

# Early career primary teachers' perceptions of the influences on their teaching of mathematics

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How do factors related to the teacher themselves and factors related to the school context combine to influence the evolving practice of early career primary teachers' teaching of mathematics?





# Theoretical Background to the study – Influences on teacher development



## Factors relating to the teacher

- Mathematical proficiency and subject knowledge for teaching mathematics (Kilpatrick et al, 2001; Shulman, 1987)
- Attitudes and emotions towards mathematics (Di Martino and Zan, 2010)
- Self-efficacy as a teacher of mathematics (Bandura, 2006)
- Beliefs about the learning and teaching of mathematics (Ernest, 1989)
- Proactivity in learning and developing through reflection on practice (Schön, 1995; Hodgson and Askew, 2007)

## Factors relating to the school context

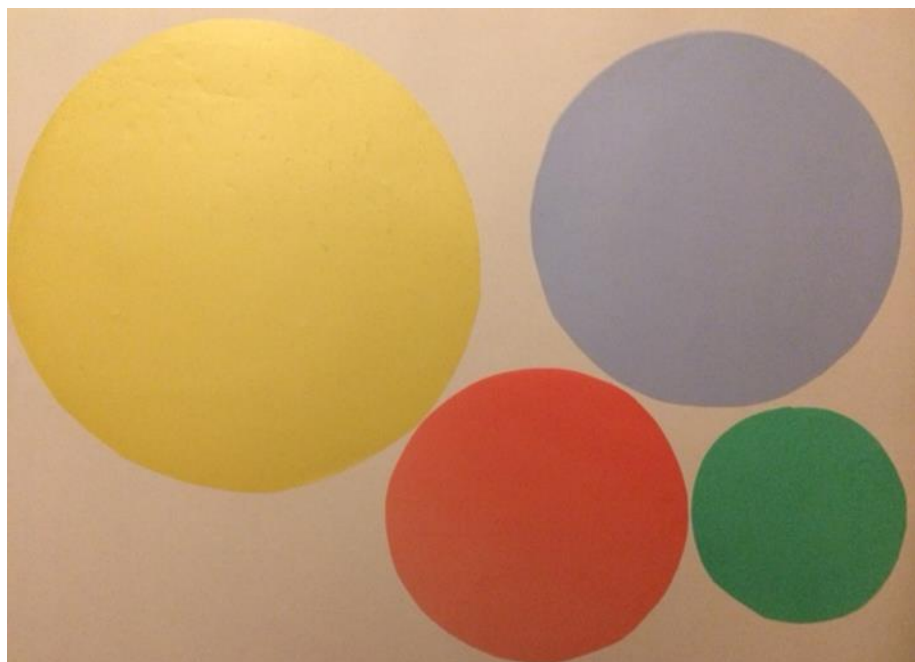
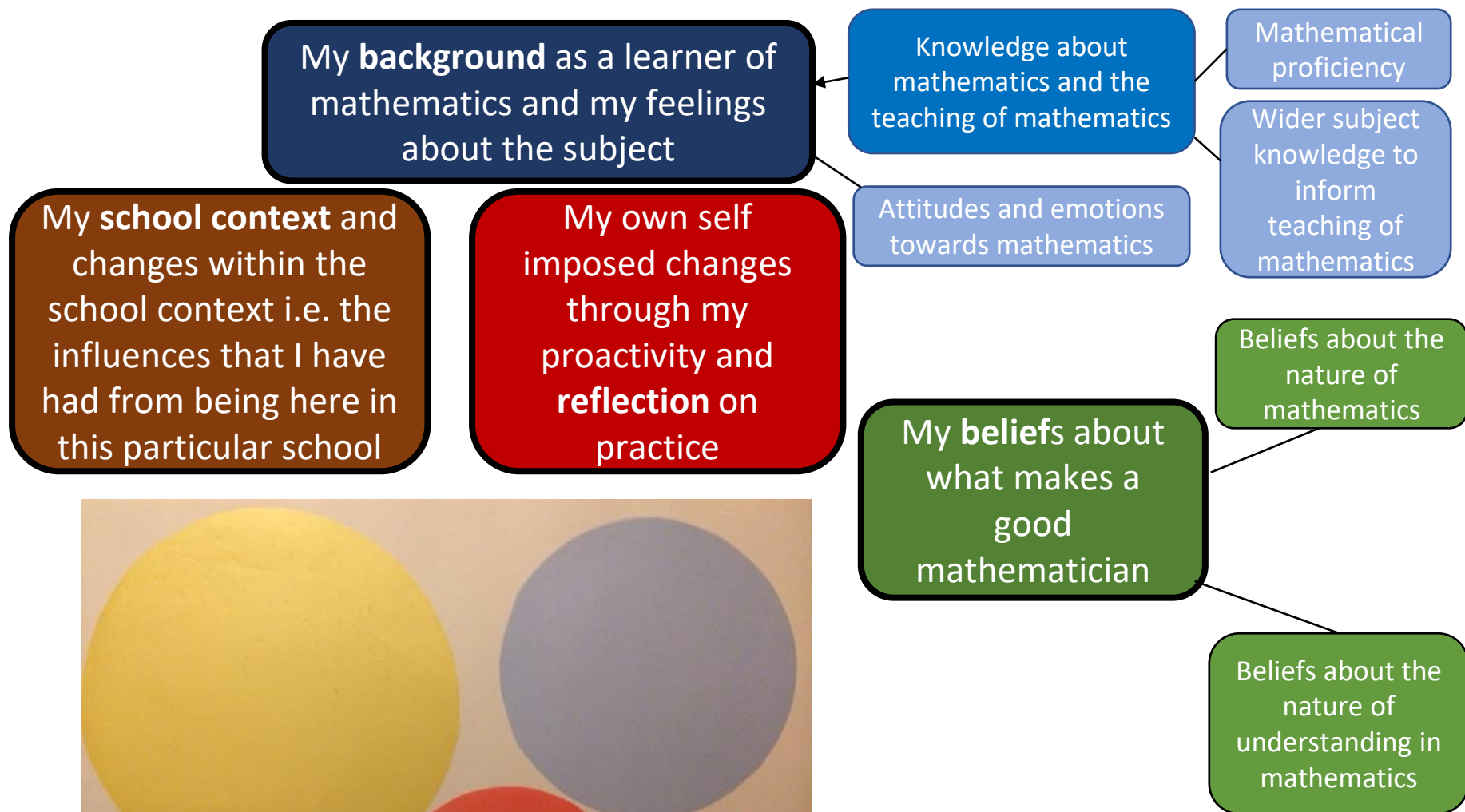
- Social and organisational structures of the school community (Goos, 2013; Millett, Brown and Askew, 2014)
  - Formal education and professional development opportunities (Levine, 2010)
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# Methodology

- Qualitative longitudinal approach
- Eight participants with varied mathematical backgrounds and prior experiences (5 maths specialists, 3 non-specialists)
- Five meetings with each participant over their first two years as teachers
- Focus on each participant's perspective on their evolving practice as a teacher of mathematics and what had influenced this.
- Visual data collection techniques used within semi-structured interviews

# Influence Maps – Final interview



# Participants

- Rahma, Gina and Penny
- All taught in Year 1

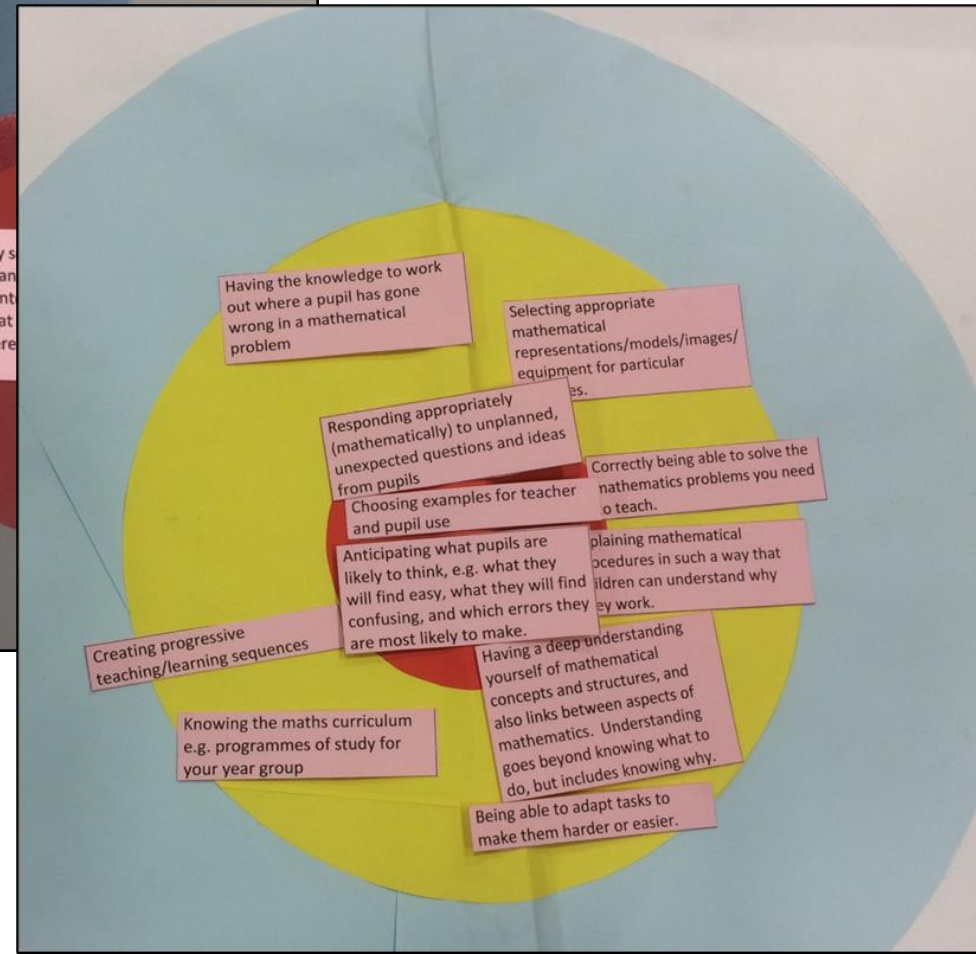
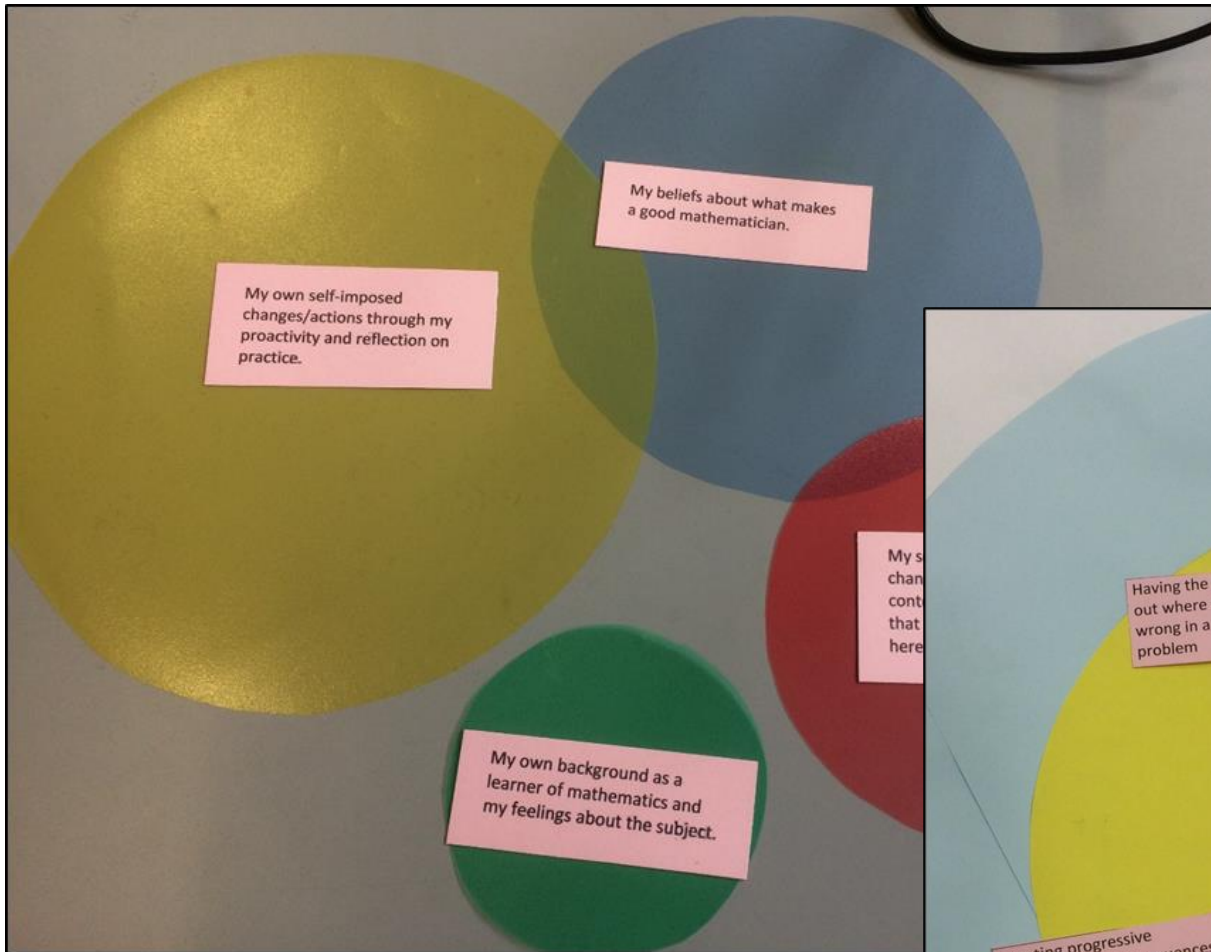
## Maths specialists:

- Rama – A level
- Penny – masters' degree in mathematics

## Non-specialist

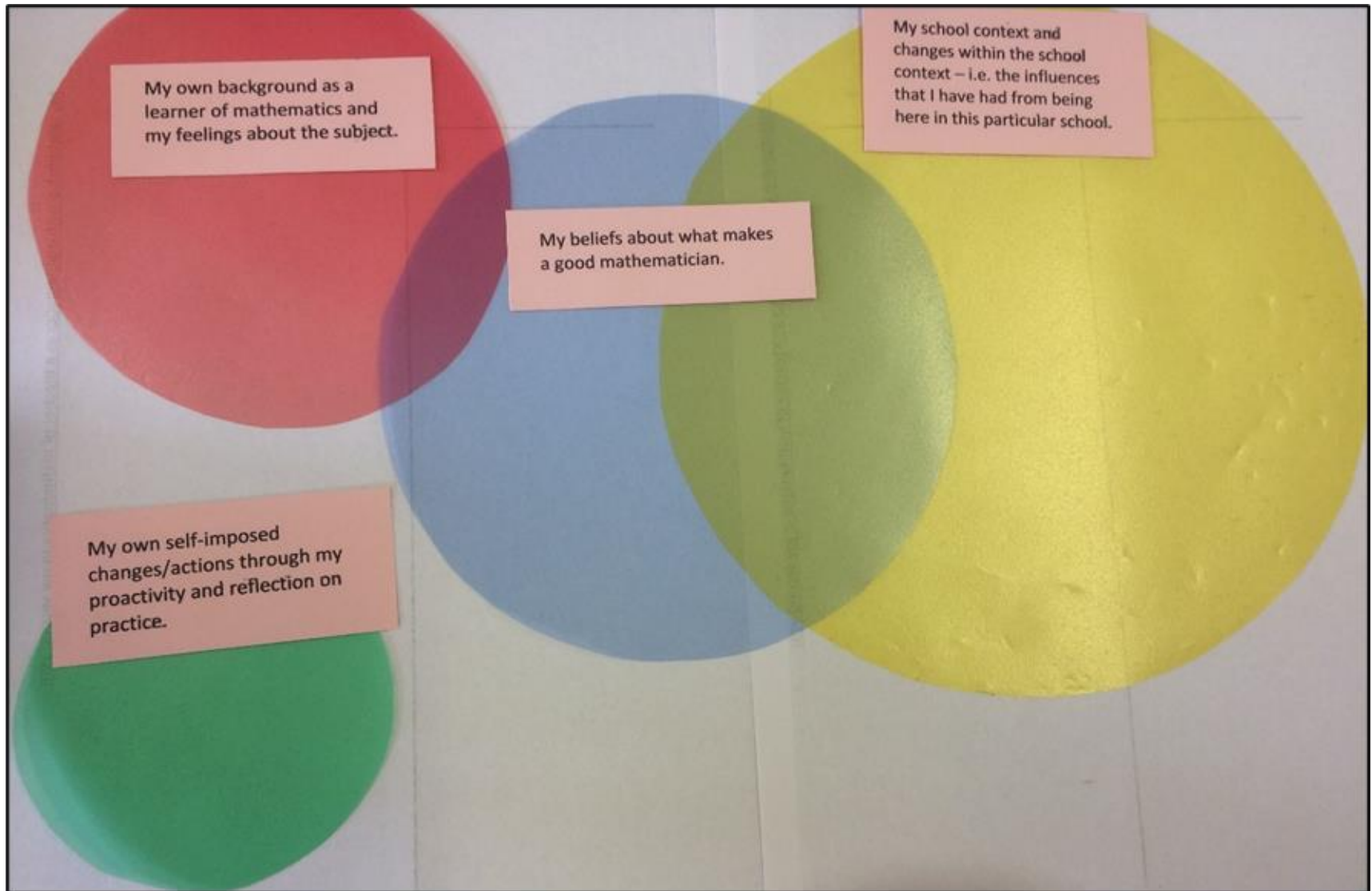
- Gina - GCSE

# Rahma – A level mathematics



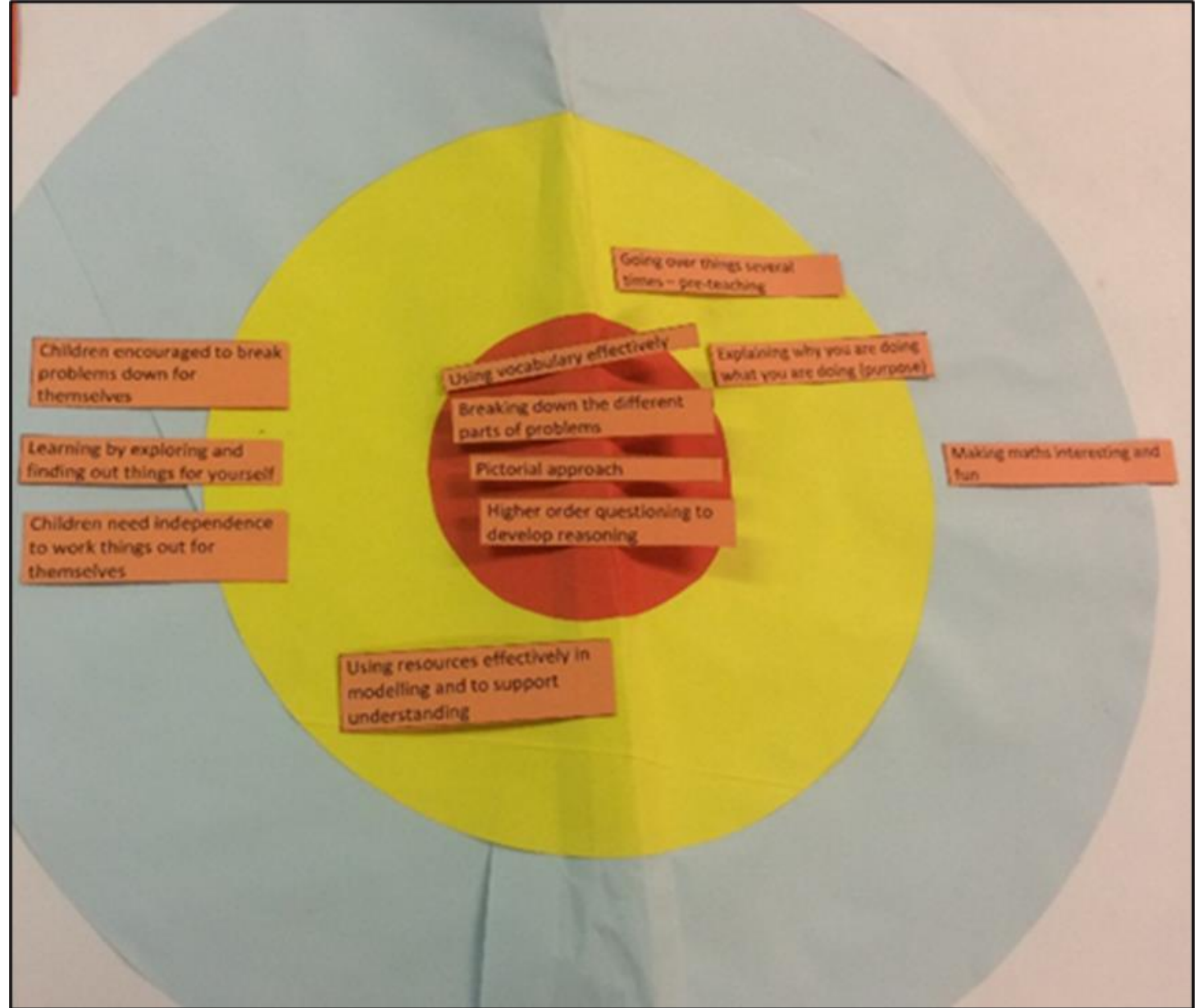
Rahma's perceptions of her strengths in terms of subject knowledge (midway through her second year of teaching)

# Gina – GCSE mathematics



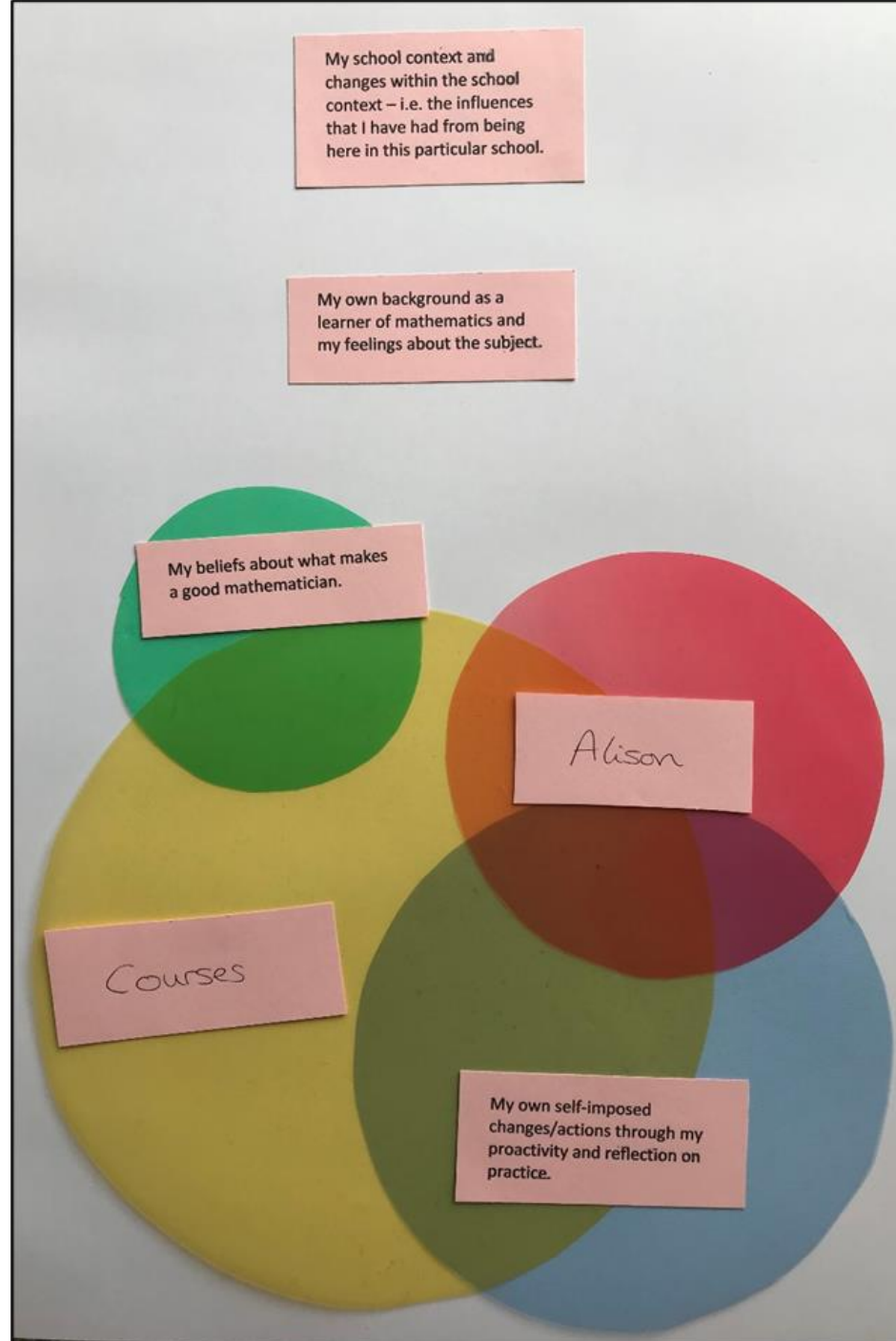


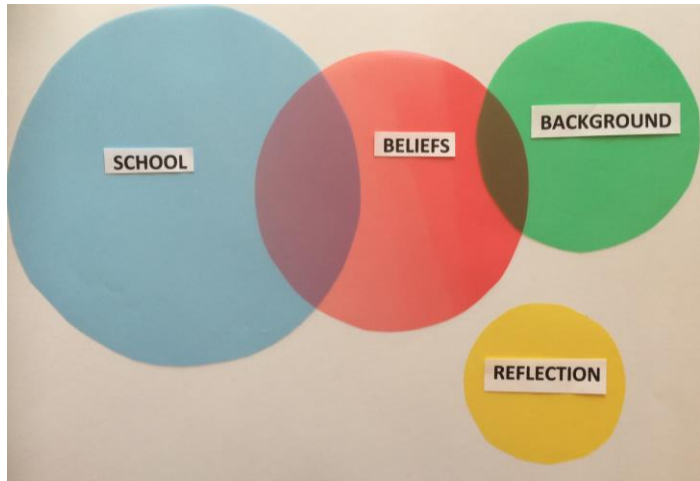
# Gina



Gina's perceptions of her strengths in terms of what she had previously identified as characteristics of good mathematicians (midway through her second year of teaching)

# Penny Masters degree

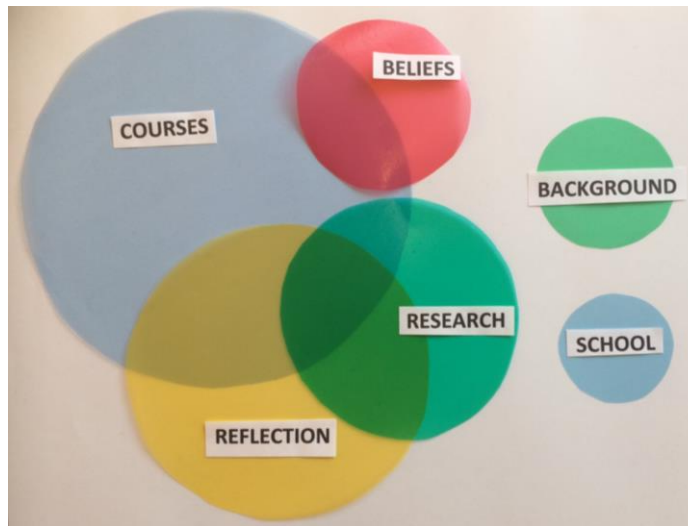




Gina (relatively weak mathematical background)



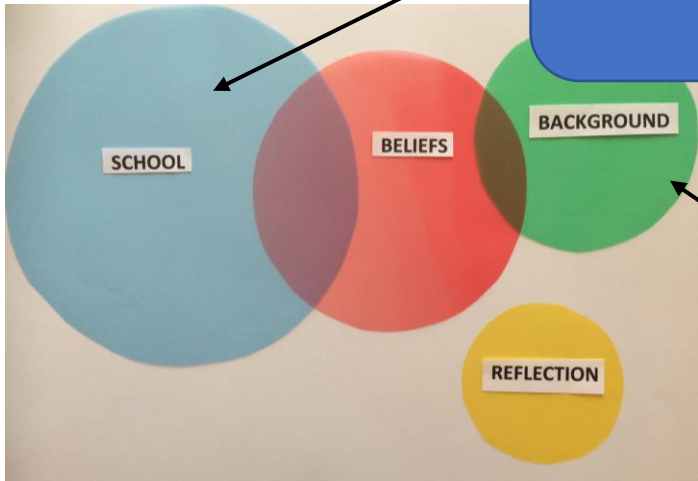
Rahma (relatively strong mathematical background)



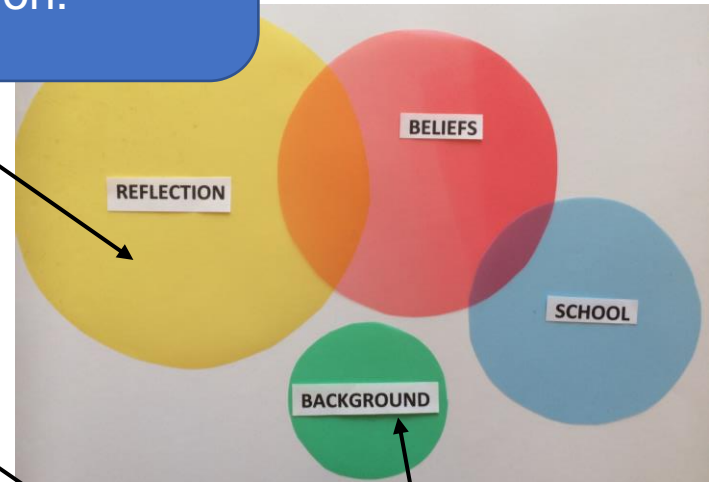
Penny (strongest mathematical background)



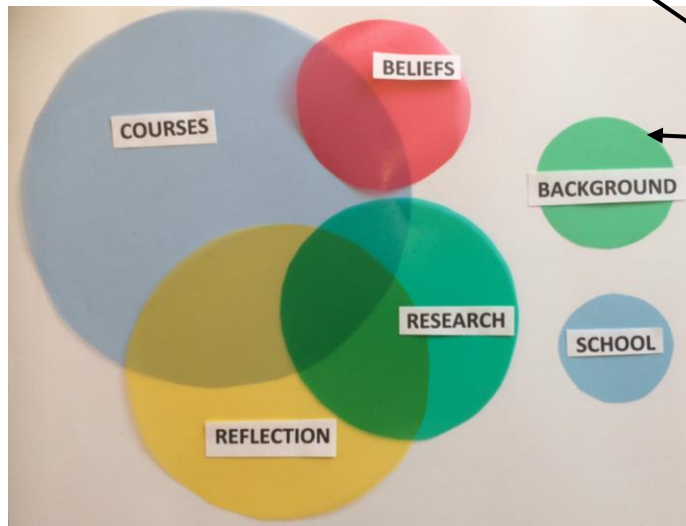
Strongest influences overall were those of the school and of proactivity/reflection.



Gina (relatively weak mathematical background)



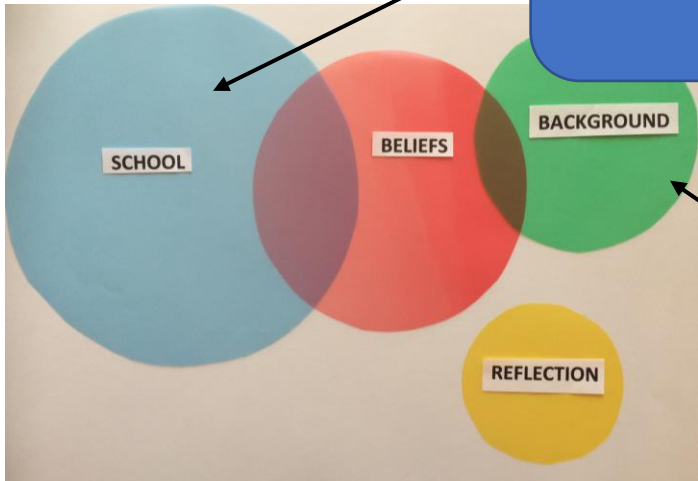
Rahma (relatively strong mathematical background)



Penny (strongest mathematical background)

Background was perceived as a relatively small influence by most. However other evidence in the study suggests for some this might be understated.

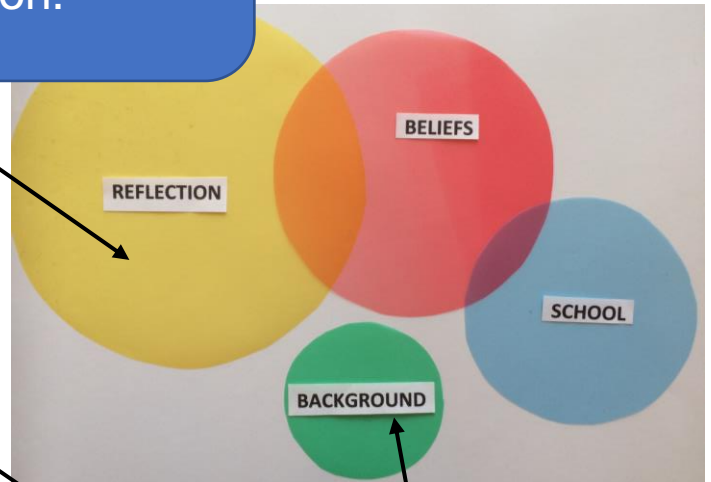
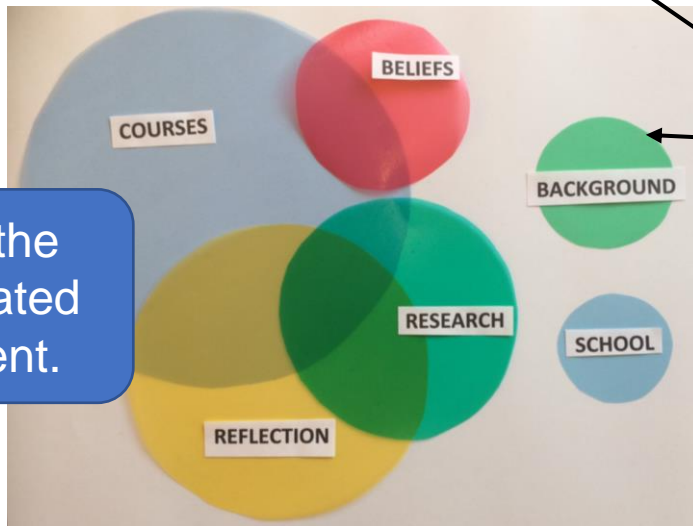
Strongest influences overall were those of the school and of proactivity/reflection.



Gina (relatively weak mathematical background)

All participants saw the influences as interrelated at least to some extent.

Penny (strongest mathematical background)



Rahma (relatively strong mathematical background)

Background was perceived as a relatively small influence by most. However other evidence in the study suggests for some this might be understated.

# How do factors related to the teacher themselves and factors related to the school context combine to influence the evolving practice of early career primary teachers' teaching of mathematics?

- Importance, complexity and individualised nature of the influence of the school context
- Recognition of the importance of reflection to facilitate self-imposed changes
- Confidence to make changes within what was perceived as permissible in their school context
- Differences in the beliefs and priorities of teachers with stronger and weaker mathematical backgrounds

School  
context

Background  
and  
feelings

Beliefs about  
what makes a  
good  
mathematician

Proactivity  
and  
Reflection

The various influences interrelate:

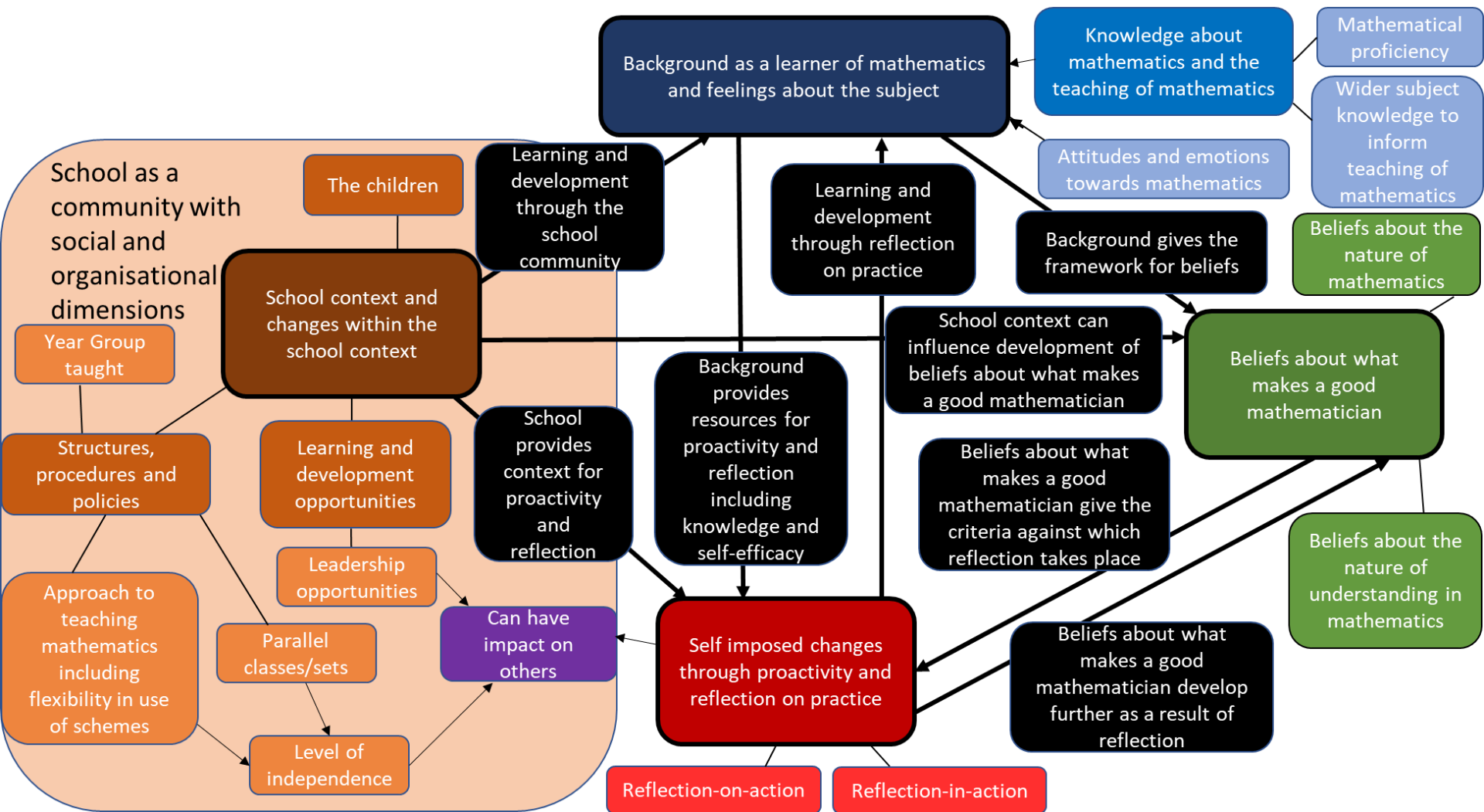
- School context provides learning and development opportunities that influence subject knowledge and beliefs about what makes a good mathematician
- These beliefs provide the criteria for a teachers' reflection on their practice.
- Background including subject knowledge and self-efficacy provides the resources for proactive and reflective practice.
- Reflection on practice is a mechanism of learning and development

School  
context

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Reflection





# Implications for content of ITE mathematics courses

1. Actively promoting student teachers' awareness of:
  - The range of factors related to the school context that might impact on their evolving practice.
  - Importance of developing as reflective practitioners aware of the benefits of this for their development
  - Importance of beliefs as the criteria against which reflection takes place

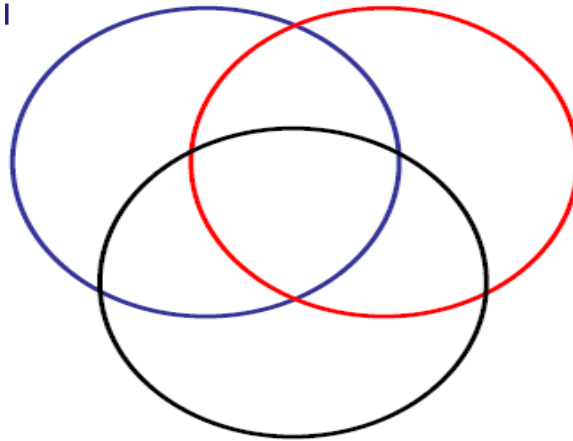
# Implications for content of ITE mathematics courses

2. Going beyond addressing student teachers' subject knowledge:

- Raise awareness of beliefs and links between these and teacher background. Ensure understanding of the essential elements of mathematical proficiency.
- Address attitudes and emotions

# Implications for supporting teachers/student teachers in school

Zone of Proximal  
Development  
(The capacity of the  
teacher for  
development)



Zone of Promoted  
actions

Zone of Free  
Movement  
(The school context  
and teacher's  
perceptions of  
what is permissible  
within this)

Goos (2013)

- If the actions we are aiming to promote fit with the ZPD and ZMF of the student teacher, they are likely to action it
  - If not, we may need to help them to change something about their ZPD (e.g. support with developing their subject knowledge) or their ZFM (e.g. it's ok to use other resources).
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# References

- Bandura, A. (2006) 'Guide for constructing self-efficacy scales', in Pajares, F. and Urdan, T. (eds.) *Self-efficacy beliefs of adolescents*. Greenwich, Connecticut: Information Age Publishing, pp. 307-338.
- Di Martino, P., & Zan, R. (2010). 'Me and maths': Towards a definition of attitude grounded on students' narratives. *Journal of Mathematics Teacher Education*, 13(1), 27-48.
- Ernest, P. (1989) *Mathematics teaching*. New York; London: Falmer.
- Godfrey, A. (2020) *Early career primary teachers' perceptions of the influences on their teaching of mathematics – a longitudinal study*. PhD thesis. University of Leicester. Available at: <https://doi.org/10.25392/leicester.data.11932935>
- Goos, M. (2013) 'Sociocultural perspectives in research on and with mathematics teachers: a zone theory approach', *ZDM; The International Journal on Mathematics Education*, 45(4), pp. 521-533.
- Hodgen, J., & Askew, M. (2007). Emotion, identity and teacher learning: Becoming a primary mathematics teacher. *Oxford Review of Education*, 33(4), 469-487.
- Kilpatrick, J., Swafford, J. & Findell, B. (2001) *Adding it up: helping children learn mathematics*. Washington, D.C.: National Academy Press.
- Levine, T. (2010). Tools for the study and design of collaborative teacher learning: The affordances of different conceptions of teacher community and activity theory. *Teacher Education Quarterly*, 37(1), 109-130.
- Lewis, G. (2013) *An investigation into disaffection with school mathematics*. PhD thesis. University of Leicester. Available at: <https://lra.le.ac.uk/bitstream/2381/28479/1/2013LewisGPhD.pdf> (Accessed: 31 May 2017).
- Millett, A., Brown, M. & Askew, M. (2004) *Primary mathematics and the developing professional*. Dordrecht: Kluwer.
- Shulman, L. (1987). 'Knowledge and Teaching: Foundations of the New Reform', *Harvard Educational Review*, 57(1), pp. 1-22.

# Any questions?