"Anyone Can Teach Maths": Workplace Perspectives on Out-of-Field Teaching of Mathematics

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The pervasive shortage of mathematics teachers in Australia has resulted in a critical reliance on out-of-field (OOF) teaching, significantly impacting student performance. This study shares insights from a scholarly inquiry in progress aiming to map the complex educational ecosystem that perpetuates OOF teaching. This paper examines the positioning of OOF mathematics teachers within (or absent from) the current policy and organisational strategy documents that are supposed to support them. It explores analyses and interpretations using methodologies relating to the professional capital of the researchers considering them, with implications for future research.

The escalating teacher shortage across Australia and globally has precipitated a crisis, compelling school leaders to implement emergency measures to staff classrooms. An increasingly widespread response has been to assign teachers to teach subjects or levels of schooling for which they are not qualified – that is, to teach out-of-field (OOF) (Hobbs, 2013). This practice, evidenced by recent data such as the estimated 40% of Mathematics teachers teaching OOF (Australian Institute for Teaching and School Leadership (AITSL), 2021), carries significant implications, including diminished student academic performance (Van Overschelde, 2022), increased teacher attrition (Sharplin, 2014), and compromised teacher confidence and sense of professional identity (Du Plessis et al., 2015). While existing upskilling initiatives, such as graduate certificates and micro-credentials, may offer potential avenues for addressing this issue, their efficacy is challenged by deeply ingrained cultural norms that often fail to adequately recognise and value teacher specialisation (Hobbs et al., 2022), necessitating a critical re-evaluation of current strategies.

It is critical for effective workforce planning to address the prevalence of OOF teaching through targeted professional education (PE) (professional learning and re-specialisation) and related strategies (AITSL, 2021), highlighted with specific reference to mathematics by Goos and Marchant (2025). Recognising the urgent need to understand the factors influencing OOF teachers' engagement with PE, a research project was designed seeking to map the ecosystem that perpetuates OOF teaching (Ross & Hobbs, 2024). The project, supported through an Australian Research Council grant, is entitled Shifting the Culture of Out-of-Field Professional Education for Teachers" (www.scope-t.org). This investigation explores key elements, including school priorities for OOF teacher learning, the impact of policy on PE culture, the

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roles of stakeholders in its provision and discourse, and the systemic incentives that promote PE aimed at developing in-field teaching capabilities. The researchers operate under the premise that clearly defined pathways to "in-field" status will increase the perceived value and uptake of PE, thereby reducing OOF teaching (Hobbs, 2020). Ultimately this research aims to model an education ecology that fosters a cultural shift, valuing the re-specialisation of OOF teachers through PE and addressing the complex challenges inherent in systemic reform.

The broader project seeks to identify the systemic factors that hinder the recognition and value of OOF teacher re-specialisation through PE across the four subject domains of English, geography, mathematics, and science. This report presents a scholarly inquiry in progress, offering an emerging map of the current educational ecosystem that sustains OOF teaching in one of the four domains, that is mathematics. This paper specifically contributes to knowledge by examining how OOF mathematics teachers are positioned—or overlooked—within the current policy and organisational strategy documents that are supposed to support them. Additionally, it explores methodologies related to professional capital used during policy analysis and highlights the current state of workplace-based support for OOF mathematics teachers seeking to access PE.

Literature Review

Considering the Out-of-Field Phenomenon

The prevalence of OOF teaching in Australia has been obscured by a historical lack of systematic data, particularly concerning teacher subject specialisations (Weldon, 2016). This data gap has contributed to a tendency within government to normalise OOF teaching as a pragmatic solution to persistent teacher shortages rather than addressing the root causes. While upskilling programs like graduate certificates and micro-credentials exist, their effectiveness is limited by prevailing cultural norms within schools and education systems that often undervalue teacher specialisation (Hobbs et al., 2022). This cultural resistance is deeply embedded within the mechanisms that recognise and monitor specialisation, including data collection practices, teacher registration policies, and school improvement frameworks.

Research consistently emphasises the heterogeneity of OOF teachers (Hobbs, 2020), highlighting the variability in their support needs, willingness to remain in OOF roles, and inclination to pursue additional qualifications. Teachers are assigned to OOF positions for diverse reasons, ranging from temporary placements to expected career trajectories, and encompass both novice and experienced teachers (Donitsa-Schmidt et al., 2021; Nixon et al., 2017; Hobbs, 2013, 2020). To capture this complexity, Hobbs et al. (2020) proposed a multidimensional definition of OOF teaching, considering factors such as qualifications and specialisations, subject allocation stability, developing subject identity, and pathways to 'in-field' through formally recognised re-specialisation programs. Moreover, school context and support culture significantly influence teacher commitment, self-concept, and confidence.

This heterogeneity necessitates nuanced approaches to motivate OOF teachers to engage in PE. Policymakers and PE providers must recognise that reported incidences of OOF teaching (e.g., AITSL, 2021; Weldon, 2016; Thomson et al., 2017; Shah et al., 2022) do not directly translate to the proportion of teachers willing to pursue additional qualifications. Not all OOF teachers are intrinsically motivated to gain expertise in their assigned subjects (Donitsa-Schmidt et al., 2021; Lünne et al., 2021), highlighting the need for targeted interventions that address the diverse needs and motivations of this teacher population.

Mapping an Ecosystem

The diversity of OOF teacher needs has led us to employ Bronfenbrenner's (1994) ecological systems theory to provide a comprehensive framework for analysing the complex

dynamics surrounding OOF teaching and PE. Originally conceptualised to understand child development within a nested system of influences, Bronfenbrenner's theory has proven increasingly valuable in educational and social contexts for examining intricate interrelationships between systems (Callingham et al., 2017). Bronfenbrenner's model posits that development occurs within a series of interconnected systems: the microsystem (immediate environment), mesosystem (interactions or connections between microsystems), exosystem (external settings that indirectly affect the individual), macrosystem (social and cultural values), and chronosystem (changes over time). The theory poses a series of nested environments. In our study the teacher is positioned at the centre and is shaped by their immediate context as well as the proximal and distil contexts of the broader ecological settings. Applying this lens to OOF teaching enables a shift from focusing solely on individual teacher experiences (e.g., Hobbs, 2013; Donitsa-Schmidt et al., 2021) or student outcomes (e.g., Van Overschelde, 2022) to a broader examination of the cultural and systemic factors that perpetuate this phenomenon. As Darling-Hammond (2010) argues, teacher quality is influenced by a complex interplay of factors beyond individual teacher attributes, including policy contexts and organisational structures. Bronfenbrenner's theory allows for a nuanced exploration of the PE ecosystem, encompassing initial teacher education (ITE), research communities, PE providers (universities, government, private organisations), schools, professional associations, and government agencies.

This research adopts an ecological perspective, aiming to move beyond descriptive analyses of OOF teaching to a more holistic understanding of the systemic factors that drive its prevalence. Bronfenbrenner's (1994) ecological systems theory was selected for the study, to position policies and other documents within the relevant system they influence, allowing for the development of a map of the ecosystem that underpins and perpetuates OOFness, while also providing avenues to teachers becoming in-field, that is, via in-the-workplace training, through PE, or through requalification via Initial Teacher Education. The study has developed preliminary maps based on ecological theory to portray each of the four curriculum areas being considered.

This paper reports on the initial work undertaken by the mathematics team to develop a map of the mathematical terrain, drawn from academic and grey literature, including state/territory and federal policies, industrial background and organisational strategy documents. Due to the nature of these documents, their influence centres their effects on the mesosystem and exosystem, that is, documents such as policy documents and strategy documents provide guidance about how to fix a specific issue (Parliamentary Education Office, 2023), thus they influence connections between environments (mesosystems) or external settings that indirectly affect individuals (exosystems). The documents considered for this study represented perspectives on OOF teaching in mathematics relating to workplace support (e.g., AITSL, 2021; DuPlessis, 2020; Weldon, 2015), initial teacher education (ITE) and retraining (national policies and university courses; see e.g., Australian Government Department of Education, 2022; Barker et al., 2024; Hobbs, 2020), and PE available to teachers (national and state subject associations; see e.g., Centre for Social Impact, 2022; Goos & Marchant, 2025). This paper reflects on the process used and themes uncovered from the mathematics team's analysis to answer the question, *how do policies and publications of professional organisations influence workplace representations of and support for teachers currently teaching mathematics out-of-field?*

Methodology

Context and Method

This paper describes the process used as a part of the larger study, *Shifting the Culture of Out-of-field Professional Education for Teachers (SCOPE-T)*, to identify literature and policy documents focused on research and commentary on PE for OOF teaching (Hobbs et al., 2025). The purpose of the review was to ensure a representation of the current state of PE was mapped before considering how it could be adapted to better support multiple pathways to in-field.

The process for policy review and analysis involved multiple researchers collecting a range of documents from professional associations, teacher registration bodies, government departments and agencies, unions, and other learned societies with a specific group of researchers analysing documents relevant to their area/s of expertise, e.g., the authors of this paper as mathematics teacher educators and researchers were allocated all documents related to mathematics education. Researchers undertook a process of document analysis to consider aspects of the documents that directly mentioned or were related to OOF teachers or teaching, including direct references to OOF or indirect references (e.g., new or returning teachers to a subject or learning area). Following this analysis, the researchers from the mathematics group met to discuss their findings and determine emerging themes. During the discussion, the researchers were able to simultaneously check the reliability of their analysis and draw on their professional capital to discern meaning and implications from the findings.

Data Analysis and Professional Capital

Hargreaves and Fullan (2012) conceptualised professional capital as the importance and effectiveness of professional work. They proposed three linked aspects of professional capital: human (an individual's attributes and competencies), social (the quality of professional interactions), and decisional capital (the ability to make informed judgments). In an educational context, professional capital encompasses the qualities and values of individuals within educational settings (Gillies, 2015). Hargreaves and Fullan (2012) describe professional capital as a product of the interplay between human, social and decisional capital. Beyond individual talent, professional capital emphasises the collective sharing and networking of expertise, offering a framework for analysing decision-making at both individual and group levels. Oates et al. (2021) explored the use of professional capital to describe the influences on mathematics teacher educators' decisions in course design, and their study supports the use of professional knowledge as an integral part of the discourse analysis (p. 351)

As mathematics teacher educators and researchers, the researchers drew upon a discourse analysis approach using their human, social and decisional capital to consider themes emerging from the document analysis. The three researchers leading the mathematics analysis and development of the map independently considered the documents and compared themes and the appropriate placing of these with the ecosystem. The emerging themes pertained to opportunities and challenges for teachers to access pathways to becoming in-field primarily emanating from the mesosystem and exosystem due to the nature of the documents being analysed. A contextual understanding was also required in interpreting the focus and purpose of the documents. While the thematic analysis may not have been as rigorous as commonly employed approaches (Oates et al., 2021), the analysis was drawn from the interplay of the document analysis with the professional capital of the researchers, whose expertise in the field reinforced credible contextual understanding. Further, the researchers were able to draw on the professional capital of a wider community of expert mathematics educators and researchers when testing the emerging themes in round table presentations at conferences (e.g., Oates et al., 2024; Ross et al., 2024).

Findings and Discussion

The findings and discussion report on key themes emerging from the analysis of research literature, policies and strategy documents relating to mesosystem and exosystem influences on OOF teachers in the workplace.

Mesosystem: Myths From the Workplace

When testing/analysing themes identified in the data/literature with mathematics teachers and mathematics teacher educators, the research team found emerging themes that identified a prevalent pair of contradictory myths that stem from school leadership practices (the mesosystem); contradictory to each other, but also, in some ways, to the literature that underpins them. The first myth shared by teachers and teacher educators (Ross et al., 2024) is a belief from school leadership that *anyone can teach mathematics.* It is brought about by the consideration that every person engages in some mathematics every day. Therefore, anyone should be able to teach mathematics. This notion devalues the specialised knowledge and pedagogical content knowledge required for effective mathematics instruction, suggesting that mere content familiarity is sufficient. Research consistently demonstrates that effective mathematics teaching requires a profound understanding of mathematical concepts (Hill et al., 2005). Further, mathematical pedagogical content knowledge is not just knowing the correct mathematics or how to teach it, but a deep understanding of the ways that students come to mathematics. This can be, for example, knowledge of the misconceptions and issues students typically face and expertise in how to assist students in working through the wrong answers to work towards correct ideas. The myth that anyone can teach mathematics not only disregards the complexity of mathematics education but also contributes to the normalisation of OOF teaching, hindering the development of targeted interventions and reinforcing the systemic undervaluation of mathematics teacher specialisation (Weldon, 2016).

The contradiction comes from an ongoing belief that *not everyone can learn mathematics*. This myth seems to be used in relation to students, suggesting that while we expect every teacher to be an expert in mathematics because they engage in the subject matter in incidental situations in their daily lives, we do not expect all students to be able to learn mathematics. The question is about the underpinning philosophy of these contradictory myths. Is the omnipresence of these myths a result of our belief that students are on a learning journey and may not reach the desired destination at the exact time planned for, or is it foreseeable that one myth is feeding the other? That is, if we ask OOF teachers to teach mathematics, do we believe that we have set the students up for success in mathematics? These are areas for further exploration.

Exosystem: Barriers to Targeted Workplace Interventions

A recurring theme identified in the research studies analysed for this study is that targeted interventions appear to be devalued in practice (Hobbs et al., 2022). As Barker and colleagues (2024) examined in a recent report, *Analysis of Out-of-field Secondary Mathematics Teacher Upskilling Initiatives in Australia*, there is a diverse landscape of programs designed to address OOF mathematics teaching, this includes several universities across Australia that are offering courses to support OOF mathematics teachers. The report reveals a diverse landscape with varying degrees of alignment to initial teacher education standards, highlighting that some programs focus on bridging specific content gaps while others aim to develop broader pedagogical skills necessary for effective mathematics teaching. However, even with incentives (such as no or minimal fees) and despite growing numbers of OOF mathematics teachers (AITSL, 2021), these courses are not attracting large numbers of teachers wishing to re-train or re-qualify to teach mathematics.

Addressing OOF teaching necessitates more than simply providing upskilling opportunities; it requires a nuanced understanding of the systemic and individual factors that influence teacher participation in professional education. While targeted professional development can equip OOF teachers with essential tools and support, it is not a singular solution to the broader teacher workforce crisis (Weldon, 2016). As Hobbs and Porsch (2021) highlight, even when relevant professional development is accessible, OOF teachers may choose not to engage. This reluctance can stem from various factors, including a preference to allocate professional time and resources to their in-field specialisations, a lack of intrinsic motivation to improve their OOF teaching, or the intermittent nature of their OOF assignments, which may diminish perceived long-term career relevance. Furthermore, the apprehension of being permanently reassigned to the OOF subject can act as a significant deterrent, discouraging teachers from pursuing further training in that area (Hobbs & Porsch, 2021). This reluctance is further exacerbated by the practices of hierarchical PE structures within schools that limit teacher choice and tie participation to annual development plans that may favour the teacher's in-field area. Alternatively, PE targets are frequently satisfied by mandatory PE that is generic and non-subject-specific (e.g., annual fire safety training) rather than focusing on adequately developing subject matter knowledge for teaching. This is not unique to mathematics; however, with the volume of teachers reportedly teaching mathematics OOF (AITSL, 2021), it is a concern to ensure students have appropriately qualified and/or supported teachers.

Teachers and teacher educators shared their perspectives that while on-the-job learning can offer immediate workplace support, it risks reinforcing knowledge gaps and may be insufficient for building capacity, particularly when OOF teachers lack access to high-quality mathematics teaching models within their schools (Ross et al., 2024). It can also reinforce a teacher's lack of knowledge. Goos et al. (2023) emphasise the crucial role of PE in equipping teachers to effectively manage OOF teaching. Teacher engagement in PE is often enhanced when they recognise learning as an ongoing process that leads to increased self-efficacy (Bugwak, 2021). This recognition can be challenging when the systems and structures of schools do not support ongoing development. For example, OOF teachers can often lack the necessary time to engage with the incidental PE available through engaging with in-field colleagues during school meetings. A teacher who is OOF for mathematics may only have one or two classes per week. During school subject meeting structures, they will be asked to attend in the area most aligned to their work, thereby missing the PE that emanates from discussions about pedagogy, assessment or moderation. Further consideration of the supporting structures within schools is needed to consider how these can be flexibly placed to ensure OOF teacher support.

Reflection on Themes in Relation to Professional Capital

The three aspects of professional capital (Hargreaves & Fullan, 2012) provide a frame for considering the intricacies and complexities of PE to support OOF teachers. Consideration during the document analysis was given to the importance of developing OOF teachers' individual skills and knowledge, including the current suite of courses available to teachers to address content gaps and pedagogy contributing to development of human capital. Additionally, consideration for the relational aspects of teacher PE in formal settings and on the job considers the development of social capital, while systemic factors from the exosystem explicating structures and policies influencing OOF teachers' ability to make informed decisions about their professional learning contribute to their decisional capital. In Hargreaves and Fullan's (2012) conceptualisation, all three aspects were essential for the development of professional capital, and this analysis has emphasised this necessity for the development of PE that truly supports OOF mathematics teachers.

Conclusion

The complex motivations relating to OOF teachers and PE outlined above underscore the need for a comprehensive approach that acknowledges the heterogeneous experiences of OOF teachers and that addresses the underlying systemic issues that contribute to the phenomenon. Recognising the variability in current offerings for PE, Goos and Marchant (2025) have proposed the technical specifications for a nationally consistent framework for PE to support OOF teachers to work toward qualification. The program, delivered in partnership with universities, would consist of a Graduate Diploma with options for staged entry or early exit to allow for flexibility to meet the needs of the teachers requiring it. The proposal goes beyond the qualification component to recommend supports such as subsidised tuition fees, leadership activities and teaching relief time to support teachers undertaking this study beyond the development of content and pedagogical knowledge. This is a start.

The multifaceted challenges associated with OOF teaching, as evidenced by analyses of policy and strategic documents, reveal that upskilling alone is insufficient. The complex motivations influencing OOF teachers' engagement with PE, alongside systemic barriers point toward further research to map the complex ecosystem that both supports the ongoing need for PE and to consider the breadth of possible avenues to supporting teachers to become in-field should they wish to do so.

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