

## Dialogic mathematics teaching as identity work: Negotiating belonging in an early-career classroom abstract

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### Abstract

This interpretive case study explores how a novice grade 10 mathematics teacher enacted dialogic teaching and negotiated professional belonging. Videorecorded classroom lessons on parabola transformations were analyzed using the teacher scheme for educational dialogue analysis, and interview narratives were analyzed using the negotiation of belonging framework, which includes the processes claiming, participating, evaluating, adjusting, and challenging. Classroom discourse analysis showed strong dialogic engagement within the focal lesson, with learners contributing the majority of turns and the teacher frequently inviting reasoning, encouraging learners to build on peers' ideas, and coordinating multiple contributions. Interview analysis identified recurring identity work in which the teacher claimed a reasoning centered professional stance and reflected critically on fit and legitimacy. These identity narratives aligned with episodes of high classroom reasoning. Together, the findings indicate that dialogic teaching functioned both as a pedagogical approach and as identity work. Dialogic episodes supported the teacher's sense of legitimacy and agency, whereas institutional constraints such as departmental expectations, parental scrutiny, and assessment pressures periodically curtailed dialogue and prompted adaptive compromises. The study highlights the need for induction, mentoring, and school level recognition of dialogic aims to support reasoning centered mathematics teaching in early career contexts.

**Keywords:** dialogic teaching, teacher identity, professional belonging, communities of practice, novice mathematics teachers, classroom discourse, early career teachers, mathematics education

## INTRODUCTION

The transition from university teacher education to the realities of classroom life remains one of the most challenging stages in a teacher's professional development. This period is frequently characterized by heightened emotional intensity and vulnerability, as beginning teachers negotiate tensions between preparation-based ideals and the institutional, relational, and accountability demands of schools (Losano et al., 2018; Pillen et al., 2013; Sydnor et al., 2024). Contemporary research confirms that this transition is often accompanied by contradictory emotions—excitement and hope intertwined with fear, uncertainty, and self-doubt—particularly when novice teachers

confront experiences of “reality shock” and perceived unpreparedness in their early practice (Gordon et al., 2025; Sheokarah, 2025). Rather than representing a linear consolidation of professional competence, the move from preservice preparation into full classroom responsibility typically involves an iterative process of adjustment, identity negotiation, and recalibration of expectations.

Within mathematics education, teacher preparation programs increasingly emphasize dialogic teaching—classroom talk that builds shared understanding, elicits reasoning, and promotes conceptual learning (Alexander, 2020; Mercer & Hodgkinson, 2019; Walshaw & Anthony, 2021). Empirical work continues to demonstrate the pedagogical value of dialogic and

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### Contribution to the literature

- This article advances research on mathematics teacher learning by empirically linking dialogic classroom practice with novice teachers' identity work, showing that reasoning centered talk can express and support professional belonging.
- Methodologically, it combines fine grained the teacher scheme for educational dialogue analysis (T-SEDA) interaction analysis with an operationalized account of Wenger's (1998) modes of belonging through the negotiation of belonging framework, namely claiming, participating, evaluating, adjusting, and challenging, to make visible the micro processes through which belonging is negotiated.
- Substantively, the study reports a moderate positive association between dialogic intensity and affirmative identity discourse and shows how institutional constraints shape, but do not wholly suppress, dialogic enactment. The findings inform teacher education and induction policy by highlighting the relational and emotional work required to sustain reform oriented pedagogy in early career practice.

discourse-rich mathematics instruction, including its potential to deepen conceptual understanding and support student participation (Hwang, 2022; Lehesvuori et al., 2021). However, sustaining such dialogic practices within schools dominated by testing regimes, curriculum coverage pressures, and accountability demands remains a formidable challenge (Huizinga et al., 2014; Remillard & Heaton, 2020; Schmidt & Kennedy, 2022). Early-career teachers, in particular, often experience tension between reform-oriented preparation and performance-oriented school cultures (Hwang, 2022).

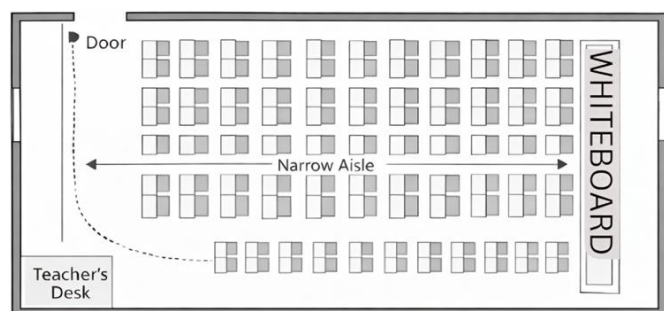
Research in mathematics education has long examined why pedagogical approaches promoted in universities do not transfer seamlessly into teachers' early professional practice (Gainsburg, 2012; Solomon et al., 2016; Wenger-Trayner & Wenger-Trayner, 2020). The enactment of reasoning-rich dialogue requires sophisticated pedagogical judgement, extensive planning, and deep content knowledge to manage multiple lines of student thinking in real time (Ebby, 2000; Hart, 2002; Lehesvuori et al., 2021; Ndlovu & Chikore, 2023). In addition, novice teachers must navigate boundary crossings between the "two worlds" of university and school, renegotiating their identities as they move from student to legitimate participant in established professional communities (Daniels & Du Plooy, 2024; Gainsburg, 2012; Jarvis et al., 2023). Teachers who have developed dialogic sensibilities in supportive university settings frequently encounter institutional norms privileging procedural fluency, efficiency, and classroom control (Solomon et al., 2016), which may constrain their ability to enact reform-oriented pedagogy.

Lortie (1975) characterized this conservatism as the "apprenticeship of observation," whereby teachers reproduce familiar instructional patterns internalized during their own schooling. Nolan (2012) extended this notion through the concept of educational habitus—a deeply embodied professional disposition resistant to change. Contemporary research confirms that even teachers prepared for inquiry-based and dialogic

pedagogy may revert to transmissive routines when confronted with exam-driven curricula, limited collegial support, or institutional expectations of conformity (Groenewald & Arnold, 2025; Hobson et al., 2022). Yet evidence also suggests that when early-career teachers are afforded structured mentoring, collaborative reflection, and leadership support, dialogical practices can be adapted and sustained (Liyuan et al., 2024; Schaap et al., 2021; Vasalampi et al., 2021). For instance, Jong (2016) documents on how sustained professional support enabled a beginning mathematics teacher to maintain reasoning-centered lessons, illustrating how dialogic approaches may persist when teachers construct new forms of professional belonging that legitimize such methods.

Despite growing scholarship on early-career professional learning, relatively little research has examined in depth what occurs when novice teachers attempt to enact dialogic teaching within unsupportive or traditionally oriented school cultures. This study seeks to extend that understanding. Following Losano et al.'s (2018) interpretive perspective, preservice learning is understood not as a repertoire of strategies to be transferred intact, but as a set of embodied practices and discourses that shape teachers' professional identities and orientations to practice. Dialogic pedagogy, in this sense, functions both as instructional method and as identity resource: inviting reasoning, coordinating ideas, and legitimizing multiple voices become ways through which emerging teachers author themselves as particular kinds of professionals and negotiate what forms of practice are recognized and valued within their communities.

Guided by this understanding, this paper reports on an interpretive case study that adopts a reflective narrative approach to examine how a novice mathematics teacher, Mr. Marks, engaged with dialogic teaching during his first year of professional practice. Professional identity is conceptualised here as a form of negotiated belonging—the dynamic process through which teachers define who they are, and can become, in relation to their professional communities



**Figure 1.** Layout of the repurposed shipping container (Source: Author's own elaboration)

(Beijaard et al., 2019; Wenger, 1998). Identities evolve through interactions with learners, colleagues, school management, parents, and university mentors and are intertwined with the emotional and ethical dimensions of teaching (Kelchtermans, 2020). In examining Mr. Marks's experience, I focus on how pedagogical enactment and identity work intersect, revealing how belonging is constructed through classroom talk and social negotiation.

Mr. Marks taught bilingual grade 10 students in a suburban secondary school far from his home while studying for a master's degree in mathematics education at the University of the Witwatersrand. His postgraduate coursework emphasized conceptual understanding and reasoning through dialogue. Deeply committed to dialogic principles, he sought to engage learners in joint inquiry, yet the school's departmental culture demanded uniformity of pacing and assessment practices. Observations revealed the tensions that emerged as he attempted to balance dialogic exploration with organizational expectations of procedural conformity.

Although Mr. Marks's story is situated within one local context, this interpretive single-case study is not intended to yield statistically generalizable findings; rather, it offers analytically generalizable, theory-building insights into the situated processes through which early-career teachers may attempt to recreate dialogic pedagogy inside traditional systems. Understanding these negotiations is essential for supporting new teachers as they transform classroom dialogue into sustainable practice. The purpose of this case study was therefore to analyze Mr. Marks's efforts to enact dialogic mathematics teaching and to understand the factors influencing his practice and sense of belonging. The following research questions guided the investigation:

1. To what extent did Mr. Marks enact dialogic teaching practices in his lessons?
2. What factors supported or constrained his enactment of these practices?
3. How did he negotiate belonging as he navigated his early teaching experience?

The paper proceeds by outlining the theoretical perspective that informed the study and then describing the research design and methodology. Subsequent sections present and discuss findings from classroom observations and interviews, illuminating how Mr. Marks's dialogic practice and professional identity developed in tandem during his first year of teaching mathematics.

## MATERIALS AND METHODS

This interpretive case study investigated how a novice secondary mathematics teacher enacted dialogic teaching and concurrently negotiated professional belonging during his early career. The research combined microanalysis of classroom interaction with narrative analysis of teacher interviews, using two complementary analytic frameworks.

### Context and Participant Selection

The study was conducted in a suburban South African secondary school that had previously been relatively advantaged but where material and spatial constraints shaped daily teaching, including instruction in a repurposed shipping container converted into a classroom, with fixed seating arrangements and limited interior space affecting classroom interaction (see **Figure 1**). The focal participant, Mr. Marks, was purposively selected from a larger project involving five grade 10 mathematics teachers (two novices and three experienced teachers). His professional circumstances exemplified multi-membership across communities of practice: he taught bilingual grade 10 classes while undertaking a part-time master's in mathematics education. His varied educational trajectory (remediation in mathematics, a technical diploma, interim teaching, and formal teacher education) rendered his identity and practice particularly informative for the study's aims.

### Design and Timeline

Data collection occurred over a single school term and combined classroom observation, artefact collection, and two semi-structured interviews; the resulting dataset is temporally bounded and supports in-depth case analysis but does not permit claims about long-term stability or consolidation of practice. Six mathematics lessons on quadratic functions and transformations (horizontal and vertical shifts of parabolas) were videorecorded for detailed interactional analysis. A pre-lesson semi-structured "identity interview" elicited biography, pedagogical beliefs, and intercommunity relations; a post-lesson stimulated recall interview invited Mr. Marks to comment on selected lesson episodes. Lesson artefacts (tasks, worksheets, teacher notes) were collected to contextualize observed practice. The design prioritized depth (thick description and

sequential alignment of lesson events and reflections) over breadth, appropriate to an interpretive case study seeking theory-building insights rather than generalizable patterns.

### Data Generation and Ethics

All participants provided informed consent, and school permission was obtained. Student identities were anonymized in transcripts and reporting. Video and audio recordings were transcribed verbatim and time-aligned with lesson artefacts. Ethical clearance was granted by the host institution. Raw data files are stored securely; representative excerpts are reported in the manuscript. Full transcripts, codebooks, and manual coding records are available on request to qualified researchers, subject to ethical restrictions, enabling external audit of the analytic procedures without compromising participant confidentiality.

### Analytic Frameworks and Overall Strategy

The study combined two analytic frameworks to capture

- (a) the fine-grained structure of classroom dialogue and
- (b) the narrative and interactional processes through which professional belonging is negotiated.

The T-SEDA was applied to lesson transcripts, while the negotiation of belonging framework was applied to interview transcripts. The two frameworks were then integrated through temporal and conceptual alignment to trace relationships between dialogic classroom moves and identity-related talk.

### Rationale and Units of Analysis

T-SEDA (T-SEDA Collective, 2023) was selected because it differentiates dialogic moves central to reasoning-centered mathematics teaching (e.g., inviting justification, building on peers' ideas, and coordinating multiple contributions). The primary unit of analysis was the individual turn (teacher or learner), as transcribed with aligned video timestamps. Interactional episodes were defined as contiguous clusters of turns focused on a single mathematical problem or claim. Episodes were demarcated by topical shifts, teacher summarizing moves, or changes in task phase (e.g., from exploration to consolidation). Episode boundaries were explicitly marked in the transcripts to permit episode-level analysis.

### T-SEDA Categories and Operational Definitions

Each T-SEDA category was defined in a coding manual with explicit inclusion and exclusion criteria and prototypical examples drawn from pilot data. This specification supported consistent interpretation across coders and minimized analytic drift.

- **Invite reasoning (IR):** A teacher turn that explicitly asks for justification, explanation, or rationale (e.g., *"Why do you think that?"*). This excludes WH-questions that solicit factual recall or procedural responses.
- **Invite to build on ideas (IB):** A teacher prompt that asks learners to expand or elaborate on a peer's contribution (e.g., *"Can someone add to what Ken just said?"*).
- **Build on ideas (B):** A learner turn that elaborates, extends, or refines a previously expressed idea; mere repetition or echoing without conceptual addition was excluded.
- **Coordinate ideas and agreement (CA):** Teacher moves that synthesize, compare, or reconcile multiple learner contributions (e.g., *"So Andy says X and Ken says Y – how do we reconcile these?"*).
- **Express (E):** Brief statements or direct responses, including confirmations, paraphrases, or short factual answers within an IRF-type exchange.
- **Connect (C):** Explicit linking of representations, procedures, or concepts (for example, connecting a graphical transformation of a parabola to its algebraic form).
- **Challenge (CH):** Direct contestation of a claim, posed by either teacher or learner, intended to promote sense-making rather than evaluative correction.
- **Guide (G):** Directive organising or procedural moves (e.g., *"Now copy this down"*), used sparingly within otherwise dialogic episodes.

Counterexamples were documented for categories prone to overlap (particularly E vs. B) and were used during coder calibration to support consistent application of codes.

### Coding Procedures

Lesson data were coded using T-SEDA categories within an iterative calibration process. Two lessons were pilot coded to refine category definitions and identify ambiguities, which were documented in analytic memos. The full dataset (six lessons) was then coded systematically using the refined framework. Coding consistency was supported through ongoing reference to category definitions and analytic note-taking of borderline cases.

### Descriptive Dialogic Metrics

Following coding, counts for each code by speaker (teacher/learner), episode, and lesson were manually tallied from the coded transcripts and entered into summary tables. From these tallies, descriptive metrics were calculated, including total number of turns, teacher-learner turn ratios, proportions of reasoning-

related moves (IR, IB, B, and CA), mean episode length in turns, and the percentage of open prompts (Q, IB, and IR) that elicited elaborate learner responses. These metrics were used to characterize the dialogic profile of lesson 2 and to guide the selection of focal episodes for qualitative interpretation.

### Negotiation of Belonging Framework: Identity/Process Analysis (Interview Data), Conceptual Grounding, and Units

Wenger's (1998) modes of belonging (engagement, imagination, alignment) provided the conceptual starting point for analyzing professional identity. The negotiation of belonging framework operationalizes these modes into five processes—claiming, participating, evaluating, adjusting, and challenging—allowing empirical identification of identity work in talk and narrative. Interview transcripts were segmented at the clause or turn level; longer narratives were subdivided into analytic segments representing discrete identity acts (e.g., a single episode in which the teacher claims vocation, evaluates a lesson outcome, or describes adjusting to departmental policy).

### Process Definitions and Coding

Each of the five processes was defined in a codebook with explicit operational criteria:

- **Claiming:** First-person identity positioning, future orientation, and vocational language (e.g., "I think my calling was to be a teacher"), including rejection of imposed identities.
- **Participating:** Descriptions of concrete membership behaviors (e.g., consulting colleagues, enacting department norms, engaging learners in particular ways).
- **Evaluating:** Affective or cognitive judgements about fit, competence, legitimacy, or belonging (e.g., feeling inadequate and questioning whether one "belongs").
- **Adjusting:** Accounts of tactical alignment, compromise, or pragmatic changes in practice in response to contextual pressures.
- **Challenging:** Explicit critique, resistance, or attempts to redefine norms (e.g., questioning departmental practices and aspiring to change teacher education).

Interview data were coded according to these definitions using an iterative, memo-supported process. Where segments reflected multiple processes, co-labeling was permitted; a dominant process was identified, and secondary processes were documented in analytic memos.

### Frequency Summaries

Analytic segments were tallied manually to produce frequency counts and proportions for each negotiation process. These descriptive statistics were treated as indicative patterns rather than as inferential tests, guiding the selection of illustrative extracts and the structuring of the thematic discussion.

### Temporal and Conceptual Integration (Co-Coding)

Lessons and interviews were integrated through a three-step manual co-coding procedure. First, lesson transcripts (coded with T-SEDA) and interview transcripts (coded with the negotiation of belonging framework) were coded independently, with coding decisions recorded in analytic memos. Second, interview segments were aligned to specific lesson episodes where the stimulated-recall interview referenced identifiable lesson events; where direct reference was absent, alignment was conducted at the level of lesson phase (opening, exploration, consolidation) and topic. Third, alignment outputs were entered into excel spreadsheets that recorded, for each focal episode,

- (a) the distribution of T-SEDA codes and
- (b) the associated belonging-process codes from the linked interview segment(s).

From these matrices, descriptive cross-tabulations were constructed manually (e.g., counts of episodes characterized by high IR/IB/CA activity that co-occurred with claiming/evaluating/adjusting talk). These cross-tabulations were used only to identify patterns that warranted qualitative interpretation and to guide selection of illustrative episodes; they were not treated as inferential evidence and do not support causal claims.

### Trustworthiness, Reflexivity, and Limitations of the Analytic Approach

Several strategies supported the credibility of the analysis: triangulation of data sources (lessons, artefacts, and interviews), use of explicit codebooks for both frameworks, and systematic analytic note-taking to document coding decisions and emerging interpretations. Coding proceeded through an iterative calibration process in which category definitions were refined and applied consistently across the dataset. Member checking was used selectively. Mr. Marks reviewed selected lesson excerpts and a summary of interpretive themes during the stimulated recall interview and provided clarifications that informed, but did not determine, final analytic decisions. Manual coding records, Excel spreadsheets, and frequency tables were retained to support transparency and traceability of the analytic process.

At the same time, several limitations should be noted. Reducing complex identity work to discrete codes risks

**Table 1.** Distribution of T-SEDA dialogic codes for lesson 2 (teacher and learner turns)

T-SEDA dialogic code	Teacher focus (n = 198)	Learner focus (n = 283)	Total (%)	Description*
Q-Question	19 (9.6%)	22 (7.8%)	8.4%	Elicit or direct attention
IB-Invite to build on ideas	45 (22.7%)	7 (2.5%)	10.7%	Invite learners to extend reasoning
B-Build on ideas	13 (6.6%)	112 (39.6%)	25.6%	Elaborate or re-use peer/teacher ideas
CH-Challenge	2 (1.0%)	2 (0.7%)	0.8%	Disagree or request justification
IR-Invite reasoning	22 (11.1%)	1 (0.4%)	4.7%	Ask for explanation of thinking
CA-Coordinate ideas and agreement	42 (21.2%)	0 (0.0%)	8.6%	Integrate or reconcile contributions
C-Connect	8 (4.0%)	2 (0.7%)	2.1%	Link to previous statements or contexts
G-Guide	1 (0.5%)	0 (0.0%)	0.2%	Direct next steps or activity
E-Express/respond	46 (23.2%)	137 (48.4%)	38.9%	Express idea or reply within triad
Total	198 (100%)	283 (100%)	487 (100%)	

loss of nuance, which was mitigated through analytic note-taking and the use of co-labels. Sequence analyses are descriptive rather than causal, and the small-sample quantitative summaries are indicative only. These constraints were addressed by privileging qualitative synthesis, with quantitative descriptions used to support—rather than substitute for—interpretive claims.

## RESULTS

Data for this study were drawn from six video-recorded mathematics lessons and two in-depth interviews with Mr. Marks, a novice grade 10 mathematics teacher. Lesson 2, focusing on horizontal and vertical transformations of the parabola, was selected for detailed coding because it exhibited the clearest evidence of dialogic interaction. Lesson discourse was analyzed using the T-SEDA, while interview transcripts were coded with the negotiation of belonging framework.

Quantitative results summarize the distribution of dialogic moves, and qualitative exemplars illustrate how these moves are manifested within classroom and interview data.

### Descriptive Statistics of Dialogic Codes

A total of 487 conversational exchanges were coded in lesson 2, comprising 198 teacher turns (40.7%) and 283 learner turns (59.3%). Nine T-SEDA dialogic categories were used. **Table 1** presents the frequency and proportional distribution of codes for teacher- and learner-initiated speech acts.

The dominant category overall was *E* (38.9 % of all turns), indicating a high level of verbal participation from both teacher and students. Learners produced 137 e-coded turns and 112 *B* turns, together constituting nearly 63 % of all learner talk. These codes reflect repeated elaboration or re-voicing, consistent with dialogic discussion. For teacher behavior, *IB* (22.7 %) and *CA* (21.2 %) were most frequent, confirming that substantial time was devoted to eliciting elaboration and synthesizing viewpoints. *IR* (11.1 %) occurred regularly,

whereas *CH* (1 %) and *G* (0.5 %) occurred rarely, suggesting minimal directive instruction.

### Patterns of Discourse Interaction

The exploratory phase accounted for 72 % of interactions, during which *IB*, *IR*, and learner-initiated *B* codes were most prevalent. During the final consolidation phase, *CA* and *E* codes dominated as the teacher integrated competing answers. Analysis of response pairing revealed that 78 % of teacher questions (*Q*, *IB*, and *IR*) were followed by learner elaboration (*B* or *E*), demonstrating a high rate of uptake and sustained interaction. Mean exchange length was 6.9 turns (standard deviation = 3.4, range = 2-18). The longest dialogic cycle lasted 18 turns, beginning at Turn 10, when the teacher drew a graph and prompted discussion of whether a parabola could exist entirely in one quadrant.

#### Exemplar Episode: “The One-Quadrant Parabola”

Within this 18-turn exchange, the teacher initiated with a question (*Q*) and two reasoning invitations (*IR*). Learners responded with opposing claims—“you need positive x-values” vs. “no, you don’t”—coded sequentially as *B* and *CH*. Mr. Marks used *CA* moves three times to attribute and reconcile arguments (“So are we saying the zero is what makes the graph curve?”), while ensuring equal participation among speakers. The ratio of teacher to learner turns in this segment was 1:2.4, indicating a learner-dominated discussion.

**Table 2** shows the quantitative summary of dialogic characteristics.

The numerical pattern shows a predominance of interactive dialogue over expository instruction. The frequency of learner turn-taking and sustained chains of *B-IB-CA* sequences suggest a conceptual, reasoning-oriented classroom discourse.

### Interview Data: Negotiation of Belonging

Across the two semi-structured interviews (total = 8,400 words), 42 analytical segments were coded using the negotiation of belonging framework. **Table 3**

**Table 2.** Quantitative summary of dialogic characteristics

Variable	Value	Statistic
Total coded exchanges	487	N
Mean exchanges per minute	3.6	M
Learner share of total turns	59.3%	%
Teacher share of total turns	40.7%	%
Open prompts leading to elaboration	78.0%	% of Q/IB/IR responses
Mean length of dialogic episodes	6.9 turns	SD = 3.4 range 2-18
Longest episode ("parabola debate")	18 turns (37 % learner initiated)	-

**Table 3.** Proportional representation of the five processes

Negotiation process	Frequency	Proportion	Illustrative qualitative extract
Claiming	8	19%	"Mathematics is the measure of how one thinks ... I believe my calling is to help learners think that way."
Participating	6	14%	"I go to Mrs. [senior teacher] whenever I'm unsure; she always explains how it's handled in the department."
Evaluating	13	31%	"Sometimes I cry ... when other classes do better, I feel I must be failing them or the system."
Adjusting	11	26%	"Anything I do has to be the same as the other classes; I can't always try new ways even if they understand better."
Challenging	4	10%	"If I was in control, I'd teach much better-too many others just follow routines without thinking."
Total	42	100%	

summarizes proportional representation of the five processes.

Evaluating and adjusting were the most frequent processes, whereas challenging accounted for only 10% (n = 4) of segments, suggesting that overt resistance was comparatively rare and typically emerged under constrained conditions rather than as a dominant mode of identity agency.

**Claiming: Constructing Professional Identity Through Pedagogical Commitment**

The teacher's identity claims center on a view of mathematics teaching as intellectual facilitation rather than procedural transmission. He positions himself as someone committed to developing learners' reasoning capacities, stating: "with teaching mathematics I tend to [draw] out of them which means I create that thinking strategy and reasoning ability." This claim reflects an alignment with contemporary reform discourse and his university training, positioning him as a teacher who values conceptual understanding.

However, these identity claims exist in tension with his actual pathway into teaching. When asked why he became a teacher, he reveals: "Actually I wanted to become a nurse but all my opportunity to apply to become a nurse, they failed but I became a teacher." Despite this unplanned entry, he later reframes his trajectory as vocational:

"This is what I say to myself I think my calling was to be teacher because all the means of trying to do something else never succeeded but I've tried once to be a teacher and it was successful."

This retrospective claiming transforms contingency into destiny, suggesting an ongoing effort to construct a coherent professional identity.

His future-oriented claims further reveal his ambivalent relationship with school teaching. He explicitly states: "In five years' time, I want to see myself lecturing at one of the top universities in South Africa. That's why I'm doing my master's now because soon I should be a lecturer and not a teacher." This projection positions university teaching as the ultimate professional destination, implicitly constructing school teaching as a temporary or less desirable location.

**Participating: Constrained Enactment of Membership**

The teacher's participation in the school community is marked by restrictions on pedagogical autonomy. He describes institutional constraints that limit his ability to enact the teaching approaches he values:

"I'm very much restricted in doing in class what I'm not supposed to do. Anything that I do must be the same as the other classes so as a result I am restricted ... as me telling them what to do."

This standardization requirement forces him into a transmission mode that conflicts with his preferred identity as a facilitator of mathematical thinking.

His participation also involves seeking support from more experienced colleagues, though this is primarily technical rather than pedagogical. He explains: "I know if I go to her for something that has been done in the high school level, she already knows it and master's it so she will have the answers." When asked about pedagogical consultation, however, he reveals asymmetry:

"I think the issue of the pedagogy is different especially since I'm the new teacher from the university and she's been here for long so the way I normally implement things is challenged and questioned so I normally don't do that."

This suggests that his participation is tolerated only within narrow boundaries, with his university-informed approaches viewed with suspicion.

Administrative participation also constrains his professional practice. He describes a departmental policy that prevents him from seeing assessment papers in advance:

"There's a policy here in the mathematics department that says that teachers are not supposed to set a mathematics paper because it normally leaks the paper and because of that I didn't see the cycle test, it is possible that there may be something in the cycle test that I haven't taught and when that comes out I will appear to be incompetent in front of the kids."

This structural exclusion undermines his ability to align his teaching with assessment, positioning him as potentially incompetent through no fault of his own.

### **Evaluating: Persistent Experiences of Misfit and Professional Doubt**

The teacher's evaluative assessments are dominated by experiences of discomfort, inadequacy, and marginalization. He repeatedly articulates a sense of not belonging, particularly when his students' performance is compared unfavorably to other teachers' classes:

"When I stand in front of the kids sometimes I don't know what I'm doing, especially if the kid knows that in the other class they passed a lot, so when I stand there the confidence is gone and as I stand there they don't know whether to trust me or not."

His emotional responses to these experiences are acute. He describes moments of profound distress:

"I remember the last time I found myself crying and it's very hard because I am a man and I am not supposed to cry. Sometimes I find myself crying and when I ask myself what I have done, there were times when I felt like quitting the job."

The gendered dimension of his evaluation adds complexity—crying is constructed as contradicting his masculine identity, compounding his sense of professional failure.

Parental involvement further intensifies his sense of not fitting:

"Unfortunately there so much involvement of parents in most of the schools like this one and because there is so much involvement of the parents, the kids trust their parents more than they trust us as teachers so as a result sometimes you find that you nor winning."

He experiences this as loss of authority and professional legitimacy.

Spatially, he also evaluates himself as an outsider:

"Right now it's like I'm a stranger in a different community ... especially because I live in Sondoland, it's even worse it's like I travel from my community to come and intrude in this community and I'm not good enough for it."

This suggests that belonging is not only professionally but also racially and socioeconomically inflected, with the suburban school context positioning him as perpetually external.

### **Adjusting: Strategic Adaptation Under Constraint**

The teacher employs various adjusting strategies to maintain workable, if uncomfortable, belonging. He modifies his pedagogical approach to meet institutional expectations: "I was taught the teacher used to explain on the board and show me what to do and I used to just do it which I still think that's what this school expects me to do." Despite recognizing limitations of this approach, he adapts to survive institutional scrutiny.

He also adjusts his communication with learners about the purpose of mathematics. When students question relevance, he deploys different strategies depending on context: "Those kind of kids, I just say no way if you want the type of mathematics you will use in real life go to mathematics literacy." This pragmatic response redirects resistance while protecting his own teaching space, even if it sidesteps deeper engagement with students' questions.

His adjustments extend to managing discipline problems, which he partially internalizes: "I look at [the] discipline problem, sometimes I think it's me because I'm not yet a parent." By attributing difficulties to his own developmental stage rather than to structural or contextual factors, he adjusts his self-understanding to accommodate institutional blame.

Importantly, he also recognizes that his adjustments are temporary coping mechanisms. Reflecting on long-term effects of difficult experiences, he notes:

"I think the experience would have taught me how to deal in situations like this because right now when something happens, because I am experiencing it for the first time I feel bad about it but in the long run I would grow to understand

and part of it I think I will know by then what works and what doesn't work."

This positions adjustment as a learning process, though it places responsibility for change on himself rather than on the institution.

### Challenging: Limited But Present Resistance

While less frequently, the teacher does articulate moments of challenge and critique. He contests the traditional teaching model he was trained in and is expected to reproduce:

"I think the way I was taught is still effective in a way that I can get learners to pass, I can get learners to do the mathematics but unfortunately it's not easy to get learners to think about the mathematics."

This evaluation implicitly challenges the school's emphasis on passing rates over conceptual understanding.

Most explicitly, he challenges the constraints on his autonomy:

"I think if I was teaching here for example I had all the grade tens, don't share the grade tens I have all the grade tens, I think I will teach much better because I will be in control, what is to be assessed, how will it be assessed but since there are three other teachers that are teaching the same thing ..."

Here, he directly identifies institutional structures as obstacles to effective teaching, resisting the assumption that standardization serves learners' interests.

He also challenges the school's performance hierarchy by suggesting that successful grade 12 results may not reflect teaching quality:

"Since she's the grade 12 teacher who's always producing a lot of distinctions and hundred percent pass rate, umm its seems that her method of teaching is efficient ... [but] My, if my kids for example they fail ... will be questioned. If I'm having some discipline problem, my teaching will be questioned."

This critique exposes unequal conditions of evaluation, where experienced teachers are insulated from scrutiny while he faces constant judgment.

Finally, his aspiration to become an educator teacher represents a form of challenge oriented towards systemic change:

"When I say I want to be a lecturer I want to train teachers to what works and what doesn't work. I will have enough experience though it will be a huge try but I think it will make a difference."

While this also represents an exit strategy, it reframes his difficult experiences as generative knowledge that could transform teacher education—a challenge directed not at his current school but at the broader system that prepared him inadequately for its realities.

The analysis of Mr. Marks's interview data reveals that his negotiation of professional belonging is characterized primarily by evaluative and adaptive processes. While he articulates clear pedagogical commitments centered on developing learners' reasoning capacities, institutional constraints significantly limit his ability to enact these values. The predominance of evaluating (31%) and adjusting (26%) processes, combined with relatively infrequent challenging (10%), suggests an early career experience marked by persistent professional doubt, restricted autonomy, and limited space for resistance. These findings illuminate the lived tension between reform-oriented teacher preparation and traditional school cultures, pointing toward critical questions about how novice teachers negotiate professional identity when their pedagogical values and institutional realities diverge. The implications of these patterns for teacher retention, professional learning, and educational reform warrant careful consideration.

## DISCUSSION

The findings of this case study contribute to ongoing debates about the feasibility and significance of dialogic pedagogy in early-career mathematics teaching. Empirically, lesson 2 demonstrated substantial dialogic engagement: learners produced the majority of turns, reasoning-inviting moves (IR and IB) and coordination (CA) were frequent, and dialogic episodes typically built cumulative, elaborative talk. These interactional patterns align with descriptions of dialogic classrooms in which questioning, voicing, and joint sense-making distribute epistemic authority and support conceptual learning (Alexander, 2020; Mercer & Hodgkinson, 2019; Walshaw & Anthony, 2021). In showing that a novice teacher could instantiate many of these features in practice, the study nuances narratives that early-career teachers uniformly revert to transmissive routines. While Gainsburg (2012) and others have documented a tendency for novices to fall back on procedural teaching, Mr. Marks's practice indicates that dialogic enactment is possible—even if partial and contextually contingent—within traditionally oriented school settings (Hwang, 2022; Lehesvuori et al., 2021).

At the same time, the data corroborate and extend studies emphasizing the persistent constraints on reform enactment. Accountability pressures, departmental norms, and parental expectations can re-inscribe traditional practice and narrow the space for dialogic exploration (Schmidt & Kennedy, 2022; Solomon et al., 2016). Mr. Marks's interviews and lesson sequences

provide concrete evidence of these pressures: episodes of curtailed dialogue and procedural closure coincided with reflections of conformity and anxiety. This pattern supports boundary-crossing analyses that locate difficulties in transfer not in novice deficits but in negotiation across communities of practice and institutional expectations (Daniels & Du Plooy, 2024; Jarvis et al., 2023; Remillard & Heaton, 2020). Thus, the study suggests that dialogic practice may coexist with—rather than wholly replace—contextually compelled pedagogies; the result is an adaptive, negotiated repertoire rather than the straightforward adoption of reform practices.

A central contribution of this study is to show that dialogic teaching operates simultaneously as pedagogical work and as identity work. The alignment between dialogic classroom episodes and affirmative identity discourse in Mr. Marks's interviews lends empirical weight to claims in identity research that professional learning involves embodied discourses and relational negotiations of legitimacy (Kelchtermans, 2020; Losano et al., 2018). In this case, dialogic episodes not only enacted conceptual pedagogy but also appeared to bolster Mr. Marks's sense of professional legitimacy and agency; conversely, periods of institutional pressure undermined both talk and confidence. Importantly, this alignment is treated as descriptive rather than causal, indicating patterns of co-occurrence that warrant interpretive synthesis rather than strong inferential claims.

The study's elaboration of Wenger's (1998) modes of belonging through the five negotiation processes (claiming, participating, evaluating, adjusting, and challenging) further sharpens analytic leverage for identity research. Prior applications of Wenger (1998) in mathematics education have been illuminating but often remain conceptually abstract (Graven, 2004; Solomon et al., 2016). By specifying micro-processes that map onto observable classroom and narrative moves, this study operationalizes how imagination, engagement, and alignment are enacted in everyday practice. That claiming and evaluating were most frequent in Mr. Marks's interview data signals a professional identity that is simultaneously aspirational and reflexive: teachers claim ideals while continually assessing fitness and legitimacy (Beijaard et al., 2019; Kelchtermans, 2020). Notably, challenging accounted for a comparatively small proportion of segments (10%,  $n = 4$ ), suggesting that overt resistance was rare and tended to emerge under constrained conditions rather than as a dominant mode of identity agency (Groenewald & Arnold, 2025; Liyuan et al., 2024).

These findings also resonate with research on induction and mentorship. Structured support can reduce early-career attrition pressures and foster professional learning, including the conditions under which reform-oriented practices can be sustained (Diab

& Green, 2024; Schaap et al., 2021). In Mr. Marks's case, mentorship (participation with a senior colleague) appeared to be a pragmatic resource for problem solving and confidence building, but not a systemic cushion enabling sustained innovation. The implication is that mentorship alone is insufficient unless departmental and school-level norms also recognize dialogic aims as legitimate; otherwise, dialogic enactment remains precarious and person-dependent (Hwang, 2022; Schmidt & Kennedy, 2022).

Comparatively, the case aligns with Jong's (2016) single-case account showing that commitment and modelled practice can sustain reform enactment, but it also underscores limits: individual resolve alone is insufficient to institutionalize dialogic norms. The observed oscillation between exploratory dialogue and procedural closure supports a nuanced position: early-career teachers may enact reform-oriented practices in pockets of lesson time, yet their overall repertoire becomes a negotiated hybrid shaped by emotional labor, institutional expectations, and available social support (Hobson et al., 2022; Pillen et al., 2013). This study both confirms and extends prior work: it confirms that dialogic practice can foster conceptual engagement (Alexander, 2020; Walshaw & Anthony, 2021) and that school contexts constrain enactment (Solomon et al., 2016), it extends understanding by empirically describing the patterned alignment between dialogic intensity and identity affirmation and by operationalizing belonging as micro-processes traceable across classroom talk and narrative. The significance lies not only in documenting a novice teacher's dialogic competence but in illuminating dialogic pedagogy as an arena for identity formation, with implications for teacher education, induction, and school leadership (Losano et al., 2018; Wenger, 1998).

## CONCLUSION

This case study demonstrates that dialogic teaching practices can be meaningfully enacted by a novice mathematics teacher even within a school culture that privileges procedural conformity. Evidence from the T-SEDA analysis shows substantial learner participation, frequent reasoning invitations, and distributed epistemic authority; interview analysis indicates that these dialogic episodes were closely connected to the teacher's identity work—his claims about who he was becoming, his assessments of legitimacy, and his adaptive responses to institutional pressures. Together, the findings suggest that dialogic pedagogy can function dually as instructional strategy and identity practice: dialogic engagement may bolster novice teachers' sense of competence and belonging, while institutional constraints—departmental expectations, parental scrutiny, and comparative performance pressures—can curtail dialogue and undermine confidence. The study

therefore reframes the “theory-practice gap” as, in part, an identity negotiation: pre-service dialogic dispositions persist as embodied resources but require continual recalibration in practice (Losano et al., 2018; Wenger, 1998).

The study has several limitations. This is an interpretive single-case investigation, and its findings are therefore not statistically generalizable; instead, they are offered as contextually situated, theory-building insights intended to inform conceptual understanding of dialogic teaching and professional belonging rather than to represent wider populations. The lesson sample, while rich, was limited in duration and scope (six lessons collected over a single term, with one lesson foregrounded), which precludes conclusions about the long-term stability, routinization, or institutional embedding of dialogic enactment. Interview data rely on self-report and retrospective reflection and are subject to the usual concerns about social desirability and selective recollection. The correlational evidence linking dialogic intensity with affirmative identity discourse is based on small-sample ordinal data and should be interpreted cautiously; it suggests association, not causation. Finally, ethical and practical constraints limit open public sharing of full transcripts; however, detailed codebooks, and conditional access to anonymized transcripts and coding records for qualified researchers support analytic transparency and enable reasonable external audit of the findings.

Future research should address these limitations through broader and longer designs. Comparative multi-case studies across diverse school types would test the transferability of the dialogic-identity relationship and clarify how departmental cultures mediate enactment. Longitudinal mixed-methods research following novice teachers across their first three to five years would reveal whether dialogic practices and identity effects persist, strengthen, or erode over time. Experimental or quasi-experimental studies of induction interventions (e.g., targeted mentoring, departmental professional learning communities, and leadership support for dialogic aims) could evaluate which institutional supports most effectively stabilize dialogic pedagogy and teacher belonging. Quantitative work that develops validated measures of dialogic intensity and teacher identity could permit larger-scale hypothesis testing, while qualitative studies could further unpack micro-processes of adjustment and challenge in situ. Finally, research that examines policy levers—assessment design, timetabling, and faculty leadership—would help identify systemic changes needed to make dialogic practice both viable and valued in everyday schooling. In closing, Mr. Marks’s experience underscores that promoting dialogic mathematics teaching requires attention to both pedagogical technique and the professional conditions that enable teachers to belong to a community that

values reasoning. Supporting novices therefore calls not only for skills development, but for induction, leadership, and policy arrangements that recognize dialogue as a legitimate and measurable aspect of good teaching. Only by addressing both the instructional and identity dimensions can dialogic practices move from individual endeavor to collective educational practice.

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