We are All Made of Stars
A Metaphor for Exploring the Greater Whole in which Beliefs Subsist

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> The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies, we're made in the interiors of collapsing stars. We are made of star stuff.
>
> Carl Sagan (1980, p. 190)

The Importance of Metaphors

THE WAY IN WHICH A PROSPECTIVE TEACHER INTERPRETS the world is based on the traditions, experiences, and cultures he or she inhabits. Prospective teachers develop their belief systems, collections of beliefs about teaching, learning, and their content specialization through the experiences and narratives constructed about education. Once a person graduates from high school, he or she has been through more than 15 years of schooling. The graduates have experiences leading them to have certain expectations of what education is and what it should be. For this reason, teacher education can be seen as combating the past of the individual, specifically intervening in their beliefs. In other words, teacher education programs can be seen as being in the business of changing beliefs. Teacher educators plan a series of interventions through the teacher education program to change the beliefs of prospective teachers to produce teachers who can teach the content effectively. The beliefs teachers should possess are defined by our institutions (e.g., departments, program committees, college mission statements) and specialized professional associations. For example, the National Council of Teachers of Mathematics (NCTM, 2014) described in *Principles to Action* the productive and unproductive beliefs for effective mathematics practice. In order to better impact the teaching practices of prospective teachers, teacher educators need tools to understand the beliefs of individuals. The purpose of this paper is provide one such metaphor for thinking about how beliefs are held and ways to intervene.

Britzman (2009) discussed the paradox prospective teachers face:

> Newcomers learning to teach enter teacher education looking backward on their years of school experience and project these memories and wishes into the present that they then identify with as somehow indication of what should happen or never happen again. (pp. 28–29)

When prospective teachers begin their preparation programs, they already have belief systems justified by their previous experiences and observations. To explore the changes, modification, and compromises of these beliefs has been a goal in teacher education research (e.g., Cho & Huang, 2014; Conner, Edenfield, Gleason, & Ersoz, 2011; Philipp, 2007; Weller, Arnon, & Dubinsky, 2011). Charalambous, Panaoura, and Philippou (2009) described the actions taken as teacher educators to create a mathematics methods course focusing on the history of mathematics to change the epistemological and self-efficacy beliefs of prospective mathematics teachers. Teacher educators have developed and described a variety of interventions used in methods and content courses to change the beliefs of prospective teachers (see Gomez & Conner, 2020).

In his own investigation on the activities of teaching, Green (1971) argued for a metaphor to aid others in the exploration of a teacher's collection of beliefs. Green stated that metaphors "permit us to construct ways of leading the mind from the familiar to the unfamiliar" (p. 60). Metaphor, as a tool, is important to support researchers in their exploration of phenomena. Atwell-Vasey (1998) wrote that a metaphor "relies on the imagination of its users to see that we can only include some elusive phenomena in our talk by letting other things, more sensible to us, stand in the position of the more elusive phenomenon" (p. 11). Metaphors provide the individual with a language to discuss challenging phenomena by providing conceptual osmosis (Sfard, 1998). This can be tricky as metaphors come with a set of assumptions that may be warranted or unwarranted. For example, when using the metaphor of reflecting, the individual is assuming one's perspective is clear and untainted by the self (Markham, 1999). Metaphors, allegories, and similes aid the individual in attaining a new way to speak about an event, object, or emotion. It is these similarities that enlighten researchers and philosophers to new ideas and constructs in our uncertain world.

In this paper, I expand on Green's (1971) metaphor to attain a deeper understanding of one's belief system. I will use this exploration to expand his metaphor by looking at it as a part of a greater whole using the Onion model described by Korthagen (2004) (adapted from Bateson's model—see Dilts, 1990). This thought experiment will then lead to the creation of a new model representing a belief system as a piece of a whole, the different levels in which beliefs exist, and the possible connections one's beliefs have with competencies, identity, and other levels of change (Korthagen, 2004). To conclude, I use Gadamer's (1966, 1975) ideas of tradition to explore the forces holding our beliefs and other aspects-of-self.

This thought experiment only demonstrates one way the galaxy metaphor could be helpful in thinking about the beliefs of preservice teachers. In the same way constructivism helps in thinking through how one learns and interprets the world, the galaxy metaphor aids researchers in considering how beliefs may be influencing the act of learning and being-in-the-world. I imagine that, as readers proceed through this construction, they will bring in their own experiences, beliefs, and knowledge and overlay them onto the metaphors. I recommend the reader reflect on how these metaphors may help in seeing their interactions with students differently. In addition, the metaphor you use now to make sense of teaching and learning may be enveloped within the galaxy metaphor.

My goal through this document is to provide a metaphor to work with the metaphors of the reader to provide new avenues of exploration.

Green's Metaphor of a Belief System

Green (1971) described a metaphor for an individual's belief system. He made no claim that this was the only possible model, but it was one idea aiding him in his own thinking about beliefs. Green (1971) stressed the importance of calling this a metaphor because "no major philosopher in the history of the subject has escaped [metaphors] use and no major field of knowledge in the modern world can do without them" (p. 56). In addition, the metaphor Green constructed is solely for how beliefs are held and not for how beliefs come to fruition. He argued, however, that, when one constructs or derives a belief, it becomes part of the individual's belief system, and when a belief is modified, it then modifies the individual's belief system (Green, 1971).

Green continued his assembly of the metaphor saying that our beliefs occur in sets or groups:

> It seems true that whenever a person holds a certain belief, he must also take some attitude toward that belief; and that attitude is always itself capable of formulation as a belief. It is a belief about a belief. Indeed, there will be a whole set of such beliefs about beliefs. (Green, 1971, p. 42)

The relationship between these groups is dynamic and in constant flux. Some beliefs are dependent on one another while others exist independently, but never in total isolation. Although Green did not state it directly, he implied that our beliefs are fluid.

Green (1971) explained that there are derivative beliefs, those that are a consequence or a direct product of another belief, and primary beliefs:

> We might describe this relationship by saying that, in the belief system of any particular person, some beliefs will be derivative, meaning simply that they will be seen by him as derived from some other belief. This observation also suggests that in any given system of beliefs there may be some beliefs so basic that they are not themselves derived from any other beliefs. (p. 44)

Green discussed the interconnectedness of our beliefs. Although some of the connections may be weaker than others, a hidden thread or force connects them all. It could be said then that all of our beliefs occupy the same space even though one may not be aware of their existence. As a result, no belief exists outside of this space. Green does not discuss the space in which beliefs exist or the greater system to which they belong. Further on, we will argue for the construction of such a space and the benefits of navigating it.

Green (1971) continued molding his metaphor by expanding on the sets and groups in which beliefs exist. He imagined beliefs exist in clusters, consequently allowing for the existence of contradictory beliefs. The individual is unaware of the contradictions existing within their own belief system, due to a "protective shield." These shields are valuable since they protect the individual from recognizing contradictions within their system. The clusters are then organized to

be consistent with one another in what Green called a quasi-logical manner. Thus, a prospective or in-service teacher may have conflicting beliefs, but only from the observer's point of view. To the individual, their belief system is sensible (Leatham, 2006) meaning that to the individual there are no contradictory beliefs. To change beliefs then, it has been argued, the individual needs to be perturbed in such a manner that their beliefs are challenged.

Green (1971) takes into account the validity one has for their beliefs. He compartmentalizes beliefs into those held evidentially and non-evidentially. For a belief to be held evidentially meant the individual is holding on due to a basis of evidence. These beliefs are open to modification and criticism because the evidence holding the belief can be questioned through the production of new evidence (perturbation). Non-evidentially held beliefs are more difficult to change because evidence does not support them. Consequently, the non-evident beliefs are not prone to rational argument. So, an individual considers their beliefs to be right to varying degrees in relation to their understanding of truth. "When a person believes something, he believes it to be true or to be a reasonable approximation to the truth. Besides arriving at some decision about its truth or reasonableness, a person need not decide" (Green, 1971, p. 43). This means that some beliefs are held with a stronger, more "passionate conviction" than others and with different kinds of justification. This allows us to consider the psychological strength by which beliefs are held.

Green (1971) envisioned a belief system as a series of concentric circles. At the center of all these concentric circles one has "core beliefs," which are the beliefs that have a high psychological strength and are less likely to be challenged to change. On the outskirts of a belief system one has beliefs with a weak psychological strength or peripheral beliefs, beliefs more susceptible to being challenged and changed (Green, 1971). Hence, within a belief system there is a quasi-logical structure and a positioning of beliefs based on psychological strength. The space within a belief system can further be deconstructed by considering Korthagen's (2004) onion metaphor.

Korthagen's Onion Metaphor

Korthagen (2004) described an adaptation of Bateson's model, which Korthagen referred to as the onion. The goal was to represent different *levels of change* or "the various levels in people that can be influenced" (Korthagen, 2004, p. 79–80). His objective, thereafter, was to construct a framework for researchers to investigate the deeper aspects of the onions of teachers. He does this in an attempt to find the essential qualities of a "good" teacher and to start a conversation on how to appropriately intervene at different levels of change. As the metaphor of the onion implies, the model is a series of concentric circles, and only the outer layer is visible to others. For teacher education, Korthagen makes the argument that this model helps focus preservice teachers' reflection practices:

> [The onion] provides support in supervising the reflection processes of teachers because it focuses attention on the possible contents of that reflection…. In this sense, the model of levels of change (the "onion") supplements such process models of reflection, in that it helps educators to determine on which levels the teacher is having problems, as well as on which levels the supplement might lie that should take shape. (p. 87)

By compartmentalizing changes in these different levels, Korthagen is able to focus research to different aspects of the individual teacher and explore ways to reveal these diverse levels.

As previously mentioned, the environment in which the onion exists and the outermost layer are all that is visible to others. So, the environment and the behavior of the individual makes up the exterior of the model as these components of people can be directly observed (Korthagen, 2004). The environment one inhabits, whether it be a classroom, office, coffee shop, or park, can be easily changed either by the self or others. At the same time, an individual's behavior can also be influenced to change by the environment. The model also demonstrates that influence can be in reverse; the behavior of the individual can influence an alteration to the environment he or she occupies. For example, a teacher who guides students through the construction of routines, pressures students toward certain behaviors. Thus, the teacher, through these actions, changes the environment of the classroom, the space in which he or she resides.

The inner levels of change are one's competencies, beliefs, identity, and mission (Korthagen, 2004). Beginning with the *competencies* of the individual, these are an important stimulant to the layer of behavior, yet it is essential to recognize the difference between behaviors and competencies. Korthagen (2004) cites Stoof, Martens, and Van Merrienboer (2000) to describe how competencies are an integrated body of knowledge, skills, and attitudes. Competencies influence the possibility for a change in behavior. Competencies are also reflected in our behavior. For example, consider the reflections one goes through after a particularly regretful event. One begins to play out various scenarios in hindsight. The numerous behaviors imagined in these phantasies represent possible behaviors (explored through the competencies created or altered) but not the behavior the individual actually went through. If a similar event occurs, then from previous experience and reflection, one has constructed new pieces of knowledge or has shifted their attitude towards said event.

The beliefs of the person will impact the competencies he or she demonstrates. Green (1971) discussed the intricacies between beliefs and knowledge (a competency):

> The only difference between the two, believing and knowing, seems to lie in the truth condition. When the truth condition is unsatisfied, then what one took to be knowledge turns out to have been only belief.… Knowing is simply believing plus something else, and that something else must be the fulfillment of the truth condition. (pp. 68–69)

The discussions on beliefs are focused on a specific aspect of the individual preservice or inservice teacher. Korthagen (2004) focused on the beliefs teachers and students have as to what makes a good teacher. Other researchers have emphasized beliefs of student teachers, mentors, and supervisors (Leatham & Peterson, 2010), beliefs and teaching practice (Decker, Kunter, & Voss, 2015; Raymond, 1997), and beliefs about diversity (Garmon, 2004; Jong & Jackson, 2016) as important to consider during teacher education. Neither Korthagen (2004) nor Green (1971), however, define or discuss what a belief is, but instead discuss the ways in which research has developed the concept. This supports the claim that belief has been used differently by many researchers and that the term is generally left defined in a vague way or in a way that contradicts with others (Furinghetti & Pehkonen, 2002; Pajaras, 1992; Philipp, 2007; Thompson, 1992). For our consideration, I follow Rokeach's (1968) definition of belief as a disposition to action or "any simple proposition, conscious or unconscious, inferred from what a person says or does" (p. 113). This definition highlights the relationship between beliefs and behaviors.

The next level of Korthagen's (2004) adaptation is the teacher's professional identity or their self-concept as a teacher. Developing a professional identity is the attempt to answer the questions 'who am I?' and 'how do I see my role as …?' (Brown, 2008). It is the individual believing certain aspects or characteristics about themselves. Gecas (1985) stated that identity "gives structure and content to the self-concept, and anchors the self to social systems" (p. 739). Part of our identity is related to our current position in the world. More importantly, the interpretation of the space one inhabits will affect the behaviors, competencies, and other aspects of self. Accordingly, Gee (2001) described four different views of identity (nature, institution, discourse, and affinity), which are not mutually exclusive. Instead they overlap and interact with one another in complex and significant ways.

Educating future teachers is preparing them for the position they will take in a school, community, and society. The composite character of "good teacher" is presented and developed throughout the teacher preparation program. It is through the interpretations of pedagogy and content that preservice teachers construct the archetype. Thus, the institutional, discursive, and affinitive identity (Gee, 2001) of the individual as teacher needs to be understood not only by researchers, but also by the prospective teachers themselves.

The center of the onion is one's *mission*. Korthagen (2004) described mission in the following way:

> This level is concerned with such highly personal questions as to what end the teacher wants to do his or her work, or even what he or she sees as his or her personal calling in the world. In short, the question of what it is deep inside us that moves us to do what we do. (p. 85)

The mission of the individual is the answer to the question 'what is my purpose in my life?' In addition, the mission gives meaning to one's being-in-the-world. This is not to be confused with a spiritual or religious understanding of purpose. It could be a teacher's purpose in the classroom to improve the lives of students through education or to have them become proper citizens of our society. This does not mean spirituality is not influential on one's mission, but they are not one and the same. I argue, however, that the word *mission* is just as problematic as the word spiritual. When one thinks of a mission, it has the implication of a direction, an understanding of where someone is going or has to go. Thus, the metaphor of a mission makes the assumption that the individual understands what the operation will entail, which is not necessarily true of these central beliefs. Hence, by mixing metaphors, the limitations and assumptions of Green's (1971) belief system and Korthagen's (2004) onion can be alleviated, accepting that all metaphors have some taken-for-granted assumptions to them (Markham, 1999). In the next section, I mix the metaphors in order to construct a Galaxy metaphor.

The Metaphor and the Onion: Developing a Galaxy

Green (1971) and Korthagen (2004) play with language and imagery to discuss the relationships between beliefs, attitudes, and competencies. Altogether I refer to these as aspects-of-self. Through metaphor, the authors inspired new questions and opened up new possibilities for research. So, stretching the metaphor, one could ask, where does a belief system reside? Is this system of beliefs part of a greater whole? To explore these questions, let us consider a belief system

to be a piece or "a part that can subsist and be presented even apart from the whole" (Sokolowski, 2000, pp. 22–23). Korthagen's (2004) onion helps us envision the greater whole of which one part is Green's belief system. Consequently, a new metaphor can be constructed, preserving Green's belief system ideas within the levels of change. I argue this construction allows for a metaphor of a galaxy to be used to explore the relationships between beliefs and other aspects-of-self.

I envision the levels of change as a vast array of clusters or a galaxy, a collective of stars, planets, moons, and other celestial bodies representing our aspects-of-self (behaviors, competencies, beliefs, identities, and missions). These aspects-of-self are the filter used to interpret and make sense of the space one inhabits. All of the stars and objects (planets, asteroids, etc.) in a galaxy revolve around a central point called the galactic nucleus. A galaxy exists within a universe, which is endless, just like the possible environments one might inhabit in a lifetime. Within this infinite number of environments, there lie the clusters influential to the aspects-of-self. Thinking about a galaxy can help us imagine the relationships between the aspects-of-self, an elusive phenomenon, in a concrete way (Atwell-Vasey, 1998).

Moreover, in a galaxy, there exists a collection of solar systems that move at different speeds and have their own rotational trajectories. The planetary systems on the outskirts of the galaxy have a slower orbital velocity; those closer to the nucleus have a faster orbital velocity. Additionally, if a system is closer to the center, then it has a stronger gravitational force applied to it from the nucleus. Consequently, this preserves how both Korthagen (2004) and Green (1971) envisioned the workings of one's core beliefs (identity and mission). These beliefs require a more significant pressure or force to change due to the clusters' stronger psychological strength. This also represents the influence or strength one's core levels have on the other parts of the galaxy and how challenging it is for researchers to determine which forces are being applied. The outer most systems, those furthest from the galactic center, are changing more often, as well as being more susceptible to other forces, just like the outer aspects-of-self (i.e., environment, behavior, and competencies).

According to Dahlberg, Dahlberg, and Nystöm (2008), when Merleau-Ponty (1968) described the flesh of the world, he meant "that all phenomena and meanings are interconnected and it can be hard to see where one phenomenon ends and the next begins, where one meaning is and whether it is connected to one phenomenon or another one instead" (p. 15). The galaxy metaphor as described gives the aspects-of-self a flesh, blurring the lines between beliefs, competencies, and identity. When prospective teachers begin their methods and content courses, there are years' worth of development in their own galaxies. The prospective teachers are imbued with these characteristics of their past schooling traditions. When teaching preservice teachers new ways of talking about education, providing a new academic language, it can clash with the pasts and traditions that have constructed their experiences. Change then travels through space with magnitude and direction, potentially changing other aspects-of-self. We, as educators, construct interventions to have the individual question his or her accepted history, traditions, and prejudices. So, one must be cautious and understand that all of the aspects-of-self are difficult to separate and tease out. This perspective of students as resisters of knowledge should not be pessimistic. On the contrary, understanding the uncertainty and confrontations of knowledge is empowering. Having students become aware of, question, and deconstruct their resistances and then restructure their prejudices is important and necessary for them to learn to teach.

Overall, the galaxy metaphor preserves Green's (1971) description of how beliefs are held (clusters, psychological strength, and pseudo-logical structure) and the different levels of change Korthagen (2004) discussed. The galaxy metaphor provides a new perspective for doing research

in education. I begin by exploring beliefs and other aspects-of-self through Gadamer's (1975) ideas of tradition. Thereafter, I describe how the galaxy metaphor can be used when considering teacher preparation programs' curricula.

The Galaxy Through a Hermeneutic Lens

The galaxy metaphor invites different perspectives to come into conversation with one another. To begin, the metaphor better demonstrates how beliefs are held fluidly, because in a galaxy nothing is ever static; objects are constantly moving due to the forces being applied. The only way one holds an aspect-of-self is on the orbit it travels. Using Gadamer's (1966, 1975) ideas of tradition and language can help in exploring this type of hold. Gadamer (1975) wrote that hermeneutics is "the art or technique of understanding and interpretation" (p. 174). Individuals are interpretive beings born and raised in the traditions and histories of ourselves, of others, of objects, and ideas. As a result, our histories and traditions hold our aspects-of-self in place, along with the prejudices that are consequences of those traditions. Take for example how Leatham and Peterson (2010) found that mentor teachers believe one of the main purposes of student teaching is to experience the *real* mathematics classroom. The use of the word *real* demonstrates the mentor teachers' interpretation of the student teaching experience and the prejudices they have, not only towards teacher preparation programs, but potentially their own teacher education. If the mentor teachers believe they are providing the *real* experience for prospective teachers, then teacher educators would be providing an unrealistic experience. This can make the act of bridging field experiences with course work challenging for the teacher in training.

Hermeneutics takes into consideration the problematic nature of language and the fact individuals are always immersed in language. Gadamer (1966) wrote, "we can only think in a language, and just this residing of our thinking in a language is the profound enigma that language presents to thought" (p. 62). Accordingly, every event is interpreted through the flow of experiences changing our horizons of understanding. Consequently, because people are interpretive beings (Gadamer, 1975) having new experiences, ideas, theories, and environments, one cannot make the assumption that our aspects-of-self remain static as beings-in-the-world. Thompson (1992) warned against this mentality in research on mathematics teacher beliefs and knowledge. This fluidity, however, should be kept in mind beyond research on beliefs and knowledge, but also identity and other aspects of being an educator or a student.

As one attains more and more experiences, the horizon of understanding shifts, consequently changing the way in which one interprets objects and events. This includes when one reflects on an event in one's past; "every experience has implicit horizons of before and after, and finally fuses with the continuum of the experiences present in the before and after to form a unified flow of experience" (Gadamer, 1975, p. 237). If the interpretation one makes changes through the flow of experiences, this means an aspect-of-self has potentially changed. Although the cluster stays on an orbit, leaving it at the same level (behavior, competency, etc.), it is still changing ever so slightly, it will never return to what it once was, even if the language one uses to describe it may be similar. One can only capture a participant's tentative manifestation of beliefs through the interpretation of said cluster, because our aspects-of-self are always moving.

Just like the orbits of planets can be closer at times than others, one can envision the beliefs of an individual at times becoming difficult to distinguish between other levels. This means one has to keep in mind the consistent movement of the clusters and the possible significant events

occurring intermittently. This is particularly relevant when investigating the influence of an event on a preservice teacher. The extent of that movement and the significance of that advancement on the orbit will need to be considered between reflections. One can only just catch a tentative manifestation of the individual's cluster, as they will shortly move. Researchers and teacher educators must consider the places and spaces they and their participants and students inhabit at a given moment, as these will be influencing factors as well. Finally, the constant movement of aspects-of-self also aid in understanding how the individual may not recognize contradictory clusters.

Also to be considered are the forces holding these clusters in orbit. As noted above, Green (1971) argued that beliefs are held evidently or non-evidently, but with this galaxy metaphor, the evidence the individual has for those clusters is only one possibility. It takes many different combating forces to hold objects in orbit. One other possibility is the traditions in which one exists and with which one compromises daily. Gadamer (1975) stated:

> That which has been sanctioned by tradition and custom has an authority that is nameless, and our finite historical being is marked by the fact that the authority of what has been handed down to us—and not just what is clearly grounded—always has power over our attitudes and behavior. (p. 281)

These traditions and norms are reflected in these clusters and influence the psychological strength with which these objects are in orbit. The traditions into which one is born have an influential power over us. Gadamer (1975) claims all power exists in its expression, and thus, each aspect-of-self, as one expresses it, demonstrates power. The force an aspect-of-self exerts conflicts and compromises with other clusters and other levels. The larger the cluster, the greater power it can demonstrate and the greater power it has over other clusters.

So, consider a teacher educator's position in the classroom. There are a variety of expressions of power occurring, and through these manifestations, one is attempting to change the beliefs, perspectives, and professional identities of the preservice teachers who may demonstrate their own beliefs to resist the power expressed before them. Take for example the following exchange taken from a study I conducted on the vision (Hammerness, 2006) of prospective elementary teachers in their first of two mathematics methods courses. Karenina (pseudonym) was given a task featuring 10 open spaces evenly distributed on a circle with a blank space in the center of the circle. Each of the 10 spaces were connected to the center of the circle with a line segment. She was asked to place the numbers 1 through 11 in the spaces such that every three numbers in a straight line added up to the same quantity. The purpose of the task was to problematize Karenina's belief that mathematics problems only have one possible solution, though many different strategies are possible. Karenina successfully found a solution for the problem, and when asked if this was a mathematics problem, she responded with a confident yes. When told, however, the problem had three different solutions, she was asked again if it was a mathematics problem. She responded as follows:

> Yes because—yes a lot of math problems have one answer. But there are problems like... [sighs] I was going to say that there are problems that can go on for forever, but are those problems—I don't know if those problems have multiple solutions or if they are just the answer to a problem that goes on for forever. I guess you could think of it as like, you could go about solving this in multiple ways, just as you can go about solving a math problem in

multiple ways. But yeah with a lot of math there is mostly one answer unless you look at—like when I was in statistics there's like multiple answers or you could explain your reasoning for things. *I feel like I can't say yes or no; yes it's a math problem because you can think of about math and solving that in multiple ways. But I guess I would also say no because when I think of math a lot of it is one answer 'cause that's also why I like math is 'cause you can most of the time know if you are right or wrong is 'cause there is one answer.* So, I don't know I'm kind of torn. (Karenina, Int. 2, emphasis added)

The tradition of mathematics Karenina had been raised to understand came into question, and she desired to keep those traditions the same. Her beliefs clashed, and she attempted to reason through the conflict by externalizing her internal speech. Leaving the issue unresolved, Karenina's solution was to attempt to split with her knowledge of mathematics from her past. This perturbed her on many different levels. Seeing a contradiction within her beliefs led her to attempt to justify their existence. Karenina desired to hold on to her tradition that mathematics problems had one solution but, with the given task, was forced to think otherwise, allowing the possibility for change within various levels if she could get past the traditions holding her beliefs in place.

Lenore was also prospective elementary teacher who participated in the same study as Karenina. Within the interviews, Lenore emphasized a different tradition she experienced as she progressed through school. To demonstrate this tradition, Lenore was asked to describe the relationship she had with who she identified as her ideal teacher.

Lenore: And I still have a relationship with her to this day, and I think that's important. I mean I was a fifth grader. To still have at 21 years old, to have a relationship with your fifth grade teacher—I mean a close relationship. I can call her any day and talk to her about anything. I think that's so important. Maybe not having one as close as she and I do but just having one that you know if you ever needed something you could go to them. And remembering at 21 or at 40 or at 50 how much fun you had in fifth grade. Because some of my grades I can't remember at all. I can't even tell you who my teacher was. I think the fact that I can tell you so much about my fifth grade teacher means that she was a great teacher.

Interviewer: So, what obstacles do you see in becoming this ideal teacher?

Lenore: Honestly, the relationship part. Nowadays there's a very fine line between what…where you can take a relationship. You know like, I'm very close with all my teachers, and I can call my teachers even when I was in high school and to certain people that would look weird although it wasn't. And I think that's just going to get worse and worse and worse. So, I think it's defining the line between what they can talk to you about—what you can talk to them about, when you can talk, where you can talk. I mean nowadays people are like, my mom was a teacher, and she tells me all the time, never be alone in your classroom with a student. And that's sad to me that it's gotten to that point. So, I just think that that's going to be the hardest thing to overcome cause I'm not going to have a problem building the relationships. I love kids. I love students. I love teaching them things but

knowing when I just need to back up so that nothing looks bad because it's just going to get worse and worse as far as you know teachers getting in trouble. And I'm just dreading that everyday 'cause I think it's so sad. I was alone with my teachers all the time to talk to them about stuff, and now you can't do that. So, that's going to be the biggest obstacle I have in every area of teaching—just knowing the line that you can't cross.

Lenore's emphasis on the teacher-student relationships involved many levels in the galaxy that is within her. These constellations shine brightly and influence her perspective on her future teacher-self. She articulates the desire to create these relationships with students and how the current culture in education will make her desired acts difficult. The tradition and the meaning she had placed on the word teacher and the role of teacher conflicted with how others view the act. She seemed to be resistant to changing these aspects-of-self but aware of the context she will be working within. This awareness helped her in being resistant to changing her perspective on student-teacher relationships.

These are only some of the possibilities the galaxy metaphor provides for the ways in which we hold our clusters at various levels. Of course, with this model there are many other factors that can be contemplated and discussed. The previously mentioned are just a few, and I hope others will take these thoughts and open them up to unfold new inquiries and questions of the individual. As Gadamer (1975) stated "discourse that is intended to reveal something requires that that thing be broken open by the question" (p 357). Only by continuing to question the models can we continue to reveal new understandings.

Discussion: The Galaxy Metaphor as a Lens

One can envision a collection of super clusters of galaxies coming together, interacting with one another with forces of varying magnitudes, colliding in the space provided by the classroom. Even the authoritative figures outside the classroom influence the actions within (e.g., administration, education agencies). For example, Hammerness (2006) witnessed the pressures of standardized testing's impact on the vision and practice of one of her participants. So, we can see no galaxy exists alone. Every galaxy is by some degree affected by other galaxies in the universe it subsists in, even if it is only immersed in the light the other stars are emitting. In the cosmos, the smallest changes can influence how individuals interpret their world.

I believe one of the goals of a teacher preparation program is to implicitly teach resistance to the conservative teaching style rampant in today's schools. As Felman (1987) wrote, "teaching, like analysis, has to deal not so much with lack of knowledge as with resistances to knowledge" (p. 79). However, those same prospective teachers being taught resistance are resisting what they are being taught. So, looking at future teachers as resisting knowledge is supported by the galaxy metaphor. When these prospective teachers begin their methods and content courses, there are years' worth of development in their own galaxies. They are imbued with these characteristics of their past schooling. They are successful products of the education system in which they grew up. When we teach them new ways of talking about education, a new academic language, it clashes with the past language and traditions that have constructed their galaxy. Collisions occur in the emptiness of space creating a ripple effect throughout.

So, how can this metaphor be utilized to enhance our teaching? In general, our beliefs about teaching and learning influence the curriculum of our courses. A tool, like the galaxy metaphor, can help in designing stronger and more targeted interventions. For example, in mathematics methods courses for prospective elementary teachers, one goal is to have prospective teachers learn to use students' mathematical thinking. Philipp et al. (2007) found a stronger intervention is to have prospective teachers have the opportunity to conduct guided interviews with elementary aged students, rather than showing videos of students being interviewed or documents with students' mathematical work. Reflecting on our curriculum and selected interventions can also help in seeing what beliefs and levels we are targeting with assignments and activities. The galaxy metaphor can help in our own professional development and curriculum design.

In *The Activities of Teaching*, Green (1971) discussed the belief system of an individual to explore the actions of the teacher in the classroom and what it means to teach. Korthagen (2004) wanted to investigate distinct forces effecting different levels of change and the methods researchers could use to study teachers' inner most layers. By putting these two metaphors together into the galaxy metaphor, one is able to explore the same ideas through a different lens—opening up new avenues of investigation. When I first got glasses and the blur was no more, I was able to explore colors in new ways. The aesthetic experience I had with my doodles changed, and the way I interpreted what I created was different. Similarly, the manner in which I investigate my own and others' behaviors, competencies, and beliefs is now different. New factors are appearing, and other considerations are taking place when reflecting on my own past experiences. The blur has become more focused, and I realize the sensitivity of my own perspective. Is this correct though? This is only an idea, a possibility, but whether it is correct or not is impossible to say. The experience and analysis this galaxy metaphor is providing has the potential to change us at any level.

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