Examining the Pedagogical Practices of a Teacher in a High Mathematical Wellbeing Classroom: An Exemplary Case Study

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This study advances mathematical wellbeing (MWB) research by mapping specific pedagogical practices associated with high class-level MWB. Through examining a Year 5 classroom demonstrating high MWB in a sample of 350 classes (4137 students; 160 teachers), the analysis revealed five key pedagogical practices: substantive conversations, challenging tasks, high expectations, social norms, and mathematical practices. The teacher emphasised student-centred and collaborative approaches while minimising teacher-directed instruction. These findings highlight ways to create enabling classroom environments where students can thrive mathematically.

Mathematics is an important school subject and a predictor of future educational and employment opportunities; however, students often report mixed feelings towards it - either loving or hating it. Associating negative emotions (e.g., anxiety) with mathematics inevitably contributes to lower achievement and limits students' pathways beyond school (Watt et al., 2019). While students typically begin primary school with a positive disposition towards mathematics, this often declines as they progress through their education (Grootenboer & Marshman 2015; Watt et al., 2019). This suggests that it's not the discipline of mathematics per se but rather how students experience mathematics (i.e., pedagogies and teacher practices) that impacts their disposition towards mathematics. This study offers an innovative contribution to the field by examining the relationship between pedagogical practices and student mathematical wellbeing (MWB).

MWB is defined as the fulfilment of values whilst learning mathematics accompanied by positive feelings (e.g., enjoyment) and functioning (e.g., engagement, accomplishment) in the discipline. Recent international studies purport that students have high MWB when given opportunities to fulfil seven core – or 'ultimate' -– values (i.e., accomplishments, cognitions, engagement, meaning, perseverance, positive emotions, and positive relationships) through the mathematics learning process (Hill et al., 2021; 2022). I developed a MWB framework in response to calls for wellbeing to be integrated into existing subject disciplines (e.g., Waters, 2021) and addressing the often deficit and binary discourse (e.g., "I am/am not a maths person") prevalent in mathematics education. Over several decades, research has documented pervasive negative trends and experiences in mathematics education, including mathematics anxiety, disengagement, declining or stagnating achievement, and negative attitudes toward mathematics (Grootenboer & Marshman, 2015; Hill & Hunter, 2024; Watt et al., 2019). While addressing these challenges remains important, an emerging strengths-based MWB perspective argues for greater attention to understanding and promoting positive mathematics experiences and outcomes (Hill et al., 2021).

While growing research explores student MWB through self-reported surveys, there remains a limited understanding of how pedagogical practices influence class-level MWB. The present study addresses this gap by focusing on a classroom demonstrating high class-level MWB. Through detailed analysis of classroom observations using a productive pedagogies framework, teacher and student surveys, and an email, we examine the practices of Karla (pseudonym), whose Year 5 class demonstrated one of the highest MWB scores across a large sample (350 classes, 4137 students). By investigating Karla's classroom as an exemplary case, I aim to identify specific teacher characteristics and pedagogical practices that may support

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MWB. In the current study, I respond to the following research question: *What teacher characteristics and pedagogical practices are evident in a classroom demonstrating exemplary levels of student mathematical wellbeing?*

Background and Theoretical Framing

Mathematical Wellbeing

Mathematical wellbeing (MWB) stems from value fulfilment theory, which suggests that wellbeing occurs when individuals successfully pursue and fulfil their core values (Tiberius, 2018). Rather than solely addressing negative experiences like mathematics anxiety, a value fulfilment approach emphasises proactively supporting students to thrive by aligning classroom experiences with what they value most in mathematics learning. Through a systematic review of mathematics education values literature and various international empirical studies, Hill and colleagues (Hill et al., 2021, 2022, 2024) identified seven ultimate values that consistently support students' positive mathematical experiences. These include accomplishments (e.g., mastery, achievement), cognitions (e.g., mathematical understanding, skills), engagement (e.g., interest, focus), meaning (e.g., relevance, utility), perseverance (e.g., sustained effort, productive struggle), positive emotions (e.g., enjoyment, pride), and positive relationships (e.g., teacher support, peer collaboration).

Concerningly, students' MWB significantly declines as students progress through school (especially positive emotions and engagement), with the sharpest declines during the primary to secondary school transition (Hill & Hunter, 2024). This trend suggests a need to better understand how teachers can proactively cultivate enabling classroom environments and pedagogies that support students in fulfilling these seven values to foster MWB. These seven ultimate values can be fulfilled in various ways. For example, a teacher might support students' relationship values through collaborative tasks and an inclusive classroom climate while fulfilling students' valuing of meaning through contextual problems connected to students' lives. The way teachers position themselves and their students (e.g., power dynamics), their personal characteristics (e.g., patience), specific pedagogical choices (e.g., group work), or mathematics content selection (e.g., meaningful tasks) all potentially influence students' opportunities to fulfil these ultimate values.

Importantly, a MWB approach offers a preventative rather than remedial strategy. Instead of waiting to address the anxieties, negative emotions and attitudes after they develop, focusing proactively on supporting students to thrive in mathematics may help prevent the disaffection and anxieties students experience. This approach aligns with broader shifts in psychology toward strength-based approaches that emphasise building and affirming positive capacities rather than solely addressing deficits (Seligman, 2011). The MWB framework provides a useful tool to understand what aspects are working well for students (i.e., values that are fulfilled) and what areas need more attention (i.e., values that remain unfilled or are conflicted). This framework also provides a foundation for examining how specific teacher practices and characteristics might support student enjoyment, engagement, persistence, and performance in mathematics.

Productive Mathematical Pedagogies

The productive pedagogies framework offers a structured approach to examining quality teaching practices across three key dimensions: Intellectual quality, cultural connectedness, and supportive environment (Lingard et al., 2003). This framework has been adapted for mathematics education to document specific pedagogical practices that promote deep learning while supporting student diversity and wellbeing (Hunter et al., 2024). The intellectual quality dimension focuses on embedding high-level mathematics content through practices like challenging tasks and substantive discourse. Cultural connectedness encompasses practices that recognise and build upon students' cultural knowledge and experiences. The supportive environment dimension attends to creating inclusive classroom contexts where students feel valued and supported to participate (Hunter et al., 2024).

The choice of this observational tool was deliberate, as it was developed to connect the theoretical frameworks of culturally sustaining, ambitious, and wellbeing-oriented pedagogies. The three dimensions align closely with the underpinnings of MWB. For example, the intellectual quality practices support students' cognitive engagement and sense of accomplishment, while supportive environment practices foster positive relationships and emotions. However, no research has explicitly examined which specific pedagogical practices most effectively promote class-wide MWB. The present study addresses this gap by investigating the pedagogical practices (as measured through an adapted productive pedagogy framework) of one teacher of upper primary students whose class survey results indicated an overall high class-level of MWB.

Methods

Study Design

This study employed a mixed-methods exemplary case study design to examine the pedagogical practices and teacher characteristics associated with high class-level mathematical wellbeing (MWB). The case study approach was selected to provide an in-depth understanding of how one teacher, Karla (pseudonym), creates and maintains a high MWB classroom environment.

Participants and Case Selection

Karla was purposefully selected as an exemplary case from a larger longitudinal study (2020-2023) that investigated changes in teachers' pedagogical practices and their impact on student outcomes across 350 classes in New Zealand. The broader study included 4,137 students and 160 teachers from 31 schools from which Karla's 2023 Year 5 class (n = 20 students) was identified as demonstrating exceptionally high MWB levels. Karla’s Year 5 class was selected as an exemplary case based on three criteria: (1) her class-level MWB score was in the top 5% of the sample (M = 8.46 versus sample M = 6.6), (2) she had consistently high class MWB across three consecutive years despite different student cohorts, and (3) she was teaching at the critical Year 5 transition point where MWB typically declines (Hill & Hunter, 2024). Karla is a diploma-qualified primary school teacher with over 30 years of experience, currently teaching in a public primary school (Year 1-6) serving a low socioeconomic New Zealand neighbourhood. She has taught across Years 4-6 at this school for the past 9 years. Her school serves approximately 140 students who identify as Māori (36%), Pacific Island (59%), Asian (21%), and Pākehā/New Zealand European (27%).

Data Collection

Data collection involved three complementary sources to triangulate findings about Karla's pedagogical practices and their relationship to high class-level MWB:

Quantitative Data

Student MWB was measured using a 21-item survey previously validated with this population (Hill & Hunter, 2024), assessing levels of MWB across seven ultimate values: Accomplishments, cognitions, engagement, meaning, perseverance, positive emotions, and positive relationships. Students rated each item (e.g., *I feel like my maths learning has a purpose and is meaningful to me*) on an 11-point scale (0 = not like me at all, 10 = completely like me)

Classroom observations were conducted using the productive pedagogy profiling tool, assessing 20 pedagogical practices across three dimensions: Intellectual quality, cultural connectedness, and supportive environment. For each lesson (*n* = 2133 lessons over three years), two observers independently rated each practice on a five-point scale (1 = a total absence of the pedagogy in the lesson, 5 = a strong feature of the pedagogy during the entire lesson), considering both quality and duration throughout the lesson. Each teacher was observed on at least three occasions over a 12-month period. Observers then engaged in moderation discussions to agree on final scores (Hunter et al., 2024).

The teachers also completed a 50-item self-report survey rating the frequency of various pedagogical approaches (e.g., *I use questioning to elicit students' reasons and explanations)* on a four-point scale (1 = never, 4 = every or almost every lesson). They also responded to several open-ended questions (e.g., *What are your strengths and weaknesses as a math teacher?)*

Qualitative Data

To gain deeper insights into Karla's pedagogical practices, she responded to three open-ended questions via email: *How do you support students to feel good and function well in your maths class? Can you describe a specific moment in your class when you enabled a student to feel good and function well?* and *Is there anything specific that you do to support students who don't enjoy doing maths?* These questions were designed to elicit Karla's understanding of her practices and their impact on students' MWB.

Analysis

Analysis began with examination of the overall study data to identify patterns in class-level MWB before focusing on Karla's exemplary case using a convergent mixed methods approach. Individual student MWB scores were calculated by averaging responses across the 22 survey items, then aggregated to create class-level mean MWB scores for all 350 classes across the three-year period (2021-2023). Descriptive statistics and visualisations were generated using Excel and SPSS to examine the distribution of class-level MWB across year levels and identify patterns in the broader dataset. Karla's Year 5 class was identified as an exemplary case by comparing her class-level MWB score against the distribution of all classes in the sample. Classes demonstrating MWB scores in the upper quartile were examined, with Karla's class selected based on consistently high performance across multiple years (2021-2023). For the pedagogical practices, Karla's observational scores were compared against group means to identify distinctive practices, with differences of 1 point or more on the 5-point scale considered substantial. The five practices with the greatest positive differences were identified as Karla's most distinctive pedagogical characteristics (Table 2). Self-report survey responses were similarly compared against group means to identify Karla's distinctive self-reported practices.

Karla's email responses and open-ended survey questions were analysed using a deductive thematic approach, aligning her responses with the seven MWB values (accomplishments, cognitions, engagement, meaning, perseverance, positive emotions, and positive relationships) (Hill et al., 2021) and the productive pedagogies framework (Hunter et al., 2024).

The quantitative and qualitative findings are integrated below to develop a nuanced profile of Karla's pedagogical practices and how these may support student MWB.

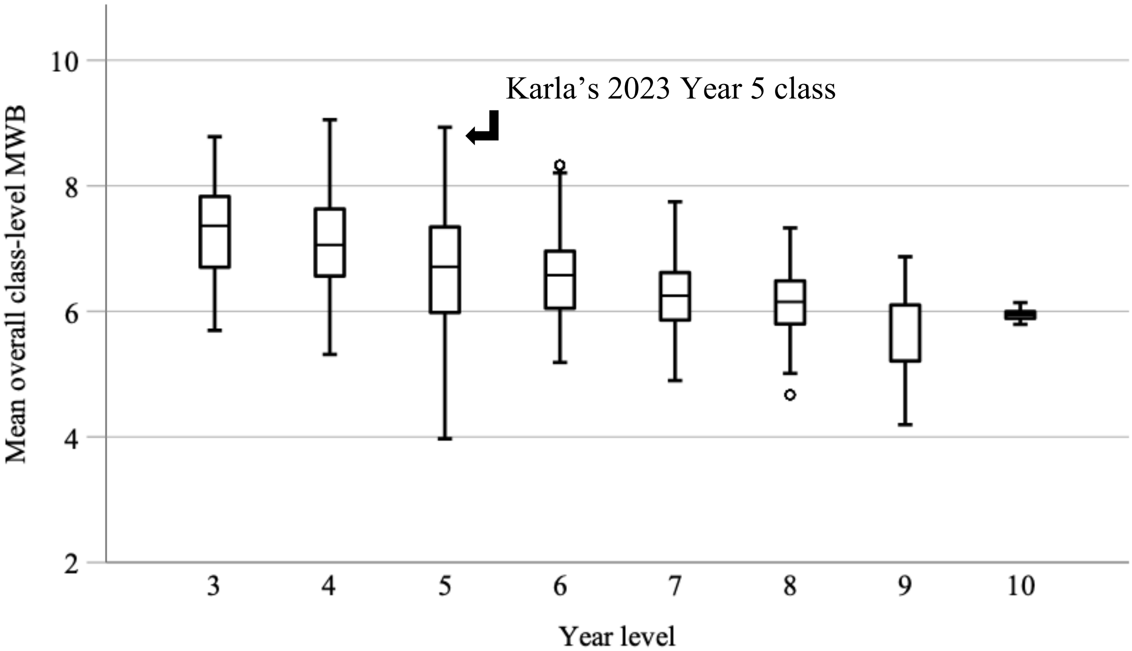
Results in Discussion

Karla's Class Level MWB in Context

As shown in Figure 1, Karla's Year 5 class from 2023 *(n* = 20 students) demonstrated substantially high MWB (*M* = 8.46), placing it in the uppermost range of all Year 5 classes and well above the overall sample mean (*M* = 6.6). This finding is particularly notable given that the Year 5 classes showed the largest variability in MWB scores (ranging from M = 3.97 to 8.46), suggesting that Karla's practices may offer important insights for supporting MWB during this upper primary transition period. Also notable was that Karla's class level MWB was consistently high over the three years she was observed (M ranging from 8 – 8.46) despite teaching different students across each year.

Figure 1

Class Level MWB Scores between 2021 – 2023 (n = 350 classes)



Karla's Distinctive Pedagogical Practices

Analysis of the classroom observations revealed five pedagogical practices in which Karla substantially exceeded sample means in her Year 5 class, as shown in Table 2. Sample mean scores of 2.6 – 2.8 represent moderate implementation across the broader study, making Karla's scores of 4.0+ particularly distinctive and indicating consistent, high-quality enactment throughout entire lessons. These practices formed a pattern reflecting her student-centred, relationship-focused teaching approach that fostered productive struggle.

Table 1

Pedagogical Practices in Karla's Year 5 Classroom

Pedagogical practice	Karla's mean	Sample mean	Difference
Substantive mathematical conversations	4.22	2.66	1.56
Challenging tasks	4.11	2.65	1.46
High expectations	4	2.62	1.38
Social norms	4.11	2.87	1.24
Mathematical practices	4	2.8	1.20

Note. Karla's Year 5 class was observed three times in 2023. Sample mean includes 350 classes.

Substantive Mathematical Conversations

Substantive mathematical conversations involve productive verbal/non-verbal communication that promotes sustained intellectual interactions between teacher to students and students to students, focused on mathematical ideas and thinking (Hunter et al., 2024).

Karla was observed consistently facilitating these conversations that focused on students' thinking and reasoning. Her survey responses revealed she asks students to *develop a mathematical explanation including why and how their solution works* in every or almost every lesson, compared to never asking them to *listen to her explanations*. In her email, she noted: "Listening to my students more rather than 'telling' them. Developing a strong maths culture in the classroom where all my students [sic] ideas are valued." She also revealed the intentional nature of this practice:

> I often get group members to share with each other what skills they bring to the task. This can range from being a good listener, being able to ask thoughtful questions, know their number knowledge, show their thinking using diagrams etc. I stress that everyone brings skills to their group.

Karla's approach creates opportunities for all students to contribute meaningfully to mathematical discourse, directly supporting the MWB values of positive *relationships* through collaborative sharing, *cognitions* through developing understandings, and *positive emotions* from enjoying working collaboratively. The emphasis on student discourse and mathematical explanations creates opportunities for students to engage deeply with mathematics while building understanding through peer interaction (Tsuei, 2012).

Challenging Tasks

Challenging tasks are group-worthy teaching tasks that create opportunities for higher-order thinking and/or applying mathematics—tasks which are open-ended with multiple pathways and/or have no immediately obvious solution (Hunter et al., 2024). Karla was observed maintaining consistently high expectations while providing challenging mathematical tasks. Her survey responses showed she asks students *to work on challenging problems and develop their own solution strategies* in every or almost every lesson, while never asking them to *memorise procedures*. In her email, she described her practice to "move to developing student capability through challenging group tasks" and noted that "when I provide more challenging tasks, students are more active participants and I draw on students for my problems." Using challenging mathematical tasks supports the MWB values of *accomplishment* through meaningful challenge, *cognitions* through deep mathematical thinking, and *perseverance* through productive struggle (Hill et al., 2021). Challenging tasks serve as entry points for developing deep mathematical understanding while supporting student engagement and positive mathematical disposition (Hunter et al., 2024). In turn, teachers who incorporate challenging tasks often experience greater enjoyment from observing their students overcome challenges and those "light bulb" moments of understanding (Russo et al., 2023).

High Expectations

High expectations involve teachers expressing encouragement and affirmation of students' positive mathematical disposition towards intellectual challenge while using mistakes as learning tools (Hunter et al., 2024). Despite working in a low-demographic school with predominantly Māori and Pacific students, which is often associated with low teacher expectations (Rubie-Davies, 2017), Karla was observed consistently maintaining high expectations and supporting agency for all her students. Her survey responses showed she never uses *ability grouping,* instead implementing *mixed-ability grouping*. In her email she noted:

> I think that students feel they are successful when they know how things go. e.g. How to work in their group, expectations during independent learning. It's kind of 'how we do things' It's not a secret from the students and they do have a say.

These responses demonstrate her belief in all students' capabilities, building relationships and ensuring a clear understanding rather than lowering expectations to support struggling students. This pedagogical approach supports MWB by fostering students' *accomplishments* (e.g., mathematical self-concept) and *relationships* (e.g., care and respect) (Hill et al., 2021).

High teacher expectations towards students are also linked to mathematical performance and engagement (Rubie-Davies, 2017), which can further support MWB.

Social Norms and Respectful Relationships

Social norms refer to establishing and discussing behavioural expectations where pro-social behaviour is evident in student interactions, creating inclusive classroom environments (Hunter et al., 2024). Karla's strong emphasis on social norms was evident both observationally and in her responses. For example, her survey showed she facilitates *students to work in groups* and *share solutions with the class* in every or almost every lesson. In the survey, she described her commitment to "Ensuring my students' cultures are reflected in all mathematics learning" and "Making it relate to real-life scenarios and integrating word problems that relate to their cultural background." She described how "the group norms play an important role as we discuss them before every maths session" and emphasised that:

> Firstly, it is the relationships that I develop with the students in my class. I take time to learn about them as people rather than students and I focus on their culture and what they bring to our class.

Her approach to supporting students who don't enjoy mathematics centres on relationships over remediation:

> Again, it's relationships. Finding out why, discussing as a class where, when and how we use Maths. Group dynamics and recognition of all skills needed to solve problems - group norms - showing an ethic of care by not letting them opt out and contributing in any way possible.

This relational focus directly supports the MWB value of positive *relationships* while creating conditions for students to experience *meaning* through discussion of mathematics relevance and cultural connections, *engagement* through inclusive participation, and *positive emotions* through supportive interactions (Hill et al., 2021). Such social norms encourage respectful and diverse ways of knowing and participating in mathematics, aligning with the relationship value of MWB and culturally sustaining pedagogy that builds on students' cultural assets while maintaining high academic expectations (Hunter & Hunter, 2023).

Mathematical Practices

Mathematical practices involve students generating ideas and sense-making through disciplinary practices such as developing explanations, justifying, conjecturing, representing, and generalising (Hunter et al., 2024). Karla was consistently observed supporting her students' engagement in these mathematical practices. Her survey responses showed she asks students to *justify their reasoning* and use *questioning to elicit reasons and explanations* in every or almost every lesson. Her email responses revealed how she structures sharing opportunities: "At the end of the working time, I asked their group to share, ensuring that they all had a role and contributed to the sharing." Students regularly explained their thinking, justified their reasoning, and made mathematical connections—practices that support the *cognitive* and *accomplishment* MWB value by fostering skills, understanding, and confidence (Hill et al., 2021). These disciplinary practices are key aspects of ambitious pedagogy and support deep conceptual understanding while enabling students to construct mathematical arguments and solve authentic problems (Lampert & Ghousseini, 2012).

Conclusion

This study makes a significant contribution by mapping both observed and self-reported pedagogical practices to high class-level MWB, moving beyond individual student perspectives to examine classroom-level factors. While these findings cannot establish causal relationships due to the nature of the case study analysis, they highlight a pedagogical profile associated with a high MWB class. The findings suggest that integrating intellectually challenging content, holding high expectations, emphasising mathematical discourses, and providing strong socialemotional support can foster student MWB. By identifying concrete teaching practices associated with high class-wide MWB, this research provides valuable insights for teachers and teacher educators seeking to implement preventative rather than remedial approaches that support students to thrive mathematically. Future research will use statistical models to interrogate the relationships (including potential causality and directionality) between the seven MWB values, specific pedagogical practices, and academic achievement. Teachers and students in high MWB classes will also be interviewed to provide a more nuanced understanding of their classroom practice and discourses.

While mathematics education research often focuses on documenting negative experiences, this study offers a solution-focused and strength-focused approach and contributes to the field by exemplifying how teachers can develop classroom environments where all students can flourish mathematically.

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