Seven Barriers (Perceived or Real) to Inclusive Secondary Mathematics

Rhonda Faragher
University of Queensland
r.faragher@uq.edu.au

Kim Beswick
University of Queensland
k.beswick@uq.edu.au

Monica Cuskelly
University of Queensland
m.cuskelly@uq.edu.au

Jan Lloyd
University of Queensland
j.lloyd@uq.edu.au

The study of secondary mathematics has been largely inaccessible for students with intellectual disability and options for studying mathematics reduce as school years increase. In this paper we discuss seven barriers that secondary mathematics teachers indicated they faced in teaching year level adjusted mathematics curriculum in the junior secondary years. These teachers were part of a research project undertaken in Queensland schools over three years. We address these barriers and offer approaches for enabling inclusive mathematics practice.

The study of mathematics at secondary school level has been largely inaccessible for students with intellectual disability[2]. Indeed, for many low attaining students, options for studying mathematics reduce as school years increase (Marchant & Kennedy, 2025). Two approaches are typical: a simpler curriculum with narrower content; or a functional "life skills" curriculum (Faragher, 2019). Tan et al. (2019) found that teaching approaches that focussed on following set steps in mathematical procedures were common for students with mathematics learning difficulties and disabilities, with few opportunities to develop mathematical thinking.

An alternative approach is to make adjustments to the year level curriculum to make mathematics accessible, thus allowing students to be successful. This approach to curriculum design, called Learning Year Level Adjusted Curriculum (LYLAC) is not new (for a review, see Faragher, 2023a); however, it is also not commonly adopted teaching practice.

In this paper, we explore barriers that might exist that restrict the uptake of LYLAC, even though there is evidence that it can lead to student success with year level content (Browder et al., 2012; Browder et al., 2020; Monari Martinez & Benedetti, 2011). It would appear little previous work specifically on barriers to inclusive secondary mathematics has been published.

Our study exploring inclusive secondary mathematics adjustments

Here we report findings from a three-year, qualitative study which was conducted in partnership with five secondary schools in Southeast Queensland. The study focussed on the work of secondary mathematics teachers as they adjusted year level mathematics from the Australian Curriculum (AC:M) for students with intellectual disability. The project was longitudinal and used a codesign approach where the Heads of Mathematics departments (HODs) collaborated with the research team to plan annual (term 1) professional learning (PL) workshops for all mathematics staff from the participating schools over the three years of the project. The aim of the PL was to develop expertise in adjusting mathematics teaching and assessment to support the learning of low attaining students. Lesson observations and interviews with classroom teachers were designed to explore inclusive mathematics education

[2] Defined as a lifelong condition that includes significant limitations in both intellectual functioning and adaptive behaviours that begins in the developmental period. Definition was included in Workshop 1 professional learning.

(2026). In N. Berger, M. Thompson, J. Ley & C. Wilsmore (Eds.), *Beyond boundaries: Strengthening futures in mathematics education. Proceedings of the 48th annual conference of the Mathematics Education Research Group of Australasia, Sydney* (pp. 146–153). MERGA.

in practice. In this paper, we explore the research question: What are the factors that appear as barriers to teachers making adjustments to mathematics lessons for low attaining learners?

Participants

The schools (Table 1) were located in Brisbane, Moreton and Ipswich cities. Three of the five enrolled a significant proportion of students with disability. All mathematics teachers (including those "out of field", such as qualified Health and Physical Education teachers who taught junior mathematics), HODs and learning support staff participated, a total of 104.

Table 1

Participating schools

School affiliation	Type	Average Enrolment 2022-2024
State	Co-education years 7-12*	814
Independent Catholic	Co-education 5-12	595
Systemic Catholic	Boys 5-12	1715
Independent Anglican	Girls Prep-12	986
Independent	Girls Prep-12	1198

*This school opened in 2020 – enrolment years during the project: 7-10; 7-11; 7-12

Professional learning workshops

The PL workshops enabled participants to collaborate in understanding students' specific mathematics learning support needs and build the conceptualisation of reasonable adjustments of mathematics, through focus on partner school contexts. The workshops also offered a rare opportunity for teachers from different school systems to work together over time.

Workshop survey

As part of the workshops, teachers completed a survey that was divided into two parts. Part 1 contained Likert scale responses and are not reported in this paper. Part 2 asked five open response questions: two were procedural about the project, and three (Table 2) asked about participants' perspectives on the barriers to enacting inclusive mathematics practice.

Table 2

Open response questions

Question number	Question
1	What skills do you have that will enable you to include students with an intellectual disability in your classroom?
2	If you have anxieties about including students with an intellectual disability in your classroom, what are they?
3	What do your colleagues feel about the inclusion of students with an intellectual disability in their classrooms?

Classroom observations

Partner schools were asked annually to nominate up to two teachers to take part in lesson observation cycles. There were four cycles of co-design work, resulting in 18 observations (one of the schools was able to nominate staff for only two cycles). Each observation involved three parts: pre-lesson planning; the lesson observation; and a post-lesson discussion. Audio recordings were made of interviews and video recordings (two cameras, one recording the work of nominated students with intellectual disability, the other the whole class) were made and transcribed.

Data analysis

The classroom observation cycles gave depth to the survey responses and enabled the university team to more deeply understand the contexts in which teachers worked. We analysed data from the survey questions and observation cycles, particularly the interview transcripts.

In undertaking the data analysis, we were mindful of our backgrounds as researchers and how that influences our work. The first two authors of this paper have been secondary mathematics teachers, HODs, researchers and teachers of pre-service mathematics education teachers. The third author is an educational psychologist; the fourth a teacher and disability-focused researcher. Our backgrounds necessarily have influenced what we noticed while we were closely working with our teaching colleagues over the three years of field work for this project. This aspect of noticing has been called "wonder" by MacLure (2013) who discussed the potential for data to provoke thought for researchers.

> This potentiality can be felt on occasions where something—perhaps a comment in an interview, a fragment of a field note, an anecdote, an object, or a strange facial expression—seems to reach out from the inert corpus (corpse) of the data, to grasp us. These moments confound the industrious, mechanical search for meanings, patterns, codes, or themes; but at the same time, they exert a kind of fascination, and have a capacity to animate further thought. (p. 228)

In deeply considering our engagement with our teaching colleagues and the data that emerged, it struck us that certain experiences did indeed cause us to wonder, playing on our minds and our conversations. Because our research involved working with some of the participants over the three years of the study, we were able to share our wonderings in various conversations: in steering committee meetings, at the PL workshops, in lesson observation interviews and other similar opportunities. We were hearing their perspectives on our thinking and having our ideas challenged and enriched.

In the results to follow, we take these "wonderings" and provide illustrative quotations from our data that elucidate the issues that emerged and the nature of our deliberations on them.

Barriers to Inclusive Secondary Mathematics Classroom Practice

Teachers indicated strong commitment to inclusion of all learners, and especially those with intellectual disability. They also indicated a belief that their colleagues shared this commitment. It was clear that they wanted all learners to succeed in mathematics. It was also clear that they experienced barriers in supporting their learners with intellectual disabilities to do so. We have discerned seven barriers to enacting inclusive secondary mathematics teaching. The seven barriers have been categorised into three groups: Organisational constraints; Teachers' mindsets; and Teachers' capacity to do their work.

Organisational constraints

1. Time and workload – impact on a teacher's work

Time pressures were raised in participants' responses to the surveys with comments including: "*Not enough time to adjust effectively", "Time to organise alternatives", "Whether I have all the time available to provide the resources required"* and *"Extra workload to provide access and UDL activities".* A prevalent view was that students with intellectual disability require additional resources or activities to be developed and undertaken by teachers. The underpinning philosophy of Universal Design for Learning (UDL; CAST, 2024) as planning for all through provision of multiple approaches to learning, did not appear to be understood by teachers, even though it was often described as an approach promoted by their schools. Rather, their comments suggest that planning for students with intellectual disability was seen as extra work they would not otherwise have to do.

2. Crowded curriculum – constraints on teaching

Closely related to the sense of time pressure is the commonly expressed barrier that can be described as a "crowded curriculum". This refers to notions that there is too much to cover in the specified curriculum. This perception leads to teachers feeling that coverage of the curriculum overrides a focus on student achievement. Some responses by teachers on the survey are illustrative: "*In Mathematics we have no room in our class plans for <u>any</u> consolidation so always a new topic for each lesson (unfair for all students)"*, and "*Fast paced nature of mathematics – a lot of content to cover".*

The AC:M specifies content to be taught, embedding proficiencies of understanding and fluency. It acknowledges that some students will need more time than others to build conceptual understanding and fluency with the content. Guidance on the implementation of the AC reminds teachers that they are required to provide learning opportunities and choices for students with disability and that the AC "can be used flexibly to meet the needs of all students" (ACARA, 2026). Even so, the pressure teachers feel to get through content was expressed by many in our study. Some schools responded to this barrier by designing alternative mathematics programs that modified the AC:M to reduce the content for low attaining learners. Others removed or minimised lessons that engage students in use of manipulative materials or open-ended tasks, approaches intended to support the learning of students who find abstraction difficult and foster mathematical thinking.

While we did not specify teaching approaches, some schools appeared to design lessons as special events for our observations. This created unintended pressures on teachers and HODs who felt the already crowded mathematics program needed to be put on hold to make room for a special observation lesson. One HOD in a post lesson interview stated:

> At the moment the Australian curriculum is so jam-packed that the big thing in maths is we're so time poor, and most teachers have removed a lot of the physical nature of activities, because we can't fit it all in. If we spend time like we did for you, especially to come in, we wouldn't cover all of the content. And so sometimes you have to make the decision is the benefit going to outweigh the time loss, because, you know, [teacher] only got through maybe one type of question and didn't get through you know the multiple types that could be assessable.

Comments from the project participants expressed the sentiment that they would like to do more lessons where multiple approaches were offered (as per the principles of UDL) as they recognised the benefits to students, particularly those who were low attainers; however, they believed they could not afford the time. The technical imperative of curriculum coverage overrode the imperative of students achieving learning outcomes.

3. External assessment regimes – and assessment adjustments

In the PL workshops, we discussed the use of adjustments in assessment. Australian law requires the provision of approved assessment adjustments (Commonwealth Department of Employment Education and Training, 2005). In our study, we observed the impact of Queensland's recently implemented external examination scheme on the teachers' approach to assessment. Even though the external examinations only applied to students in Year 12, teachers were modifying their assessment practices across all year levels. As an example, one year 12 external examination paper assessing a mathematics course designed for students intending to study university mathematics, does not permit the use of calculators. This led one school to restrict the use of calculators on all tests, even in the lower secondary years, in order to prepare students for future assessment practices.

Teachers' mindsets

The next two barriers relate to how teachers view learners' capacity to do mathematics and how they should be taught.

4. Mindset of inclusion vs integration for students with intellectual disability

The distinction between the terms "inclusion" and "integration" was clarified in General Comment Number 4 of the Committee on the United Nations Convention on the Rights of People with Disability (Committee on the Rights of Persons with Disabilities, 2016) as:

> Integration is the process of placing persons with disabilities in existing mainstream educational institutions with the understanding that they can adjust to the standardized requirements of such institutions. Inclusion involves a process of systemic reform embodying changes and modifications in content, teaching methods, approaches, structures and strategies in education to overcome barriers with a vision serving to provide all students of the relevant age range with an equitable and participatory learning experience and the environment that best corresponds to their requirements and preferences. (Paragraph 11)

When teachers adopt an inclusion mindset, they focus on supporting the learning needs of all students in their class, as they arise and from whatever source. Conversely, viewing students with disabilities as distinct from other students is an integration mindset where students need to be able to cope to be part of the class. Seeing students with difficulties with learning as fundamentally different and requiring special provisions that may or may not be able to be provided portrays an integration mindset. This was evident in the concerns raised by some of our participants in their survey responses: "*Ensuring that they are enjoying and are engaged as I am teaching the mainstream class", I don't believe I have the training/skills to teach these students", "Ensuring other students are still in a learning environment that will ensure success", "Other students' learning being disrupted"* and *"Causing disruption/holding back other kids".*

5. Mindset of student ability

Ability is a contested term (Mighton, 2003). Once thought to be fixed, measurable and reported by a single number, the Intelligence Quotient, it is now understood to be malleable and affected by many factors. Dweck's (2006) work has introduced the terms "fixed mindset" and "growth mindset" into the lexicon of Queensland teachers, with many schools even proclaiming on school advertising that they are "a school with a growth mindset". This should indicate a view that intelligence and ability can change with effort, good teaching and the right support.

The mathematics teachers in our project were dedicated professionals who had a keen interest in providing the best learning opportunities for their students. While it was clear the teachers wanted the best for all their students, it was also clear that their view of the ability of their students with difficulties with learning did not always align with a growth mindset. At the start of one lesson observation, the HOD at a school that proclaimed a growth mindset gave us an overview of the class pointing out three students who "were E students". This referred to the A to E achievement rating scale with E being the lowest grade. By being designated an "E student", there was a sense that this was a fixed characteristic of the student. There was no indication in the conversation that change was likely or even possible.

In responses to the survey given in the PL workshops, teachers expressed concerns about: "*Mixed ability classrooms and large range of abilities trying to cater for all", "How will they cope in class? My interactions with them?"* and *"Greatest concern in managing the range of abilities. How do I support those with ID while still supporting the other learners?".* These concerns suggest a fixed ability mindset that learning outcomes cannot be ameliorated by good teaching, support or student effort.

Teachers' capacity to do their work

6. Lack of resources

Some survey responses indicated a perceived need for specific resources that the teacher did not have, e.g. "*I cannot think of, or find, resources that promote open-ended tasks"* and

"*Funds for resources"*. These comments suggest a link to the barriers about time and a crowded curriculum, with a view that something additional or special is required to support learners who are low attainers.

A second category of responses related to provision of teacher aide support, with a number reporting a lack of such support. One Head of Learning Support did make an alternative point when raising concerns about inclusive practice: *"too much use of TA".* This is an issue that has been addressed in previous research which we take up in the discussion.

7. Lack of confidence or skills

The final barrier combines two concerns that are difficult to disentangle. Is it the skills that are lacking or the confidence to apply them? Teachers shared their insecurities, honestly, writing, "*feeling of judging whether I've done it successfully, anxiety about including students with ID: That I am doing a good job.", "Anxieties about how to offer students with an intellectual disability with alternative explanations"* and *"What parents think about me, Meeting HOD's expectation".* Teachers also raised some specific concerns such as: "*Lack of experience, therefore unsure how effective strategies will be".*

Specifically, teachers wrote about their insecurities about their abilities to design learning adjustments. "*I don't believe I have the training/skills to teach these students", "Not knowing the student (level of need; type of need)",* and *"How best to support a child working below level in a way that doesn't highlight their support."* The comment, "*Not making work too hard/easy; Correctly adjusted assessments; Pushing students"* gives insight into the challenge teachers felt about pitching the level of adjustments. Heads of Learning Support also wrote about colleagues' needs for support with making adjustments, and more training, and also that they believed some teachers thought, "*It is the responsibility of the "Inclusive Learning Department".*

It is clear that teachers want to do the best for all their students and worry that they are not. Skills and confidence are closely linked. Some may perceive a lack of skills, though they may actually have the skills and lack confidence to use them or to try new approaches.

Discussion

Teachers perceived a number of barriers preventing them from effectively including students with intellectual disability in their mathematics classrooms. These perceived barriers acted to prevent teachers from implementing inclusive practices and reflect three overarching areas of concern.

The first, Organisational Constraints, is significant for teachers. The perception of a crowded curriculum results in a real barrier to teachers that affects the approach they take to the learning they plan for their students. However, data from this and other projects we have undertaken, lead us to challenge the perception of a crowded curriculum. In previous studies, we have recorded three different lessons, each focussing on the rule for finding the volume of a prism: the first a year 3 and 4 composite class, the second a year 7 class and the final one, a year 9 class. The year 9 class did not include any student with an intellectual disability and included at least one student excelling in mathematics. The spiral curriculum in evidence here does offer opportunities for learners to revisit concepts and consolidate their understanding. However, there can be a view that all concepts mentioned in the AC:M need to be taught, rather than finding out whether and which students have already mastered concepts in previous years. The time on a particular topic in successive revisits could likely be reduced. Also, if the emphasis of teachers moved from a focus on curriculum coverage to student understanding of the learning goals, less time repeating concepts is likely to be required.

The Organisational Constraint of external assessment requirements serves as a warning about the impact of decisions misapplied to other contexts. Many of the students of interest in this study, that is, those with intellectual disability, realistically are unlikely to study advanced

mathematics courses in their final years of secondary school, nor would many other low attaining students. Yet teachers in two participating schools were making decisions to require all mathematics examinations to be undertaken without calculators, therefore denying junior secondary students the opportunity to show what they had learnt in their current courses. In addition, the use of calculators is an essential adjustment for many learners with mathematics learning difficulties (Faragher, 2023b).

Teachers' Mindsets, the second category of barriers, influences teachers' perceptions of learners and their ability to learn. The "othering" (Mik-Meyer, 2020) of students with difficulties with learning is evident in the comments of the teachers reported above. There is a striking sense that in some way, these students do not belong (Swinton, 2012) and are being at best, tolerated, and at worst, seen as a potential source of disruption to the class. This is a long way from a mindset of inclusion which welcomes all students, values their gifts and meets their needs (Thousand & Villa, 2000). In an inclusive classroom, diversity is expected and planned for.

The final two barriers in the third category, Perception of Teachers' Capacity to do their Work, relate to teachers' views of their ability to teach students with intellectual disabilities in inclusive mathematics classrooms. The two barriers: lack of resources and lack of skills or confidence are closely related. Sometimes the lack can be viewed by teachers as someone else's fault or responsibility, or sometimes perceived as a personal limitation. In inclusive education, this is a well-known phenomenon where teachers rarely feel completely confident to teach learners who require additional learning support (Mónicoa et al., 2020). This can manifest in a reliance on teacher aide support, often abdicating learning responsibility to an unqualified teacher. Teacher aide support can be invaluable, but requires careful attention to best practice guidelines (Butt, 2016).

Conclusion

We wish to be clear that the teachers in our study were not averse to the inclusion of students with intellectual disability in mathematics classes and were supportive of the aspirations for them to succeed. We also wish to acknowledge that our teachers had many comments about what enabled their inclusive practice. However, they felt constrained by barriers that impeded their ability to make adjustments for learners.

We leave as an open question whether these barriers are objectively real or instead, perceived barriers. The reliance on teachers' perceptions does introduce some limitations, including potential bias if attitudes towards inclusion or those with intellectual disability are negative, though this was not evident in our data. In addition, perceptions are recognised as contributing to behaviours, although it is also clear they are not the only determinant (Granados Samayoa & Albarracin, 2025).

In practical terms, if a teacher experiences an issue as a barrier to inclusive mathematics practice, it will be real for them, even if another teacher in the same system does not experience the same issue as a barrier. These barriers need to be identified and removed so that students with intellectual disabilities and low attainment in general can engage in high quality inclusive mathematics education.

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