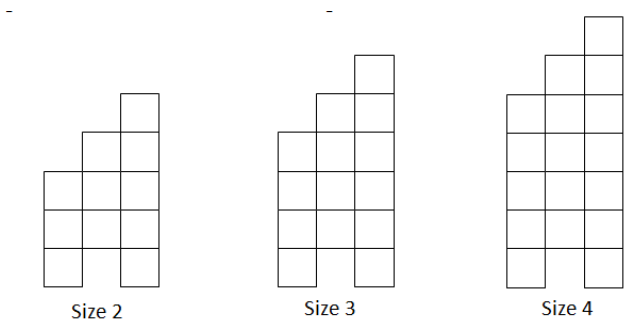
Theoretical Framework

- Mathematical Task Framework (Stein & Smith, 1998)
- Differentiating Instruction (Tomlinson, 2000)

Research Question

- What steps taken by the teacher supported differentiation and maintained or modified the challenge of the task?

Task



Alex uses identical tiles to make different sized chair designs for a school art project. The pictures on the sheet show the first three designs created, size 2, size 3 and size 4. Alex wanted a rule that would help work out the number of tiles needed for a chair of any size.

Q 1

(a) **If Alex wanted to create a size 5 chair, what would it look like? Can you draw it or use other materials to represent it? How many tiles would be used?**

(b) **Work out the number of tiles needed for the size 6 and size 7 chairs. Explain how you did this.**

(c) **Draw or make the size 1 chair. How many tiles did you need?**

Q 2

(a) **Do you notice any pattern between the chair size and the number of tiles needed each time? Discuss this pattern with your partner(s).**

Q 3

(a) **Alex wanted to create a size 20 chair. Talk with your partner(s) about a rule that would help Alex work out the number of tiles needed for this chair.**

(b) **Would this rule work for the previous chair sizes?**

(c) **If yes, write out this rule in words.**

(d) **Discuss if it would work for a chair of any size.**

Q 4

(a) **Could you re-write this rule using symbols/letters?**

Q 5

(a) **Use the rule to calculate the number of tiles needed for a “size 50” chair?**

Method

- 4 data sources: teacher's planning notes, task, children's work, videos of lessons
- Focus: analysis of task and video of maths lab class implementing the task
- Open Coding informed by the theoretical framework

FINDINGS (1)

- Task is at level of “Procedures with Connections” (find a rule, compare solutions) & “Doing Mathematics” (non-algorithmic thinking)
- Task provided for differentiation by having multiple entry and exit points
- Teacher actively guided students
  - Choice of task and planning (enablers and extenders)
  - Clear instructions to students
  - Students attention directed to relevant ideas of concepts
  - Ideas that would support students were highlighted
  - Students questioned for clarification
  - Challenge for students increased
  - Students had time to think

Findings (2)

- Suitable classroom norms established
  - Confusion accepted on way to learning
  - Talking about mathematics
  - Manipulative materials available
  - Solutions represented in visual form
- Students acted as resources for each other's learning
  - Opportunities to share solutions
  - Repeat, revoice, explain
  - Analyse and compare solutions and ideas
  - Clarify ideas using words & representations