



14th Annual
Research
Conference
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Do children in multi-grade classes in small schools do well in mathematics?

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Multi-grade classes

- Multi-grade teaching is defined as where two or more grade groups are taught together by a teacher in the same classroom (Quail & Smyth, 2014; Mulryan-Kyne, 2007; Veenman, 1995)
- 22.8% of children attending DES aided primary schools in 2020-2021 were in consecutive grade or multi-grade classes (DES, 2022)
- In 2019, 43.7% of primary schools were small primary schools with 4 or fewer teachers (DES, 2020)

What are mathematics outcomes?

Aims of the Primary School Mathematics Curriculum (NCCA, 1999)

- to develop a positive attitude towards mathematics and an appreciation of both its practical and its aesthetic aspects
- to enable the child to acquire an understanding of mathematical concepts and processes to his/her appropriate level of development and ability
- to enable the child to acquire proficiency in fundamental mathematical skills and in recalling basic number facts.

What are mathematics outcomes?

Draft Primary Mathematics Curriculum

The over-arching aim of the Primary Mathematics Curriculum is the development of mathematical proficiency (NCCA, 2022).

Mathematical proficiency encompasses conceptual understanding, procedural fluency, adaptive reasoning, strategic competence, and productive disposition (NCCA, 2022).

Examples of outcomes examined in previous studies include:

- Academic outcomes
- Attitudinal outcomes
- Socio-emotional outcomes

Mathematics attainment and attitudes towards mathematics

- No significant difference between single grade and multigrade mathematics scores in NAMER 2009 (Eivers et al., 2010)
- Being in a multi-grade classroom had little impact. However, girls in classes with older children scored significantly lower in maths than those in single grade classes (Quail & Smyth, 2014)
- Evidence of compositional effects with advantages for lower grade levels in the presence of older peers (Borbely et al., 2021)
- A negative attitude towards mathematics could considerably reduce a person's persistence with a problem (Ashby, 2009)
- Positive attitudes towards maths were associated higher achievement in maths. Boys tended to be more positive towards maths and benefitted more from this relationship than girls (Berger et al., 2020)

Research Questions

Are mathematics attainment scores similar for children in multi-grade classes and children in single grade classes?

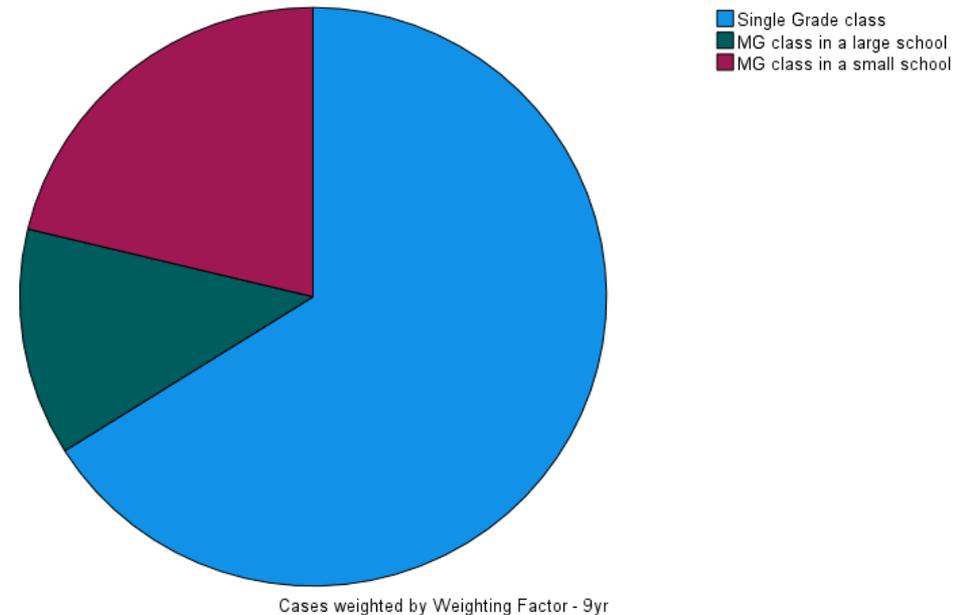
Are there differences between mathematics scores of boys and girls in multi-grade and single grade classes?

Do children's attitudes towards mathematics vary according to classroom structure?

Data source

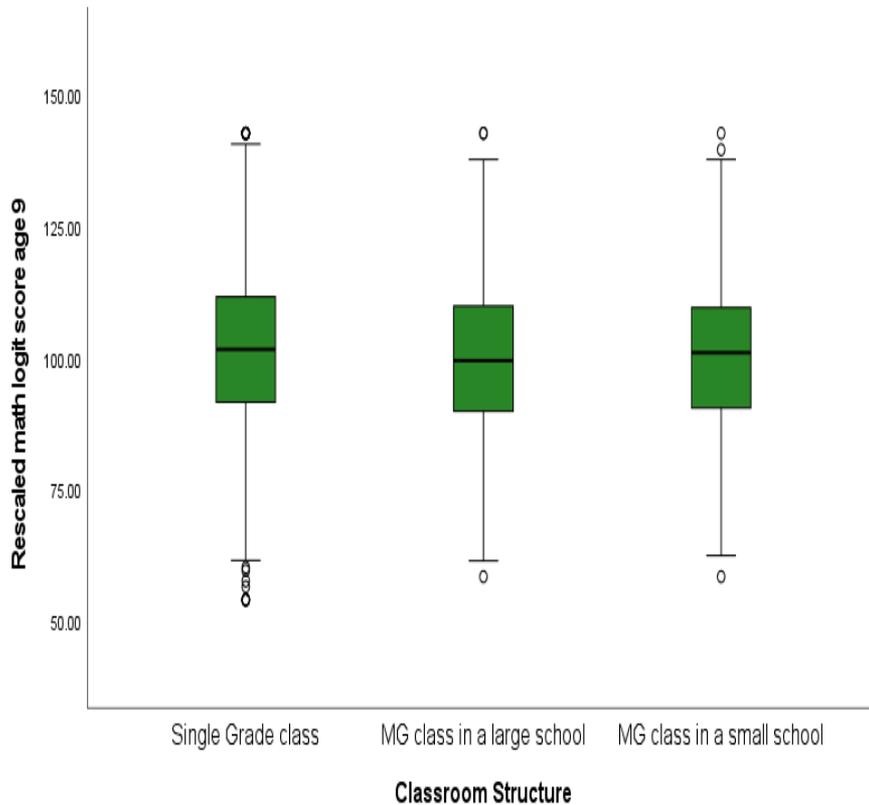
'98 cohort of Growing Up in Ireland

- Data from wave 1 and wave 2
- Drumcondra Mathematics Assessment Scores
- Study child questionnaire
- Primary caregiver questionnaire
- N=6521

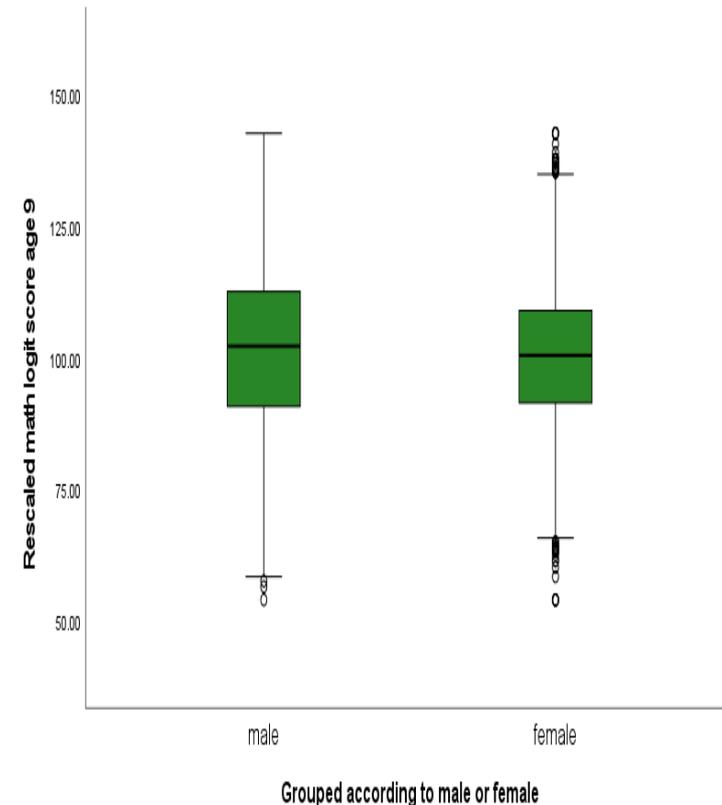


Attainment at age 9

- Outcome variable: Drumcondra Primary Maths Test (Revised) logit score which has been rescaled.



Cases weighted by Weighting Factor - 9yr



Mean difference 1.87*

Attainment at Age 9

Boys, girls and classroom structure

- Boys

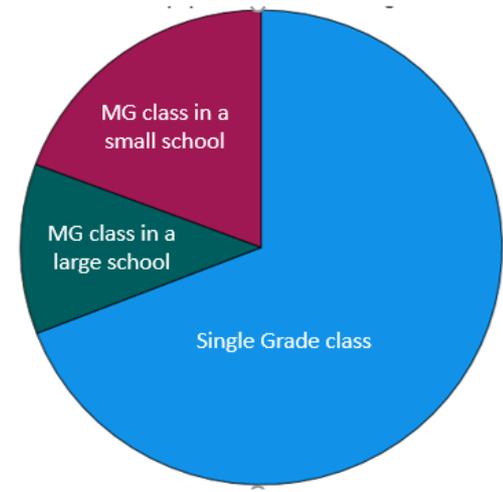
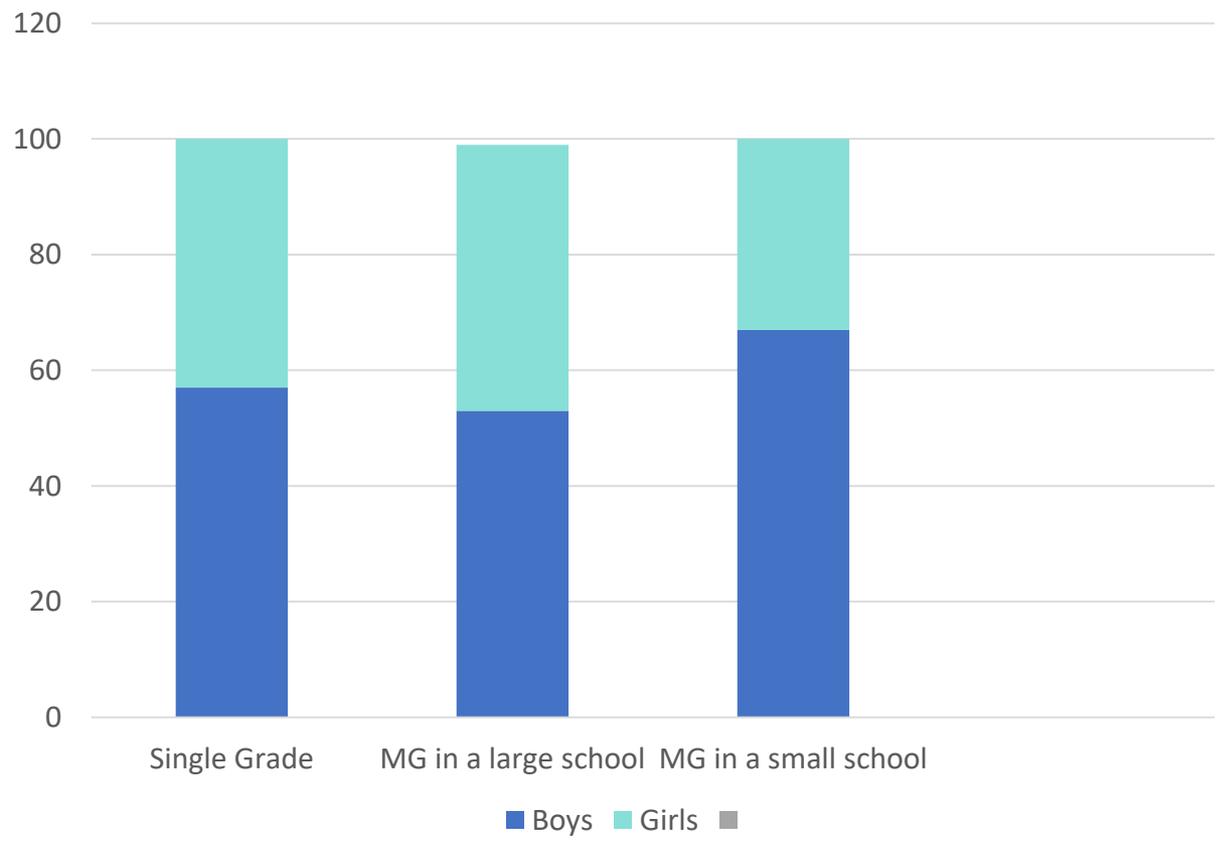
| | |
|--|----------|
| Boys in single grade classes | 102.380 |
| Boys in multi-grade classes in large schools | -2.509 * |
| Boys in multi-grade classes in small schools | 1.612 |

- Girls

| | |
|---|----------|
| Girls in single grade classes | 100.511 |
| Girls in multi-grade classes in large schools | -1.403 |
| Girls in multi-grade classes in small schools | -1.939 * |

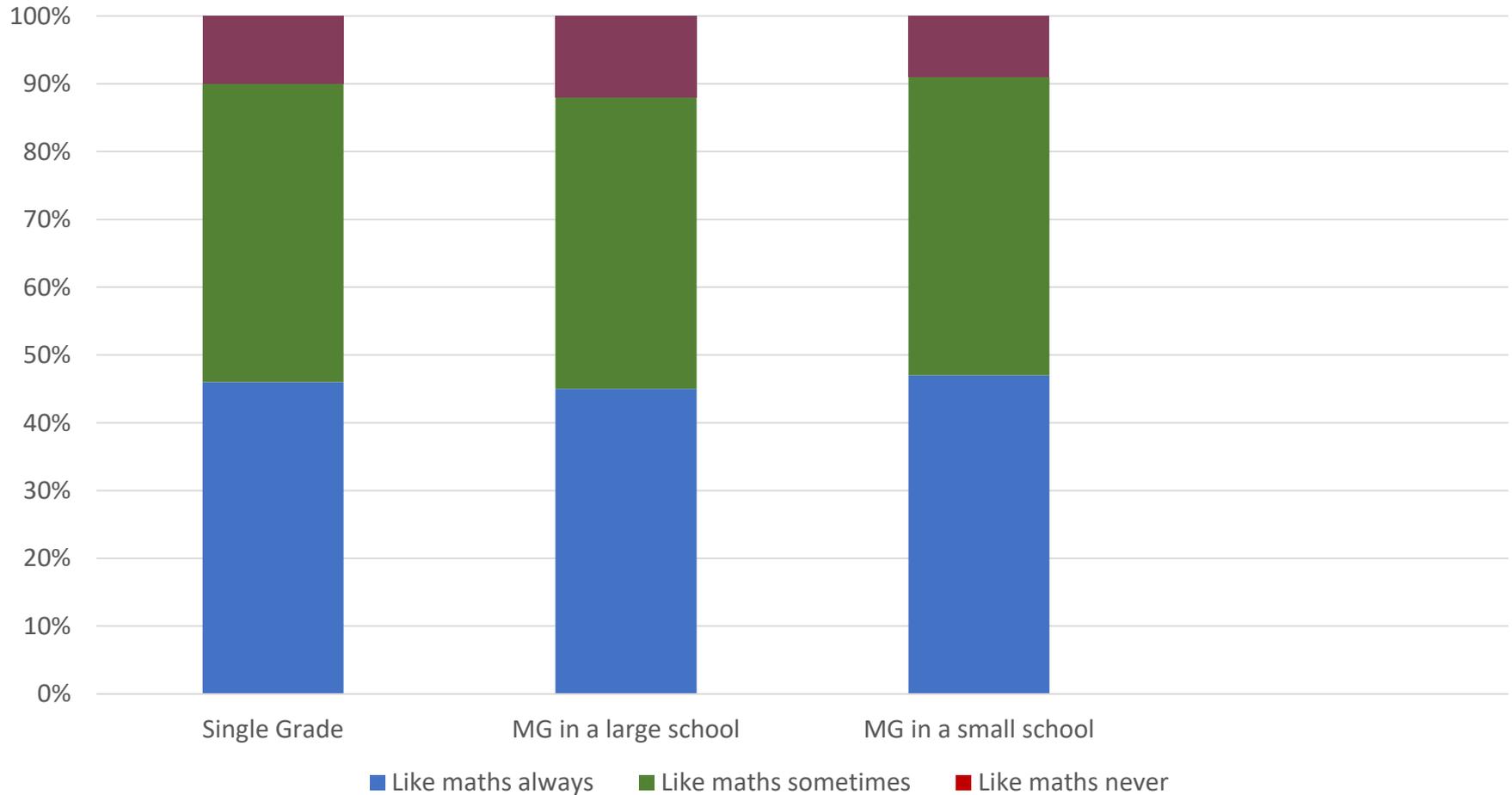
The top quintile

Boys and girls in the top quintile according to classroom structure



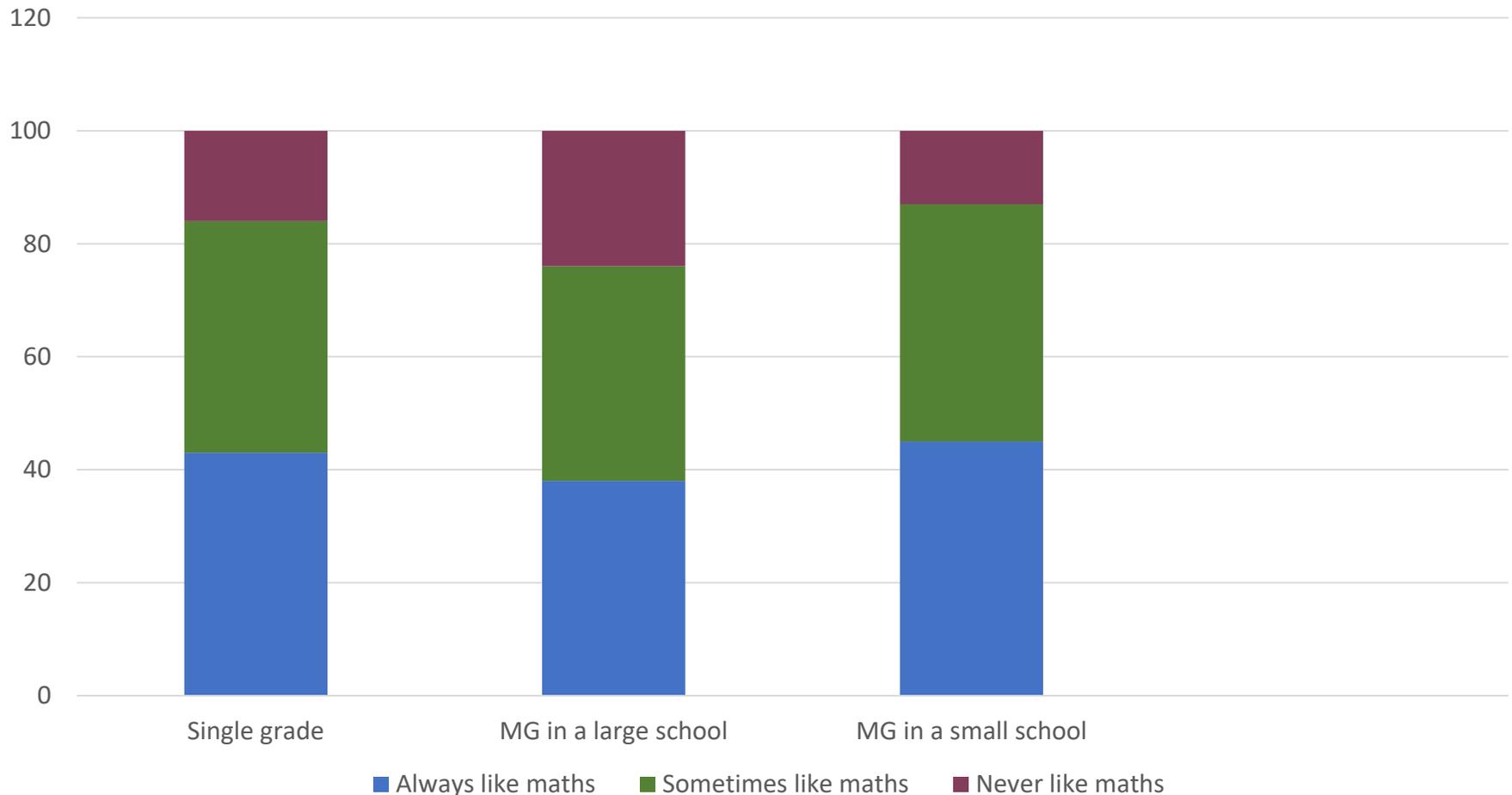
Attitude towards maths by classroom structure

Liking maths at age 9



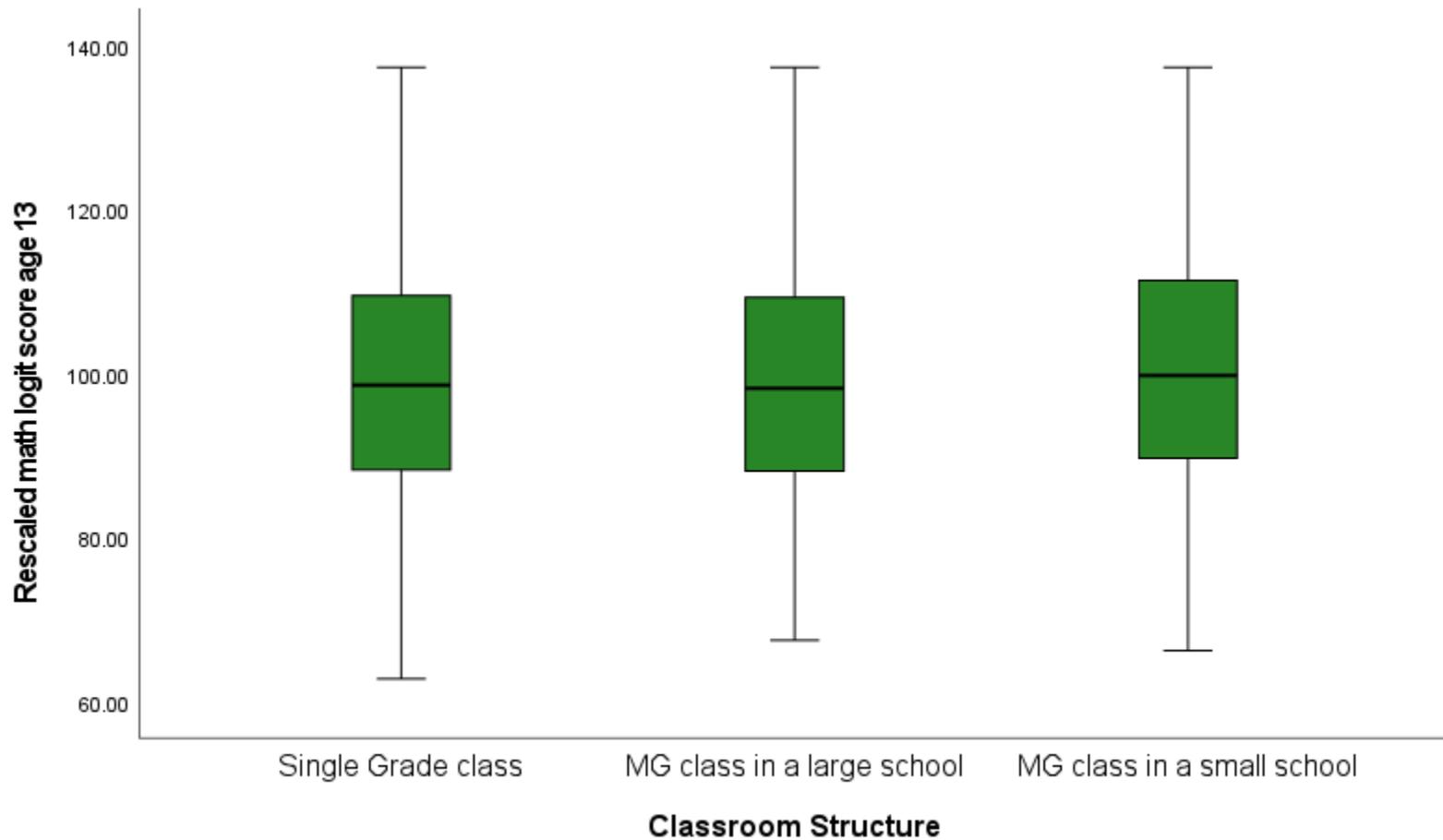
Attitudes towards maths among children with learning difficulties

Liking maths at age 9



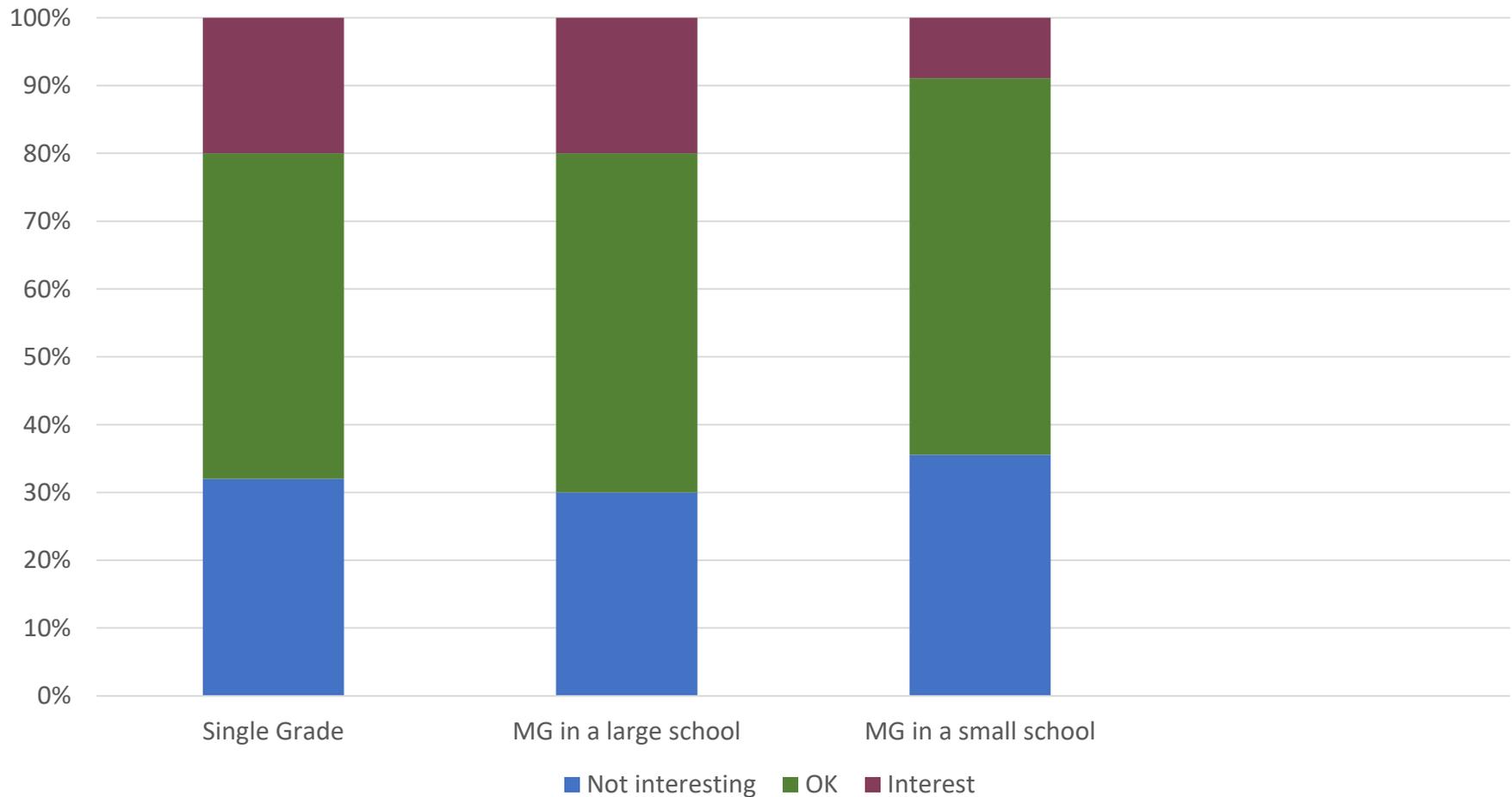
Attainment at age 13

Outcome variable : Drumcondra Numerical Ability Test logit score which has been rescaled.



Interest in mathematics at age 13

Student indication of interest in mathematics



Conclusion

- Overall, at age 9, the mean scores of children in multi-grade classes in small schools are no different to children who learn in single grade classes or larger schools.
- More boys than girls attain scores which situate them in the top quintile at age 9 across all classroom types. However, the gap between the proportion of boys and girls with scores in this category is most pronounced in multi-grade classes in small schools.
- Patterns in relation to liking maths and finding maths interesting are largely similar across all classroom structures investigated in this study indicating that children in small schools have a similar likelihood of liking maths or finding maths interesting as children in other classroom types.