

Conceptualizing Teacher Candidates' Figured Worlds in Learning to Enact Core Practices

Byungeun Pak (Graduate Student)^{1*}, Ji-Eun Lee (Professor)²

¹Michigan State University, pakbyun1@msu.edu

²Oakland University, lee2345@oakland.edu

(Received June 5, 2019; Accepted June 18, 2019)

This conceptual paper proposes a conceptualization regarding teacher candidates' experiences as learners during instructional activities implemented by teacher educators in practice-based teacher education programs. We argue that the current learning cycle framework for teacher candidates to engage in core teaching practices does not fully address teacher candidates' own learning experiences as learners. To provide a rationale for our proposal, we examine the current conceptualization of learning to enact core practices and suggest the need for integrating teacher candidates' experiences into the current conceptualization. We also draw on research on figured worlds as an effort to conceptualize teacher candidates' experiences coming from multiple figured world. We present some examples from our own mathematics methods courses to illustrate how this newly proposed framework can be used in practice and share remaining questions for future research.

Keywords: core practices, high-leverage practices, eliciting and interpreting student' thinking, prospective teachers, figured worlds.

ZDM classification: B59

2000 Mathematics Subject Classification: 97C70

I. INTRODUCTION

Over the past few decades, there has been a growing movement towards practice-based teacher education, which makes teaching practice the central element of teacher education (Ball & Cohen, 1999; Ball, Sleep, Boerst, & Bass, 2009; Forzani, 2014; Grossman, 2018; Grossman, Hammerness, & McDonald, 2009; McDonald et al., 2014). The advocates of practice-based teacher education have identified a list of “core teaching practices” and urge teacher educators to help teacher candidates learn to enact these practices while they are in the teacher education program (TEP), rather than simply assuming that they will figure out how to enact these practices in the real classroom after completing the TEP. Core practices

* Corresponding Author: pakbyun1@msu.edu

in teaching encompass various identifiable components underlying teaching that teachers enact to support students' learning (Grossman, 2018). Eliciting and interpreting individual student's thinking, explaining and modeling content, practices, and strategies, and leading group discussion are a few examples of core practices (TeachingWorks, n.d.).

The practice-based teacher education movement has become a common discourse (e.g., Grossman, 2018; Kazemi, Franke, & Lampert, 2009; TeachingWorks, n.d.), and as such teacher educators have tried to organize their courses around the pedagogies of practice that are grounded on three key concepts: (a) representations of practice (i.e., providing novices with opportunities to develop ways of seeing and understanding professional practice), (b) decomposition of practice (i.e., breaking down practice into its constituent parts for the purposes of teaching and learning), and (c) approximations of practice (i.e., providing opportunities to engage in practices that are more or less proximal to the practices of a profession) (Grossman et al., 2009).

In an effort to support teacher educators who adopt pedagogies of practice, several leading scholars propose a learning cycle framework for orienting TEPs around core practices with the pedagogy of enactment (McDonald, Kazemi, & Kavanagh, 2013). While this learning cycle framework offers valuable perspectives in how to organize the programs or courses, this paper will argue that teacher candidates' experiences when they engage in the learning cycle should be considered an important ingredient of the recipe for success.

Our argument is aligned with the social-cultural perspective on learning (Holland, Lachicotte, Skinner, & Cain, 1998; Lave & Wenger, 1991), which involves understanding humans as socio-cultural beings who construct their own meanings from experiences through participating in socially and culturally constructed contexts. In the context of practice-based teacher education, we believe that teacher candidates are not just passive recipients to external expectations or norms embedded in learning to enact core practices. Rather, they decide to take up or refuse expectations according to how they construct their experiences. Thus, addressing what candidates may experience in a real context is just as important as designing and implementing the learning cycle on the part of teacher educators.

As such, the purpose of this paper is to propose a conceptualization regarding teacher candidates' experiences as learners during instructional activities implemented by teacher educators. To that end, first, this paper will discuss the current conceptualization of learning to enact core practices (McDonald et al., 2013). Second, this paper will suggest integrating teacher candidates' experiences into the current conceptualization. This paper will draw on research on figured worlds (Holland et al., 1998) with respect to TEPs, schooling, and mathematics to conceptualize teacher candidates' experiences that are mediated by multiple figured worlds they are and were a part of. Third, this paper will present examples to illustrate how this framework can be used in practice. Last, this paper will provide

implications that may result from using this proposed conceptualization.

II. BUILDING ON A FRAMEWORK TO SUPPORT TEACHER CANDIDATES TO LEARN TO ENACT CORE PRACTICES

This section will explain our rationale to extendedly integrate teacher candidates' experiences into the current conceptualization of the pedagogy of enactment. To do so, first, this section will describe the learning cycle framework that conceptualizes how to organize courses in TEPs to support teacher candidates in learning about core practices (McDonald et al., 2013). Second, this section will re-examine the current conceptualization of pedagogy of enactment drawing on Goffman's (1974) notion of lamination of a frame.

1. CURRENT CONCEPTUALIZATION OF INSTRUCTIONAL ACTIVITIES TO ORGANIZE CORE PRACTICES

Subsequent to the identification of the core practices, there have been great efforts to experiment with the organization of instructional activities for teacher education courses around these core practices (Kazemi et al., 2009; Lampert et al., 2013; Lampert & Graziani, 2009). Building on these efforts, several teacher education researchers have proposed a framework shown in Figure 1 to present "a cycle for learning to enact core practices" for teacher educators to support teacher candidates' learning (McDonald et al., 2013, p. 381). This framework addresses a long-standing concern about the traditional model of teacher education that is structured "in ways that align with acquisition models of learning in which teacher educators deliver information about teaching over teacher candidates at a university or other non-K-12 setting" (McDonald et al., 2013, p. 381). Under this circumstance regarding the concern, it is the job of teacher candidates to construct how to enact what they learned when they enter the classroom. As beginning teachers enter the field, they are likely to be in a "sink or swim" situation (Varah, Theune, & Parker, 1986). As opposed to this traditional model, the learning cycle framework expects teacher educators to prepare their students to develop core practices that they can use later in their teaching.

The learning cycle is organized into four quadrants and teacher educators can begin this learning cycle in any of the four quadrants (McDonald et al., 2013). For example, teacher educators typically introduce teacher candidates to particular practices with guided scaffolding (1st quadrant), prepare them to enact those practices by rehearsal in university courses (2nd quadrant), require them to enact the practices with students in classroom settings (3rd quadrant), and then analyze their enactment in several ways (4th quadrant). As a whole, this learning cycle framework can help teacher educators engage their teacher

candidates in more authentic and ambitious instructional activities through multiple enactments and analyses.

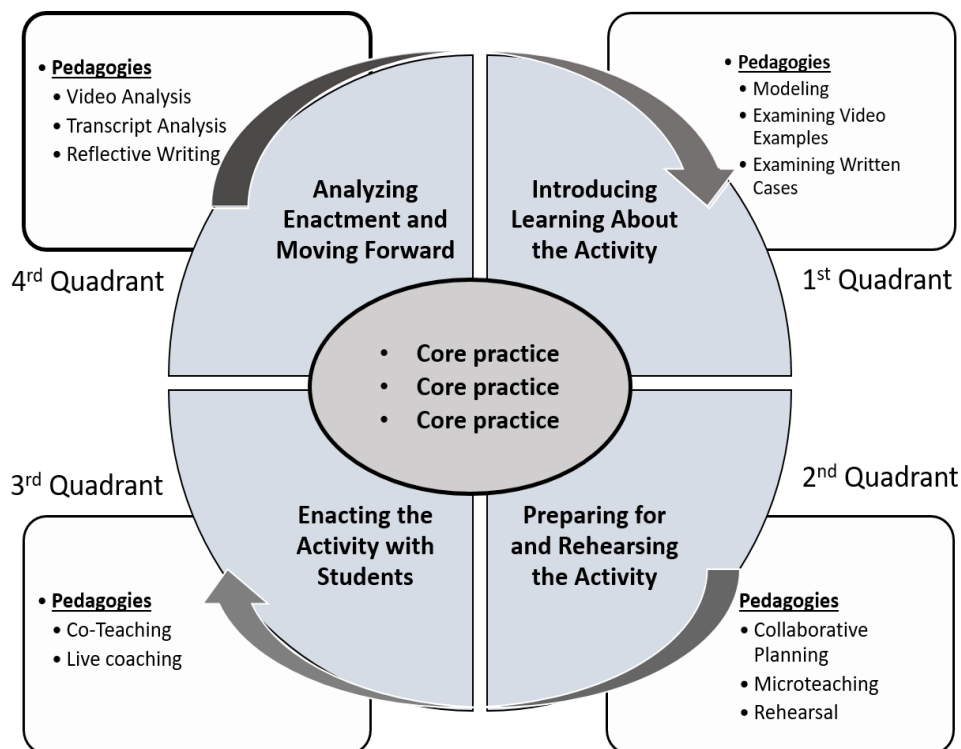


Figure 1. Cycle for collectively learning to engage in an authentic and ambitious instructional activity (McDonald et al., 2013)

2. EXTENDING THE LEARNING CYCLE FRAMEWORK

To understand and question the learning cycle framework, we draw on Goffman's (1974) notion of *laminations or layers of frames*. Frames refer to the lenses that individuals express and hold while structuring information for the sense-making process of the world surrounding them by filtering and discarding (Goffman, 1974). As individuals engage in dialogue, they laminate a new frame over each other's frame. For example, one may laminate a new frame of reform-based teaching over another person's frame of teaching regarding transmission of knowledge to students. In this example, the person refutes the view of teaching as transmission. What they are doing is that they take, negotiate, or refute each other's frames in conversation.

Academic conversation that normally occurs through published journals and findings can be understood in the sense of the notion of Goffman (1974). Researchers have

laminated their frames over an existing frame to inform new ways of understanding phenomena.

The learning cycle framework shown in Figure 1 is a recent outcome of ongoing communication among researchers and teacher educators with interest in how to support teacher candidates learning to enact core practices. Thus, we regard this framework as having laminations of frames, as shown in Figure 2, that have occurred among researchers over decades.

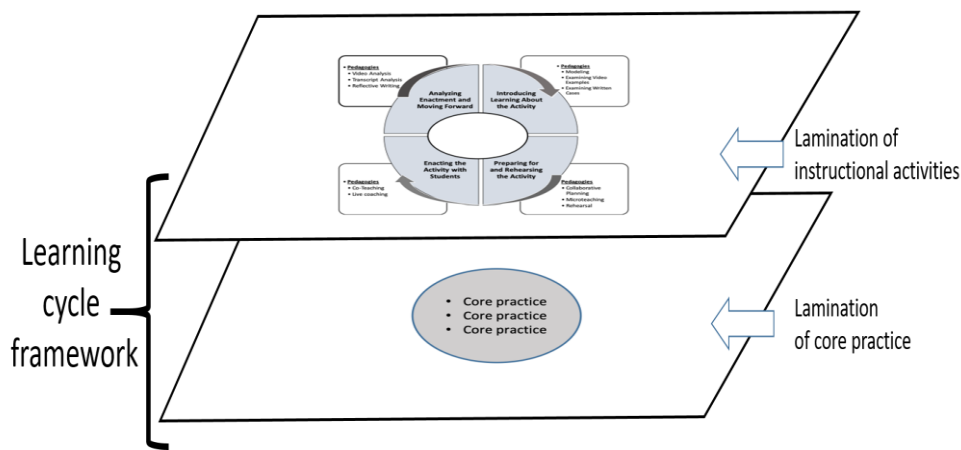


Figure 2. Lamination structure of learning cycle framework

In Figure 2, the learning cycle framework consists of two layers. The bottom layer represents the core practices identified by researchers. Core practices in this layer include but are not limited to, high-leverage practices, core practices of science teaching, and teaching practices for historical inquiry (See appendix in Grossman (2018) for detail). Researchers added this layer over “competency-based teacher education and case-based methods for teacher education” that failed to attend to learning to enact core practices (Grossman et al., 2009, p. 379).

The top layer in the learning cycle represents the lamination of another new frame regarding instructional activities. This layer represents instructional activities as the pedagogy of teacher educators that addresses the representations, decomposition, and approximations of practice (Grossman et al., 2009). This new lamination attends to supporting teacher educators to engage teacher candidates in learning to enact the core practices. Otherwise, core practices may become “fad-like, resulting in a proliferation of approaches driven more by the trend than by a deep understanding of how people learn to enact professional practice” (McDonald et al., 2013, p. 379).

Here, we would like to join the on-going communication among researchers, with respect to a practice-based approach to learning to teach, by adding an additional frame to

be laminated over the existing learning cycle framework as shown in Figure 3.

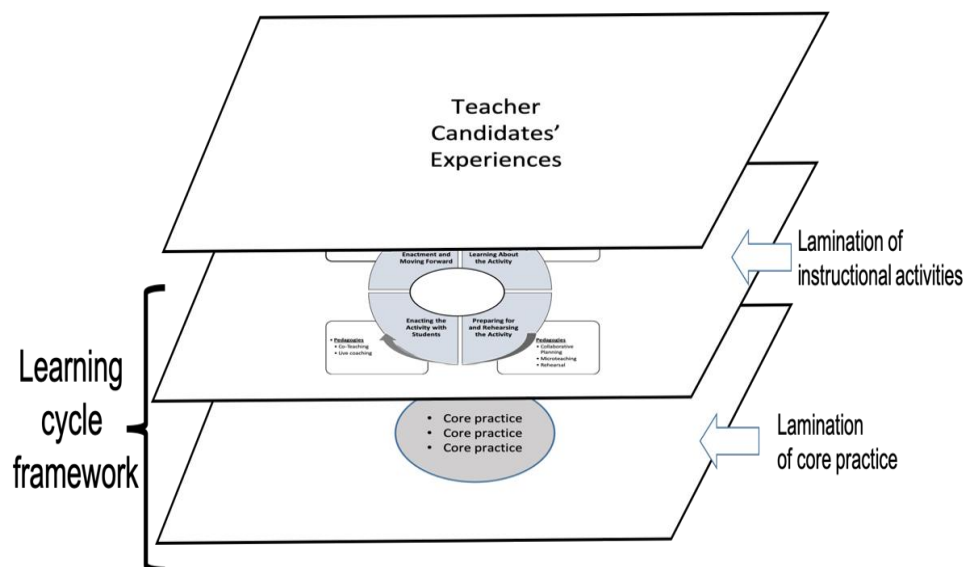


Figure 3. Laminating teacher candidates' experiences over the learning cycle framework

We suggest this new layer because the learning cycle framework (Figure 1) misses an importance of understanding teacher candidates' experiences. For example, in the core practice frame, the criteria of core practices depict teacher candidates as needing to enact these practices, such as “practices that novices can enact in classrooms across different curricula or instructional approaches; practices that novices can actually begin to master; practices that allow novices to learn more about students and about teaching” (Grossman et al., 2009, p. 277). In the instructional activities frame, teacher candidates need to go through the cycle of instructional activities. In all laminations of the learning cycle frames, however, teacher candidates' own learning experiences as learners are missing. As such, this paper suggests laminating a new frame regarding teacher candidates' experiences over the current learning cycle framework. The next section will propose a conceptualization of teacher candidates' experiences in instructional activities as context, which they reside in.

III. CONCEPTUALIZING TEACHER CANDIDATES' EXPERIENCES DRAWING ON MULTIPLE FIGURED WORLDS

In this section, we first introduce the notion of figured worlds (Holland et al., 1998) that we draw on to conceptualize experiences teacher candidates may have when participating

in course activities in practice-based TEPs. Second, we describe a figured world of TEPs. Lastly, we present our conceptualization of teacher candidates' experiences, drawing on research using figured worlds to understand how learners construct their meanings of teaching and learning to teach in TEP worlds.

1. WHAT ARE FIGURED WORLDS?

From the socio-cultural perspectives, we understand that learning does not occur in isolation from contexts we are a part of (Boaler, 2002; Lave & Wenger, 1991). Holland and her colleagues (1998) viewed these contexts as figured worlds, which are socially and culturally identified “frames of meaning in which interpretations of human actions are negotiated” (p. 271). In other words, these frames of meaning make people interpret and guide their actions within a figured world where “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).

Figured worlds, as the contexts learning takes place in, are present materially as well as conceptually through “artifacts” figured worlds “rely on” (Holland et al., 1998, p. 60). One example of material aspects includes when students enter classrooms, they act as learners of mathematics. They are expected to use manipulatives, such as base 10 blocks to learn place value, or are asked by teachers to provide answers to the questions. One can see material aspects of figured worlds of classrooms through manipulatives or teachers' verbal behavior patterns as cultural artifacts. One instance of conceptual aspects is when mathematics teacher educators design and implement course activities regarding core practices, such as eliciting and responding to students' thinking (Grossman, 2018; TeachingWorks, n.d.), with the expectation of supporting teacher candidates to continue to practice with the vision of reform-oriented teaching. Once this vision is continued, the activities they provide become “the contexts of meaning for action, cultural productions, performances, disputes, for understanding that people [teacher candidates] come to make of themselves, and for the capabilities that people develop to direct their own behaviors in these worlds” (Holland et al., 1998, p. 60). One can also see conceptual aspects of figured worlds of TEP regarding reform-based teaching pedagogy through these activities. Thus, experiences as learners are interrelated to participation in both material and conceptual dimensions of figured worlds.

Experiences through participation do not always guarantee successful learning in a figured world. Successful learning is uncertain because it depends on how people interpret the figured world and decide whether to align themselves with the world (e.g., Horn, Nolen, Ward, & Campbell, 2008). This is also uncertain because there is “the very multiplicity and partiality of the figured worlds that hedge the interpretation of action” (Holland et al., 1998,

p. 56). Multiple figured worlds always cohere in one space because of the possibility of people's diverse interpretations of artifacts or actions in activities in a figured world. For instance, manipulatives are viewed by mathematics teachers as tools for learning mathematical ideas. These same artifacts can be regarded by some kindergartners as toys. Taking another example from mathematics methods courses with an emphasis on a core practice, *eliciting and responding to students' thinking*, some teacher candidates may regard their experiences as reinforcement of traditional ways of teaching rather than as the media that transform their views towards reform-based approach to teaching.

People understand themselves in relation to socially and culturally figured worlds where they form and "develop identities" through "the contexts of meaning and action" provided by figured worlds (Holland et al., 1998, p. 60). Thus, the formation and development of these identities or self-understandings is inseparable from participation in activities specific to figured worlds.

According to Holland and her colleagues (1998), the concept of figured worlds goes against "any simplistic notion that identities are internalized in a sort of faxing process that unproblematically reproduces the collective upon the individual, the social upon the body" (p. 169). Rather, Holland and her colleagues (1998) view figured worlds as a "space of authoring" (p. 169), highlighting people's capacity to construct, or author, their selves in alignment with their understandings of figured worlds. People, particularly novices, need to make sense of expectations or values embedded in activities as they participate in figured worlds and these expectations become the frame of meaning to interpret events.

Through participation in activities, positioning inevitably occurs. People position themselves or others and know how they are positioned by others in figured worlds. This positioning guides people to construct their identities in relation to the worlds. As they do, they draw on resources they built in multiple figured worlds they were a part of in the past. For example, teacher candidates may draw on their own experiences as learners in K-12 schooling to make sense of reform-based teaching practices and their positioning in a figured world of TEPs. As such, this idea of figured worlds informs our identities that traces participation in activities by mediation of positioning in relation to figured worlds.

2. A FIGURED WORLD OF TEACHER EDUCATION PROGRAM

Building on the previous section, this paper defines TEP worlds as a main context where teacher candidates engage in with respect to instructional activities building on the learning cycle (Figure 1). As such, a TEP reveals a figured world that supports teacher candidates to form and develop their teacher identities as they participate in the world (Horn et al., 2008). Thinking of what is happening in a TEP world, let us think about the following scenario:

All teacher candidates enter a TEP with the same idea on teaching and learning in alignment with the figured world of the TEP. The TEP offers opportunities to learn to teach in relation to enacting core practices. As they participate in the TEP, teacher candidates take up the TEP's figured world regarding core practices, and exit the TEP equipped with necessary teaching skills, knowledge, and disposition.

Even though this sounds ideal, it is certainly unrealistic because this scenario does not consider different experiences that guide the formation, development, and objectification of teacher candidates' identities as teachers.

In reality, individual teacher candidates enter a TEP with varied prior experiences. Some may have common experiences and ideas of teaching; others may have different experiences. Teacher educators construct a figured world regarding reform-based teaching in their courses to offer opportunities to learn to enact with various levels of authenticity of approximation of core practices (Grossman et al., 2009). However, individual teacher candidates may leave a TEP with different understandings of core practices. Some may implement what a TEP offers, and others may refuse or modify what a TEP offers. We acknowledge that the commonality among teacher candidates may increase from their entry status as a result of the teacher educators' efforts, but we cannot guarantee that the figured world regarding core practices teacher candidates construct through experiences in participation is identical. We are not arguing that their experiences should be identical. Rather we are emphasizing the necessity of considering teacher candidates' varied experiences.

3. TEACHER CANDIDATES' EXPERIENCES REGARDING FIGURED WORLDS AS RESOURCES IN TEP WORLDS

As mentioned in the previous section, when teacher candidates construct their own meanings of experiences of participation in a TEP, they draw on views of teaching and learning to teach, which are related to multiple figured worlds teacher candidates experienced in the past. In Figure 4, TEPs are placed on the same level as the learning cycle that teacher candidates participate in to learn to enact core practices. TEP worlds are a context of meanings teacher candidates construct. The other figured worlds are depicted as resources, or mediators, teacher candidates use to respond to the current TEP worlds they are part of. In that regard, in Figure 4, they are placed over TEP worlds.

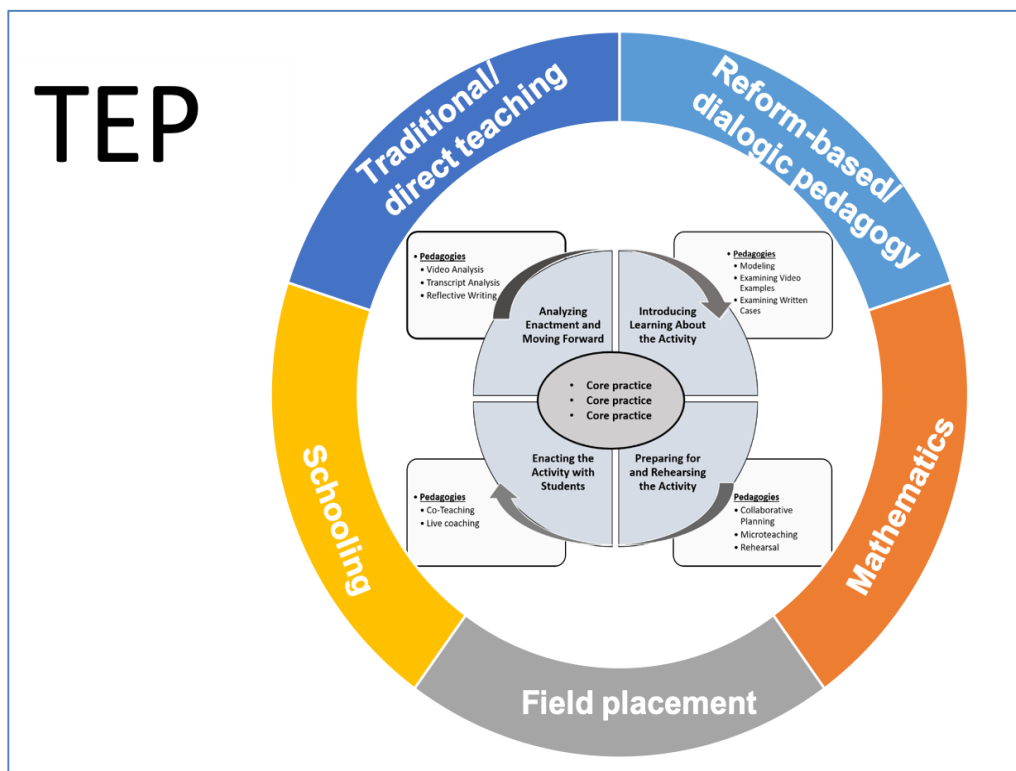


Figure 4. Conceptualization of teacher candidates' figured worlds as resources

Literature below informs us of several figured worlds we can consider because they are likely to be seen in teacher candidates' experiences in relation to participating in the TEP world. As shown in Figure 4, those include traditional/direct teaching, reform-based/dialogic pedagogy, mathematics, schooling, and field placements, which are described below.

A TEP as an institution embeds TEP worlds through methods courses and a figured world of field placements as teacher candidates experience teaching as learners. In a mathematics methods course with a focus on dialogic teaching, Ma and Singer-Gabella (2011) describe how prospective teachers participated in activities that helped them imagine being students learning mathematical content in the context of a reform-oriented mathematics class and as teachers who needed to support these students. These prospective teachers developed their identities as teachers over time through participation in practices and activities in this TEP world. Horn and colleagues (2008) make a distinction between TEP and field placement worlds. Through identification and negotiation with these worlds, one intern re-formed his identities as a learner and as a teacher candidate, thus shifting his behavior, interactions, and understanding of his present experiences. These researchers

indicate that the intern's experiences of dialogic teaching in a TEP world would be different from in the field placement world. Following Horn and colleagues (2008), this paper will make a distinction between TEP and field placement worlds.

A figured world of schooling is what teacher candidates experienced as learners with respect to teaching during their own K-12 schooling, which is what Lortie (1975) called apprenticeship of observation. Gomez (2014) examined how an aspiring teacher and her siblings experienced a figured world of schooling and its relationship to their developed identities. She found what it looks like to be in a schooling figured world.

In schools, such rules concern what constitutes a good student, someone who is compliant with school rules; how she enacts that role, for example, turning in assignments on time and being quiet until invited to speak; what artifacts she uses to show her investments in school, practicing and playing instruments in the school band, or playing on sports teams; and how she is rewarded for her behaviors, with high grades or prizes for comportment or varsity letters. (Gomez, 2014, p. 48)

This example implies that teacher candidates form their identity in part by continued participation in certain figured worlds regarding their K-12 schooling.

Mathematics classrooms in the U.S. can be considered to be particular figured worlds (Boaler & Greeno, 2000), which is "defined in part by tensions between the 'traditional' and 'Standards-based' approaches to teaching" (Esmonde & Langer-Osuna, 2013, p. 290). Esmonde and Langer-Osuna (2013) suggest that what teachers and students do in this figured world of mathematics classrooms may take different forms depending on whether classroom practices involve direct or dialogic teaching. In relation to mathematics teaching and learning, Munter, Stein, and Smith (2015) provide descriptions of what it looks like to be within classrooms based on traditional/direct teaching and reform-based/dialogic teaching. More specifically, in a figured world relying more on dialogic teaching, students are encouraged to interact with one another by engaging multiple ways of problem solving and reasoning. On the contrary, in a figured world of mathematics classrooms where direct teaching is prevalent, teachers view mathematics as having a right answer or a procedure to follow. This paper will draw on these two figured worlds because conflict between these two worlds in TEP worlds have been reported by researchers (e.g., Horn and et al., 2008).

In mathematics classrooms, a figured world of mathematics exists because teachers and students engage in mathematics, which are full of socially and culturally constructed mathematical signs and symbols. In a paper about middle school students developing their identities through a real-life problem-solving project, Jurow (2011) illustrates the mathematics figured worlds.

The activity posed by the "Area and Perimeter" worksheet was meant to engage students in what might be described as a figured world of mathematics. Such a world [of mathematics] is populated by mathematical agents who use mathematical concepts and symbols (e.g., area, perimeter, and numbers) to observe, identify, and represent patterns. These agents are motivated by a desire to understand and explain the order of the social and physical world. (Jurow, 2011, p. 45)

This shows that as learners participate in activities, which have mainly components of mathematics, they engage in mathematics figured worlds. This paper will include this figured world on the part of teacher candidates, which is salient for teacher candidates given the mathematical nature of activities in mathematics methods courses and their experiences as learners of mathematics.

Informed by literature, this paper conceptualizes multiple figured worlds as more isolated worlds. In practice, however, these figured worlds are likely to be interrelated and interwoven into one another (e.g., Esmonde & Langer-Osuna, 2013; Jurow, 2011). For example, as students engage in a real-life mathematical project, students may experience a figured world of mathematics classrooms regarding reform-based/dialogic teaching, where the emphasis is on multiple ways of problem solving, reasoning, and justification. Some of the students might feel uncomfortable at offering justification for their answers because of their experiences as learners in classrooms where they got used to doing what teachers told them to do. Their views come from a figured world of traditional/direct teaching. The focus from this world is on memorization and procedure in mathematics. In the example above, three figured worlds come into play, such as figured worlds of mathematics, reform-based teaching and/or traditional teaching. As such, the communication between multiple figured worlds may occur in many ways through any activity embedded into a seemingly one figured world, for example, the TEP world. Reasonably speaking, this conflict may transpire when teacher candidates engage in instructional activities that are built on the learning cycle framework.

IV. AN ILLUSTRATIVE EXAMPLE

This section will provide a brief example to illustrate our conceptualization of teacher candidates' experiences in a mathematics methods course in a TEP. This course was designed for teacher candidates to learn to teach mathematical concepts ranging from the elementary school level to the middle school level. One of the major course projects for teacher candidates, Math Assessment Development, consists of instructional activities similar to the four steps in the learning cycle framework (Figure 1). Its purpose was to

engage teacher candidates in learning to enact a high-leverage practice-*eliciting and interpreting students' thinking*. This work requires several components, including formulating and posing questions, listening to and interpreting students' responses, and developing additional questions, prompts, and tasks to probe and unpack what students say (TeachingWorks, n.d.). With the goal of this teaching practice in mind, teacher candidates are to refrain from filling in or applying their own ideas. Even when a student produces incorrect answers or proposes invalid methods, teacher candidates are asked to try to identify a student's mathematical thinking that yield those results, instead of directly teaching the student. By doing so, teacher candidates can find the starting point from which they can help the student move forward.

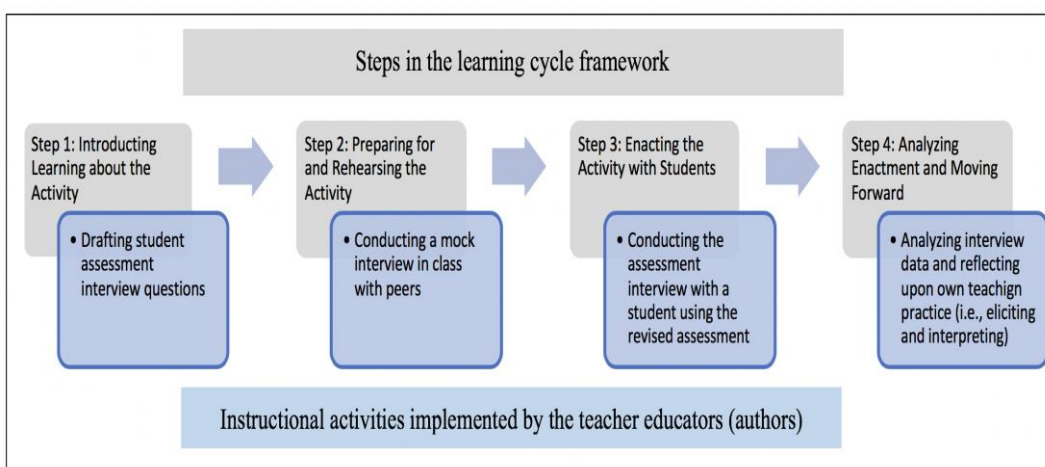


Figure 5. An illustrative example in relation to the conceptualization: Case of authors' methods class focusing on *eliciting and interpreting students' thinking*.

As shown in Figure 5, the instructional activities implemented by the teacher educators (authors) in the course are aligned with the learning cycle framework. Utilizing thematic analysis (Glesne, 1999), we coded teacher candidates' autobiographies and analysis/reflection papers as data sources to capture the multiple figured worlds we mentioned above. This paper offers some examples that particularly reveal the traditional/direct teaching world, reform-based/dialogic teaching world, and mathematics world in Steps 2 and 3, considering the salient frequencies shown in the data.

Figure 6 illustrates how teacher candidates engaged in instructional activities the teacher educators (authors) implemented to learn to enact the high-leverage practice in the figured world of TEP in the course. Teacher candidates drew on their prior experiences coming from multiple figured worlds, including traditional/direct teaching, reform-based/dialogic teaching pedagogy, or mathematics, to respond to activities in the current figured world.

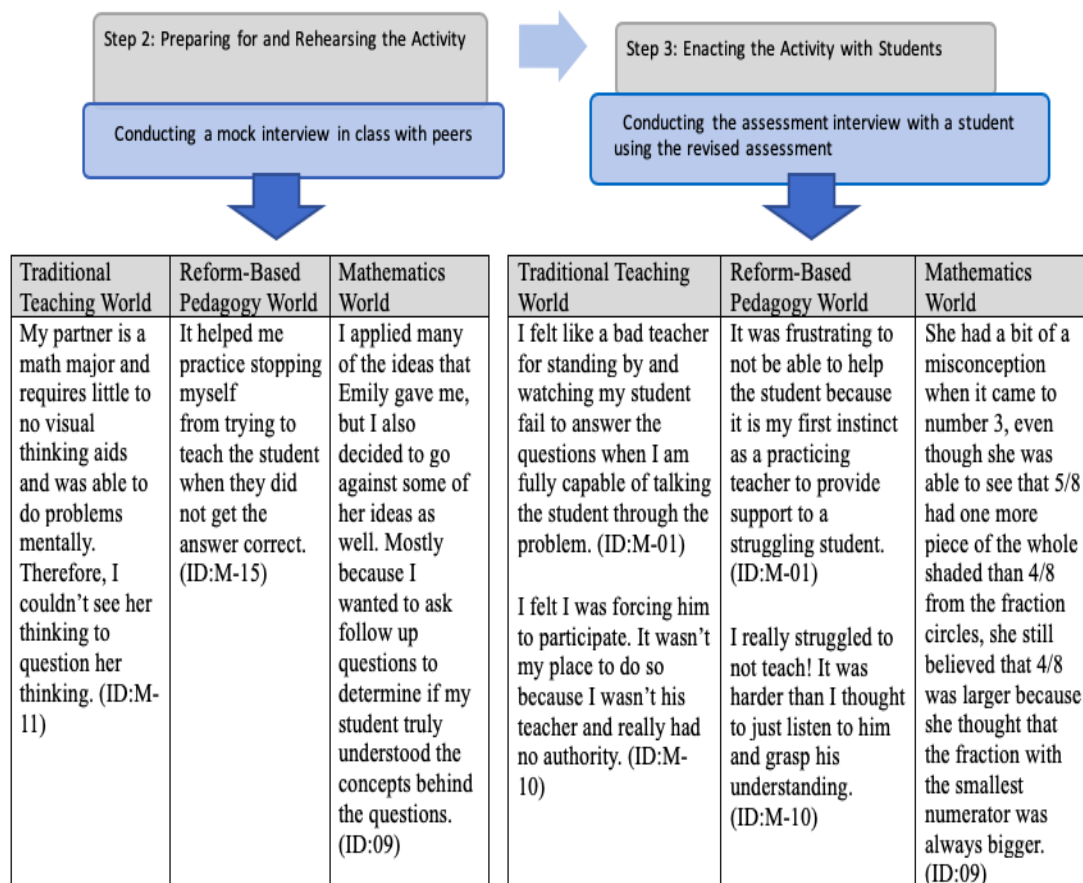


Figure 6. An illustrative example in relation to multiple figured worlds

As shown in Figure 6, some teacher candidates concentrated on how students construct their mathematical understanding, which is related to a figured world of mathematics. For example, a teacher candidate (ID:09) attended to whether a student understood a concept regarding fractions in Step 2 and to the student's possible misconception with respect to comparing fractions with different denominators in Step 3. This teacher candidate viewed students as agents who constructed their own understanding of fractions.

Furthermore, across responses from several teacher candidates (ID:M-01 and ID:M-10) or within those from one teacher candidate (ID:M-01), the conflict between the traditional teaching world and reform-based pedagogy was salient. These teacher candidates perceived and believed the importance of eliciting and interpreting students' thinking as a core practice that reveals the reform-based teaching pedagogy world, which has been

encouraged by teacher educators (authors) to do. The example shows that this world is not the only one within the TEP world. The teacher candidates were also tempted to tell students what to do to solve the questions, a teaching practice from the traditional teaching world, which has been discouraged by teacher educators (authors). Even though they were able to apply the core practice, the conflict between these two figured worlds existed in the many teacher candidates. This conflict between the traditional and the reform-based teaching world is similar to what research on teaching and learning to teach in relation to figured worlds shows (Esmonde & Langer-Osuna, 2013; Horn et al., 2008; Rush & Fecho, 2008). Thus, it is plausible that there are more conflicts between multiple figured worlds (Figure 4) emerging within the current TEP world with an emphasis on core practice movement, and those are not fully known to us yet.

V. CONCLUSIONS AND IMPLICATIONS

In summary, by conceptualizing a learning cycle for collectively learning to engage in an authentic and ambitious instructional activity (Figure 1), McDonald and colleagues (2013) tried to connect “the work of identifying K-12 teaching core practices to the work of specifying and developing teacher education pedagogies” (p. 385). Further, they have asked teacher educators and researchers to “articulate a vision for teaching and teacher education” (p. 385). In this paper, taking up the call, we highlighted teacher candidates’ diverse experiences that may promote or hinder their learning to enact core practices. It is possible that their experiences are shaped by their prior views of teaching, learning, and mathematics, which are ingrained to some degree as they have participated in multiple figured worlds.

As shown in the brief illustrative example above, multiple figured worlds were present among teacher candidates and even within one teacher candidate. This implies that teacher candidates draw on these figured worlds as resources to decide how they take up the TEP world embedded into instructional activities and core practices. Further, this suggests that teacher candidates do not likely involve “in a sort of faxing process that unproblematically reproduces” the TEP world upon themselves (Holland et al., 1998, p. 169).

Our conceptualization has implications for researchers as well as for teacher educators. First, our conceptualization invites researchers to articulate teacher candidates’ experiences that may promote or hinder learning to enact core practices. We found that diverse experiences are related to multiple figured worlds. Our findings are just a few examples of teacher candidates’ experiences with respect to mathematics courses. To enrich a knowledge base of teacher experiences in practice-based teacher education, it is worth investigating to understand how our conceptualization works in other settings. Further

research building on our conceptualization will “support all of us [teacher educators and researchers] to better preparing teachers” and “in turn, improve the learning opportunities available to K-12 students” (McDonald et al., 2013, p. 385).

Second, our conceptualization also invites teacher educators to attend more to what teacher candidates are actually experiencing when going through the process of learning to enact core practices in teacher education courses. All teacher educators hope that their participation in instructional activities (Figure 1) helps teacher candidates learn to enact core practices in alignment with their intentions to design the activities so that teacher candidates can be more adaptive and responsive to their future students’ learning. It depends on how teacher educators try to address teacher candidates’ experiences in their courses by understanding how they figure TEP worlds with respect to instructional activities to learn to enact core practices.

One clear path for future study is to apply our conceptualization to a greater variety of contexts where teacher educators and teacher candidates reside in. We conclude this paper with questions because we believe that they are worth answering in the future study. What is the mechanism associated with the process of constructing teacher candidates’ figured world of teaching practice? What factors influence teacher candidates’ decision with respect to adopting, rejecting, modifying, or negotiating the TEP world? What are the implications for TEP? What can we learn from the teacher candidates’ varied experiences? It is our hope that these ideas presented in this paper will provide significant implications for practice-based teacher education.

REFERENCES

- Ball, D., & Cohen, D. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as a learning profession* (pp. 3–32). San Francisco, CA: Jossey-Bass.
- Ball, D. L., Sleep, L., Boerst, T., & Bass, H. (2009). Combining the development of practice and the practice of development in teacher education. *The Elementary School Journal*, *109*(5), 458–474.
- Boaler, J. (2002). The development of disciplinary relationships: knowledge, practice and identity in mathematics classrooms. *For the Learning of Mathematics*, *22*(1), 42–47.
- Boaler, J., & Greeno, J. G. (2000). Identity, agency, and knowing in mathematics worlds. In J. Boaler (Ed.), *Multiple perspectives on mathematics teaching and learning* (pp. 171–200). Westport, CT: Ablex.
- Esmonde, I., & Langer-Osuna, J. M. (2013). Power in numbers: Student participation in mathematical discussions in heterogeneous spaces. *Journal for Research in Mathematics Education*, *44*(1), 288–315.
- Forzani, F. M. (2014). Understanding “Core Practices” and “Practice-Based” Teacher Education:

- Learning from the past. *Journal of Teacher Education*, 65(4), 357–368.
- Glesne, C. (1999). *Becoming qualitative researchers: An introduction (2nd ed.)*. New York: Longman.
- Goffman, E. (1974). *Frame analysis*. Cambridge: Harvard University Press.
- Gomez, M. L. (2014). Discourses of an aspiring teacher of color in the figured world of schooling. *Teacher Education Quarterly*, 41(1), 45–62.
- Grossman, P. (2018). *Teaching core practices in teacher education*. Cambridge, MA: Harvard Education Press.
- Grossman, P., Hammerness, K., & McDonald, M. (2009). Redefining teaching, re-imagining teacher education. *Teachers and Teaching, Theory and Practice*, 15(2), 273–289.
- Holland, D., Lachicotte Jr., W., Skinner, D., & Cain, C. (1998). *Identity and agency in cultural worlds*. Cambridge, MA: Harvard 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, 61–72.
- Jurow, S. (2005). Shifting engagements in figured worlds: Middle school mathematics students' participation in an architectural design project. *Journal of the Learning Sciences*, 14, 35–67.
- Kazemi, E., Franke, M., & Lampert, M. (2009). Developing pedagogies in teacher education to support novice teachers' ability to enact ambitious instruction. In R. Hunter, B. Bicknell & T. Burgess (Eds.), *Crossing divides: Proceedings of the 32nd annual conference of the Mathematics Education Research Group of Australasia* (Vol. 1, pp. 12-30). Palmerston North, NZ: MERGA.
- Lampert, M., Franke, M., Kazemi, E., Ghouseini, H., Turrou, A., Beasley, H., & Crowe, K. (2013). Keeping it complex: Using rehearsals to support novice teacher learning of ambitious teaching. *Journal of Teacher Education*, 64, 226–243.
- Lampert, M., & Graziani, F. (2009). Instructional activities as a tool for teachers' and teacher educators' learning in and for practice. *Elementary School Journal*, 109, 491–509.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lortie, D. (1975) *Schoolteacher: a sociological study*, Chicago, IL: The University of Chicago Press.
- 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.
- McDonald, M., Kazemi, E., & Kavanagh, S. S. (2013). Core practices and pedagogies of teacher education: A call for a common language and collective activity. *Journal of Teacher Education*, 64(5), 378–386.
- McDonald, M., Kazemi, E., Kelley-Petersen, M., Mikolasy, K., Thompson, J., Valencia, S. W., & Windschitl, M. (2014). Practice makes practice: Learning to teach in teacher education. *Peabody Journal of Education*, 89(4), 500-515.
- Munter, C., Stein, M. K., & Smith, M. S. (2015). Dialogic and direct instruction: Two distinct models of mathematics instruction and the debate(s) surrounding them. *Teachers College Record*, 117(11), 1–32.
- Rush, L. S., & Fecho, B. (2008). When figured worlds collide: Improvisation in an inquiry

classroom. *Teaching Education*, 19, 123–136.

TeachingWorks (n.d.). *High-leverage practices*. Retrieved

from <http://www.teachingworks.org/workof-teaching/high-leverage-practices>.

Varah, L. J., Theune, W. S., & Parker, L. (1986). Beginning teachers: Sink or swim? *Journal of Teacher Education*, 37(1), 30–34.