Translating Curriculum Reform to the Mathematics Classroom: The Myth of the Resistant Teacher

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This research investigated teachers' experiences of enacting curriculum reform in secondary mathematics education in Ireland, focusing on the integration of problem-solving in classroom practice. Based on qualitative data generated through semi-structured interviews with 16 teachers, the analysis revealed a complex interplay of challenges experienced by teachers attempting to enact the reform. These include contextual constraints such as insufficient instructional resources, consideration of the role of the teacher, and beliefs about the teaching and learning of problem-solving and mathematics more generally. Most pertinent to the challenges of enacting reform were views of problem-solving as a peripheral "add on" to the subject, as opposed to a core element of mathematical thinking. Where teachers were implementing problem-solving in their classroom, their efforts led to excessive workload and the potential for burnout. Focusing on three exemplar teacher profiles, the research findings suggested that a lack of curriculum enactment is not due to teachers resisting the reform, but rather due to failures within the system to support teachers through appropriately designed professional development and relevant curriculum materials. This article concludes with suggestions to move beyond disjointed, off-site professional development toward sustained support that addresses tensions between cultural considerations of a teacher's role and the pedagogical skills involved in facilitating problem-solving.

Keywords • mathematics teacher education research • curriculum reform • in-service teachers • problem solving • Ireland

Introduction

The importance of mathematical literacy is well documented for all learners in terms of social mobility, employment, and in providing people with the necessary skills to participate as engaged citizens in society (Boaler & Selling, 2017; Organisation for Economic Co-operation and Development, 2016; Rose & Betts, 2004). As part of an increased global focus on mathematical literacy, there is an international trend of curriculum reform with greater focus on problem-solving skills (Rott, 2020). Problem-solving is one of the common mathematics competencies across curricula internationally, for example in Germany (Beschlüsse der Kultusministerkonferenz, 2004), the United States (National Council of Teachers of Mathematics, 2000; Schoenfeld, 2007), Japan (Hino, 2007) and Singapore (Ministry of Education, Singapore, 2023). As Burkhardt (2014) noted, however, despite being an explicit curricular goal in many countries, one is unlikely to see students engaged in problem-solving in most classrooms, indicating specific issues related to both curriculum reform and problem-solving.

A key policy focus in Ireland for over a decade has been on developing a highly educated population with a strong proficiency in Science, Technology, Engineering, and Mathematics (STEM), particularly, in mathematics (Department of Education and Skills [DES], 2019; Ní Shuilleabhain et al., 2021). The increased emphasis on problem-solving skills of all learners is highlighted in numerous policy documents and is apparent in mathematics curricula reforms over the past fifteen years (DES, 2010; 2015; 2017; 2019). This has included the introduction of new curricula that aim to transform mathematics teaching and learning, with a strong emphasis on mathematical problem-solving. In 2012 a new curriculum, colloquially referred to as Project Maths, was introduced for the span of all secondary mathematics education in Ireland. In this context, mathematics reform has been presented

at a national level as necessary and progressive, with the objective to instruct sometimes reluctant teachers to adopt new practices and procedures. Research has demonstrated, however, that despite these policy initiatives mathematics classroom practices at second-level have remained largely unchanged (Jeffes et al., 2013; Prendergast & Treacy, 2018), with a heavy focus on procedural skills and rote-learning (O'Meara et al., 2017; Prendergast & O'Donoghue, 2014; Prendergast & Treacy, 2018). Studies undertaken as to why the curriculum is not being enacted in the classroom found that systemic issues prevailed. The final high-stakes exam at senior secondary level acts as a gateway to higher level education and influences what happens in the classroom (Burns et al., 2018). This is particularly relevant in mathematics, where bonus points awarded for studying mathematics at 'Higher' (or advanced) level has resulted in increases in student-teacher ratios and have, therefore, influenced classroom practice (Treacy et al., 2020). Research has also highlighted that textbooks, a main pedagogical resource for mathematics teachers, have not aligned well with the new curricula (O'Sullivan et al., 2024). Furthermore, professional development, which is provided at a national level through the Department of Education and Youth, continues to be offered as one-off, off-site offerings that focus on subject content (Long & Delargey, 2025). There is an implicit narrative, however, that the failure of curriculum enactment lies with teachers who are either unqualified and unable, or resistant and unwilling, to make changes to their classroom practice to align with the curriculum (e.g., Berry et al., 2021; Guerrero, 2014; Jeffes et al., 2013).

Recognising that teachers are the key to enacting reform (Borko, 2004; Kilpatrick, 2009), Charalambous and Philippou (2010) outlined that identifying and attending to the concerns of teachers can contribute to the successful implementation of curriculum reform. Furthermore, Chapman and Heater (2010) suggested that teacher self-efficacy and reflectiveness must be considered. More recent research has found that mathematics teachers in Ireland have concerns related to the 2012 reform and the more recent introduction of classroom-based assessments. (Byrne & Prendergast, 2020; Prendergast & O'Meara, 2026). However, little is known or understood as to how teachers are experiencing, interpreting or attempting to undertake such reform in their classrooms. Furthermore, there is little understanding as to how the national mechanisms of implementation (e.g., new curriculum documents, new curriculum materials, and the provision of professional development) may be supporting teachers. In the context of the most recent introduction of problem-solving classroom-based assessments at lower secondary (12–15 years) level in Ireland, we therefore investigate mathematics teachers' considerations and struggles related to this most recent curriculum reform and pose the following research question:

> *How are teachers experiencing the enactment of problem-solving in their mathematics classroom as part of curriculum reform?*

Mathematical Problem-solving in the Classroom

Despite being a focus for many decades, mathematical problem-solving continues to be a challenge for many teachers to teach effectively and, in parallel, for students to learn proficiently (Chapman, 2015; Prusak et al., 2013). Incorporating problem-solving into the classroom in a meaningful way means that students are grappling with problems for which the solution is not readily available to them (Lester, 2013). The teachers' role in this is key, as they must consider their students' prior knowledge and experiences to ensure the task is genuinely problematic. Moreover, the manner in which teachers present and facilitate students' approaches to a task can greatly influence its problem-solving potential (Hiebert et al., 1996).

Problem-solving pedagogies, also known as inquiry-based pedagogies or teaching through problem-solving, are student-centred and engage students in challenging, authentic problem-solving on a regular basis (Hino, 2015). Since mathematics maybe perceived as a subject where success is related to conformance, compliance and lack of agency (Boaler & Greeno, 2000), problem-solving can be a difficult change to embrace for students and teachers alike. Incorporating problem-solving approaches, which require the learner to demonstrate creativity, resilience and autonomy in proposing a solution, may require a significant shift in the teacher's role from more expository approaches (Cavanna et al.,

2015; Cross, 2009). Cultural dispositions towards mathematics can also impact the need for a change in the teacher's role since, in many traditional mathematics classrooms, the teacher is in control of the learning and determines what tasks are done, in what order, and by which students (Erickson et al., 2021; Stipek et al., 2001). By contrast, in classrooms aligned with problem-solving pedagogies, such as those proposed in recent policy documents in Ireland, students have ownership of their learning and contribute to the classroom through discussion while the teacher guides the interactions (Cavanna et al., 2015). In these classrooms, the teacher's role is core to students' learning since they facilitate mathematical discussions and prompt student thinking through careful questioning and advance planning, in ways that recognise and build on the strengths of each learner (Goos, 2004; Hino, 2015). This can be a complex pedagogy for teachers to embrace, since they must decide when and how to intervene, while at the same time leaving space for students to attempt their own solutions and arrive at their own answer (Prusak et al., 2013). Such presentation of teaching is often unfamiliar to, and challenges the beliefs of, teachers who did not experience problem-solving as learners themselves (Handal & Herrington, 2003). Without guidance or expectations for what might happen or insight into the teachers' role, many teachers are left feeling they should avoid telling students anything and experience a reduction in self-efficacy (Stein et al., 2008). In addition to understanding how to help students to become better problem solvers, teachers also need knowledge of mathematical problems and problem-posing, and to understand problem-solving as a way of thinking rather than an isolated activity (Chapman, 2015).

Culturally embedded beliefs about students' fixed mathematical abilities, combined with views of mathematics as a set of procedural skills to be learned, can be detrimental when attempting to shift classroom practices towards inquiry pedagogies (Ernest, 1989; Fitzgerald et al., 2021). Stipek et al. (2001) found that classroom practices that include an emphasis on speed, accuracy and greater control over students' mathematical activity correlated with teachers' beliefs of mathematics as a "static" subject and perceptions about learners' fixed ability. For teachers unfamiliar with the skills of facilitation, this can lead to missed opportunities to prompt learners to attempt solutions or to consider what information students might need to continue, thereby diluting students' experiences of problem solving (Lester, 2013). In a vicious cycle of missed mathematical opportunities, students may be less motivated in their learning (Heyder et al., 2020), thereby fortifying the idea that problem-solving is an unattainable skill for lower-achieving students (Zohar et al., 2001). Contrastingly, when problem-solving is encouraged a classroom culture is developed where students are emboldened to make and correct mistakes, are provided opportunities to engage in productive struggle, and have autonomy over their mathematical thinking and approaches (Hiebert & Grouws, 2007; Schoenfeld, 2018; Takahashi, 2021).

It is important to outline these cultural interpretations of mathematics in the context of Ireland, where there are pervasive messages around mathematics as a subject one is either "good" or "bad" at (e.g., McCoy et al., 2020). Up until recently, higher-level or advanced mathematics was only considered by a minority of students (typically less than 15% up until the 2012 reform) and the addition of bonus-points has contributed to some as evidence that this subject is more difficult and elite than others (e.g. McCoy et al., 2019). This fixed-ability interpretation of mathematics is particularly relevant for students from socioeconomically underprivileged schools, where there are often less ambitious goals held for them in their mathematical learning (Ní Shuilleabhain et al., 2021). The pervasive mode of teaching mathematics has, for decades, emphasised rote learning of procedures (e.g., Lyons et al., 2003; Prendergast & O'Donoghue, 2014) and may have contributed to the high levels of mathematics anxiety found in Ireland (e.g. Perkins et al., 2013). It is within this background that reform in the teaching of mathematics has not yet succeeded to take hold (e.g., Prendergast & O'Donoghue, 2014; Prendergast & Treacy, 2018).

Teachers in Mathematics Curriculum Reform and Professional Development

The successful enactment of curriculum reform depends on the teachers who will interpret and implement it (Gravemeijer, 2014; Kilpatrick, 2009; Spillane, 1999). However, while teachers might be

celebrated in success, failure of enactment is often laid at their feet for purposefully hindering necessary educational change (Duke, 2003; Maaß, 2011; Valoyes-Chávez, 2019). Teachers have been portrayed as the gatekeepers to policy enactment, resisting change as a self-aligned act (Valoyes-Chávez, 2019; Zimmerman, 2006). While resisting reform may well be a justified action in relation to teachers' concerns about student learning (Christou et al., 2004; Zimmerman, 2006), the system and mechanisms of reform often neglect teachers' considerations, understandings, and experiences of enacting a new curriculum (Orafi & Borg, 2009). Valoyes-Chávez (2019) challenged the idea of the "resistor" teacher as a way of explaining failure within mathematics curriculum reform and instead suggests that failures to implement mathematics curriculum reform is a result of conflicting identities, as teachers struggle with different meanings of being a mathematics teacher. Fry et al. (2025) further highlighted how the potential impact on teachers' identity and beliefs is a major challenge to reform efforts that aim to shift teachers' mindsets towards inquiry-based approaches in mathematics education.

In order to support curriculum reform, research suggests that effective professional development needs to specifically address teacher beliefs around pedagogy and to identify any mismatches between teachers' viewpoints and the goals of the reform (Handal & Herrington, 2003). Professional development should incorporate opportunities for mathematics teachers to observe and critically reflect on the desired classroom practices, in order to enable them to interpret and consider these as part of their own work (Herbert & Bragg, 2021; Manouchehri & Goodman, 2000). Research from Herbel-Eisenmann et al. (2009) demonstrated that where teachers have opportunity to engage with and critically reflect on research literature around new instructional approaches, they come to see and talk about their practice in new ways and to better align their classroom practices with their pedagogical beliefs through discourse-related ideas. When reform aims to move away from expository approaches towards a focus on problem-solving, this can cause conflict with teachers' existing considerations and understandings of mathematics, how it can be learned, and their role as a teacher (Borko, 2004; Fry et al., 2025; Handal & Herrington, 2003). Teachers should therefore be afforded opportunity to witness and experience new practices first-hand in order to gain greater understanding of how to enact them in their classrooms for their learners (Herbert & Bragg, 2021; Hourigan & Leavy, 2022). Meaningful and sustained teacher change occurs when there are productive tensions arising between teachers' beliefs, actions and contexts, and when they are supported to recognise, attend to, and resolve these tensions (Chapman & Heater, 2010). Off-site, one-off professional development with teachers from multiple schools may have limited success in this regard.

Research Context: Secondary Mathematics Education and Curriculum Reform in Ireland

Secondary education in Ireland is comprised of a three-year Junior Cycle (ages 11/12-14/15), and two-year Senior Cycle (ages 15/16-17/18) with an optional Transition Year in between. All students are taught common State-designed curricula and at the end of each cycle students complete State examinations, the Junior Certificate and Leaving Certificate. For the Leaving Certificate students receive points according to their grades and these largely determine access to third-level education. As a result, the Leaving Certificate is considered a high-stakes examination (see McCoy et al., 2020).

As noted previously, the Irish secondary mathematics curriculum has undergone significant change in the past decade, but there is little evidence of change in classroom practices (Prendergast & Treacy, 2018). Mathematics teachers have displayed high levels of concerns about the curriculum reforms (Byrne & Prendergast, 2020; Prendergast & O'Meara, 2026). Following the introduction of compulsory classroom-based assessments in problem-solving at Junior Cycle, this study focuses on gaining an understanding of teachers' lived experiences of the reform and their attempts to incorporate problem-solving into their classrooms.

Methodology

Participants and Data Generation

Given that the research aimed to gain insight into teachers' experiences around incorporating problem-solving into their classroom practice, it demanded a qualitative approach based on participants' own frame of reference (Elliott et al., 1999; Yin, 2015). Semi-structured interviews were chosen as the primary data generation tool (Seidman, 2006), focusing on teachers' experiences, considerations and struggles with incorporating problem-solving in their work. Both authors previously taught mathematics in the secondary school classroom and brought this previous professional experience to the research and analysis, as well as an objective of developing insight into teachers' experiences enacting reform from a phenomenological perspective.

Teachers were invited to participate in the research through an online form which was publicised through social media, shared with national subject associations, and emailed to school leaders across the country. Of the volunteer teachers, a range of teacher experiences (gender, mathematical background, years of experience) and school contexts (underprivileged, co-educational/single sex, small/large pupil population) were identified, and 16 teachers were invited to participate in the research (see Table 1).

Table 1
Demographic Details of Participating Teachers

Participant	Gender	Years Teaching	Cohort[1]	Out-of-field[4]
T1	F	>12	Boys	N
T2	M	>12	Co-ed	N
T2	M	>12	Co-ed	N
T4[2]	F	<4	Boys	N
T5	M	<4	Co-ed	N
T6[2]	F	>12	Boys	N
T7	M	<4	Co-ed	N
T8	M	4–7	Co-ed	N
T9	F	7–12	Girls[3]	N
T10	F	>12	Boys	Y
T11	F	<4	Co-ed	N
T12	F	<4	Co-ed	N
T13	M	>12	Co-ed	Y
Lucy	F	4–7	Girls	Y
Mary	F	>12	Girls	Y
Rory	M	7–12	Boys	N

[1] In Ireland, approximately one third of students attend a single-sex school which are largely state-funded and non-selective. [2]T4 and T6 were both working in the same school. [3]T9's school was in the process of becoming co-educational and at the time of the research had boys and girls in first year only. [4]There is a high incidence of out-of-field teaching in Mathematics in Ireland. A National survey in 2011 found 48% of respondents were teaching mathematics without the required subject-specific qualifications (Ní Riordáin & Hannigan, 2011).

Online interviews were conducted and audio-recorded with each of these 16 teachers, lasting on average 55 minutes. The research conformed to the ethical procedures of, and was approved by, the first author's research institute. The interview protocol included questions such as "What do you see as the role of problem-solving in the curriculum?" and "How does problem-solving currently feature in your classroom practice, if at all?" (see Appendix). Interviews were transcribed, identifying information was removed, and the transcriptions were added to NVivo software to allow easy transfer

of documentation and comparison of analysis between the two authors, in keeping with case study research (Tagnin & Ní Ríordáin, 2022).

Data Analysis

The two authors engaged with thematic coding, with the first author coding all interviews and the second author coding a subset of four interviews. In line with Braun and Clarke (2022), any potentially interesting features and comments were coded to generate initial descriptive codes. The authors shared their analysis of the interviews and discussed features that were prominent. Initial shared descriptive codes included: teachers' beliefs about their students' capacity for problem-solving; problem-solving being viewed as an "add-on" to the curriculum; and the importance of teacher facilitation in developing students' problem-solving skills. Through their discussions the authors identified four overarching themes in the data: teachers' epistemological views about problem-solving and mathematics, teachers' beliefs about the teaching and learning of mathematics, the role of the teacher, and contextual constraints. After further discussion of these themes the first author revisited the data, coding within these over-arching themes. For example, if a teacher described themselves as an "exam coach" this was coded as the "role of teacher" or if a teacher described the subject of mathematics as "creative" this was coded as "epistemological views about problem-solving and mathematics." After this second phase of analysis the authors again discussed the data and the patterns they had identified as related to teachers' experiences of their attempts, successful or otherwise, to incorporate problem-solving into their classroom practice.

Due to the richness of the data and its contextual nature, we chose to focus on three teachers as exemplar case studies to elucidate the patterns and tensions among and between teachers' experiences across the four themes. The three profiles of Mary, Rory and Lucy were chosen as they captured the diverse ways in which the 16 participating teachers were experiencing the enactment of problem-solving following curriculum reform and represented the span of views expressed across the interviews. These three profiles provided a useful focus to outline the three broad categories of participating teachers and allowed us to delve deeper into teachers' experiences of attempting to interpret and enact the curriculum reform. Furthermore, these teachers illustrated the complexity of the findings by highlighting that while many of the teachers were contending with the challenges of recent reforms, none were explicitly resisting it.

Findings

A common theme for all 16 participating teachers was the lack of class time available to teach all components of the curriculum. In addition, all participating teachers highlighted the lack of suitable resources to use in the classroom, particularly the lack of suitable tasks in the textbooks for problem-solving (e.g., O'Sullivan et al., 2024). Our three exemplar teachers spoke of these *contextual constraints* in different ways, which we highlight below. Mary, Rory, and Lucy also offered differing views of *the role of the teacher* in the mathematics classroom and of their attempts to develop students' problem-solving skills. In discussing their roles in the classroom and *beliefs around teaching and learning mathematics*, they outlined differing *epistemological views of mathematics and problem-solving*, further emphasising the links between teachers' beliefs and their pedagogical practices (Cavanna et al., 2015; Fry et al., 2025). Due to the interrelated nature of these themes, the findings from the in-depth analysis of these three teachers are outlined below through an overall profile of each teacher's experiences, relating the connections, tensions, and contradictions between the four themes highlighted above. To emphasise the qualitative nature of the data and phenomenological approach taken to develop our understanding of teachers' experiences, the findings are reported in the present tense.

Mary

Mary is struggling to engage meaningfully with problem-solving in her classroom. She is very aware of the necessity of her role as the teacher in developing her students' problem-solving capabilities but is unsure what this role looks like in her classroom. Other than occasional one-off lessons, she rarely incorporates problem-solving into her teaching. Throughout her interview Mary consistently takes responsibility for the lack of problem-solving in her classroom, and she explicitly states that she is avoiding problem-solving with her students, not because she does not want to include it within her practice but because she does not know how to do it.

> *I'm avoiding [problem-solving] I suppose, because I don't feel properly equipped to make it work well in the classroom.*

Mary understands that the recent reforms demand a shift in the *role of the teacher* in order to meaningfully engage with problem-solving. She talks about needing to be able to "facilitate" her students and acknowledges that her "teacher-led" approach is not consistent with the pedagogies promoted in the recent reforms.

> *… most of my teaching has been teacher-led, and that's the way I was taught and that's what I know. I suppose that's my crutch. And I know we should be doing more problem-solving and I'd like to be able to do it.*

Reflecting on some of the professional development programmes she has attended, she describes it as being "very vague" and not specific enough to take into the classroom. Notably, Mary seems to know what she needs from professional development activities. She desires something "concrete" which she can implement in her classroom. In Mary's experience the professional development programmes have focused on communicating the reform and attempting to convince teachers of the need to change their practice, without specifically providing guidance on how to enact these changes.

> *I think a bit more structure, a bit more guidance. Not the professional development [telling us] this is why we're doing it, it's so important that they can problem-solve and so on. We all understand why it's important, but what can we do? How do we do it?*

Mary's *beliefs about the teaching and learning of problem-solving and mathematics* may also be impacting on how she engages with problem-solving in her teaching. While she says she is convinced about a need to include problem-solving in her teaching, she articulates a perceived tension between focusing on students' "basic skills" and problem-solving which she seems to consider as a dichotomous choice. Despite stating that she understands the importance of problem-solving and wants to bring more problem-solving into her practice, she wonders if her students' may be better served by "practicing skills, covering the course". This is particularly evident when she talks about her experience of the new problem-solving classroom-based assessment.

> *I have concerns that some of the students wouldn't have learned a whole lot from it. […] That would be my concern, that it was a lot of time wasted in the classroom when maybe we would have been better practicing our skills.*

Mary demonstrates a willingness to learn and improve her practice through her attendance at professional development. However, she is struggling to translate this to the classroom. She is not resisting the implementation of the reform. She wants to implement it but does not know how to and does not feel supported to make any changes to her classroom practice.

Rory

Rory is one of the few teachers interviewed who speaks positively and confidently about incorporating problem-solving into his practice. His *epistemological views about problem-solving and mathematics* and his *beliefs about its teaching and learning* appear to be in line with the aims of the recent reforms. Rory describes mathematics as a creative subject with many approaches, rather than a subject where one is either right or wrong.

> *I suppose the idea that maths is not just a … there's not only one solution to a question.*

This view also supports his expressed *beliefs about the teaching and learning of mathematics*. Rory believes that students should be given the opportunity to investigate different approaches and be given opportunity to take chances and explore different approaches with mathematics.

> *When you allow students to be creative with their mathematics, and I suppose look at a problem in a variety of different ways it greatly enhances their problem-solving skills.*

He describes having "a constructivist approach to mathematics" where he allows students to "reinvent the mathematics" and "rediscover the mathematics," which is consistent with his view of mathematics as a subject to be "opened up."

Rory also outlines the *role of the teacher* in this process. He acknowledges the importance of providing an appropriate level of scaffolding and guiding the students through the process of problem-solving to ensure it is mathematically productive.

> *I kind of feel sometimes there's a little bit too much scaffolding. Whereas if you let the students off and then provide the scaffolding where needed […] letting them rediscover the mathematics, and then, where appropriate, providing feedback.*

Rory understands his role as a facilitator, supporting students "through guided reinvention". Rory also views his role as going beyond simply preparing students for their examinations.

> *You're trying to educate the students as lifelong learners […] as opposed to just preparing students for an exam. You are trying to get them to problem solve and be able to apply these problem-solving skills in a variety of situations.*

Developing his students' problem-solving skills is a priority for Rory and, consequently, he devotes time to it, ensuring it is a regular part of his students' mathematical experiences. Rory has considered how students' problem-solving capabilities develop, and he emphasises student reasoning and the importance of "constantly trying to make connections between various areas of mathematics."

> *I try to get them to, to get them to solve a sort of an open problem where possible and then […] try to get them to justify or explain their answers so they're constantly thinking and it's not just maths is a linear process here's the answer.*

A key difference between Rory's description of his practice and the majority of the other participating teachers, is that he does not consider problem-solving and procedural work to be a contrasting choice. He articulates that procedural fluency is also important for his students, but aims to develop this without repetitious, drill work.

> *I think it's important that they do their procedural work… but having said that you're not just spoon-feeding them the procedural work […] I try to steer clear of doing 100 repetitions of the same question.*

However, despite reporting positive experiences with enacting the new curriculum and speaking with confidence about problem-solving, Rory invests significant time and effort into improving his practice. He finds it difficult to source appropriate resources to support his pedagogical approach to teaching. As a result, he spends time designing his own tasks which brings its own challenges.

> *The biggest challenge is the appropriate design of tasks. I feel that it's something I do put a good bit of research into…*
>
> *I spend a lot of time designing or looking for tasks. […] If there were more tasks readily available that tied in nicely with the subject specification, but at the same time developed the students' various components of mathematical proficiency […] I think that would be great.*

He reports engaging in a range of optional professional development opportunities, reading books related to pedagogy, and attending online webinars related to the classroom-based assessment and problem-solving more generally. He spends time reflecting on his professional learning and practice and highlights the importance of "being a reflective practitioner." These activities are over and above the nationally provided professional development and require Rory to spend considerable time outside

his working hours to take part in learning and research that might support him to implement the reform. While demonstrating admirable commitment to the curriculum reform, Rory undertakes this in isolation as he does not have colleagues in school who are equally invested in the reform. This approach risks being unsustainable for Rory.

Lucy

While not woven into her everyday classroom practice, Lucy reports engaging her students in problem-solving as an extracurricular activity and through one-off lessons. She describes how these lessons sometimes "turn into more art and craft projects than looking at the actual maths." She does not seem to consider her *role as the teacher* in maintaining a mathematical focus and often equates problem-solving with "fun maths" outside of the curriculum.

> *I'd love to do fun maths every single day, but it's too much of a challenge to get through the curricular content.*

She appears to hold a hierarchical perspective of the mathematics curriculum, where problem-solving is not considered as serious mathematics and is not as valuable as attainment in calculations.

While Lucy is not resisting the reform she is a little critical of it, in particular the emphasis on engaging students in problem-solving. This criticism, however, is due to the challenge of students' attitudes and abilities.

> *It's brilliant in theory, in practice it's difficult to have problem-solving abilities when they don't have the maths knowledge to back it up.*

Lucy does not appear to consider her own *role as a teacher* in developing her students' problem-solving capabilities, their knowledge of mathematics, or in impacting on their beliefs and attitudes around problem-solving. She attributes the causes of the difficulties incorporating problem-solving in the classroom as related to her students and appears to view them as outside of her control. At various points during her interview, Lucy ascribes her students' struggles with problem-solving and the associated classroom-based assessment to their age, motivation, literacy levels, attitudes and ability:

> *They just lack critical thinking skills at that age […]*
>
> *They don't put much value on the classroom-based assessment because it's not worth anything to them … they don't see why problem-solving is important.*
>
> *Some concepts for maths are just beyond some of the students.*

It may be of note here that the classroom-based assessment does not contribute to students' overall grade in their State assessment and Lucy attributes her students' uninterest to this. While there is arguably a tension between the emphasis on problem-solving in the recent reforms and the lack of meaningful problem-solving in Lucy's classroom practice, Lucy does not view this tension as an issue to be resolved. Instead, it is explained away through attributes of her students which she perceives to be fixed and removed from her role in the classroom.

Lucy's *epistemological views about problem-solving and mathematics* and *beliefs about its teaching and learning* may be influencing her consideration of the *role of the teache*r in developing students' problem-solving skills and attitudes towards it. Throughout her interview Lucy refers to mathematics as something you "get" and describes her role as "showing" the students concepts and procedures, while the students' goal is to get the correct answer. As noted above, she expresses the belief that some of her students are not able to grasp certain mathematical concepts.

Preparing students for their state examinations is a priority for Lucy and she recognises the significance of the high-stakes examination for her students. This emphasis on exam results, which she describes as "the end goal, the end outcome", is also increasing the time pressure for her. There appears, however, to be an unacknowledged tension in Lucy's efforts to support her students with their examinations. Lucy explains the limited amount of problem-solving in her classroom practice as being partly due to the need to "drill" students so that they pass their examinations, yet she also reports her students performing poorly on the problem-solving sections of these same examinations.

> *Where they have to actually read things, and comprehend where things are going, like in the applied sections, they just don't have the… […] they just look at it, immediately say I don't know how to do it, and then skip over.*

Lucy does not seem to recognise a possible connection between her students' limited exposure to problem-solving in their mathematics classroom and their level of achievement in problem-solving style exam questions. Lucy's beliefs about her students' mathematical ability, coupled with her perceived obligation to prepare them for a high-stakes examination, appear to influence her transmission-style pedagogy and use of rote-learning.

> *Some concepts for maths are just beyond some of the students, and you need to be able to dedicate enough time so that they can keep up, that they can actually get through the exam because that's ultimately what they are judged on. … they're judged on what they get in an exam and they need to pass maths so, unfortunately, drill, drill, drill, repeat for some of it, and hope that some of it sticks.*

Lucy's perceived *role as a teacher* is to ensure her students are as successful as possible in the high-stakes examination, which drives her pedagogy. Lucy is confident in her practice and, while she is teaching the new curriculum, she does not recognise any need for a change in her role as teacher or in her classroom practice more broadly. She does not express any concerns about her own capacity to incorporate problem-solving into her practice. Any challenges she faces regarding problem-solving she views as due to student attributes and attitudes, which she has not considered as being something she can impact.

These three teachers highlight the individual and contextual factors that contribute to their experiences of enacting problem-solving in their classrooms. They each display very different considerations of challenges associated with the reform. Mary wants to enact the reform but is unaware as to how to do so. Rory appears to be confidently enacting the reform but is acting in an unfortunate necessity of isolation. Lucy feels that she is enacting the reform and is not fully convinced of her students' capacity to engage with it.

Discussion

Curriculum reform is often presented as logical, rational, accumulative and irreversible (Popkewitz, 1988), with the objective then to convince teachers to adopt new practices and procedures (Guskey, 2002). This research explores teachers' experiences of enacting problem-solving in their classrooms, as relevant to recent mathematics curriculum reform in Ireland. Recognising that curriculum reform often leads to negotiation at system and individual level around what it means to be a 'mathematics teacher' (Valoyes-Chávez, 2019), our research reveals the spectrum of challenges this can pose when mathematics and its teaching look so different for so many. While the revised curriculum has an explicit objective of teachers facilitating problem-solving within their classrooms, the data suggests that this work is not supported or rewarded within the broader system. The findings align with the arguments of Valoyes-Chávez (2019) around the myth of the resistor teacher and suggest that any failure to implement the reform is not due to teacher's resistance, but rather related to a lack of appropriate resources and professional development provided at a system level. The three teachers profiled offer illustrative examples in this regard. Mary, though not fully enacting many of the practices promoted by the reform, is not resisting it. She wants to change her role in the classroom and adopt more problem-solving practices in line with the reform, but does not know how to do this. She wants to be supported to adopt new pedagogical practices. Rory is actively engaging with the reform and enacting problem-solving practices in his classroom. He is, however, spending considerable amounts of time sourcing appropriate resources, attending additional professional development, and designing materials for his classroom with little support from colleagues or the broader education system. As he grapples with this workload, attempting to navigate resource deficiencies and time-poverty, he is at risk of suffering from burnout (O'Farrell et al., 2025). Lucy is also attempting to enact the curriculum but, from her perspective, any failure to enact problem-solving practices in her classroom is a result of the attitudes and abilities of her students, which she perceives as being beyond her control (Zohar et al., 2001). Her

epistemological views do not align with those outlined by the curriculum, where problem-solving is considered a core mathematical skill (Lester, 2013; Schoenfeld, 2007). She does not consider problem-solving as an important mathematical practice (Chapman, 2015), but sees it as an additional, perhaps unnecessary, requirement of the new curriculum. This view is not unearthed, exemplified, or challenged within the curriculum documents or in the associated professional development programmes. From her perspective, Lucy is attempting to enact the reform, and it is due to the students in her classroom that this is not succeeding. Again, she is not resisting the reform.

The majority of the teachers interviewed for this research recognised there was a change of role required of them as part of the curriculum reform and were willing to attempt, but unable to identify or implement, this change. This was despite their participation in professional development offered as part of the national curriculum reform. Mary highlighted that although she engaged with the off-site professional development training, she did not feel she had the necessary resources or skills to enact the reform. Lucy did not see any tension between how she was including problem-solving in her practice and how it was articulated in the new curriculum, an issue neither discussed nor contested within the professional development programme. Rory participated in all the professional development on offer but was still left looking for suitable curriculum materials for his learners and additional teacher learning opportunities. While it is necessary for professional development programmes to effectively communicate the aims of reform and convince teachers of its importance, our research highlights that this in and of itself is not sufficient. Understanding the nature of problem-solving is an important element of teacher learning (Chapman, 2015) and participating teachers wanted further opportunities to explore and reflect on what problem-solving could look like in their particular classroom contexts. The professional development available to them did not offer opportunities to observe or reflect on desired classroom practices that might highlight potential mismatches between their identity and beliefs and the aims of the new curriculum (Fry et al., 2025; Handal & Herrington, 2003; Herbert & Bragg, 2021). Teachers in this research wanted concrete images of what it might look like to enact the reform with their own students and specific resources to consider and review for using in their own classrooms (Herbert & Bragg, 2021; Manouchehri & Goodman, 2000), but this was not part of the programme on offer. Without such resources, teachers like Mary are likely to continue to rely on the traditional pedagogical practices they are used to, despite expressing a desire to change. Teachers like Rory risk struggling with an excessive workload to source resources, thereby shifting accountability from the system within which they are working. Teachers like Lucy are unlikely to incorporate any new or unfamiliar pedagogical practices that might not align with their considerations of the subject. It is also important to note that, while Lucy and Mary identified as out-of-field teachers (see Table 1), both had participated in up-skilling courses that had enabled them to qualify as mathematics teachers. This did not seem to influence, however, their understanding of problem-solving or their abilities to incorporate it into their classroom practice.

Irish teachers have been described as taking the role of "exam coach" (Lubienski, 2011) and some of the teachers interviewed in this research provided further examples of this. Echoing the findings of Burns et al. (2018) on the influence of high-stakes matriculation examinations on teaching in Ireland, examination preparation dominated the pedagogy of many of the participating teachers and was often given as a rationale for avoiding the problem-solving elements of the curriculum. As outlined by both Mary and Lucy, the high-stakes examinations seemed to increase contextual constraints such as time pressures, which made them less likely to adopt new pedagogical approaches. Lucy articulated the high-stakes examination as a barrier to change since she viewed her role as preparing students for these examinations and found "drill and practice" an effective means of doing this. The data suggests that the necessity to cover a vast curriculum for such consequential results mitigated against lessons that would give time to learners to explore and consider mathematical problems as part of their learning. In addition, many participating teachers viewed problem-solving lessons as an "add on" that was somewhat irrelevant to students' examinations, rather than an integral part of teaching and learning mathematics, perpetuating a static and constrained view of the subject (Ernest, 1989). These teachers, as illustrated by the case of Lucy, did not consider problem-solving as a way of thinking mathematically

but rather as an isolated activity. In this regard, our research further emphasises the associations between teachers' instructional practices, their beliefs about mathematics, and beliefs about mathematics teaching and learning (Cross, 2009; Stipek et al., 2001).

Considering these findings, the question remains as to how we can support teachers in adopting a problem-solving approach to teaching mathematics. Research from Baumert et al. (2010) suggested that teacher education, and not years of experience, is at the core of the development of teacher knowledge. Professional development is, therefore, key to change in teachers' practices and there are opportunities to consider how programmes can be developed to respond to teachers' needs, particularly in the context of centralised, national programmes of professional development. Existing research has suggested that, in the Irish context, professional development for curriculum reform must be responsive to teachers' contexts, include expert support where appropriate, and foster structured collaboration to facilitate lasting pedagogical change (Long & Delargey, 2025). Based on the data from this research, programmes of professional development should offer teachers opportunities to consider, reflect on and take part in classroom practices which challenge their beliefs about mathematics and its teaching and learning (Cavanna et al., 2015; Chapman & Heater, 2010; Fry et al., 2025). In order to ensure teachers are not at further risk of burnout due to attempting to source suitable resources like Rory (O'Farrell et al., 2025), programmes should develop and share curriculum materials that are relevant to classroom practice, and which teachers can easily access and amend as relevant to their pedagogy and students. Teachers need to be supported to consider possibilities within their practice (White et al., 2021). Broader discussions about teacher beliefs and practices are required from a policy and practice context in relation to any professional development that accompanies and supports curriculum reform, particularly in the context of upcoming national mathematics curriculum reform.

Limitations, Implications, and Conclusions

Although this research was carried out in Ireland, the research context will likely resonate with other countries trying to enact similar curriculum reforms in mathematics. Given the sample population of 16 teachers interviewed, we do not claim all representative views were captured or that our three profile teachers represented all the ways in which teachers perceive the challenge of problem-solving in their classrooms. We argue, however, that the data generated for this research provide a unique insight into teachers' experiences, considerations and struggles with regards to incorporating problem-solving pedagogies into their practice. In addition, it enabled us to highlight three different ways in which teachers are currently grappling with enacting problem-solving in their classrooms following curriculum reform. In particular, the research highlights the need for programmes of professional development to support curriculum reform through critical reflection of classroom practices and provision of classroom-based curriculum materials (Remillard, 2000; Ní Shuilleabhain & Seery, 2019).

For curriculum reform efforts to be successful, professional development programs need to be designed to communicate the reform, meet teachers where their beliefs around mathematics and pedagogy lie, provide opportunities to observe and critically reflect on pedagogy and students' learning, and provide concrete resources to support and enable teachers to enact these changes (Handal & Herrington, 2003; Herbel-Eisenmann et al., 2009; Herbert & Bragg, 2021). Appropriate problem-solving materials are needed to exemplify how a problem-solving approach can be successfully embedded in the classroom. Such resources could provide the concrete examples Mary requires, ensure Rory's efforts to incorporate problem-solving into his practice are sustainable and supported by the system within which he is teaching, and prompt Lucy to reflect on the potential limitations of rote learning in the context of developing problem-solving skills.

The research provides additional challenge to suggestions that failures in curriculum reform lie at the feet of resistant teachers (Valoyes-Chávez, 2019) and, instead, suggests that accountability lies within the system to adequately support and resource teachers to enact a new curriculum. Further research investigating the role educative curriculum materials can play to support curriculum enactment and successful educational reform will be of interest. In addition, research on teachers'

epistemological beliefs around the subject of mathematics and problem-solving will also be relevant, particularly in the context of the next national curriculum reform soon to be implemented in Ireland.

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Appendix: Interview Protocol

Background/Contextual:

1. Can you tell me a bit about your background as a Mathematics teacher?
    a. How long have you been teaching Mathematics?
    b. Do you teach any other subjects?
    c. What are your qualifications/ what training did you do?

Role of Problem-solving:

2. What do you see as the role of problem-solving in the Junior Certificate curriculum?
3. How does problem-solving currently feature in your classroom/teaching, if at all?
    a. What challenges does problem-solving present for you?
4. Thinking about problem-solving more generally and how it features in your classroom, what, if any, concerns do you have regarding problem-solving in your classroom at present?

Curriculum Materials and support:

5. What resources/textbooks are available to you to support your teaching and planning in relation to problem-solving?
6. What resources/textbooks *do you actually use* to support your teaching and planning in relation to problem-solving?
    a. Why do you use these particular materials?
    b. How do they support your teaching of/through problem-solving?
    c. What are the strengths of these materials?
    d. What weaknesses to they have?
    e. How might these materials you use be improved?
7. What resources/textbooks would you like to have?
8. How might they support your teaching of/through problem-solving?
9. If you could design your ideal textbook/teacher guide/resources, what would they look like?
10. What do you need to be better supported in conducting the classroom-based Assessment or enacting problem-solving more generally?
11. What resources/materials would be beneficial to you?