BEGINNING TEACHER'S TRAJECTORY OF IDENTITY FORMATION IN THE FIGURED WORLDS OF REFORM AND TRADITIONAL INSTRUCTION

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Transitioning from a teacher education program to autonomous teaching is a complex process, fraught with challenges. This transition involves developing identities and teaching practices that allow novice teachers to reconcile the reformed teaching world of their teacher preparation program with the more traditional world of school teaching. In this paper, we follow the identity formation of one beginning teacher, Olive, by examining her narratives about her pedagogical actions as she transitions from being a pre-service teacher (PST) to being an intern (INT) to becoming a new teacher (NT). As PST, Olive's narratives about her current and desired actions aligned with reform actions; as INT, a gap opened between her current traditional actions and desired reform actions; and as NT, the gap narrowed as she modified her desired narratives to more traditional ones. We discuss our findings and their scientific significance.

Keywords: Novice Teachers, Teacher Learning, Identity, Reform Teaching

Introduction

University teacher preparation programs aim to prepare future mathematics teachers to enact ambitious pedagogical practices that align with the NCTM's vision of effective teaching and the Common Core Standards for Mathematical Practices (AMTE, 2017). As beginning teachers transition from university to school teaching, they need to reconcile between the world of ambitious (hereafter, *reform*) teaching of their teacher preparation program and the world of school teaching characterized mostly by traditional teaching practices (Jacobs, et al., 2006). The reconciliation between the two worlds can be accomplished by integrating reform practices, to varied extents, into the more traditional school world (Thompson et al., 2013). Indeed, some beginning teachers tend to lean toward traditional practices (Gainsburg, 2012), while others hold on to their reform teaching practices (Conner & Marchant, 2022; Smagorinsky et al., 2004).

The extent to which beginning teachers adopt and integrate reform practices has been linked to their emerging teacher identities and more specifically, to "the kind of teachers selves they have developed and seek to create"(Horn et al., 2008, p. 63). We can learn about identity by considering teachers' narratives about their general current pedagogical actions and their desired ones (Heyd-Metzuyanim, 2019). Moreover, it is important to examine the beginning teachers' identity formation over time and across settings. However, such longitudinal studies are rare, and not enough is known about how the processes of the reconciliation of the two worlds unfold.

In this paper, we analyze the case of one beginning teacher Olive (pseudonym), whom we followed for four years: as a pre-service secondary teacher (PST), as an intern (INT), and as a novice teacher (NT). Olive was chosen because she represents a case of a highly successful beginning teacher, in terms of her mathematical knowledge, pedagogical creativity, and productive dispositions, aligned with reform teaching (as evidenced by her undergraduate coursework). This meant that, relative to other PSTs, Olive had a good starting point in terms of integrating reform practices into the school world. We explore Olive's trajectory of teacher identity formation, building on the theoretical notions of "figured worlds" and pedagogical narratives, which we describe below.

Theoretical Framework

Drawing on Holland et al. (1998) and other scholars (Horn et al., 2008; Ma & Singer-Gabella, 2011), we view the traditional mathematics instruction and the reform teaching, not only as two pedagogical approaches but as two "figured worlds". A figured world is a "socially and culturally constructed realm of interpretation in which particular characters and actors are recognized, significance is assigned to certain *acts*, and particular *outcomes* are valued over others" (Holland et al., 1998, p. 52). To conceptualize the reform and traditional figured worlds, and specifically, their valued actions and outcomes, we drew on the National Council of Teachers of Mathematics' *Principles to Actions* (2014), a central document in the discourse on reform mathematics instruction. Table 1 shows our resulted conceptualization of the two worlds.

Table 1: Conceptualization of the Reform and Traditional Figured Worlds

	Figured World of Reform Teaching	Figured World of Traditional Teaching
Valued pedagogical actions	Examples: providing students with opportunities to explore and problem-solve; supporting students without eliminating their challenge; encouraging them to use reasoning and proving when justifying mathematical claims.	Examples: posing tasks which students are expected to solve using a specific memorized procedure; guiding students step by step through problem-solving; encouraging students to give short answers and respond to teacher only.
Valued pedagogical outcomes	Examples: collaborative explorations, open and reasoned discussions, productive struggle, and student authority.	Examples: memorization, correctness of answers, procedural knowledge, and teacher authority.

To be able to investigate processes of identity formation during the reconciliation of the reform and traditional figured worlds, we examined Olive's narratives about her pedagogical actions. Hence, our claims concern teacher's *narratives* about pedagogical actions, rather than the actual classroom practice We conceptualized four types of narratives a teacher produces about their actions, as shown in Table 2.

Table 2: Conceptualization of Narratives about a Person's Actions

	Narratives about *Specific* actions	Narratives about *General* actions
Desired actions	Example: In this specific lesson, I wish I had encouraged more peer discussions.	Example: I wish to have more peer discussions in my class.
Current actions	Example: In this specific lesson, I encouraged students to talk to their peers.	Example: I always encourage peer discussions in my class.

By distinguishing between narratives about *Specific* actions (first column) versus ones about *General* actions (second column), we drew on a distinction made by Heyd-Metzuyanim and Sfard (2012) between a person's communication about their *specific* performance versus their routine or *general* performance. We see these two types of communication as essential to exploring the formation of *identity*, defined as "narratives about individuals that are reifying,

endorsable and significant" (Sfard & Prusak, 2005, p. 16). By distinguishing between narratives about *Desired* actions (first row) versus ones about *Current* actions (second row), we drew on Sfard and Prusak's (2005) distinctions between various types of identity narratives (i.e., actual and designated). Building on their conceptualizations, we distinguish between narratives teachers author about their *current* pedagogical actions, and those authored about their desired pedagogical actions. This focus on personal narratives allows us to adopt the teacher's perspective on her pedagogical practice while we tell the story of her identity formation. Based on our four-fold conceptualization, we ask the following research question: *What was the trajectory of Olive's (specific and general) narratives about her current and desired pedagogical actions in relation to their alignment with traditional and reform pedagogical actions?*

Methods

The data on Olive's trajectory as a beginning teacher came from multiple sources, collated over four years. The PST-period data comprised lesson plans, video recordings and written reflections for the four lessons Olive taught to small groups of high-school students, as part of the capstone course *Mathematical Reasoning and Proving for Secondary Teachers* (Buchbinder & McCrone, 2023). The internship data were collected for two lessons Olive taught in her cooperating teacher's (CT's) classroom. Data sources included video recordings of the observed lessons and debriefing interviews of each lesson. As an NT, Olive was three times observed and interviewed after each lesson; and once, in lieu of an observation, we conducted an extended interview in which Olive shared an activity she enacted in her class and a sample of student work. Supplementary data included Olive's contributions to bi-monthly meetings of the professional learning community (PLC) of all new teachers participating in this study. The video recordings of all interviews and PLC meetings were transcribed for analysis.

To analyze the data, we first identified in the transcripts instances of Olive's narratives about her pedagogical actions. Each narrative was coded as either *specific* to that lesson or describing Olive's teaching in *general*. Further, the narratives were coded as either describing her *current* teaching or what she considered her *desired* way of teaching. This created the four categories conceptualized in Table 2: *current specific, current general, desired specific* and *desired general*. Next, the narratives were coded as aligned with either *reform* or *traditional* teaching practices. The coding scheme was based on content analysis of NCTM's (2014) *Principles to Action*, in which we generated a list of teaching valued actions consistent with reform or with traditional pedagogy (as exemplified in Table 1). Finally, we created a profile of Olive's narratives about her pedagogical actions *in each lesson*. Figure 1 shows one such profile extracted from the debrief interview of Olive's first lesson as NT. The actions aligned with reform practices are shaded in blue and the traditional ones are shaded in yellow.

	Specific	General
Desired	Ensure students leave with deep math knowledge Give students more time to work independently	No narratives about desired general actions
Current	Encourage students to take responsibility for their learning Ask students to provide justifications for their claims Provide activity in which students choose between strategies Let students do the mathematical talking	Encourage students to think independently Provide students opportunities to author their own tasks Teach students in a lecture style Provide activities for students to practice procedures

Figure 1: Profile of Olive's Narratives about her Actions in her First Lesson as NT

Examining these lesson profiles, we tracked changes in Olive's narratives about her pedagogical actions across time points and settings: university (PST), internship (INT), and autonomous teaching (NT). We describe them below.

Findings

PST: Current and Desired Actions Align with Reform Teaching

As a PST, all of Olive's narratives about her current pedagogical actions were specific to the four lessons she taught during the capstone course, and there were no narratives about her current general actions (as she was not yet teaching her own classroom). She did, however, author narratives about her general desired pedagogical actions. All her narratives were coherent with each other and aligned with the reform teaching practices, specifically those related to reasoning-and-proving (Stylianides, 2008). This alignment was evident in all the reflections Olive wrote after her four lessons. For example, in her second lesson, Olive incorporated reasoning-and-proving actions with the mathematical topic of congruent triangles and special segments in a triangle, while introducing students to conditional statements. In her reflection, she wrote:

> Together [with the students] we defined a conditional statement and discussed how they occur in a variety of settings. I also asked for students to provide their own examples of both if/then conditional statements and non-if/then conditional statements, identify hypothesis "P" and conclusions "Q" and determine their truth value, this includes some proofs and some counterexamples.

Olive's narratives about her pedagogical actions in this lesson (current-specific) included reform reasoning-and-proving actions such as providing students with opportunities to author their "own examples"; validate mathematical claims ("determine their truth value"); construct proofs and use counterexamples to refute arguments.

Similarly, Olive's narratives about her general desired pedagogical actions were aligned with reform teaching practices. For example, in her forth reflection, she wrote:

> Indirect reasoning and proving was so much fun to integrate into a lesson, I had never realized before that putting indirect reasoning into any math concept could be relatively easy for a teacher and *absolutely* accessible for students [emphasis in the original]. [...] I should certainly be able to find ways to incorporate it into different types of lessons.

Here, Olive shared her excitement ("so much fun") about the relative ease of integrating indirect reasoning into this specific lesson as well as future lessons ("I should certainly be able to find ways to incorporate it"). She talked about the joy of engaging students with indirect reasoning "in any math concept" and "into different types of lessons." Thus, her desired actions in this specific lesson, and general desired ones (in future lessons) were coherent and aligned with reform actions. A similar pattern was observed in all of Olive's four reflections as a PST.

INT- First Debrief: Traditional Current Actions vs. Reform Desired Actions

As an INT, Olive taught in the classroom of Julia (pseudonym), her cooperating teacher (CT). In her debrief interview, following her first lesson, there were still no narratives about her current general way of teaching, only ones specific to the lesson. These narratives, in contrast to her narratives as a PST, were completely aligned with traditional teaching practices, prevalent in her CT's classroom. This was apparent in Olive's debrief interview when she described her goals for the lesson as follows:

I would feel accomplished if they [the students] understood how to combine like terms on two sides of the equation, moving chunks with the variable […] I knew that having the variable on both sides would freak them out because they'd only done it with a variable on one side. So that was probably the biggest hurdle to get over today, combining the variable terms.

Olive's narratives in this excerpt (current-specific) were aligned with traditional practices such as making sure that students know how to carry out mathematical procedures ("the biggest hurdle to get over today, combining the variable terms"); and ensuring that students are not too frustrated or confused ("I knew that having the variable on both sides would freak them out"). However, as the debrief progressed, Olive authored narratives about wishing she had taken pedagogical actions that allow students to be more explorative in their learning, saying:

I'd love to have sometimes an equation up and they'll [the students] suggest something [like] "add 24 to both sides," and it won't make sense, but I wanna just go along with what they're saying […]. [As if saying] "let's just play with the rules for the day" […] and show them why it doesn't make sense. […] They are stuck to doing only moving these [terms], but if you can conceptually understand that we have a scale, and as long as you're doing both things to both sides [of the equation], the answer is going to be the same at the end of the day.

In this quote, Olive contrasted her traditional pedagogical actions in this lesson, with desired ("I'd love to …") actions aligned with reform pedagogical practices of encouraging students to explore mathematical rules and use their own methods for solving problems ("let's just play their rules"), and of proving them with opportunities to establish a strong conceptual foundation ("if you can conceptually understand…"). Thus, as Olive transitioned from PST to INT, a gap opened between her narratives about her current traditional actions and desired reform ones.

INT- Second Debrief: Reform/Traditional Current Actions vs. Reform Desired Actions

In the debrief following Olive's second observed lesson, the gap between her narratives about current and desired pedagogical actions narrowed as Olive's narratives about her current actions became more aligned with reform practices, as the next excerpt shows:

I had decided to do that little, what I called an exploration in the beginning [of the lesson]. […] I kind of pushed to do that just because in the original lesson plan that Julia had written years prior, the idea of flipping the inequality side is not really explored at all […] I wanted them to see it for themselves and to understand, using numbers, why that was the case.

Olive described in this quote how she took the liberty to modify her CT's lesson plan by introducing in it a short "exploration" activity that would help students make sense of the rule for changing the sign of inequality when multiplied or divided by a negative number. This activity aligned with reform practices such as providing students with opportunities to explore rules and to make sense of and justify mathematical claims ("I wanted them to see it for themselves and to understand, using numbers, why that was the case"). Although Olive's narratives about her current pedagogical actions in this excerpt aligned with reform practices, in the rest of the lesson, she followed her CT's lesson plan that was rooted in traditional practices. Olive shared that she would have preferred to continue the exploration activity for the entire lesson, saying: "I wish I could have given a whole 40 minutes to that, you know, but I'm so glad that it got worked in at all". She added: "I would've liked to take some of the conjectures that they said that I didn't agree with and show them why I didn't agree with them." Thus, Olive's narratives about her current

specific actions were aligned with both reform and traditional teaching practices, while her desired ones remained purely aligned with reform practices.

NT: Reform/Traditional Current and Desired Actions

As NT Olive was faced with the responsibility of day-to-day teaching, but also was free to experiment with reform teaching on her own. The first lesson we observed was a group activity where students explored parabolas as projectiles in the Angry Birds ® game. In the debrief interview Olive shared her excitement about this activity by saying:

> I'm really enjoying doing this project because I have been doing a lot of boring, I feel like, lecture-style things. And so, this is like an opportunity for me to stop talking, which is really wonderful. […] It is incredible how they [students] can focus, […] and kind of crank stuff out pretty quickly, and without a ton of wrestling from me, which is really nice.

Here Olive described her current general pedagogical actions ("I have been doing") as traditional ("boring lecture-style") contrasting them with reform-aligned current actions specific to this lesson, including giving students a rich mathematical task and supporting them in taking responsibility for their learning ("without a ton of wrestling from me"). However, when the interviewer inquired about incorporating more conceptually rich prompts, Olive replied:

> I guess my hesitation […] I'm playing devil's advocate in the situation, if I went and tried to go off on a conceptual tangent with each kid, I think that they would tune out immediately […] with so many kids […] to try to circulate that room and have a deep conceptual conversation with each of those 28, I don't even think I'd have time in the block to do that.

In this quote, Olive questioned whether it is realistic to pursue "deep conceptual conversations" "with so many kids." While not rejecting the idea, she *implicitly* positioned this kind of reform action as generally non-desirable. Thus, in her first debrief as NT, Olive's narratives about her *desired* actions began to move away from being purely aligned with reform practices.

In the following interviews, Olive's narratives about her current pedagogical actions presented a mixture of reform and traditional actions. For example, in her second NT interview, Olive described a lesson on operations with radicals in the following way:

> I liked that some of it [the lesson] felt exploratory, but then some of it definitely felt like a very telling way of teaching, like just kind of giving them the information as opposed to letting them figure it out".

Here, Olive communicated narratives about her current specific actions as being both reform-oriented ("I liked that some of it felt exploratory") and traditional ("telling way of teaching", "giving them the information").

As time went by, Olive's narratives about her current pedagogical actions, both specific to a certain lesson and general, continued to present a mixture of reform and traditional actions. Olive explained: "I try to start each unit with like a nice little discovery activity of some kind." She talked excitedly about one activity where students discovered the value of Pi, saying: "I didn't want to give too much away. I was trying to teeter a line of 'figure it out yourself." She shared her joy when students "have the best conversations, and they argue, and they don't want my input." These narratives were all aligned with reform practices. However, Olive admitted that these types of reform activities are infrequent among more traditional ones. She said: "I feel like as the unit goes on, it becomes less exploration and more like, here's the content, get it in your head." Thus, Olive's narratives about her current general pedagogical actions aligned also with traditional practice.

As captured already in her first debrief as NT, Olive's narratives about *desired* pedagogical actions changed as well toward more traditional practices. Notably, there was still some gap between current and desired narratives. On the one hand, Olive still strived to enact reform practices, saying "In an ideal world, I would've absolutely loved to do that activity [Pi-exploration] with every section." But on the other hand, reform teaching seemed to be more of a hypothetical ideal for Olive. The next quote illustrates this duality:

> I definitely don't wanna be a person that's lecturing every day, but I also don't necessarily have some super fun exploration planned every day either. There's gotta be like a healthy balance of those two things.

Olive did not want to revert to traditional teaching practices; however, her questioning of the feasibility of enacting reform actions day in and day out became more explicit and upfront. In one of the later interviews, Olive reflected on her trajectory from the university to classroom teaching:

> [In] undergrad and even as an intern [I] made some lesson plans that were just absolutely ridiculous in terms of what I expected the students to understand at a rate or pace that was absolutely unrealistic for the children […] I've definitely become more, I like to consider it, realistic […] sometimes I feel bad about it and sometimes I feel guilty about it. […] I try to maintain high expectations, but I think I, I'm a little bit more realistic.

In this excerpt, Olive framed some of her ambitious, reform-aligned lessons she developed as PST and INT as "ridiculous" and "unrealistic." She positioned her current mixture of reform and traditional actions as "realistic," although admitting she felt "sometimes bad" and "guilty" about this change. Thus, Olive in her second year as a new teacher identified herself as a realistic teacher who strives for a "healthy balance" between the traditional school world and the teacher-education world of reform pedagogy.

Summary and Discussion

Figure 2 summarizes the trajectory of Olive's narratives about her specific/general, current and desired pedagogical actions as aligned with traditional or reform pedagogical practices.
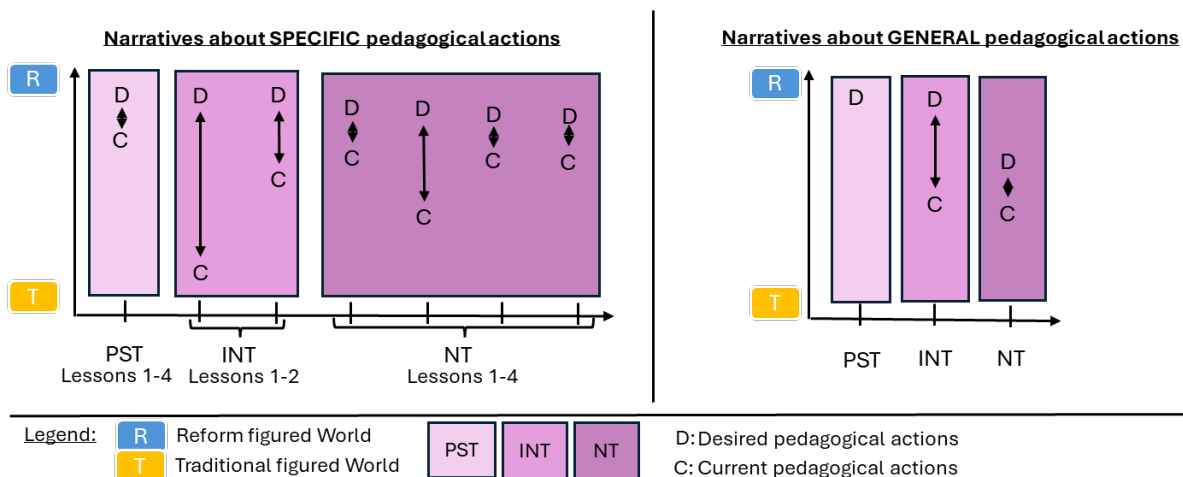
Figure 2: Trajectory of Olive's Narratives about her Pedagogical Actions

We present *specific* and *general* narratives separately, side by side. The vertical axes represent a non-quantified continuum between reform and traditional actions. The position on the

continuum is not absolute, but represents general discursive tendencies observed in the data (cf., Truxaw and DeFranco' (2008) Sequence Maps). The narratives about *general* pedagogical actions (on the right) are represented by a single instance per period (PST, INT, NT) based on aggregated data. Also, narratives about *specific* pedagogical actions for the PST stage are collapsed across four lessons. However, each observed lesson as INT or NT is represented separately, to provide greater detail about Olive's narratives during this critical period of her teaching career. The icons "C" and "D" stand for current and desired actions; close placement represents coherence of narratives, while distanced placement represents a gap between current and desired narratives.

As a PST, Olive's narratives about *desired* actions, both specific and general, were aligned with reform practices. The same was true for narratives about her *current* actions in the four specific lessons she taught as PST. This reinforces our choice of Olive as a case of a beginning mathematics teacher, who was both well-prepared and eager to enact reform teaching practices.

Two critical processes followed Olive's promising starting point as a PST. The first one occurred during Olive's internship, when her narratives showed a gap between desired reform actions and current traditional ones (both specific, as seen in lesson 1 as INT, and general). This gap is consistent with previous studies suggesting that novice teachers tend to adopt the traditional teaching practices of their mentors (Bieda et al., 2014; Gainsburg, 2012). In her second lesson as well as the following lessons during her NT period, Olive tried to close the gap by aligning her current traditional pedagogical actions with her desired reform ones (captured in the Figure by the rise of "C" toward "D"). This finding aligns with Horn and colleagues (2008) who foregrounded the link between interns' reform desired images of good teaching and the modification of their traditional teacher identities.

The second process occurred during Olive's NT period. We did not identify a particular turning point in Olive's narratives, but rather a gradual process characterized by two trends. The first one is the fluctuation of narratives about *current* specific practices somewhere in the middle along traditional-reform continuum (captured by changes in the location of "C"). This trend points to Olive's multiple attempts to integrate reform practices in specific lessons revealing the dynamic changes in her narratives about specific actions. These changes are important as they underly the formation of Olive's more stabilized narratives about current general actions aligning with *both* traditional and reform actions. The second trend in Olive's narratives is the gradual shift in the *desired* actions toward more traditional practices (captured by the lowered position of "D" both in relation to specific and general actions). This shift points to Olive's attempts to close the gap between narratives about her current and desired actions by "lowering the bar" and modifying the desired actions to be more "realistic," traditional ones. This finding suggests that even an enthusiastic beginning teacher, like Olive, who is committed to reform practices, may need support in keeping the view of reform practices as desired (Ingersoll & Strong, 2011).

We believe that Olive's longitudinal case of a promising new teacher entering the world of traditional schooling, contributes to a better understanding of the underlying processes of identity formation during the reconciliation of the two worlds. As we continue to investigate trajectories of Olive and other beginning teachers in the larger study, we intend to include further lenses to gain a better understanding of identity formation as interwoven with social and cultural contexts.

References

Association of Mathematics Teacher Educators. (2017). *Standards for Preparing Teachers of Mathematics*. Available online at amte.net/standards.

Bieda, K. N., Sela, H., & Chazan, D. (2014). "You Are Learning Well My Dear": Shifts in Novice Teachers' Talk About Teaching During Their Internship. *Journal of Teacher Education*, *66*(2), 150–169.

Buchbinder, O., & McCrone, S. (2023). Preparing prospective secondary teachers to teach mathematical reasoning and proof: the case of the role of examples in proving. *ZDM – Mathematics Education*, *55*(4), 779–792.

Conner, A., & Gómez Marchant, C. N. (2022). Seeing it all vs. not seeing anything: Professional identity and belief structures in prospective mathematics teachers' interpretations of experiences. *Teaching and Teacher Education*, *117*, 103818.

Gainsburg, J. (2012). Why new mathematics teachers do or don't use practices emphasized in their credential program. *Journal of Mathematics Teacher Education*, *15*(5), 359–379.

Heyd-Metzuyanim, E. (2019). Changing teaching practices towards explorative mathematics instruction – The interweaving of teacher identity and pedagogical discourse. *Teaching and Teacher Education*, *86*, 102862.

Heyd-Metzuyanim, E., & Sfard, A. (2012). Identity struggles in the mathematics classroom: On learning mathematics as an interplay of mathematizing and identifying. *International Journal of Educational Research*, *51*, 128–145.

Holland, D., & Lachicotte, W. J. (2007). Vygotsky, Mead, and the new sociocultural studies of identity. In *The Cambridge Companion to Vygotsky* (pp. 101–135). Cambridge university press.

Horn, I. S., Nolen, S. B., Ward, C., & Campbell, S. S. (2008). Developing Practices in Multiple Worlds: The Role of Identity in Learning To Teach. *Teacher Education Quarterly*, *35*(3), 61–72.

Ingersoll, R. M., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of educational research*, *81*(2), 201-233.

Jacobs, J. E., Hiebert, J., Givvin, K. B., Hollingsworth, H., Garnier, H., & Wearne, D. (2006). Does Eighth-Grade Mathematics Teaching in the United States Align With the NCTM Standards? Results From the TIMSS 1995 and 1999 Video Studies. *Journal for Research in Mathematics Education JRME*, *37*(1), 5–32.

Ma, J. Y., & Singer-Gabella, M. (2011). Learning to Teach in the Figured World of Reform Mathematics: Negotiating New Models of Identity. *Journal of Teacher Education*, *62*(1), 8–22.

National Council of Teachers of Mathematics (2014). *Principles to Actions: Ensuring Mathematical Success for All*. Reston, NCTM.

Sfard, A., & Prusak, A. (2005). Telling identities: in search of an analytic tool for investigating learning as a culturally shaped activity. *Educational Researcher*, *34*(4), 14–22.

Smagorinsky, P., Cook, L. S., Moore, C., Jackson, A. Y., & Fry, P. G. (2004). Tensions in Learning to Teach: Accommodation and the Development of a Teaching Identity. *Journal of Teacher Education*, *55*(1), 8–24.

Stylianides, G. J. (2008). An analytic framework of reasoning-and-proving. *For the Learning of Mathematics, 28*(1), 9-16.

Thompson, J., Windschitl, M., & Braaten, M. (2013). Developing a theory of ambitious early-career teacher practice. *American educational research journal*, *50*(3), 574-615.

Truxaw, M. P., & DeFranco, T. C. (2008). Mapping Mathematics Classroom Discourse and Its Implications for Models of Teaching. *Journal for Research in Mathematics Education JRME*, *39*(5), 489–525.