

Teacher efficacy beliefs at the horizon between primary and secondary school mathematics education

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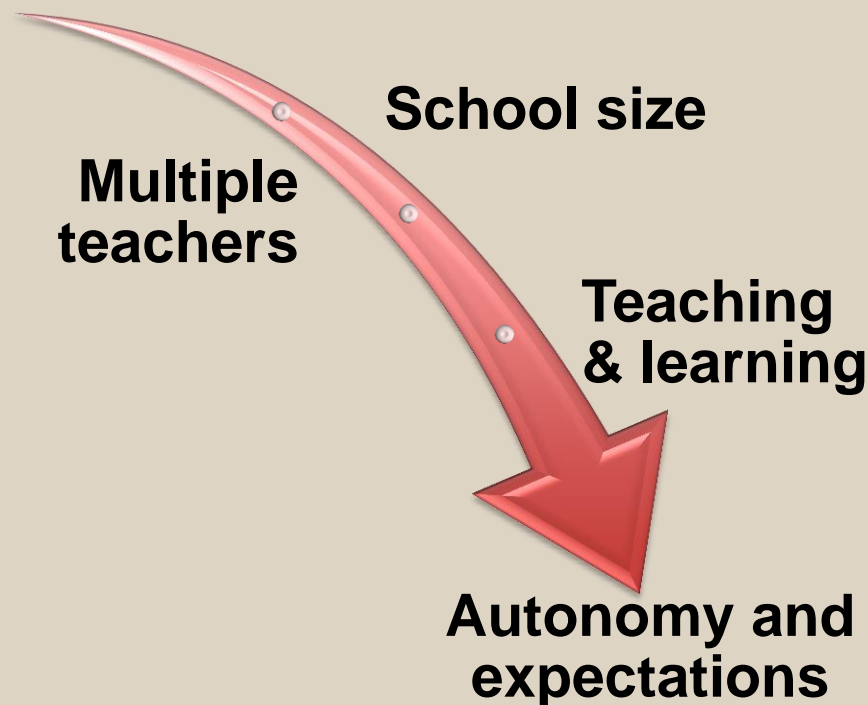
Focus for today

- Education in times of change, choice and challenge
 - International concern regarding the transition of students at key stages of education (Bourn, 2007). E.g. Transition from primary to secondary school.....

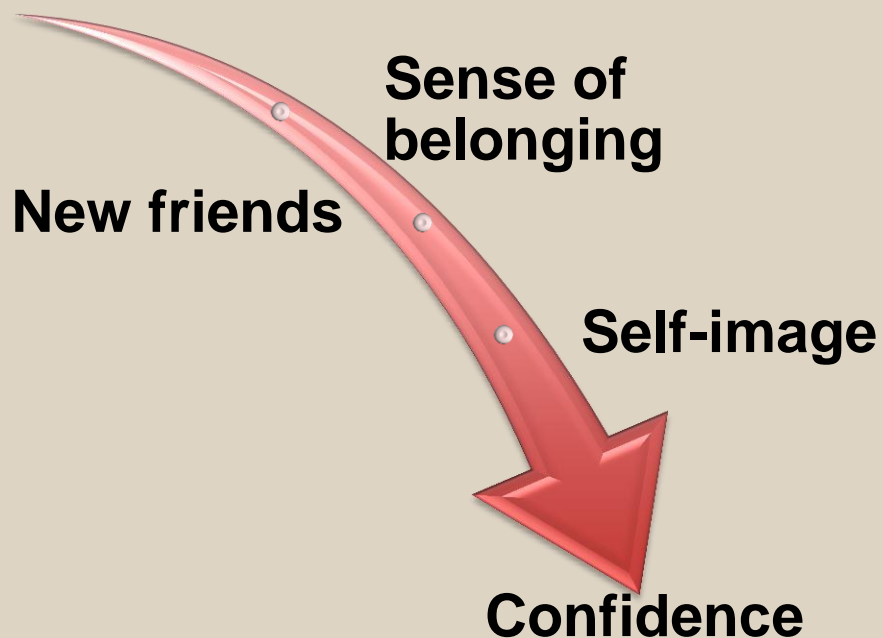
Internationally

Institutional Discontinuities

Organisational



Social

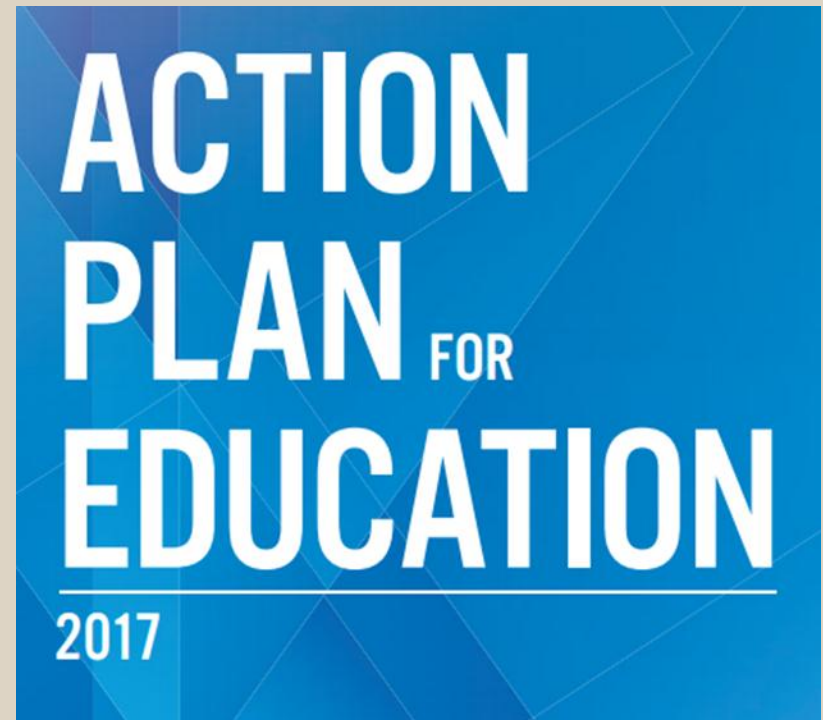


Hanewald 2013, Bicknell et al. 2009, Langenkamp 2009, Anderson et al. 2000, Green 1997, Rice 1997

Take action!

Objective 1.4

Improve the transition of learners at critical stages in the education and training system



Why focus on mathematics?

- This is the time that many students begin to develop negative attitudes towards mathematics
 - (Ashton, 2008; Bicknell, 2009; Grootenboer & Marshman, 2016)

| | Aged 9 – 10 yrs. | Aged 13 – 14 yrs. |
|--------------------------------------|---------------------|----------------------|
| Like or somewhat like learning maths | 84% | 68% |

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| Like or somewhat like learning maths | 84% | 68% |
| Do not like learning maths | 16% | 31% |

(Mullis et al., 2012)

Why focus on mathematics?

Academic and Psychosocial Interconnected

- One of main subjects negatively affected
 - » (McGee et al. 2003)
- Lessening in enjoyment and interest
- Decrease in engagement
- Drop in confidence
- Fall in motivation
- Decline in achievement
 - » (Paul 2014, Attard 2010, Cox & Kennedy 2008, Middleton et al. 2004, Mizelle & Irwin 2000)

Nationally



**Growing Up
in Ireland**

National Longitudinal
Study of Children



Growing Up in Ireland

National Longitudinal Study of Children

OFF TO A GOOD START?

Primary School Experiences and the Transition to Second-Level Education

The perspective of teachers

- Pivotal role in learners' education
 - (Midgley et al., 2000)
- Central position for providing social and academic support learners need
 - (Hopwood et al., 2016)
- Quality of interaction with second-level teachers emerged as having a significant relationship with attitudes to mathematics
 - (ESRI, 2017, 52)

Theoretical underpinning

Teacher self-efficacy beliefs

- Research has consistently shown that a teacher's impressions of mathematics and their own self-assurance in their mathematical competency are essential criterion for effective teaching
 - Ma, 1999; Dellinger, Bobbett, Olivier & Ellett, 2008; Bates, Kim, & Latham, 2011; Savage, 2005; Enochs, Smith, & Huinker, 2000.

Theoretical underpinning

Self-efficacy beliefs

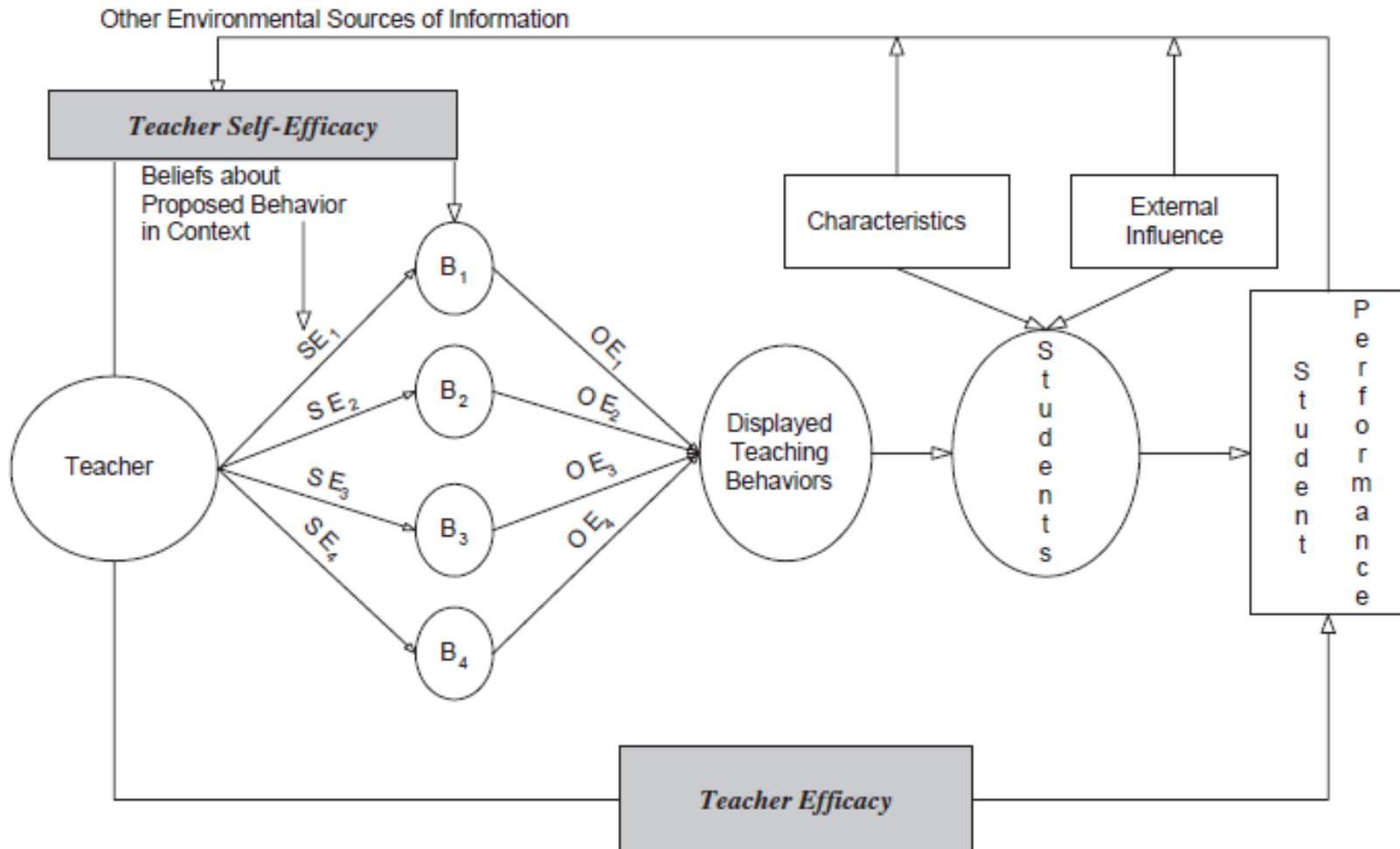
- One's perception of one's personal capability to accomplish certain levels of performance
 - » Bandura, 1977
- Self-efficacy beliefs are made manifest in how we think, feel, motivate ourselves, and thus in how we behave
 - » Savage, 2005

‘Subjective’ rather than ‘objective’

Theoretical underpinning

- Teacher self-efficacy beliefs
 - **personal teacher efficacy**: a teacher's perception of his/her personal effectiveness in teaching
 - **teaching outcome expectancy**: a teacher's belief that effective teaching can result in learning regardless of children's background
 - » Savage 2005 building upon the research of Ashton, 1985; Dembo & Gibson, 1985; Enochs, Smith, & Huinker, 2000; Gibson & Dembo, 1984.

Teacher Self-Efficacy Beliefs



Research aims & objectives

- Establish primary and second level teachers' self-efficacy beliefs about teaching mathematics in both Northern Ireland (NI) and Southern Ireland (Ire).
- Determine how prepared both sets of teachers feel students are for 1st year/Year 8 mathematics when they leave primary / enter second level school.

Methodology

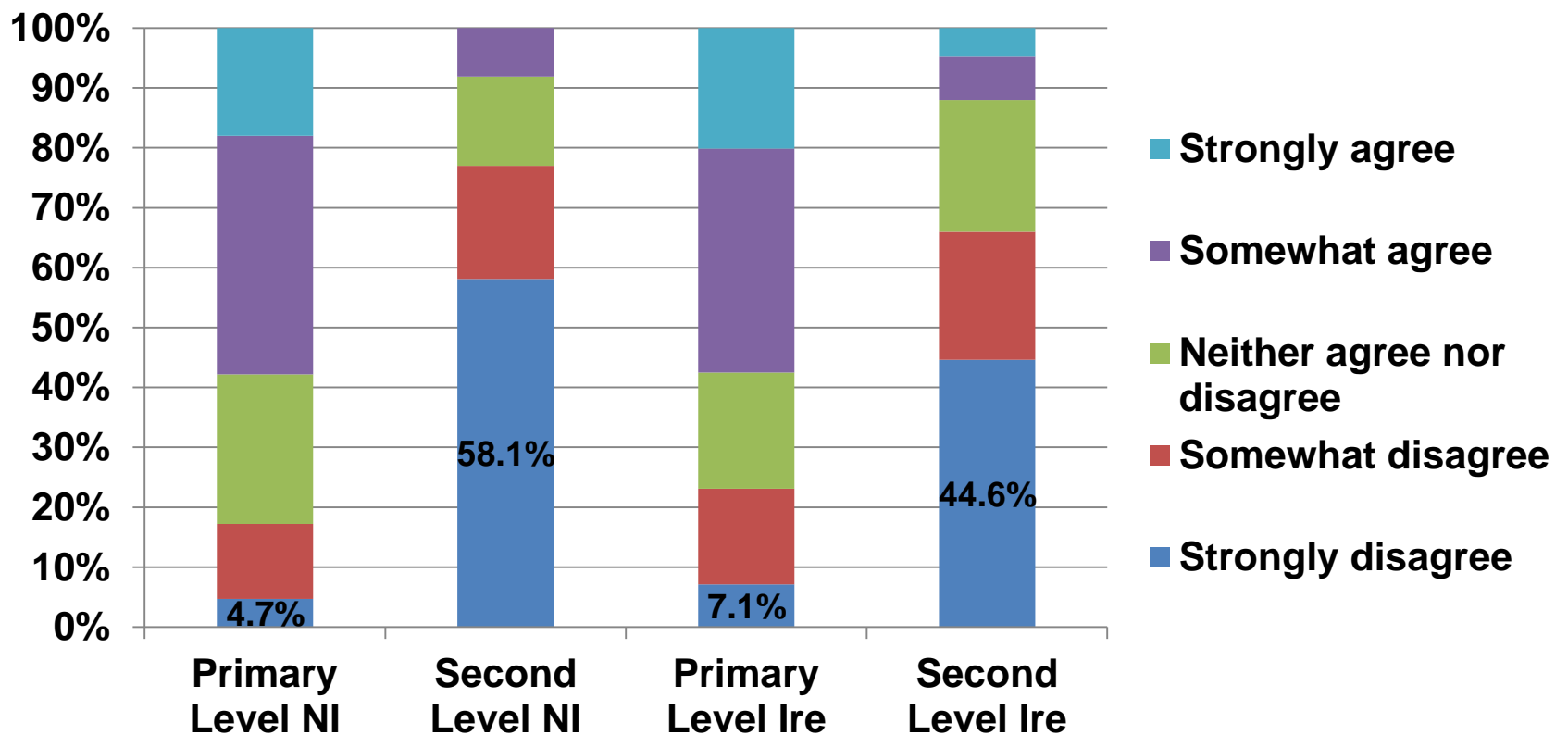
- Mixed method approach using two data collection instruments:
 - 6th Class/Year 7 Primary Level Teacher Questionnaire
 - 1st Year/Year 8 Second Level Mathematics Teacher Questionnaire
- Opportunity for teachers at both levels to offer their opinions on issues surrounding the transition.
- Both questionnaires were designed with the assistance of a research advisory group from each of the intended samples (Murphy et al., 2013).

Methodology

| | Ireland | Northern Ireland |
|------------------------------|---------|------------------|
| Primary Level Schools | 700 | 450 |
| Teacher Response Rate | 298 | 130 |
| Second Level Schools | 400 | 300 |
| Teacher Response Rate | 173 | 75 |

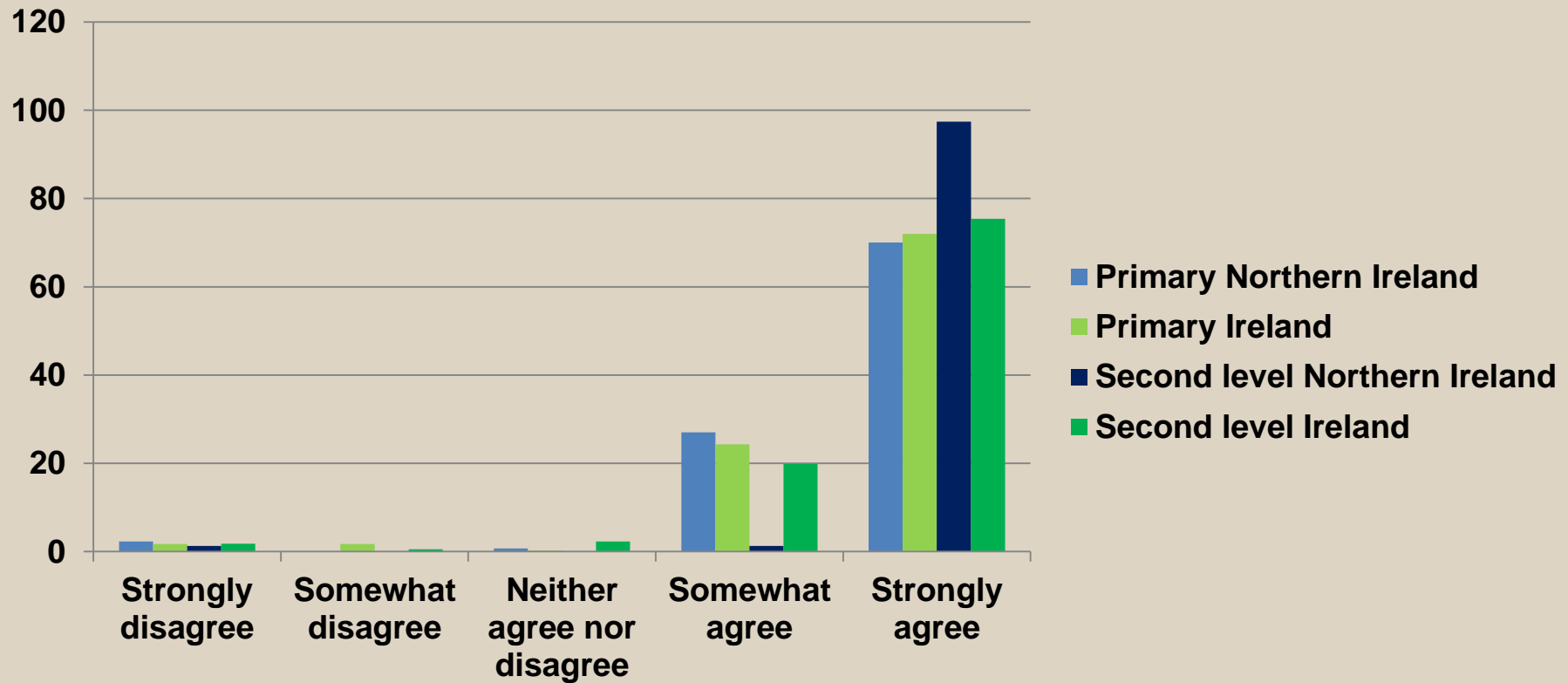
Beliefs about mathematics

It is easier to teach mathematics than other subjects.



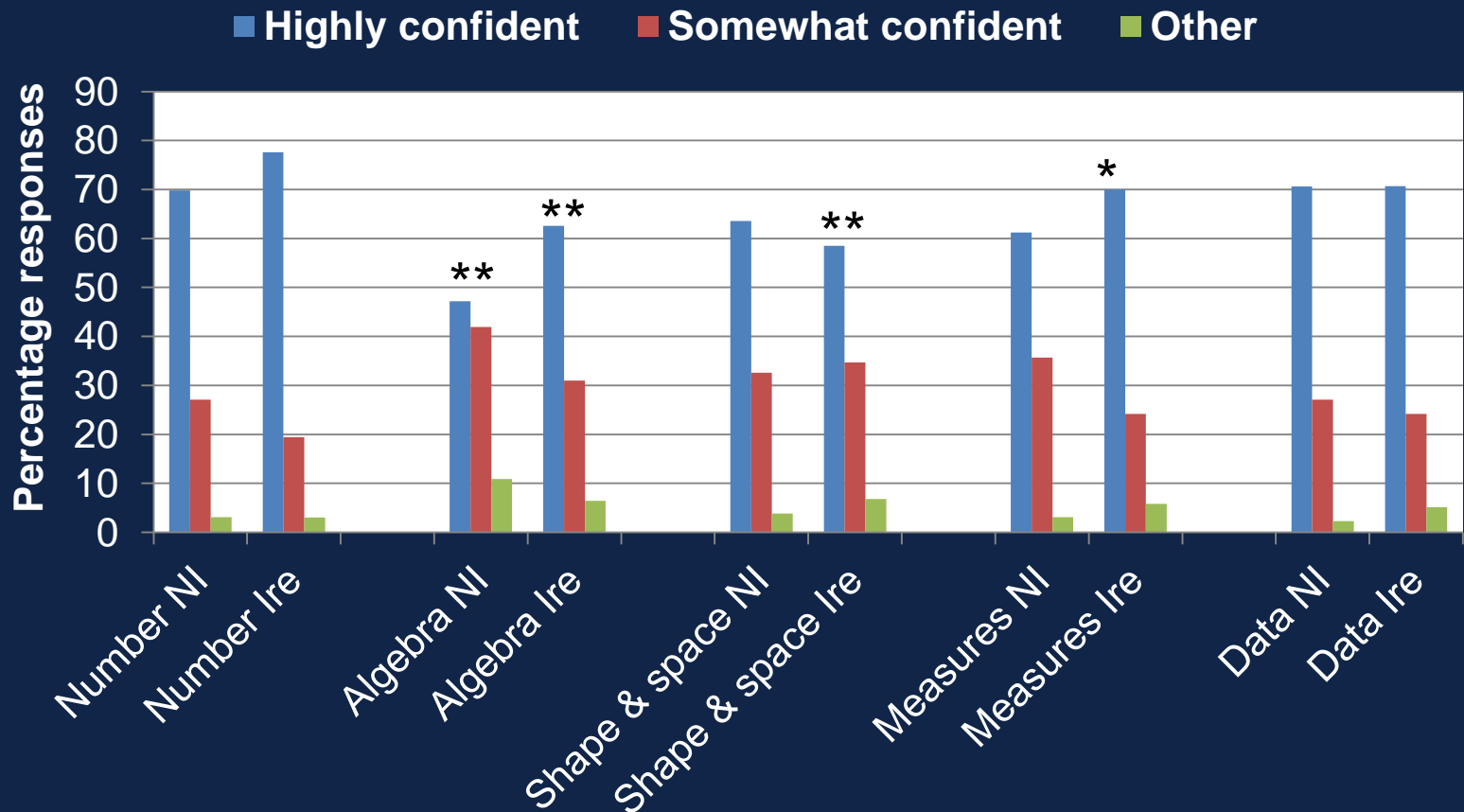
Personal mathematics teaching efficacy belief

I am generally well able to answer students' questions about mathematics in class



Primary level teachers' perception of personal capability

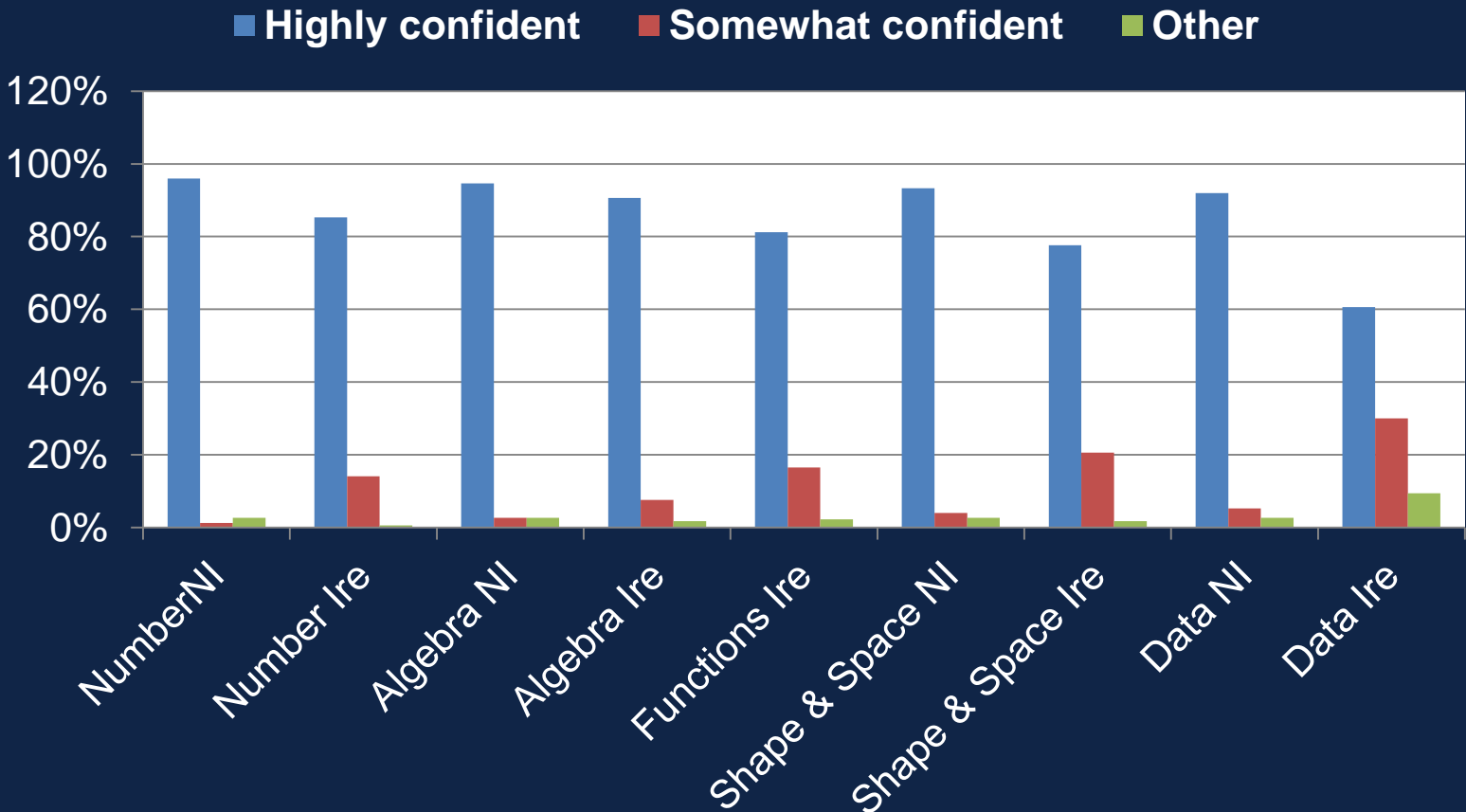
How confident are you teaching each of the following topics to your students?



*p<0.05 when compared to Number
** p< 0.001 when compared to Number

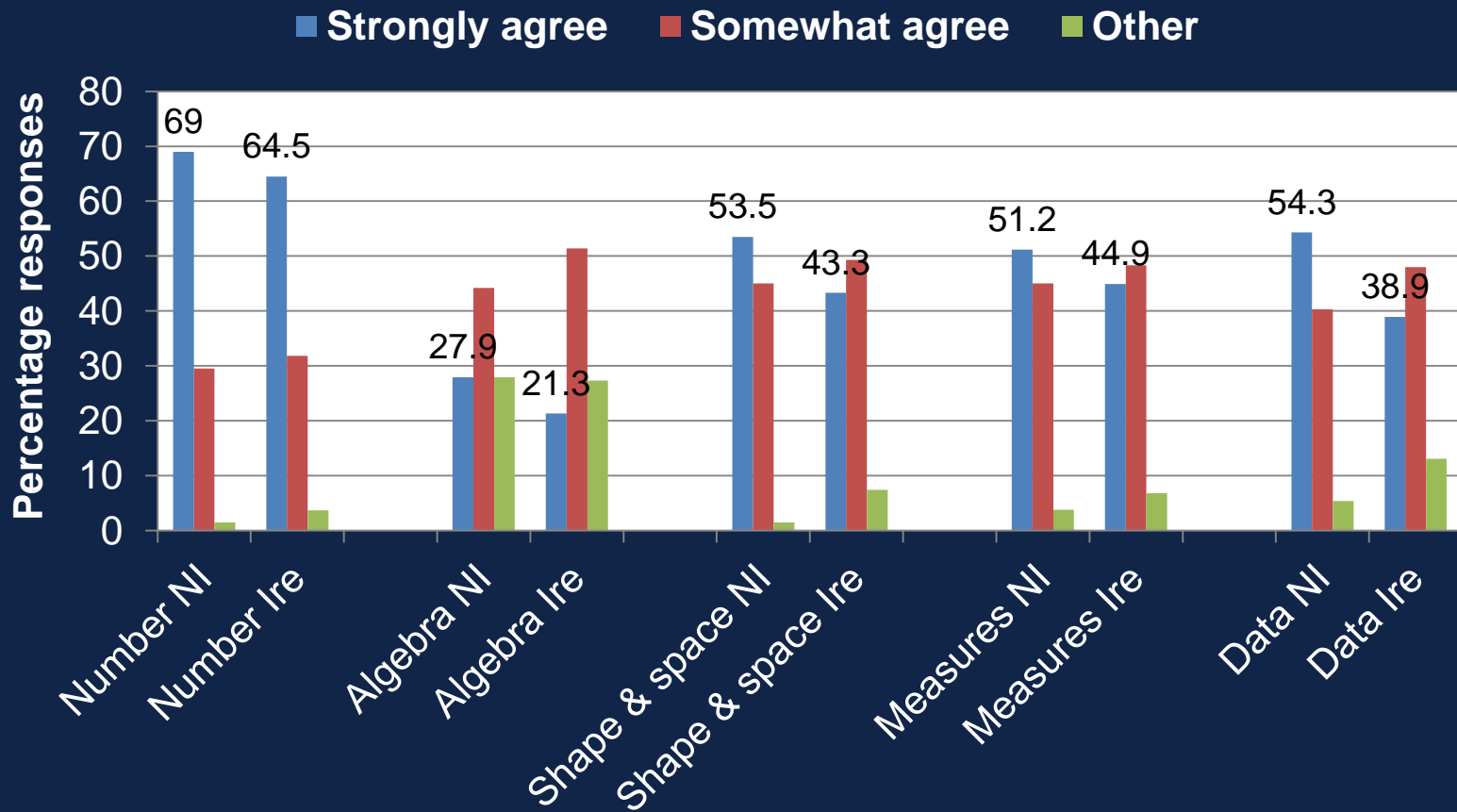
Second level teachers' perception of personal capability

How confident are you teaching each of the following topics to your students?



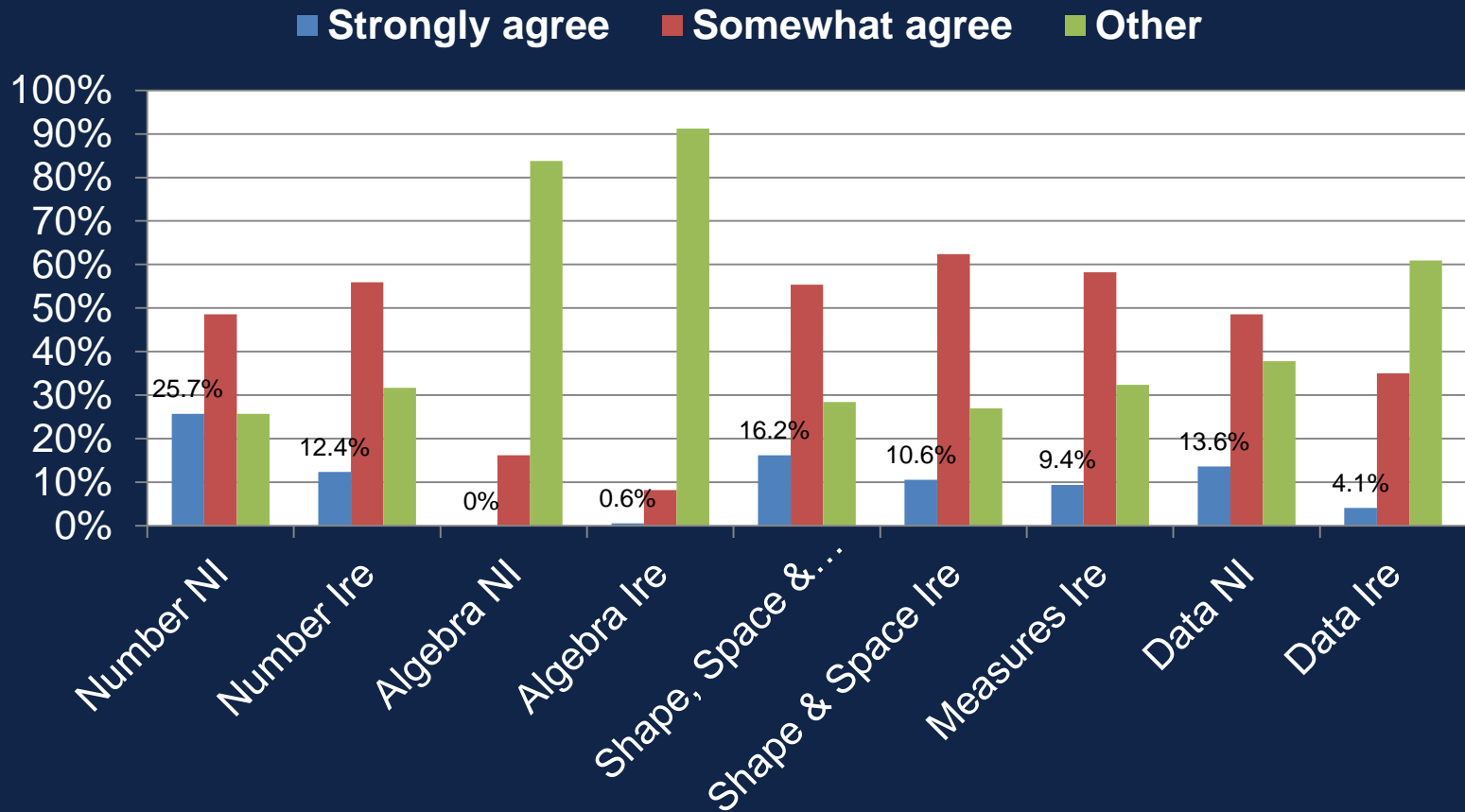
Primary level teachers' beliefs on student performance

Students are well prepared in this topic when they leave primary school.



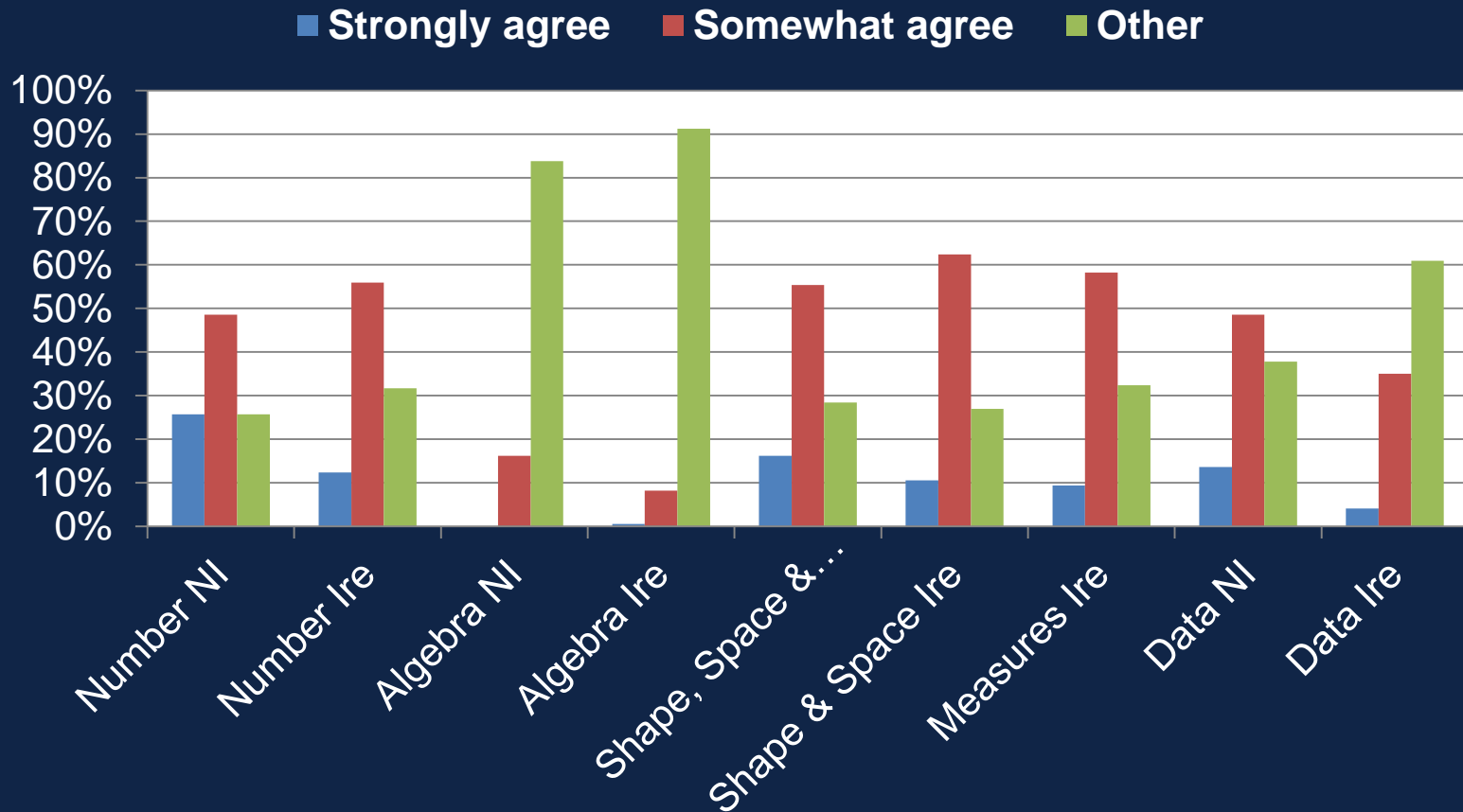
Second level teachers' beliefs on student performance

Students are well prepared in this topic when they enter secondary school.



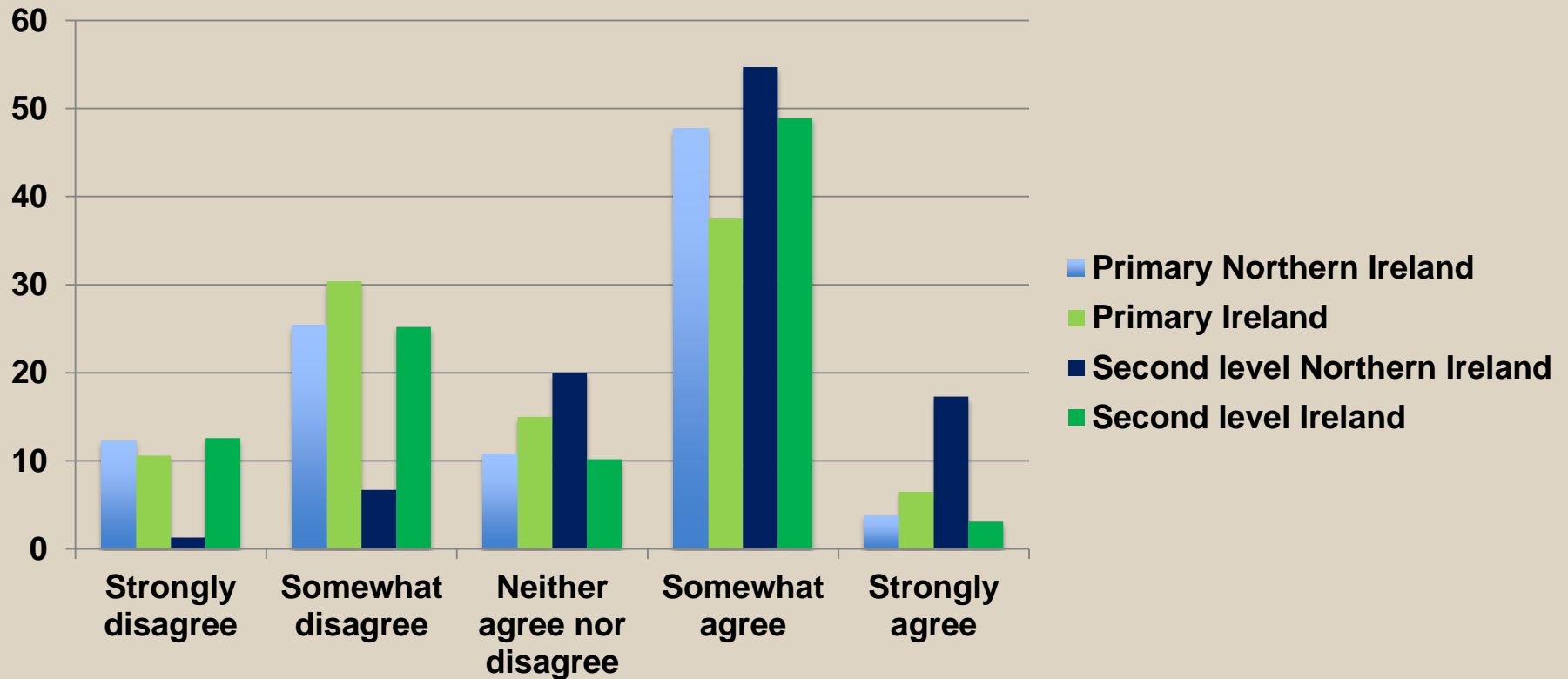
Second level teachers' beliefs on student performance

Importance of the acquisition of foundational skills in numeracy in the transition process and engagement with mathematics...



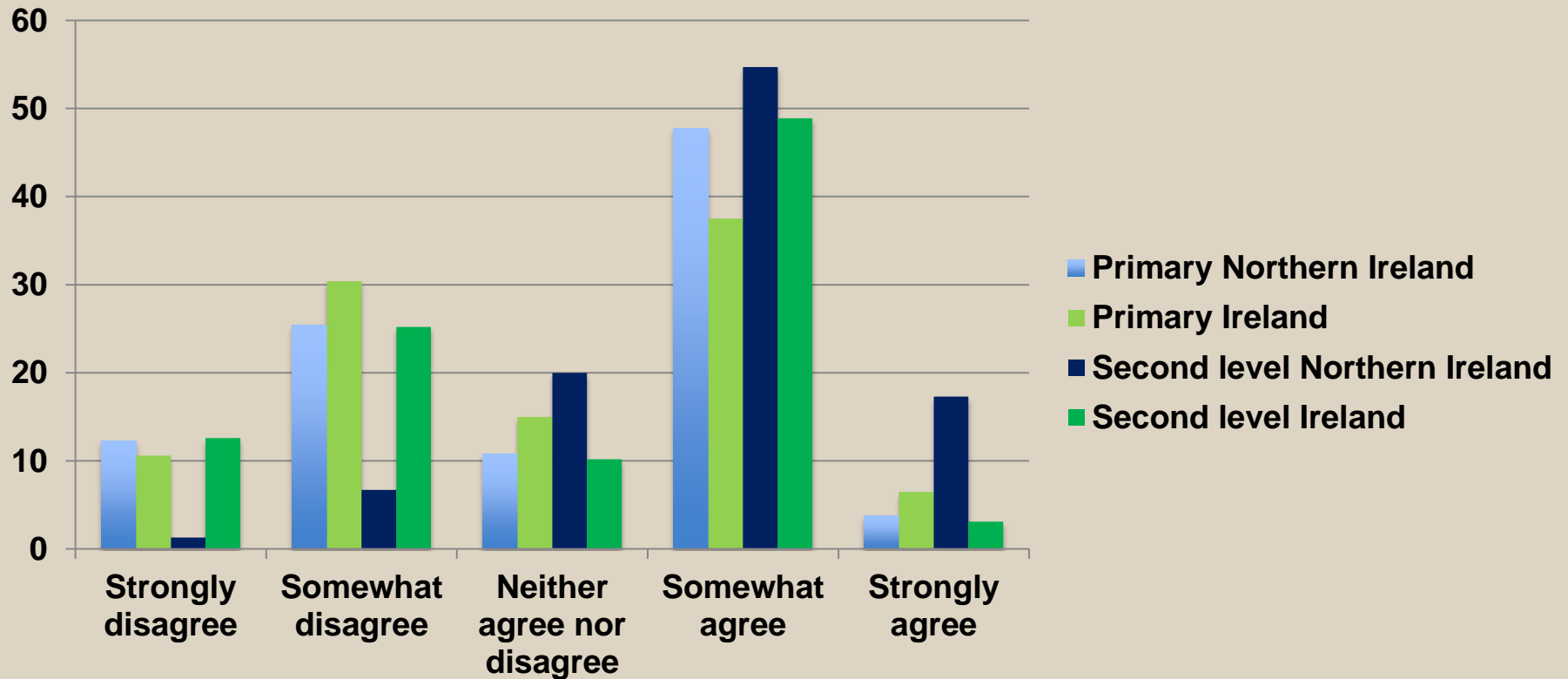
Mathematics teaching outcome expectancy

It is difficult to change students' attitudes towards mathematics



Mathematics teaching outcome expectancy

Second level teachers identified incoming students negative pre-existing attitude towards mathematics as a key barrier to successful transition



Supporting students through transition

Which of the following best describes your approach to teaching first year/Year 8 Mathematics students upon their entry to second level education

- I see it as an opportunity for a ‘fresh start’ and initially assume as little as possible about student knowledge or ability (23.2% NI; 68% Ire)
 - Boredom in students competent with the material (Galton et al., 1999).
 - Disillusionment among students who had struggled with the material originally (Galton et al., 1999).
 - Confusion and disengagement thus affecting students’ attitudes and commitment to mathematics during the transition process (Bicknell & Hunter, 2012).

Summary of main findings

- Second level teachers hold the impression of mathematics as the most difficult subject to teach
 - Second Level NI 77%; Ire 66% versus
 - Primary Level NI 17.2%; Ire 23.1%
- Second level teachers in both jurisdictions are highly-confident in their mathematical competency
- Primary level teachers in both jurisdictions are statistically not as highly confident in teaching Algebra as Number.
- Furthermore, primary level teachers in Ire. are statistically not as highly confident in teaching Shape & Space and Measures as Number.

Summary of main findings

- Teachers at both levels and in both jurisdictions believe that they are well able to answer students questions in class
- Concern expressed by second level teachers over students' lack of foundational skills in particular in Algebra.
 - Over 70% of primary level teachers in both jurisdictions agreed or strongly agreed that students were prepared as opposed to just 16.2% and 8.8% of second level teachers in NI and Ire respectively.

Summary of main findings

- Belief that students already have negative attitudes towards mathematics on entry to second level
 - In NI, 72% of second level teachers as opposed to 51.5% of primary level teachers agreed that students have their minds made up about mathematics before they start in secondary school ($p=0.006$) pointing to a lower outcome expectancy.
 - Nearly 70% of teachers in Ire use a ‘fresh start’ approach

Want to know more about the project?

- People to contact:

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Or have a read...

- International Journal of Mathematical Education in Science and Technology (2019)
 - Teachers' self-perceptions of mathematical knowledge for teaching at the transition between primary and post-primary school.
- Issues in Educational Research (2019)
 - Bridging the primary to secondary school mathematics divide: Teachers' perspectives.
- Proceedings from 14th International Conference of The Mathematics Education for the Future Project (2017)
 - Teachers' perspectives on the transition from primary to secondary school mathematics
- Proceeding from CERME 10 (2017)
 - Is teacher knowledge affecting students' transition from primary to second-level mathematics education?
- Education Matters Yearbook (2016-2017)
 - A difficult crossing: The transition from primary to secondary school mathematics.

With special thanks to...

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North and South

