Using *Currere* to Process the Curriculum of Elementary Science Methods: A Quest for Pedagogical Restructure

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I found myself asking, why isn't the science methods course I teach what I want it to be? And how could I make it better and more in line with what my teacher education students need? I operate under two core beliefs. One is that I build my courses with my students in mind; it is my job to help equip them through the courses I offer. Two, I believe teaching is dynamic, and therefore, curriculum and instruction should also be dynamic. The following is my use of the *currere* method to organically examine my teaching past (the regressive), my teaching present (the analytical), and search to improve my science methods course to more appropriately impact my future elementary teachers (the progressive and synthetical) (Pinar, 1978, 2004).

Looking Back: My Teaching Past

My classroom experiences as an elementary school teacher taught me that show and tell science did not work. Student-led experiments were more engaging but more difficult to manage. Science materials cost money, and because I taught in a school with 95% free and reduced lunch, money for such things was scarce. My passion to offer my students opportunity led me to discover that free materials could be scrounged up from all sorts of places—small donations from businesses, old and unwanted science totes and texts in school basements, parent donations of used items and/or time. Beyond the lack of resources provided by the school and district, I lacked scientific knowledge. My deficit led me to invite content experts into my classroom. I found multiple resources beyond my classroom—locals who came in with expertise, who offered a depth of knowledge that I would never have, and who afforded my students an opportunity to engage with material in new ways.

Much of my outlook regarding teaching science to elementary students formed while on the job. My first year of teaching was an exciting blur that exposed many of my teaching weaknesses. My second year of teaching brought about a boldness, particularly in teaching science. Because I taught in a Spanish bilingual classroom, I took on the attitude of "simplemente hazlo" or "Just do it" as Nike coined. The summer in between years one and year two of teaching, I met the newly hired instructional coach for elementary teachers—she was a kindergarten teacher, we taught in the same school and had become friends before her role changed, and she visited my classroom often. I lamented to her the fact that I never taught science once my first year, and that made me sad. She sat down with me and devised a plan to teach animal habitats, the rainforest, and an astronomy exploration in my mixed level bilingual classroom. She and I developed units that asked big picture questions and more importantly took my students on journeys in which we transformed our classroom. These projects took weeks, connected reading and writing, and led us on explorations and field trips. We wrote, we experienced, we researched, we transformed, we learned—all in the name of science. But it was not until I had her nudge, along with my principal's blessing, that I felt empowered to teach science. I think about what was lost in the first year that I did not teach science.

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Fast-forward 20 years later, where, in my current role as teacher educator, I take seriously my commitment to best equip the teachers I send out to teach. Reflection on my own teacher preparation often shapes my approach. How many teachers don't have an individual to shake up their world? How many teachers lack the support of an administrator to tap into what could potentially be one of the most engaging areas? How many teachers do not hold the same perspective of "simplemente hazlo"?

These reflections have led me to realize how ill-prepared I was to teach science within in my own classroom. Thinking even further back to my own teacher education, my preparation afforded me a one credit science methods course. The text offered multiple methods for teaching science, but I never experienced planning or teaching a science lesson until I did so within my own classroom, well into my second year of teaching. As young and inexperienced as I was, I had no idea how to use the one credit of science methods training I had. I recall a conversation with one of my peer mentors during my teacher education program. He was clear in his task that a methods class was never meant to be a "how to course" but a level of certainty accompanied this clarity. This is my same struggle.

My current role has established an empathy for education preparations programs and the rigidity in which they operate. Programs are bound by institutional credit limits for graduation, and they are beholden to accrediting bodies. A natural outcome is that course titles and credit hours often dictate program scope and sequence. This is not something I appreciated until I taught in higher education and gained insight on how courses could be minimized to load, credit hours, and seat time—all of which impact course quality and student perspective of the value of the course.

At this point in my teaching career, I realize the importance of failure leading to success, something that didn't exist in my earlier years. In part, that is one of my conclusions, foreshadowed. I began teaching in higher education over decade ago. It was not until I began interviewing to be an education professor that I had to share my teaching identity applied to my teaching philosophy and the institution's mission. What a powerful practice, when taken seriously. My time in higher education has afforded me the space to own these very personal concepts. Having confidence that I indeed *teach who I am*, as Parker Palmer says, and the clarity in such a concept is paramount when teaching others. Further, I believe it is my work to teach, to shape, and to send teachers who teach. And because we are human, I believe that we learn more when we are able to experience. However, to help construct meaning, we must embody success and failure and follow both by thoughtful reflection. The meeting point of all of these things allows for an articulation of conclusions about what worked and what could be changed. It is an artful intersection of many components.

Parker Palmer (2016), in "The Heart of a Teacher," wrote "we teach who we are" (p. 15). Careful examination of where I had been, articulation of my teaching identity, and intentionality about where my teachers needed to be have spoken into my writing. Palmer's text also famously challenges teachers to reflect by holding a "mirror to the soul" (Palmer, 2016, p. 15), a method that fits nicely with the *currere* method of "self-conscious conceptualization of the temporal…viewing of what is conceptualized through time" to make meaning (Pinar, 1978, p. 1). As Palmer (2016) pointedly put it,

> When I do not know myself, I cannot know who my students are. I will see them through a glass darkly, in the shadows of my own unexamined life—and when I cannot see them clearly, I cannot teach them well. (p. 15)

Palmer's (2016) encouragement and Pinar's (1978, 2004) *currere* method merge together with the current body of literature regarding elementary science education and the voices of my teacher candidates to produce a framework to establish change in my teaching practice.

Recognition and Articulation of an Issue

I have just recently been able to articulate the issue I am facing—how do I equip my elementary teachers to "really" teach science? What constitutes preparation? What or who determines the definition of "really teaching," and how do you know when you've reached that goal? I am not alone in this quandary. Recent evidence collected from multiple studies specify that elementary science is too often defined by incoherent and conceptually disconnected sets of hands-on science activities (Abell & Smith, 2007; Eshach, 2006; Lee & Houseal, 2003). Just teaching the basics as a how-to guide is not enough. Research has identified a deficit in current practice—that teacher education offers talk of progressive and project-based work, asking students to engage in activities that promote such work, but often values theory over practice and fails to walk beside students in authentic ways (Glazier, Bolick, & Stuts, 2017; Shulman, 1998). The struggle I have faced over the years in determining the right mixture of what to teach while falling within given parameters of credit and accreditation parameters is very real.

So here I am at a crossroads—I teach a two-credit science methods course. When thinking about restructuring the course, I noted ways I replicate the same system I experienced in my own educational experience, a perpetuation of a system that clearly doesn't work. For six years, I have sought to slowly introduce changes in my teaching that would permit me to involve deeper pedagogical elements, to help teacher candidates experience science, and also to sustainably translate theory, experience, and hands-on learning into the actual classroom. But at the heart of this slow change, I desire so much more.

I am validated and not alone in this endeavor, as research supports the conclusion that elementary teachers are not adequately prepared to utilize, incorporate, and teach science in a way that leverages learning to its potential (Abell & Smith, 2007; Eshach, 2006; Newman, Abell, & Martini, 2004). Because of this inadequacy, I seek to make a difference for those within my sphere of influence by improving my own science methods to include just the right mixture of the needed elements to achieve this. Existing literature, student voices, expert insight, personal experience, and classroom teaching experience weave this dynamic tapestry; my journey and discovery of *currere*—self-reflection and self-discovery (Pinar, 2004).

The Teaching Present

Course improvements over the previous six years had been minimal, yet the fact remained, course improvement was needed. Verbal comments, evaluation feedback, and course reflections repeatedly brought up issues surrounding an ongoing conundrum of striking a balance that would help elementary teachers see value, feel prepared, and find purpose and place for teaching science in their classrooms.

The submission of my sabbatical proposal began the official journey of a pedagogical overhaul for my science methods course. This point marked the moment at which I began to process and name issues with course structure that had been circling for years. It also marked a turning point at which I intentionally began to seek change to improve upon a single course and more appropriately meet teachers' needs. An approved sabbatical

application, coupled with approval from the College's Institutional Review Board to collect the qualitative data I sought, offered the space to digest anecdotal information from the previous six years and more formalized data collection. Additionally, my state's timely adoption of new science standards and an accreditation program review seemed the perfect mix to move forward and to construct meaning. While I incorporated action research methods to collect and generate data for my own improvement, this document contains my autobiographical internalization of the data collected and the story of my understanding.

A more formalized collection of data began when I issued a pre-course survey to my then group of teacher candidates. The intention of the surveys was to identify needs, pre-course, and use that information to tailor-fit the offerings. Responses were underwhelming and did not drive any change in curricular structure. I was disappointed in the lack of participation, but the void of information was as powerful in my own journey, as it spoke volumes of candidates' needs at this point in the program. When asked about the underwhelming response, the consensus was that they were too busy. One teacher candidate indicated that, because a response was not required for a grade, the task did not take precedence over other tasks. This led me to ask—if teacher candidates are unable to find time to answer three questions, is this a scheduling issue, or is it something different? If they do not see value in completing a task unless a grade is attached to it, is it a value issue? And if it were it a value issue, why didn't teacher candidates offer a response?

An implicit assumption is that, for the methods course to fully meet its potential and my goals, teacher candidates need space to practice purposeful reflection. To date, this course has not met its potential in its current placement in the program, as teacher candidates struggle to digest material beyond a survival level. This continues to be a very real struggle, one that grounds me in the reality that my teachers face. My own struggle here connects me to their daily endeavors and strikes a chord of empathy. During the course, this same group engaged in participant-led focus groups that discussed the following prompts:

- Identify explicit conclusions; implicit conclusions; null conclusions that you have about teaching elementary science, unique to the topic/unit.
- Discuss how teaching science in this way could work in your student teaching placement.
- How might teaching this topic/unit be different in your own classroom?
- What factors must be in place for you to utilize concepts taught in this topic/unit?

The more formalized focus groups yielded trends pertinent to my course restructure. ***TREND:*** the course needs an explicit component to help teacher candidates clearly navigate and recognize the following practical differences in position: not teaching science at all, teaching science as a standalone subject, and teaching science as an integrated subject. I need to further explore what elements perpetuate the limited thinking about teaching science and better understand where teacher candidates generate ideas about teaching science. ***TREND****:* teacher observation supports the notion that immediate reflection following the experience does not offer teacher candidates opportunity to digest the experience appropriately. Formal data collected did not directly support this, yet it was apparent that teacher candidates struggled to name those strategies that were shared or modeled. This merits further exploration. ***TREND:*** teacher candidates need

to begin the methods course with a basic list of possible strategies in order to recognize those that are implicitly modeled prior to any experience or hands-on learning.

Noting these trends, I immediately sought ways to incorporate them into my next course offering. I believed, and still do, that the adjustment of these areas will bring me closer to meeting the full potential of this course.

An extension to my understanding was thoughtful consideration of words from those who had completed the course and were teaching. I invited former students to offer hindsight about teacher preparation, particularly in science methods. Conversations with former students were based on the following:

- What course material (if any) stuck with you?
- Was there something that helped prepare you most for teaching science in the classroom?
- Was there anything from the course that offered you a framework for thinking about teaching science?
- What would have been most helpful to promote long-term and sustainable science teaching in your classroom?

Because the success of my teachers is my target, understanding their perspectives and incorporating them into my work is paramount. Perhaps the loudest voice in this process, my journey to construct conclusions, was directing me to look at what was missing, what I have come to respect as the "yets."

Former teacher candidates, now teachers in the field offered parallel insight: teachers identified the need for direct interaction with *the state science standards,* yet the course could not be minimized to a "teaching to the standards" course. They expressed a desire for help with *knowing how to find resources and ask for help,* yet the course needed to offer gentle guidance not a heavy-handed how-to guide. A handful suggested *adding an element of connecting science and ELA as a means to justify class time to teach science,* yet the course needed to teach flexibility to be able to digest constructing rationale and arguments to validate a deeply personal teaching practice. Some lamented their feeling of inadequacy in science content and indicated *that their lack of science content knowledge held them back from teaching science,* yet the course could not be replacement or a Band-Aid for years and credits of science content otherwise gained in a science major.

None of this came as a surprise. In part, grappling with this, I realize how important naming what it is and what is not—the "yets"—strikes me as uniquely informative when determining my next steps. Further, I appreciated that trends were consistent among former program participants and current program participants, an indication I was on the right track in my discovery. I believe the key to striking balance begins here with these identified trends. Seeking this balance has opened intentional conversations. One such conversation occurred with an individual pivotal to the state's adoption of the new science standards. The greatest takeaway from that conversation further shaped clarity in my own teaching philosophy. "Teach teachers to fail forward. Help them establish confidence in the complexity of their role—help them know that it is OK that they are not experts in every field. Teach them to be discoverers with their students." This guidance was paramount in further understanding my role as a science educator. Further, it deeply informs a pedagogical restructuring—beginning with my own re-visitation and re-clarification of my role and responsibility and what we must accomplish within the course.

Now and Beyond

The conversations nicked the tip of the iceberg. My conclusions from this endeavor are not really conclusions, rather they are jumping off points that must be visited again and again. I gained insight about the importance of focusing on nuts and bolts and tools to help teacher candidates better digest concepts while in program. I even added this explicit instruction to my course structure, but the balance eludes me. I seek to capture, in words, what this balance is—the go between of structure and "yets." Certain course elements must be very clearly addressed and presented while others are unearthed and discovered. Further realizations are less likely to be made by my teacher candidates if not clearly stated upfront, because they do not have appropriate capacity to reflect on and digest the material, making it difficult to process, name, and apply abstract concepts that are organically and authentically occurring. Therefore, I must do my best to narrow and clarify what is happening and create intentional space for reflection to occur that promotes a purposeful processing designed to help teacher candidates meet course goals. A John Dewey quote (as presented in Eisner, 2002) resonates from my undergraduate studies and seems appropriate here, "Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time" (p. 87).

Back to the Practical Present and a Momentary Synthesis

For now, the culmination of this *currere* reflection is that my two-credit science methods course offered every spring will purposefully attempt to merge Elliot Eisner's three curricula, the explicit, the hidden, and the null (Eisner, 2002). These will be reflected in course structure and course goals and will be kept at the forefront as I work to improve this course to meet its full potential. The explicit curriculum will appear in the offering of nuts and bolts on building science lesson plans and units and how to read and use science standards; the hidden or implicit curriculum will focus on working to establish confidence in teaching science, practicing to fail forward, naming fears when teaching science, and by articulating clarity in the teacher self—who are you as a science teacher and how will you move forward; and the null curriculum will appear in the way students may unlearn certain science teaching aspects traditionally associated methods courses and by gaining practical experience of teaching elementary science without being a content expert.

Ultimately, as a teacher educator, my role is to offer the framework necessary to help my teachers think and to succeed. The aforementioned points are a clear "restarting" point. My struggle is ongoing—what is that mixture that strikes balance where my teachers can achieve that level of critical thinking to be able to use what we generated in their own teaching. While I am unsure of the exact measurement of the three components—my focus remains on "trying" out what will work within the context of the three identified curricular elements.

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