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Design Thinking's Effect on Empathy Development in Middle School English- Language Arts

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Abstract

The purpose of this quantitative study was to explore the impact of Design Thinking on students' empathy development in middle school English Language Arts (ELA) classrooms. The study involved two middle school instructors with eight classes, implementing Design Thinking, Reader's Workshop, and traditional ELA curriculum in different combinations (n =102) and two control classes (n =27).

The Adolescent Empathy Measure (AMES) and rubrics for analyzing student writing samples were used to assess changes in empathy. The AMES was given before and after the interventions, and the writing samples were analyzed before and after the interventions as well. The findings indicate partial support for the hypotheses related to cognitive empathy but no statistically significant results for affective empathy. The study contributes to the understanding of Design Thinking's potential in enhancing empathy and suggests the need for further research in this area. Limitations and implications for future studies are discussed, emphasizing the role of Design Thinking in education and its potential to address the social and emotional needs of students in a post-pandemic educational landscape.

I dedicate this dissertation to my family including my husband, Scott, my children, my mom, and my sister who never gave up on me and made me believe I could finish even when I was not sure.

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Chapter 1: Introduction and Review of Related Literature

In 1994, The New London Group, a cohort of educational researchers from a diversity of philosophical backgrounds, met to discuss the current and future needs of the world's students. As a result of this meeting, a consensus was reached regarding a move from the traditional role of literacy education as a means to understand written text which had been "restricted to formalized, monolingual, monocultural, and rule-governed forms of language" (Cazden, et al., 1996, p. 61). In contrast, through this work, two overall goals for students emerged: "creating access to the evolving language of work, power, and community, and fostering the critical engagement necessary for them to design their social futures and achieve success through fulfilling employment" (Cazden, et al., 1996, p. 60). What this means for teachers in general, but literacy teachers specifically, is that instructional practices need to encompass methods that empower students to make sense of and how to access careers, communities, and opportunities in whatever form those challenges may present themselves. In reality, teachers are working to support students for community roles and careers which may not even have been fully established at this point due to future technological advancements. To this aim, teachers' instructional practices need to focus on the development of skills that will fit a wide variety of possible futures for their students.

While academic rigor and relevance will always be important goals for students, this emphasis alone is not enough to support their complex needs as they are faced with more diverse ideas and experiences both in their day-to-day activities and as part of a

global community. In a 2014 article from the Nellie Mae Education Foundation, the authors report that to be best prepared for postsecondary education students need skills that are cognitive, intrapersonal, and interpersonal (Hess, Gong, & Steinitz). With the pressure educators, administrators, and parents alike feel to meet these multifaceted goals for student life preparedness, teachers need tools in their classrooms that support student learning in the most efficient and effective ways which allow for students to learn both academic concepts as well as social and emotional ones.

Recently in educational circles, a method called *Design Thinking* has emerged. It has been widely used in areas such as: creativity (Anderson, 2012; Dorst & Cross, 2001; Rauth, Koppen, Jobst, & Meinel, 2010; Wells, 2012), business management (Dorst, 2011), spirituality development (Tan & Wong, 2012), higher education (Adams, Daly, Mann, & Dall'Alba, 2011; Bequette & Bequette, 2012; Burdick & Wills, 2010; Cassim, 2013; Rauth et al., 2010), technology development with adolescents (Fisher, Bishop, Fawcett, & Magassa, 2013; Shute & Torres, 2011), science education (Koldner, 2002), and middle school student education (Carroll, Goldman, Britos, Koh, Royalty, & Hrnstein, 2010; Carroll, 2014). Generally, the most common assertions from research and anecdotes are that Design Thinking increases participants' empathy (Bosch, Harkki, & Seitamaa-Hakkarainen, 2022; Goldman & Kabayadondo, 2017; Goldman et al., 2012; Kelley & Kelley, 2013; Noel, Liu, & Rider, 2020; Sun, 2017) and that it builds creative confidence (Carroll, et al., 2010; Kelley & Kelley, 2013; Rauth et al., 2010). Design Thinking has typically been associated with science, technology, engineering, and math (STEM) education; however, its emphasis on empathy development, group work, and

multi-modal expression makes it a reasonable addition to literacy education as teachers strive to meet students' current literacy needs as outlined by the New London Group.

Specifically, Design Thinking's possibility as a way to develop students' empathy while they are engaged in rigorous academic content could help teachers implement curricula that support students' intrapersonal and interpersonal skills. In general, empathy is the ability to connect with another person to understand his or her feelings and then to separate those feelings from one's own (Oliveira-Silva & Goncalves, 2011). As our local and global communities continue to become more interconnected and as our world continues to rely on digital media to facilitate those interactions, the necessity to examine and intervene in areas devoted to harmony and understanding increases. When one considers places where empathy development might be most necessary, middle school marks a pivotal point in adolescents' development making it imperative that school communities work with this age range to guard against student apathy to both their peers and other community members. Instead, schools must work to explicitly cultivate empathy in students.

Recent research supports the benefits of developing empathy in students while also highlighting the negative features associated with low levels of empathy. For example, higher levels of empathy in childhood increase children's popularity with peers, and, similarly, greater levels of empathy in adolescence can predict one's ability to operate socially as an adult (Allemand, Steiger, & Helmut, 2014; Dekovic and Gerris, 1994; Eisenberg et al.,1996; Jolliffe & Farrington, 2006; Murphy et al. 1999; Vossen, Piotrowski, & Valkenberg, 2015). Conversely, a lack of empathy has been connected to a

myriad of concerns including aggressive behavior, violence, and antisocial tendencies (American Psychiatric Association, 2000; Damon, 1988; Jolliffe & Farrington, 2006).

In this chapter, information on empathy will be reviewed, including how one develops empathy, how schools have attempted to support empathy development, and how higher levels of empathy benefit individuals as well as the consequences of lower levels of empathy. Finally, Design Thinking will be introduced as a method to increase participant empathy, and a case will be made for literacy education as a setting to practice Design Thinking.

Empathy

"[E]mpathy entails the capacity to resonate with another person's emotions, understand his/ her thoughts and feelings and, finally, separate one's own thoughts and emotions from those observed" (Oliveria-Silva & Goncalves, 2011, p. 201). The breadth of the research on empathy spans from investigation into the biological and evolutionary development of empathy to how to purposefully develop empathetic responses in individuals. According to de Waal (2008), empathy is: present in many animals, an evolutionarily ancient capacity, helpful to animals as they work for the good of others even to their detriment, biased towards those the individual already feels a connection to rather than one who is perceived to be the "other," and, in some species, precursory to altruistic behavior. The major facets of empathy from an investigative perspective are (a) Its composition of both affective and cognitive features (b) Empathy's arousal through mimicry, classical conditioning, direct association, mediated association, and role-taking and (c) The role empathic distress plays to move observers to prosocial behavior.

As a construct, empathy can be separated into two types: affective empathy and cognitive empathy. While affective empathy concerns the ability to experience the emotions of another and is associated with the concepts of synchrony, motor mimicry, and emotional contagion, cognitive empathy relates to understanding the emotions through the ability of self-other distinction and perspective-taking (Damon, 1988; Hoffman, 2000; Jolliffe & Farrington, 2006). Recent brain research utilizing MRI scans supports the delineation between cognitive and affective empathy by identifying the areas of the brain that influence each facet of empathy, verifying the assertion that empathy is a construct of multidimensionality (Eres, Decety, Louis, & Molenberghs, 2015; Nummenmaa, Hirvonen, Parkkola, & Hietanen, 2008).

In general, an empathetic response must include "the involvement of psychological processes that make a person have feelings that are more congruent with another's situation than with his own situation" (Hoffman, 2000, p. 30). Sometimes empathy elicits a negative feeling when one believes another to be in pain or suffering; this is called empathic distress. When considering how this might affect the individual, it is important to look at not only how one feels about another's difficulty, the affective component of empathy, but also one must consider the viewer's ability to understand the victim's position and their own role in relation to the victim, the cognitive component of empathy (Hoffman, 2000).

Empathic arousal. As the senses and brain interact with the observer's environment, the individual takes in this sensory information and begins to process it. Although some results of this sensory input are involuntary, some of these processes that

arouse empathy are voluntary as mitigated by the cognitive processing of the brain. Overall, there are five modes for the arousal of empathy: mimicry, classical conditioning, direct association, mediated association, and role-taking. The first three of these modes are characterized as "primitive, automatic, most important, involuntary" and associated with the basis of affective empathy (Hoffman, 2000, p. 36). When an observer views another's emotional expression, in a reflexive way, the brain takes over and mimics the other's facial expression. This physical reaction causes the observer's brain to feel what the observer feels (Hoffman, 2000).

De Waal (2008) refers to this as the Perception-Action Mechanism, PAM, and uses a Russian Doll Model to illustrate the concept (see Figure 1) where the very basic systems that create the ability to empathize helps the observer to be able to understand the subjective state of the observed by the actions of the observer's own brain activity and bodily reactions. Upon witnessing another's state, the observer's brain works through emotional contagion to create this same state in the observer in ways that are both automatic and unconscious. Two factors can mitigate the empathic response: similarity and social closeness. The more similar and socially close the two are, the more likely there will be emotional contagion or understanding of the other's position.

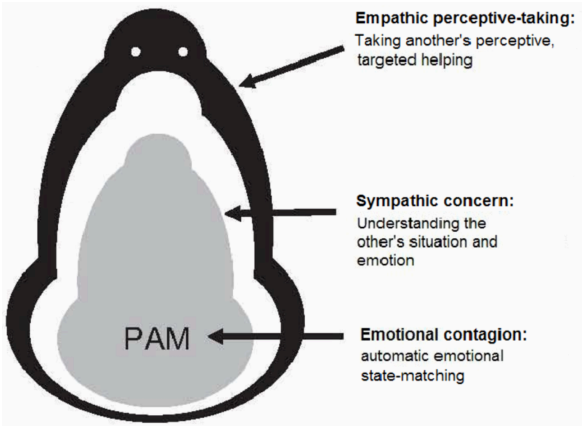


Figure 1: De Waal's (2008) Russian Doll Model of the Perception-Action Mechanism, PAM, where the involuntary process of emotional contagion enacts the observer's ability to take concern for another's plight which leads the observer to targeted helping.

One mode for the arousal of empathy, mimicry or emotional contagion, has often been described as the instinctual basis of empathy (de Waal, 2008; Hoffman, 2000). Two facets of mimicry are imitation and feedback. With imitation, the observer tends to replicate the facial expressions and vocal quality of those around her, and then that muscle movement results in afferent feedback in the observer causing her to feel that emotion. These are involuntary actions that result directly from the central nervous system as supported by the concept of PAM. For example, when one sees a particularly bad hit in a sporting event or sees someone fall on a sidewalk when running hard, the observer's brain registers the event and then sends a signal to the muscles which usually form a cringe. This physical sensation of this cringe helps the brain interpret and understand the other's subjective feelings at that moment.

Additionally, empathic arousal is impacted by classical conditioning. Conditioning can occur when one feels their own distress at the same time as witnessing another's distress. For example, if a child witnesses her mother's distress and recognizes

the facial features associated with that distress, she can then become stressed in other situations when she sees those same facial expressions. This conditioning is not unique to negative emotions, however. When a child sees smiles from her mother, she may respond positively to others' smiles as she has been conditioned to understand that the other is happy and she may experience empathic relief, the feeling that one has helped in some way.

While direct association is similar to classical conditioning, "direct association differs from conditioning because it does not require previous experiences in which distress in oneself is actually paired with cues of distress in others" (Hoffman, 2000, p. 47). Individuals do not need to see the distress of others; they must, however, be able to relate to what they might be feeling when reflecting on how they might react emotionally in a similar situation. For example, if a child learns about another student who is new to the school, the child may remember his first days in school and be able to predict how the other feels even though he has not witnessed this child's specific struggle because he can think back to his own feelings of insecurity or confusion.

Hoffman (2000) summarizes these first three aspects of empathic arousal:

> [M]imicry, conditioning, and direct association are important mechanisms of empathic arousal for several reasons: (a) they are automatic, quick-acting, and involuntary; (b) they enable infants and preverbal children, as well as adults, to empathize with others in distress; c) they produce early pairings of children's empathic distress with other people's actual distress, which contributes to children's expectation of distress whenever they are exposed to another's distress;

> (d) they are self-reinforcing to some extent because the helping behaviors they foster may produce empathic relief; (e) they contribute an involuntary dimension to children's future empathy experiences. (p. 48)

The other two modes of empathic arousal are more psychologically and cognitively taxing on the observer and associated with cognitive empathy. For example, in the case of mediated association, specifically, verbal mediation, the observer acquires the information through the use of language whether written or oral. In a mediated form of association, the observer must gather the meanings of the words semantically and then interpret how these messages relate to their own experiences and understanding of the situation described. This mode of empathic arousal is far slower than the involuntary responses of mimicry, conditioning, and direct association because it requires the observer to analyze the information without the direct benefit of input to the central nervous system (de Waal, 2008).

Finally, the most cognitively advanced type of empathic arousal is role-taking or perspective-taking (deWaal, 2008). It is separated into three types: self-focused role-taking, other-focused role-taking, and combination in which the observer shifts between self and other. The ability to enact an empathic response through role-taking or perspective-taking is related to one's ability to understand the concepts of self in relation to other. In humans, this ability to distinguish the actions of self versus the actions of another has been found to be supported in the brain's right parietal cortex which interprets input from the senses (Decety & Grezes, 2006). From a psychological

development perspective in humans, first, the infant must develop the understanding of object permanence, that objects continue to exist even when they are not within the viewer's sight, which usually occurs around the eighth month (Piaget, 1954). After that, in the child's second year of life, she will typically begin to understand the concept of self as separate from other (Zahn-Waxler, Radke-Yarrow, Wagner & Chapman, 1992). This ability can move the child to more advanced levels of empathy development.

The strongest empathic response is elicited by self-focused role-taking (Hoffman, 2000). In this action, the observer connects a person's distress to how she might feel when placed in a similar situation. If the person does this well enough, she may begin to feel some of the same emotions as the distressed person. The danger in this type of connection is called egoistic drift which occurs when the observer over-activates these feelings to the point that she is no longer thinking about the plight of the victim but can only think about how she would feel in this situation. In order to expand the observer's other-focused role-taking, the focus needs to be on how the observed feels. Increasing this reaction can be achieved by the observer knowing "more personal information about the victim or have access to the person's nonverbal responses which may activate the observer's involuntary reactions to distress" (Hoffman, 2000, p. 54). From an educational perspective, when bringing groups of students or teachers together for cooperative endeavors requiring empathy, there will likely be better understanding and willingness to support a victim's plight if the observers are able to take the person's situation into account, to have background information on the person, and to see the non-verbal actions of the person to be helped.

The most powerful of the three modes of role-taking is the combination of both self-focused and other-focused "because it combines the emotional intensity of self-focused role-taking with the more sustained attention to the victim of other-focused role-taking" (Hoffman, 2000, p.58). However, it is also the most cognitively demanding. As described earlier, the observer can consider how she might feel when placed in the same position, but then she may move to consider the position of the person in distress. This move between these two parallel processes can activate the intensity of connecting to one's own experience with the balance of stepping back to consider the context in which the observed operates.

Summary of empathic arousal. Overall, empathic arousal has roots in the bodies and emotions of individuals, whose cognitive functioning works to mediate signals from both inside and outside of individuals' minds and bodies which contributes to their motivations to enact prosocial behaviors (Gibbs, 2014). Although some results of the sensory input are involuntary, some of these processes that arouse empathy are voluntary as mitigated by the cognitive processing of the brain. Overall, there are five modes for the arousal of empathy: mimicry, classical conditioning, direct association, mediated association, and role-taking. When considering how to increase empathic arousal, one should consider how looking at another person as they express themselves can help elicit involuntary responses in the brain. These responses help with the development of empathy which lays the groundwork for feeling more connected to another. Although cognitively taxing, perspective-taking or role-taking is integral to developing higher

levels of empathy in people. Practice in these areas can lead to greater use of empathy as a way to make connections to one's own community locally as well as globally.

Empathic distress. Whether empathic arousal occurs through an involuntary or voluntary process, it can result in empathic distress, the negative feeling one gets when one believes another to be in pain or suffering (Hoffman, 2000). Empathic distress is (a) associated with an increase in helping behaviors, (b) precursive to helping, and (c) diminished after observers help alleviate the perceived suffering of the victim (Hoffman, 2000). Some critics have suggested that when one is motivated to act in order to relieve one's own distress it means that all helpers are merely working towards self-serving results, and therefore, altruistic behavior is truly just selfish (Slote, 1964). However, this statement can be refuted by research into the brain's involuntary and affective reactions to situations where cognitive processes would not have time to rationalize the action before involuntary reactions pushed the individual to help or to connect with another's suffering (deWaal, 2008). For example, when a person is sitting near a child who falls, and the person attempts to catch him, or when one's facial features mimic another's facial features in response to a sad story or traumatic event, both of these reactions to others' difficulties connect to responses in the brain's central nervous system. These involuntary efforts react before the brain can cognitively process how reacting in an empathic way might "benefit" the observer.

While forms of empathic distress are present in the youngest of infants, one's capacity to experience it develops throughout one's life. These stages are categorized from immature stages to mature stages. The immature stages are global empathic distress,

egocentric empathic distress, and quasi-egocentric empathic distress. The mature stages are veridical empathy, and empathic distress beyond the situation (Hoffman, 2000).

Immature stages. In the immature stages, empathic distress results from motor mimicry, conditioning, and direct association and is the result of something in the immediate vicinity of the viewer. Stage one, global empathic distress, is present in newborns as evidenced by the reactive cry of newborns when hearing another newborn's cries. Often these cries, triggered by the processes of mimicry and conditioning, can appear vigorous enough to make one think that the newborn is in actual distress himself (Damon, 1989; Hoffman, 2000). This reaction can be traced evolutionarily and is related to the assertion that when one is more similar to another, the empathic reaction is likely to be stronger (de Waal, 2008). In fact, relation to an evolutionary connection is supported as well by the fact that the newborn's cry has been shown to be connected more likely to the cry of another human newborn than to control stimuli including computer-simulated cries, the cries of chimpanzees, and previous recordings of the newborn's own cries (Gibbs, 2014).

By the time an infant reaches several months of age, she will move to egocentric empathic distress, the second stage. Typically by around 6 months the cries or distress of another may briefly upset her; however, she will not likely reach the level of distress that might have been evident when she was younger. The infant's face may turn to a pout, or she may look as if she could cry, but instead of continuing, she will maintain a modicum of emotional distress. This moderation in reaction is thought to be the child's first attempt to manage and redirect her own emotional regulation (Hoffman, 2000). Some of

the ways she may work to self-soothe at this point may be through thumb-sucking, or she may seek out a comforting person to help alleviate her stress.

At this point, the infant's actions are primarily based in the body and help to develop the infant's work toward self-awareness. One reason that this is a more delicate sense of self is that the infant does not have the benefit of advanced cognition to consider the involuntary input in the context of the situation. Because of the lack of sense of self which usually develops in the second year of life, the infant has trouble distinguishing what is actually distressing to her, and what is distressing to another when her body reacts to the sensory information (Hoffman, 2000). Although egocentric at this point, this stage is thought to be the precursor to prosocial behavior because the infant was not distressed before witnessing the misfortune of another and begins to work out her own connection to another's distress (Hoffman, 2000).

Early in the second year of life, stage 3, quasi-egocentric empathic distress, develops. Instead of the puckering-up and whimpering evident in stage 2, children begin to actively work to alleviate the distress of the victim. This may begin with soothing movements such as patting or touching and then move to hugging, getting another person to help the victim, or trying to offer reassurance (Damon, 1988; Hoffman, 2000; Zahn-Waxler & Radke-Yarrow, 1990). When children move to these types of actions, it shows an awareness of the separation of self from other. They understand, even with limited verbal or cognitive abilities, that if another is in a distressful situation that they can work to help that person feel better (Hoffman, 2000). At this stage, however, they have some awareness of the need for comfort when another is distressed, but they usually

are only capable of comforting another in a way that they themselves would feel better. For example, at this stage to comfort another, the child might bring her own mother over as that would give her comfort rather than realizing that another person may not be comforted by the child's own mother. They are unable to comprehend the distinction between their own needs and the needs of others; however, they can take these first steps toward prosocial actions in attempting to help another in need (Hoffman, 2000). For example, in the past, when a child reacted to another's injury by showing her own injury, it was perceived as egocentric. Currently, this sort of behavior appears to be a child's attempt at making connections with the injured person. By showing the injured person her own injury, the child attempts to share in the experience of being injured and thus convey her feelings of connection (Zahn-Waxler, Radke-Yarrow, Wagner & Chapman, 1992).

Mature Stages. The first of the mature stages of empathy development is Stage 4, Veridical Empathy, which occurs near the middle of year 2. At first, children begin to recognize that their bodies are distinctly their own as separate from other (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). Later, they begin to recognize that others have wants and needs that are separate from their own desires. This change in awareness leads to more complex helping behaviors when a child recognizes that what makes him happy may not make another who is sad feel comforted. This ability to put himself in another's position signifies an increase in the child's cognitive ability which supports the ability to problem-solve how to meet another's needs and thus relieve his own empathic distress. This stage is an important one because, unlike the preceding stages, it has "all

the basic elements of mature empathy and continues to grow and develop through life" (Hoffman, 2000, p. 72). This new development in awareness helps those in early childhood to begin to understand the connections between people's facial expressions and their feelings. Also, they begin to understand how these emotions and facial expressions can move one to action (Hoffman, 2000). By preschool age, children can speak about more complex emotions such as the fact that they miss their parents or that different people can have different emotional reactions to similar events in their lives. Additionally, they begin to understand that just because they feel something it does not mean that they are required to act upon this emotion (Hoffman, 2000). "It is around the child's fourth year that the combination of natural empathic awareness and reasoned adult encouragement leads the child to develop a firm sense of obligation to share with others" (Damon, 1988, p. 35).

By the age of 6-7 years old, children can begin to understand how their feelings are related to the feelings of others. This can help them understand how to share their feelings in order to soothe another. Also, they begin to have a greater understanding of concepts such as friendship and how their actions impact that relationship. Hoffman (2000) believes that this is the point where children develop "the self-reflective, metacognitive awareness of empathic distress" which is necessary to move toward the highest level of empathy (p. 74). This capacity will be vital as they work towards the ability to move from how they have experienced situations versus how others react to similar incidents in their lives.

The fifth stage of this model is empathic distress beyond the situation. As the ability to understand one's self and others develops, children are able to comprehend how the total of one's life creates a pattern that affects one's path and choices. This allows the child to feel empathic distress for the situation of another whether it be that the person has experienced loss, poverty, disability, or other hardship. If the observer has her own experience with this difficulty, then self-focused role-taking may feel as if she is reconnected to her own difficulty. As the observer moves from her own experience to the other's experience it is called other-focused role-taking. If the subject of this difficulty is present, then the observer will look to see if what she expected upon hearing the story of the other's hardship matches what she perceived in her mind as she moved from the perspective of self to other. If the expected matches up with the actual presentation in the person, the observer is more likely to be able to recognize examples of distress in the victim (Hoffman, 2000).

Unfortunately, if the victim does not appear to match up to the preconceptions the observer imagined, then the observer may have difficulty trying to reconcile what she knows from beforehand with what she perceives in person. For example, sometimes when discussing students who live in poverty, teachers will comment that "the student has a better cell phone than I do." Implied in this comment is the judgment that maybe the child is poor because his parents do not know how to handle their money appropriately. This view often takes very complex issues such as how poverty affects families and the choices they make with their funds and boils it down to one item. Instead, if the teacher has a greater understanding of the role of poverty in families either

through personal experience or through the experience of others, they may take a less judgmental viewpoint to the student's material possessions.

In order to support the continued development of empathy for a person in distress, or a student in the above scenario, it is important for one to get to know the person or situation more fully. The back-and-forth between the affective part of empathy development versus the cognitive part can be enhanced as the observer learns more about the victim's life condition. This added information can help to support the development of empathy as the person witnesses the information presented as he reacts with the victim (Hoffman, 2000).

In the final stage, empathy for distressed groups, children will be able to take advantage of improved cognitive development to extend empathy not only to individuals who have experienced hardship but also to larger groups of people who have struggled through disability, financial hardship, war, or other difficulties (Hoffman, 2000). Because one would need to understand an individual's struggles first to extend empathy to a whole group, this skill builds on those before it. This level of empathic development functions as a basis for prosocial actions which might put the individual at a level of discomfort or sacrifice to help a group of individuals from a disadvantaged group such as immigrants or those of lower socioeconomic status (Hoffman, 2000). For example, this level of empathic development might manifest in the individual's support of paying higher taxes to support a socially conscious program of which she may receive no direct benefit.

Summary of empathic distress. Empathic distress is the negative feeling one gets when one believes another to be in pain or suffering (Hoffman, 2000). Empathic distress

is (a) associated with an increase in helping behaviors, (b) precursive to helping, and (c) diminished after observers help alleviate the perceived suffering of the victim (Hoffman, 2000). While forms of empathic distress are present in the youngest of infants, one's capacity to experience it develops throughout one's life. These stages are categorized into immature stages which are: global empathic distress, egocentric empathic distress, and quasi-egocentric empathic distress while the mature stages are: veridical empathy, and empathic distress beyond the situation (Hoffman, 2000). Empathic distress is connected to the development of sense of self because once one understands that her emotions and feelings are separate from others', she may begin to develop the ability to transition from her own wants and needs to the consideration of the wants and needs of others. Being able to move from consideration of one's own feelings to another individual's while taking in all the facets that may be affecting her behavior is more easily achieved with higher levels of cognitive ability.

Empathy development in adolescence. From a developmental perspective, adolescents are at a crossroads in their ability to empathize. At this point, they are fine-tuning a sense of self and increasing their cognitive abilities which can help them see themselves and others in ways that may have not been accessible before. Specifically, they are able to take into greater consideration perspectives that they have not experienced themselves. Using this ability to consider the life stories of others, they may be able to have a greater understanding for those whose lives have been marred by excessive hardship. No longer do they need to personally witness the plight of others to consider their perspectives. Instead, they are able to analyze the implications of another's

suffering by considering how they might feel as well as how the other might feel (Damon, 1988). Using this natural, emerging awareness to help adolescents engage in projects can bridge their inclinations toward future prosocial behaviors and the support of a healthy school culture.

Additionally, this more nuanced empathic capacity can help adolescents look at situations while holding multiple facets of the event in their minds. In the case of someone's reaction to a tragic event, they can now discern what one would normally expect a person's reaction to being in a certain situation versus what actions or emotions the person actually shows. Also, they have the ability to register that just because they view a person as "needing help" it does not mean that the person wants another's interference in his life (Hoffman, 2000). In other words, the adolescent is more able to set her own wants and needs aside in order to consider what might be best from another's perspective.

Impact of empathy. In general, higher levels of empathy help individuals socially throughout the lifespan. A few examples are that children's popularity with peers and how one operates socially as an adult are both connected to higher levels of empathy (Dekovic and Gerris, 1994; Eisenberg et al. 1996; Murphy et al. 1999; Allemand, Steiger, & Helmut, 2014; Jolliffe & Farrington, 2006; Vossen, Piotrowski, & Valkenberg, 2015). Unfortunately, a lack of empathy has been connected to a myriad of concerns including aggressive behavior, violence, and antisocial tendencies (American Psychiatric Association, 2000; Damon, 1988; Jolliffe & Farrington, 2006).

Benefits of empathy. The benefits of empathy have been well-documented in recent research. First of all, empathy has, at its core, a prosocial impetus (Damon, 1988; Hoffman, 2000). When one faces empathic distress which is when another's perceived pain or suffering causes emotional upset to the observer, the observer feels driven to help and feels better once he sees that his helping has alleviated the person's difficulty (Hoffman, 2000). Specifically, when one has this ability to connect to others in adolescence, it can predict one's ability to operate socially as an adult (Allemand, Steiger, & Helmut, 2014; Jolliffe & Farrington, 2006; Vossen, Piotrowski, & Valkenberg, 2015). Overall, the level of and growth of a child's empathy in adolescence can have long-term effects on his or her social connections. For example, higher levels of empathy have been found to be related to children's popularity with their peers (Dekovic and Gerris, 1994; Eisenberg et al, 1996; Murphy et al, 1999). Greater levels of trait empathy are positively connected to more prosocial and altruistic behavior, and trait empathy can be a barrier to aggressive or manipulative behavior (Hoffman, 2000; Vossen, Piotrowski, & Valkenberg, 2015).

Effects of lower levels of empathy. Lower levels of empathy are generally related to behaviors and attitudes that are not beneficial to a healthy community. First of all, lower levels of empathy have been found to be related to higher levels of aggressive behaviors (Jolliffe & Farrington, 2006). According to the DSM-IV, a lack of empathy is clinically related to narcissistic personality disorders and is often connected to both violent and antisocial behavior (American Psychiatric Association, 2000). In adolescents, deficiencies in empathy can lead to antisocial behaviors as people who

perpetrate violent crimes often profess an inability to connect with their victim's feelings around the crime (Damon, 1988). In a school context, males who bully have been found to have lower empathy than those who do not participate in bullying behavior. Additionally, those who bully often are more frequent offenders and found to be lower in affective empathy as well as total empathy (Jolliffe & Farrington, 2006).

Empathy in education. While the functions of and capacity for empathy is a necessary basis, it does not explain how greater levels of empathy can be developed in people. Specifically, a considerable amount of attention has been placed on school as a natural place to develop one's level of empathy. Schools have an interest in creating safe and effective learning communities, and as such cannot ignore the potential of the school as both an academic as well as a moral community. To create this positive learning environment, students need to have a chance to develop social and emotional skills which can lead them to take ownership of their school community in preparation for their future societal roles (Likona, 1992). By addressing the academic as well as the emotional needs of students, educators can create an interactive learning environment where instructional responsibility is shared by all stakeholders. As part of this shared community, the development of empathy is integral to the formation of a healthy school culture as empathy is the basis for much of one's prosocial motivation (Hoffman, 2000).

Some ways in which it has been suggested to develop empathy is by supporting students as they learn more about those in their school and community as well as being able to identify the feelings and viewpoints of others which will support the development of respect for those around them (Elias, Ferrito, Moceri, 2016; Likona, 1991). As they

grow in knowledge about others, they will become more familiar with those around them as well as be able to see how they are more alike. Both of these factors have been shown to create greater amounts of empathy in people as they help students to practice the process of perspective-taking as well as to help students reflect on how they might feel in a similar situation and because being more like another and social closeness or kinship have been found to positively affect empathy development (de Waal, 2008; Hoffman, 2000).

Empathy instruction in typical students. Various programs have been developed to help support the development of empathy in all children. For example, the Roots of Empathy program's premise is that a classroom interacts with a baby and mother who visit the classroom, and the students are able to use this baby's actions and reactions to help understand the feelings and behavior of another. This program consists of 27 classroom visits as well as monthly visits from a mother and her infant. Children watch as the mother interacts with the infant and work to understand and label the emotions of the baby. The aims of the Roots of Empathy program are to learn the affective and cognitive components of empathy, enabling them to empathize with others. The overall goals of this program are to increase empathy and prosocial behavior while decreasing aggressive behavior in the program's participants (Gordon, 2007).

In order to meet these goals, the program is designed around six strands. Those strands include neuroscience, children understanding the science of how the brain develops; temperament, children analyze how the baby perceives and interacts with the world which helps them evaluate the ways in which they and others may interact with the

world; attachment, children observe the emotional bond and trust between the infant and mother and begin to grasp the complex emotions of themselves and others; emotional literacy, children learn the vocabulary of the description of emotions and work to apply that vocabulary to the baby and then to themselves; authentic communication, where adults express their feelings in a real way and ask questions that "provoke reflection and encourage a child's critical thinking and imagination" (Gordon, 2007, p. 62); and social inclusion which is fostered by being a part of a classroom community which supports and cares for all of its members. In one study it was found that the Roots of Empathy program was effective in teacher-rated outcomes in the areas of physical aggression, indirect aggression, and pro-social behavior in both the short term and long term, but the study did not find significant results in student-rated outcomes (Santos, et al., 2011).

Another program designed to support the development of prosocial behavior in students is The PEACE Curriculum. This program which is supported by the Center for Safe Schools and Communities consists of parent empowerment, empathy training, anger management, character education, and essential social skills (Salmon, 2003). In order to instruct in the development of empathy the curriculum follows the HEARS model: H-Hold the correct posture, E- Eye contact, A- Assess the person's feelings correctly, R-Respond appropriately with your face, and S- Say the person's feelings in your own words. This program uses lessons focused on reading body language, respecting others' space, and responding appropriately both verbally and nonverbally. Salmon reports decreases in out-of-school suspensions as well as office referrals and increases in grade point averages and school attendance.

As far as the integration of empathy development into the core curriculum, Stout's (1999) work as both a visual and language arts teacher allowed her to see how the pairing of art and literacy could interact to expand students' empathy. She supports the idea that learning "begins with the assumption that there are two inextricably intertwined purposes for education: the development of critical intelligence and the nurturance of the human capacity to care" (p. 23). With these goals in mind, she made curricular decisions to support both of these outcomes. Suggestions for increasing student empathy include teachers: connecting with students and creating a caring relationship, directing students to the ideas that thoughts and emotions work together, supporting students' quests for inquiry, and recognizing "the critical connection between personal experiences and knowing" (p. 24). This final item means that students need to understand who they are in connection with others and to be aware that how we learn and act is "bound up with our gender, ethnicity, class, and age" (p. 24). Stout supports the integration of the arts and literacy as a place to support students' growth in understanding how they relate their own experiences to the experiences of others and highlights the teacher's role in support of this expansion.

Overall, effective empathy instruction focuses specifically on having students work with other students and teachers on the development of empathy. To develop greater skills in this area, the most effective interventions will activate the involuntary responses in the students' brains. In the Roots of Empathy program, students specifically focus on the reactions and emotions of an infant and his or her mother. They develop a relationship, and then they are directed specifically to facial expressions and interactions.

In the PEACE Curriculum, students are instructed in tools of how to express themselves and how to attend to the other's body language and expressions. In the final example, Stout highlights that empathy development also comes from caring, responsive adults who model empathic relationships. While these interventions support the students as they develop greater basic skills around empathy development, they also pave the way for more cognitively taxing processes such as mediated association and role-taking, also referred to as perspective-taking.

Literacy as a mode of empathy instruction. Many theorists have supported the idea that reading literature can help improve one's social cognition as figures in fictional contexts work as abstractions for the reader to learn about social interactions (Barnes, 2017; Mar & Oatley, 2008; Masten, Eisenberger, Pfeifer, Colich, & Dapretto, 2013). In fact, one study, in particular, found that when stories were paired with imagery-building activities, students were able to develop more affective empathy for the stories' characters. Additionally, this study found increases in students' likelihood to carry this greater level of empathy into the real world through prosocial behaviors (Masten, Eisenberger, Pfeifer, Colich, & Dapretto, 2013). Specifically, the book *Wonder*, the text selected for this study, has been shown to increase students' perspective-taking abilities and found to increase students' ability to generalize empathy to a wider social circle (Guarisco & Freeman, 2015).

Empathy instruction with troubled students. While many programs work to foster the development of empathy as a preventative measure or to support the

development of prosocial behavior in all students, other programs focus on how to activate empathic tendencies in those who struggle with aggressive or antisocial behavior.

For example, the EQUIP Program, an intervention for youth with antisocial tendencies, grew out of a mutual help approach in which participants in the program work to support each other through their attempts to improve their behavior and their lives (Gibbs, 2014). While this program combines peer support with a cognitive-behavioral approach, meetings are varied between these approaches to give the participants the support of their peers, but they are also made aware of their thinking errors and provided with tools on how to develop the "skills and maturity needed for helping others and themselves to achieve cognitive and behavioral change" (Gibbs, 2014, p. 184). As a factor of the cognitive-behavioral portion of the EQUIP Program, this intervention is broken into three components: equipping with mature moral judgment, social decision-making; equipping with skills to manage anger and correct thinking errors; and equipping with social skills. EQUIP has been found to be related to increases in the sociomoral development of participants. However, results for decreased recidivism were only significant for females in the program (Stam et al., 2014).

Summary education and empathy. While empathy is an evolutionarily developed trait, its development in youth can predict how well one can operate socially as an adult. Early intervention programs such as Roots of Empathy, purposeful integration in the arts, and readings with empathetic themes in literacy can be places to support students' empathy development in schools. One program in Colorado has seen decreases in suspensions and office referrals as well as increases in grade point average as a result

of the implementation of a program designed to increase students' empathy. Investments in increasing students' feelings of empathy could have long-term effects on their future relationships and community involvement, and connecting empathy-building to children's natural inclinations to solve problems and be leaders can help them develop this trait to a greater degree.

Summary of empathy. Overall, empathy has a prosocial basis, and its evolutionary function is to work to benefit grouping species and support their survival. There are both involuntary as well as voluntary processes involved in the activation of empathy, and these are triggered by feelings of empathic distress. For the purposes of research, empathy should be divided into its affective and cognitive components as it is a construct of multidimensionality. Furthermore, females regularly demonstrate much greater levels of empathy when assessed than males to the point that the data from each group must be separated for purposes of analysis (Damon, 1988; Jolliffe & Farrington, 2006). Individuals are more likely to feel greater empathy for those who they perceive to be more alike as well as who they are closer to socially. When considering educational interventions, educators need to work first on the development of affective empathy by giving students a chance to interact with others in person. This will activate the involuntary forms of empathy development such as mimicry and direct association. The empathic arousal forms of mediated association, reading about a person or character's struggles, or role-taking, considering the perspective of another individual, are more cognitively taxing than involuntary forms as the observer must interpret words and actions while also making sense of the vocabulary as well as social contexts.

Design Thinking

While initially Design Thinking began as a process designers used to innovate products like computer mice and transportation systems, it has since expanded to the worlds of business, medical care, and education. Design Thinking breaks down the processes of creativity and innovation through empathy, collaboration, and iteration to help participants learn to "fail better" (Johansson-Skoldberg, Woodilla, and Cetinkaya, 2013). According to Rauth et al. (2010), Design Thinking is everything "from a toolbox to a culture" (p.7). Practitioners and instructors have been reluctant to define it too narrowly because they felt that to do so would take a complex set of practices and mindsets and reduce them to an oversimplification (Anderson, 2012; Dorst, 2011). Design Thinking, as many practitioners currently recognize it, originates in Stanford's d.school (Kelley & Kelley, 2013). In the most general sense, Design Thinking is a problem-solving tool. Designers face a litany of concerns when creating products: client desires, environmental advantages and interferences, and budgetary concerns to name a few. The unique way in which they address all these variables has been defined as Design Thinking which is organized into the following practices: empathize, define, ideate, prototype, and test (Goldman & Kabayadondo, 2017).

History of Design Thinking

The features and implementation of these practices are described by Peter G. Rowe (1987), Professor of Urban Design at Harvard University, as employed in architecture. The key components of the design process are that it is (a) human-centered (b) action-oriented and (c) mindful of process (Hasso Plattner Institute of Design at

Stanford, 2007). Design Thinking relies on the designer's ability to meet a wide variety of human needs through solutions that are not only functional, but that also connect to the deeper emotional needs of the users. According to the Stanford d-school's philosophy, the ability to approach problems with both these facets in mind is often innate, but it is also teachable (Kelley & Kelley, 2013).

At the inception of the design process, there is a "distinctly episodic structure, which we might characterize as a series of related skirmishes with various aspects of the problem at hand" (Rowe, 1987, p. 34). In this phase, the designer is attempting to prioritize, asking him or herself: What is most important? How can I address these needs? What are the limitations? What benefits can I derive from moving the project in one way versus another? This prioritization moves in a "to and fro" fashion as the designer attempts to meet the needs of the project in the most concise, yet aesthetically pleasing, way.

Next, designers allow themselves time to take chances. They are looking to see how they can fit the needs of the project in a new way within the parameters of the surroundings. Rowe (1987) calls these "periods of unfettered speculation" (p.34). After this space of spontaneous creativity, the designer appraises the suggestions from different angles, assessing how these new ideas fit into the project as a whole. How do the innovations meld with what the designer has already created? As varying frames of reference are considered, what does he or she feel needs to be addressed? Are there elements of the whole that are out of line with the project's overall vision?

Most commonly, Design Thinking has been described as a human-centered approach because of its emphasis on creating spaces and systems focused on meeting the needs of users rather than creating solutions for purely economic or practical concerns (Goldman, Zieliezinski, Vea, Bachas-Daunert, & Kabayadondo, 2017). This process of adjustment is always framed by the needs of the user of the product or system at the center of the investigation. The examples of this focus on others' needs support the anecdotal as well as the empirical conclusions that Design Thinking can be used as a vehicle to engender empathy development in its practitioners.

Design Thinking and Problem-solving

At its core, Design Thinking is a problem-solving strategy. In general, problem-solving strategies are often dichotomized into convergent and divergent approaches. Convergent strategies seek to find the one or most correct answer to a question with clear parameters. This type of thinking accentuates "speed, accuracy, logic, and the like and focuses on recognizing the familiar, reapplying set techniques, and accumulating information" (Cropley, 2006, p. 391). Convergent thinking involves logic and works best when there is one possible answer to reach. Examples of this type of strategy are the use of the scientific method to test a hypothesis, multiple-choice questions, and mathematical problems with only one best answer.

Conversely, divergent thinking has to do with answering open-ended questions with wide or no parameters that have no one correct answer. Instead, there are no restraints on where the thinking might go or how novel ideas may connect with other ideas to synthesize into new ways to think about the problem. In fact, in the process of

divergent thinking, even the question itself might change as the process evolves. Although each person may have a different solution to the problems at hand, those ideas are not valued less just because of that variance (Cropley, 2006). As with most things, having all convergent thinking would narrow one's thinking so much that innovation would struggle to occur. However, an equally poor choice would be to have all divergent-type thoughts with no practical or logical connections.

The way that Design Thinking seems to apply these two problem-solving approaches is to frame the practitioner's thinking just enough, typically by referring the practitioner to the needs of the user, to get to some tenable solutions only then to send the designer off on a wide divergent burst of speculation. After this tangent, the process guides the practitioner back to the more controlled area of logic with questions such as: Does the solution fit the needs of the user? What are the user's needs? Does this solution actually work for the person, or was this solution just an exercise in fantasy? What facets of the solutions could others build on to meet the user's needs?

This type of to and fro has been found to be a strategy supportive of innovation in general. Specifically in the process of Design Thinking, the practitioner follows both the process but is also encouraged to work with particular mindsets. For example, after the practitioner uses empathy to understand the users' needs, the practitioner quickly fires off lots of options for the scenario in question. Then she comes back to consider the problem. There is a lack of judgment of solutions early on in the process where one is encouraged to "fail better" and follow up others' ideas with "yes, and..." rather than "no, but…" At this point in the process, there is a deliberate emphasis on not shutting down

ideas before they have a chance to evolve and combine with the thoughts of others. Additionally, even when the practitioners arrive at the "best" solution to a problem, it does not have to be the final, best solution. Once it has been tried out in a prototype, a low-cost illustrative model, and it has been introduced to those who will actually work with the system or innovation, it may come back for another round of adjustment. This adjustment is especially necessary as generally, the designers of a building, system, or product are not always the users of the same product. The need to readjust solutions is not framed as failure, but instead, it's a natural part of the process of trying to get the best solution for those who will use the product or system.

Design Thinking in Education

The majority of the use of Design Thinking strategies and mindsets has been with adults or students in higher education designing for others in a STEM setting (Anderson, 2012; Lloyd, 2013; Kelley & Kelly, 2013).

Design Thinking in Middle School. Touting its use as an approach that can be employed to help students gain creative confidence and increase student empathy, Design Thinking has recently been used by educators in the K-12 setting to enhance their curricula (Anderson, 2012; Carroll et al., 2010). Because of its use of open-ended questions and planning formats, students are required to synthesize many types and sources of information, building critical thinking skills. As one thinks about the future roles of individuals,

> Students need both the skills and the tools to participate actively in a society where problems are increasingly complex and nuanced and understanding

> is vital. Design Thinking provides a powerful alternative [...] by challenging students to find answers to complex and difficult problems that have multiple viable solutions and by fostering students' ability to act as change agents. (Carroll et al., 2010, p. 38)

Through real-world design challenges and classroom structures geared toward positivity and synergistic collaboration, "Students engage in hands-on projects that focus on building empathy, promoting a bias toward action, encouraging ideation, and fostering active problem-solving. Using one's imagination is central" (Carroll et al., 2010, p. 38). Working to design for real-live systems inhabited by users of those systems, students develop empathy for those users; knowledge of how to work in a group; and how to create and utilize physical models, prototypes, to share ideas with others as well as to make their ideas more concise.

When analyzing the incorporation of Design Thinking into core curricula, some themes have emerged including *Design as exploring, Design as connecting,* and *Design as intersecting* (Carroll et al., 2010). *Design as exploring* focuses on how students used design to analyze their work and make models to represent their findings along the path to problem-solving. This concept also encapsulates the idea of multiple ways to interpret, investigate, and plan solutions to a problem. Next, d*esign as connecting* recognizes the collaborative nature of Design Thinking as a learning tool. Students engaged in authentic work in a way that is intrinsically motivating and offers chances for the use and development of empathy. Specifically, "Design Thinking activities provided tools that

helped illuminate the complex nature of collaborative efforts, and the multiple ways to develop as a successful collaborator" (Carroll et al., 2010, p. 39).

The final theme, *design as intersecting,* concerns the connections "between Design Thinking and academic content learning" (Carroll et al., 2010, p. 39). While students may appear to be engaged in the Design Thinking activities, both Design Thinking instructors, as well as the classroom teacher, struggled to make the connection between content and the Design Thinking process. This tension apparent in the implementation of Design Thinking practices into core areas is common (Carroll et al., 2010; Hmelo, Holton, & Kolodner, 2000). The Design Thinking instructors were comfortable with their process, and the core teacher had proficiency in content-knowledge instruction, but neither had both backgrounds. This possible tension between Design Thinking and content-area instruction was considered when planning the integration of Design Thinking and literacy instruction in the study. Additionally, it was helpful that one instructor had an understanding of both Design Thinking as an instructional method as well as knowledge of their content area, seventh grade ELA.

Similarly, Anderson's (2012) research emphasizes that the use of the principles of Design Thinking is important because it gives students skills to think like a designer. Anderson asserts that although Design Thinking may look like similar problem-solving mechanisms, it differs in its use of empathy and focus of the systems-based approach to problem-solving. One of his concerns is that the complex work designers engage in will be too simplified to be effective and thus rendered useless. Additionally, he acknowledges that little work has been done in the areas of Design Thinking's use in a

school setting, but he is hopeful for its future applicability and points to its use of empathy, collaboration, and a deeper understanding of others.

Design Thinking and Empathy Development. One of the most common claims of the Design Thinking community is that it develops empathy of those who participate in the process (Kelley & Kelley, 2013). Initially, much of the support for Design Thinking's role in empathy development was anecdotal as practitioners recounted attempts to create human-centered innovations in the business world, healthcare organizations, and the transportation industry (Gallagher & Thordarson, 2018; Kelley & Kelley, 2013; Kelley & Littman, 2001; Liedtka, Salzman, & Azer, 2017). However, currently, these stories are beginning to gain support empirically. In the area of professional development, teachers who used empathy through the Design Thinking process were found to develop more effective instructional practices to meet their students' needs and to develop more understanding of the perspectives of their students (Sun, 2017). Another study used the drawings of solutions to problems to gauge how much students considered the users when problem-solving. The presence of more people in the students' drawings indicated to these researchers that the students were beginning to understand the users behind the system or product (Goldman et al., 2017). As evidenced by the example of people in children's user-centered solutions, one of the ways that Design Thinking has been purported to develop empathy is through its emphasis on the needs of the user of the system or product the practitioner is designing for (Goldman & Kabayadondo, 2017).

One of the ways in which empathy for the user is highlighted is through the process of Design Thinking which helps the practitioner focus by framing the given

problem in terms of user-centeredness (Dorst, 2011). This frame always involves what is best for the user, the one who is to benefit from the design innovation or systemic advancement. Focus on the people or person who will use a system or solution supports empathy development because even when the designer comes to tentative solutions or breakthroughs, there is a system of checks and balances to return to the user and see if this is something that will actually work in practice, or if the solution was merely a theoretical exercise with little practical function to meet the users' needs.

In fact, the first step of the Design Thinking process is to empathize with the user. In this phase, the designer uses perspective-taking to learn more about the person or people she is designing for. At this point, cognitive empathy is activated as the designer works to intellectually understand why the design needs intervention. For example, if someone is designing a new lunch experience for middle schoolers, she will need to be able to put herself in the place of a middle schooler. She will need to ask questions about the current structures and to see if these structures are meeting the needs of the various people who use the area.

To do this, the Design Thinking process suggests that the designer interviews people who use the system or product. Through this interaction of one-to-one or group interviewing, the basic hallmarks of affective empathy can be activated. For example, synchrony, motor mimicry, and emotional contagion will likely occur when the designer interacts with another in an interview. In the case of the reorganization of the middle school lunch experience, when the designer speaks to a student and he says that he struggles at lunch because he does not have friends to sit with, this could activate the

involuntary responses associated with affective empathy. In response to this statement and the interviewee's non-verbal expression, the designer may frown or feel sad at the fact that this student has to go to a place daily that makes him feel nervous or upset. This feeling can lead to self-focused and other-focused perspective-taking or role-taking, the most intellectually taxing form of empathic arousal. What this means is that the designer begins to cognitively understand how and why the student might feel this way.

Then, the designer reflects on how she might feel in this same situation. Maybe she experienced this as a child, or she has read about the effects of loneliness on adolescents. Taking this new knowledge of this user's experience, she must go back to her design and consider if this student's concern represents enough of a challenge to make it one of the main focuses of her solution. If so, she may use that specific example as a frame for the design process. For example, she could create a "How might we" statement to focus on this need such as, "How might we create a middle school lunch experience where all students feel welcome and safe?"

People have a greater empathic response to those they are more similar to and to those they feel closer to socially. For this reason, using Design Thinking in a school setting could be beneficial for the community. While participating in the process and learning about other students and their needs, they are learning areas in which they have similarities. Also, they are able to understand more clearly how certain people might feel. This real-world interaction should be more empathy arousing than merely reading about someone's plight in a story because the involuntary responses will be activated more clearly through the reactions to others' facial features and body language.

Design Thinking Summary. Design Thinking originated with David Kelly at Stanford's d-school. It is a problem-solving tool that contains the following characteristics: an episodic structure, a willingness of the designers to take chances, and a willingness to look at a problem from many vantage points and stakeholders' perspectives to come to a solution. It has been found to be useful in helping students solve real-world problems and to feel more creatively confident as well as to expand their level of empathy. One of the ways in which empathy for the user is highlighted is by framing the given problem in terms of the needs of the user. While this method has been used primarily in STEM education, it is appropriate as a literacy instruction method due to the cooperative nature, real-world subject matter, and requirement of text-based evidence.

Reader's Workshop

Reader's Workshop or Reading Workshop is a mode of literacy instruction that incorporates: focused mini-lessons, self-selected reading choices and responses, student sharing regarding literature, and individual teacher-student conferences (Towle, 2000). In the focused mini-lessons, the teacher may offer "mentor texts" to direct student attention to certain features such as mood, word choice, or author writing style. As the teacher conducts this short, whole-group instruction, she explains her thinking as she interacts with the text. She and the students will work together to share and discuss the text's features. Then, typically, students will read from books they have chosen that are of interest to them. The teacher may ask them to read with a purpose for some facet of the

mini-lesson, or they may read to work on reading stamina or other qualities of good readers. As the students are reading, the teacher moves through the room to conference or check-in with students. She will ask about details from their book, help them decide if the book is a good fit, and, in some cases, use the time as formative assessment to drive future instruction. Additionally, the conference often ends with a goal that is set together with the instructor and student adding accountability and a starting point for future conference conversations. In some models, teachers will use the time to conduct more formal reading assessments such as documenting reading words per minute and errors in passages. After reading, students will discuss their notes or text interactions with a partner or group of partners.

Although the above is a simplification of the nuances of an effective Reader's Workshop, attention to the basic structure can help one to envision how this type of instructional method can support differentiation, individualization, and authentic learning in the literacy classroom. Instead of a situation where students are sitting and listening, this model focuses on students "doing" reading. Students are working in groups and pairs and learning about themselves as readers rather than merely turning in papers and getting grades.

ELA as a place for Design Thinking

Although Design Thinking has typically been associated with STEM education, evidence points to its effectiveness as an intervention in literacy instruction. Looking to the New London Group's goals which focus on "creating access to the evolving language of work, power, and community, and fostering the critical engagement necessary for

[students] to design their social futures and achieve success through fulfilling employment," a method which includes cooperative learning, understanding of multiple perspectives, and an emphasis on empathy could be one tool (Cazden, et al., 1996, p.60).

In literacy instruction, identifying inferences and empathizing with another person based upon a wide variety of verbal and non-verbal information are skills that require the individual to make conclusions from a variety of data sources. Respondents in ELA courses should be able to come to conclusions that are not explicitly listed in the text (Missouri Department of Elementary and Secondary Education, 2018). Text in the case of literacy instruction can be considered any form of media that the respondent uses to support his or her position (Cazden, et al., 1996; Smagorinsky, 2011). For example, a written story or article could be referenced, but also a conversation, video, image, social media post, facial expression, or other media could also be considered a text. The main goals in literacy instruction are that the individual can summarize the details of a text and that she can reach conclusions outside of the given information rather than merely restating the text or reaching a conclusion that is not supported by evidence. In the following section, for each of the Design Thinking steps, the information will be provided on how the process of Design Thinking can be used as a method of literacy instruction.

The first step in the Design Thinking process is to empathize. In this step, the practitioner must work to understand the needs of the user of a system or product. This can include: conducting interviews, observing user behavior and documenting those observations, communicating with other practitioners about the user's needs, creating a

visual representation of the user's experience called an empathy map, or reading non-fiction material to gain a greater understanding of the cultural or systemic considerations of the user's context. As a mode of literacy instruction, this step can require the user to take in information from observations, interviews, and activities to try to combine and summarize findings. Through this process, they will need to make text-based inferences to reach conclusions and to share those conclusions with peers.

In the next step, *define,* practitioners work to summarize the user's needs. The practitioner works both alone and in cooperative groups to find themes and insights about the problem at hand. From this investigation, practitioners work to create a problem statement that will guide them through the rest of the design process. To reach this problem statement, students in literacy will need to synthesize the input from the empathy stage. They will need to consider the most pressing needs and then focus those needs into one overall statement to focus the following stages of the process. As part of this focus, students will summarize, make choices concerning relevant and irrelevant information, and support those choices with information from their empathy investigation.

The third step, *ideate,* supports the practitioner as she searches for solutions to the problem statement developed in the previous step. This part of the process works as a guided brainstorm and may be returned to at different points in the process. In this stage, practitioners are urged to work on coming up with many possible solutions even if the solutions seem untenable. At this portion of divergent thinking, the focus is on quantity not quality of solutions. Practitioners share their ideas with one another and work to

solidify which one they believe will best meet the needs of the user. Idea-sharing is common with the emphasis on learning from and being inspired by one another rather than in competition with one another. From a literacy perspective, expressing one's ideas multimodally can be one facet of this process. Also, considerations such as how to express one's ideas, to analyze the feasibility of one's and others' solutions, and to use text evidence to frame the creative process.

Next is the *prototype* phase. In this phase, practitioners build physical models of the design. When explaining their design choices, they need to have reasons for why they chose one design feature over another. This supports literacy instruction as a way to help students express their ideas in a model that can be adjusted in relation to peer and personal feedback. Also, it provides a multimodal way to express one's ideas which can help the student to better understand the prototype's strengths and weaknesses as well as to help the student explain the solution's features and supporting evidence for those features.

Finally, the prototype goes to the *test* phase. In this phase, practitioners create a final, polished model or prototype to share with the user. The user can try out the model and give feedback. In the test portion of the process, the practitioner can go back to the user to see if the solution really did meet the user's needs. Are there facets to be reconsidered? How might the design be improved? This phase serves as an authentic final project presentation model with feedback from the experts in the problem, namely the users for whom the solution was designed.

Overall, portions of all of the Design Thinking steps meet the needs of any middle school Language Arts curriculum. However, the Language Arts goals that seem integral to the process are: the use of text-based evidence to support a position; making inferences and drawing conclusions, comprehending and creating complex texts; finding main ideas and themes of text; making connections to self, others, and the world; developing speaking and listening strategies; and creating multimodal presentations.

Hypotheses

The following hypotheses are based on assumptions related to the theory surrounding the development of empathy. While Design Thinking has been used primarily as an educational method in the STEM field, practitioners anecdotally speak of its use as a tool of empathy development. This relationship may be due to the one-on-one interactions with users as well as the perspective-taking activities that immerse the practitioner in the lives and experiences of those for whom they design. Participation in these real-life interactions and experiences should be more powerful empathy-building strategies since they work to activate one's involuntary responses to emotional input, namely: synchrony, motor mimicry, and emotional contagion.

Similarly, reading to learn about another's plight is often a method of traditional English-language arts instruction. However, the connection to another's story and, therefore, the development of empathy, will be mitigated by the disconnection between the reader and the physical presence of the character for whom empathy may develop. Because of the need to gather information through words in a text, the Reader's Workshop sessions will not likely increase empathy to as great a degree as will the

Design Thinking unit. When used in conjunction, the researcher believes that Reader's Workshop and Design Thinking will complement each other to develop greater levels of empathy in those participants.

This study compared five different groups of participants as they participated in Design Thinking, Reader's Workshop, the traditional curriculum of the district, or a combination of those units (see Figure 2). The groups are as follows: Section 1 which participated in Reader's Workshop followed by Design Thinking, Section 2 which participated in Design Thinking followed by Reader's Workshop, Section 3 which participated in the traditional curriculum of the district followed by Reader's Workshop, Section 4 which participated in the traditional curriculum of the district followed by Design Thinking, and Section 5 which participated in two different portions of the district's traditional ELA curriculum.

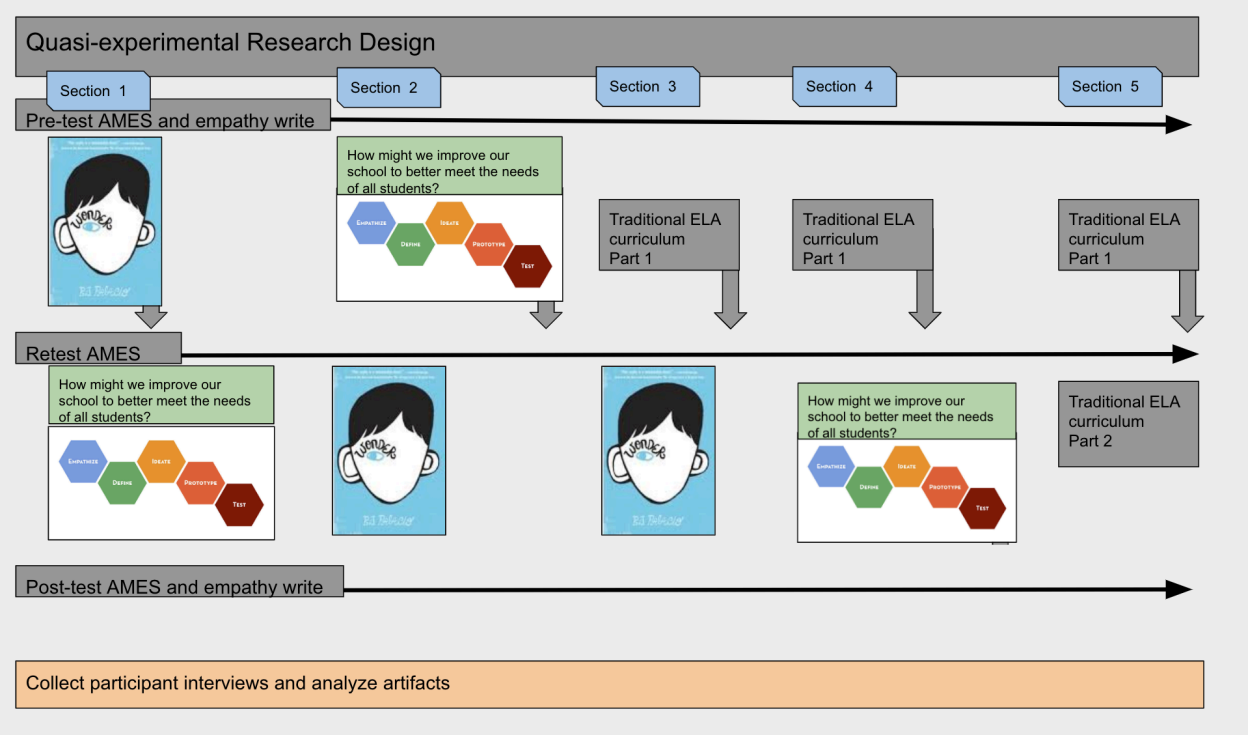


Figure 2: This figure represents the overall structure of the research design and what treatments were randomly assigned to each group.

Each unit lasted approximately six weeks and ran concurrently from January 14, 2019, to April 12, 2019. Differences between groups were explored with the prediction that participants in the group that began with Reader's Workshop followed by Design Thinking would have a greater increase in empathy than any of the other unit combinations.

The hypotheses for this study are as follows:

H_1: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking followed by Reader's Workshop.

H_2: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Reader's Workshop alone.

H_3: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking alone.

H_4: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

$H_{5:}$ Participants in Section 2, Design Thinking followed by Reader's Workshop, will demonstrate significantly higher empathy mean scores as measured by the

AMES compared to participants in Reader's Workshop alone.

$H_{6:}$ Participants in Section 2, Design Thinking followed by Reader's Workshop, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking alone.

$H_{7:}$ Participants in Design Thinking followed by Reader's Workshop will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_8: Participants in Reader's Workshop alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_9: Participants in Design Thinking alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_{10}: Participants in Design Thinking alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in group Reader's Workshop alone, as measured by the AMES.

Chapter 2: Methods

This chapter contains the methods used to conduct this quantitative methods research design. Additionally, study sample, procedures for data collection, measures, and data analysis of data are addressed. Also covered are the quality standards for the data, ethical considerations, and the researcher's perspective.

Research Design

This study used a quasi-experimental research design. This study is quasi-experimental as the participant data was gathered without randomly assigning subjects to treatment groups.

Population and Sampling

This study aimed to analyze student empathy in middle school. The researcher's role as teacher in this particular school offered access as a location to conduct research. According to Cresswell and Plano-Clark (2011), researchers must take into account threats to internal validity including "participant attrition, selection bias, and maturation of participants" when designing research studies (p. 211). Also, maturation, history, testing, and instrumentation are threats to internal validity. This study was free from participant attrition. However, due to the number of students and length of the study, the researcher could not control each individual's willingness to authentically participate in each phase of the interventions. Overall, student compliance appeared to be high, and no students left the study or withdrew their consent to participate even though they always

had that option.

Of those students who provided personal assent as well as parental consent, each class hour was randomly assigned a treatment using a random number generator. The researcher ran *t*-tests to determine if the groups were similar enough to combine by instructor and gender. Groups were combined by instructor, but they were separated by gender as is supported by the research on empathy measurement (Jolliffe & Farrington, 2006; Damon, 1988). Finally, maturation is not a significant threat to this study as the entire study lasted approximately 12 weeks. Students were tested with the AMES three times, so there is a danger of familiarity with the test. However, the test sessions were separated by 6-week intervals. Therefore, it is unlikely that they were overly familiar with the 12-item assessment. The survey instrument has been independently validated, so the researcher looked for results congruent with the research on empathy, including the fact that females test higher than males on empathy measures.

As a portion of the data involved rubrics, the researcher worked to combat threats to validity with the rubrics as well. First of all, each rubric was gathered from external sources to identify the constructs to be measured. The empathy rubric was adapted from a portion of a larger rubric developed by the d-school to analyze students' work in the practice of Design Thinking while the Learning Taxonomy rubric was used as it was designed to measure the affective domain of the students' work.

For the rubrics, data were analyzed using intercoder agreement. After the basic criteria were established, three separate coders analyzed ten random samples of pre-assessments and post-assessments. Then, the coders came together to compare

results and fine-tune examples of each level of performance. The researcher reviewed all samples and scores before they were included in the final dataset.

Sampling

This Midwestern public middle school with grades 6-8 has an overall population of approximately 750 students. In 2017, more than 90% of students identified as White, and approximately 10% of students identified as Asian, Black, Hispanic, or Indian. No specific numerical data were provided on minority student category counts due to the small size of the sample in the school population. Additionally, in 2017, 31.4% of students were eligible for free or reduced lunch prices (MoDESE, 2017).

Sample

While all students enrolled in seventh grade English Language Arts, Advanced English Language Arts, and CWC (Class within a Class) Language Arts were eligible for the study, the sample is comprised of 129 students, 63 male and 66 female, who had parental consent and gave personal assent (see Figure 3) in two ELA instructors' classes.

Treatment	Number of participants
Reader's Workshop/ Design Thinking	33
Design Thinking/ Reader's Workshop	20
Traditional ELA 1/ Reader's Workshop	18
Traditional ELA 1/ Design Thinking	31
Traditional ELA 1/ Traditional ELA 2	27
Total	129

Figure 3: Number of participants in each treatment group of the study.

In general, this study includes students enrolled in seventh-grade English Language Arts (ELA). Most students are assigned to ELA courses by computerized scheduling software. Then, the remaining students are scheduled by the counselor and principal when the student's curricular needs might require a specific adjustment due to scheduling conflicts with band, choir, or gifted education. Students whose Individual Education Plans (IEPs) require them to have self-contained ELA were not part of the study as those courses do not currently follow the Reader's Workshop model of instruction. As both Design Thinking and Reader's Workshop are educational methods that support the curricular aims of seventh-grade ELA, subjects who declined participation in the study, either actively or passively, still received the randomly assigned treatments of combinations of Design Thinking, Wonder, and traditional ELA units; however, only subjects with consent to participate had their data collected.

This study collected data in the form of the Adolescent Measure of Empathy and Sympathy (AMES) survey, administered at three points in the study, and a writing sample, collected both before the intervention and after all units' completion (see Figure 2). Two rubrics were used to analyze the writing sample for evidence of empathy and participants' ability to communicate proficiently in writing.

Study Groups

The curriculum was organized into three units: Reader's Workshop, Design Thinking, and the traditional ELA curriculum. These units were combined in different ways to offer a variety of analytic possibilities at the end of data collection. This variation

resulted in five separate treatment groups. Each of the instructor's hours was randomly assigned to a treatment using a random number generator. Section one, Reader's Workshop/ Design Thinking, had 18 males and 16 females. Section two, Design Thinking/ Reader's Workshop, had 8 males and 12 females. Section three was composed of 9 males and 9 females and followed the traditional ELA curriculum for six weeks and then participated in Reader's Workshop. Section four followed the traditional ELA curriculum followed by a unit on Design Thinking and had 14 male and 17 female participants. Finally, section five, the control, followed the traditional ELA curriculum for the entire unit and had 14 males and 12 females in the group.

At the time of analysis, each instructor's groups' data were combined by treatment after it was determined that the groups were similar in regards to beginning scores on the AMES and rubrics. All comparisons were made at the group level.

Procedure

Student activity in each group varied according to their randomly assigned unit; however, all work, with the exception of the AMES, were assignments typical to middle school ELA as dictated by the Missouri Learning Standards which align with US Common Core Standards (MoDESE, 2016, see fig. 4). These activities may include: reading fiction and non-fiction texts, drawing conclusions, looking for relevant text evidence, making inferences, working with a group, expressing one's understanding of texts, and creating artifacts to demonstrate one's understanding. The three units all use these outcomes as their ultimate academic goals. In the following sections, each unit's activities will be described.

Figure 4

Study Treatments' Alignment with Missouri ELA Standards

Mode of Instruction	Design Thinking	Reader's Workshop/ *Wonder*	Traditional ELA Curriculum
Standards			
7.RL/RI.1.A Draw conclusions/infer/analyze citing several pieces of textual evidence	Intro videos DT Practice Empathy Boxes Character Creation Stakeholder Interviews Presentation	Character Analyses Reader's notebook Guiding questions	Articles on people who have overcome adversity Evidence chart-articles' subjects Character trait writings
7.RL/RI.1.B Word meaning/ vocabulary	Intro videos DT Practice Empathy Boxes Character Creation Stakeholder Interviews Presentation	Vocabulary practice Character Trait/ Group Act.	Articles on people who have overcome adversity Vocabulary practice
7.RL/RI.1.D Theme, central/main idea, summarize the text distinct from personal opinions.	Intro videos DT Practice Empathy Boxes Character Creation Stakeholder Interviews Presentation	Small group work Individual conferences Auggie character dev. activity	Summary paragraphs
7.RL/RI.2.B Author/ Character POV development	Empathy Boxes Character Creation Stakeholder Interviews	Small group work Individual conferences Character analyses Auggie character dev. activity	Articles on people who have overcome adversity Character trait writings
7.RL.2.D How the setting/characters/plot affect each other and contribute to meaning		Small group work Individual conferences Character analyses Weekly quizzes	
7.RL/RI.3.D Read and comprehend independently and proficiently in a variety of forms and media	Intro videos DT Practice Empathy Boxes Character Creation Stakeholder Interviews Presentation	Independent reading Partner work Small group activities Weekly quizzes	Articles on people who have overcome adversity

Figure 4 cont.

Study Treatments' Alignment with Missouri ELA Standards

Mode of Instruction	Design Thinking	Reader's Workshop/ *Wonder*	Traditional ELA Curriculum
Standards			
7.SL.1.A Follow rules for collegial discussions and decision-making	DT Practice Empathy Boxes Character Creation Stakeholder Interviews Presentation	Partner work Small group activities	
7.SL.1.C Acknowledge new information expressed by others including those presented in diverse media and, when warranted, modify their own views.	Character Creation Stakeholder Interviews Presentation	Partner work Small group activities	
7.SL.2.A Speak clearly, audibly, and to the point	Empathy Boxes Character Creation Stakeholder Interviews Presentation	Partner work Small group activities	
7.SL.2.B Nonverbal communication	Empathy Boxes Character Creation Stakeholder Interviews Presentation	Partner work Small group activities	
7.SL.2.C Plan and deliver appropriate presentations based on the task, audience,and purpose	Presentation		

Key:**Intro videos**-Introduction to Design Thinking- Doug Dietz Video and Design Thinking Process Introduction Video, **DT Practice-**Design Thinking Practices- Needs of a fictional character and Jack and Jill, **Character Creation**-Empathy Box Character Creation/ Everyday Situations Activity/Character Analysis , **Presentation**-Research and Presentation- How might we make our school better for all students?
Note: Standards listed in Figure 4 have been abbreviated. For a complete list of Missouri's Seventh Grade ELA standards visit: https://dese.mo.gov/media/pdf/curr-mls-ela-7-standards-with-examples

Design Thinking Unit

While the work students completed in Reader's Workshop involved a fictional student in a fictional school, the work in Design Thinking considered the students' own school

context. Although the process of Design Thinking is basically: empathize, define, ideate, prototype, and test, the way the instructor introduces these steps as well as in what order can vary widely based upon the educational level of the students as well as their understanding of the concept of Design Thinking as a tool. The students in this study had no known previous experience with the process of Design Thinking and were on a variety of levels academically speaking for students in the seventh grade. Therefore, the researcher chose to use specific tools and a task that she felt would be most beneficial to the needs and interests of these students.

Specifically, in the Design Thinking (DT) unit, students were asked to answer the question: How might we improve this school in order to better meet the needs of all students? This question represents a typical frame of Design Thinking activities. As Design Thinking practitioners, students followed steps to problem-solve the previously stated question. These actions involved learning about the process of Design Thinking, reading articles about schools and school innovation, having conversations with other students as well as stakeholders about the school's needs, participating in cooperative-learning groups, looking at and creating visual interpretations of their investigations, making inferences and drawing conclusions from a variety of media, and creating final oral and visual presentations which answered the driving question. In addition to the following daily activities, students were introduced to and reminded about the concepts of empathy and Design Thinking as well as being refocused on the question framing this project: How might we improve this school in order to better meet the needs of all students?

Introduction to Design Thinking- Doug Dietz Video. On day 1 of the unit, students began with an introductory lesson on how Design Thinking is used. In this lesson, they used the note-taking strategy of incredible shrinking notes to get to a short summary sentence or main idea of the video. Students were introduced to the concept of Design Thinking as they worked to summarize the information from the video.

The video is a TED talk from Doug Dietz, an industrial designer from GE in Wisconsin. Dietz designs MRI machines and figured out that children and families were scared to use the machines he had proudly created. This bothered him, so he worked with his team by going to children and users of the MRIs to see how the experience could be made more pleasant for all involved. He emphasizes the necessity of user-centeredness in his process. Additionally, the video emphasizes the steps of the Design Thinking process and how the designer must use empathy to determine what is the base of the user's needs. As students watch the video, the instructor guides them to the questions of how Dietz's process differs from other problem-solving tools. Some sample questions are as follows: *Have any of you or your families been in a hospital like the one Doug describes? How can the environment of the hospital affect a person's healing? After realizing that he does not like how his machine is being used in the hospital, what steps does he take to improve the environment of his MRI machine? What role does empathy play in Dietz's process?*

Design Thinking Process Introduction Video. Before watching the current day's video, students reflected on the previous day's Dietz video. Again, students practiced the note-taking strategy on a short video outlining the Design Thinking process. In this animated video, DT is explained and the narrator uses the example of creating a

health app for children. As the students worked to summarize the information in the video, the instructor, as well as students in pairs, discussed the terms Design Thinking and empathy. At the end of the hour, students completed an exit ticket to see if they could define the terms Design Thinking and empathy.

Design Thinking Practice. The next class meeting began with a reflection on the process of DT with a common visual used to illustrate the steps. This is the first day students participated in activities different from what typical ELA activities may look like. In this activity, students began to practice DT on the needs of a fictional character, Dory from *Finding Nemo*. After watching a short clip, they followed the Design Thinking process to create supports that might meet Dory's needs.

This design challenge was adapted by one of the instructors in this study from a challenge created by Mary Cantwell who uses the method DEEP DT. The instructor took Cantwell's original plan and changed the character to Dory because she thought Dory would be more accessible as a character to middle school students. For this activity, instructors used this character's concerns in conjunction with an adapted version of the Bootcamp Bootleg provided by the d.school at Stanford which sets the DT procedure of the exercise.

The first step in this exercise was to define who is the user as indicated by the DT process. In this activity, the students designed to meet the needs of Dory. Next, students watched a short clip in which Dory tries to help Marlin, a fish who has lost his son, but her lack of memory causes her to get frustrated, scared, and angry when she forgets why Marlin is following her. Students were instructed to observe and document what Dory

says and does. In this step, they were instructed to record as many details as they could. At this point, facts should be about Dory. The students were instructed to refrain from creating inferences about Dory's words or actions at this point.

Next, after a group reflection on the evidence students observed from Dory, they try to infer what they think is going on with her. Some guiding questions might be: *What problems is her difficulty to remember causing her? How does her inability to remember impact her daily life? What evidence do you have of this impact? How does Dory feel when she can't remember?*

After these questions are considered, the next step in the process is to create a problem statement. For example, Dory needs a way to remember because she wants to help, but she gets upset when she loses track of details. Each student comes up with his or her own problem statement. This statement acts as a frame for the rest of the current challenge.

The next step has participants rewrite the problem statement as a guide through the design process. They are given about four minutes and are instructed to try to "sketch" as many solutions to the problem as they can come up with. The idea of sketching solutions also contributes to the DT mindsets of *fail, fail better* and *bias towards action*. These mindsets work to help turn off the judgments and critiques in the participants' brains. With the idea of *sketch*, there is the intention that students are allowed to throw out ephemeral solutions which may or may not be used later. However, rather than waiting for the best all-time solution, students can get ideas down on which to build. Also, because the timer is used, there is an urgency to the process. Students need

to move quickly and commit to half-formed ideas to try to fill the five rectangles provided.

After this, students paired up and shared their ideas with a partner. They were instructed to explain each solution they sketched and to ask for feedback from the other designer. Students were reminded at this point of the DT mindset of *yes, and.* This mindset is in contrast to the typical response of, "I hear you, **but** that won't work because...." Instead, students were encouraged to hold their critiques. Instead, they were asked to say something like, "Yes, I see what you're saying, and to make it even better you might…" The point of this mindset as well is to help participants learn to build upon the ideas of others to make a better solution. As students took turns sharing with a partner and getting feedback, they were instructed to document the partner's suggestions in the space below the sketches.

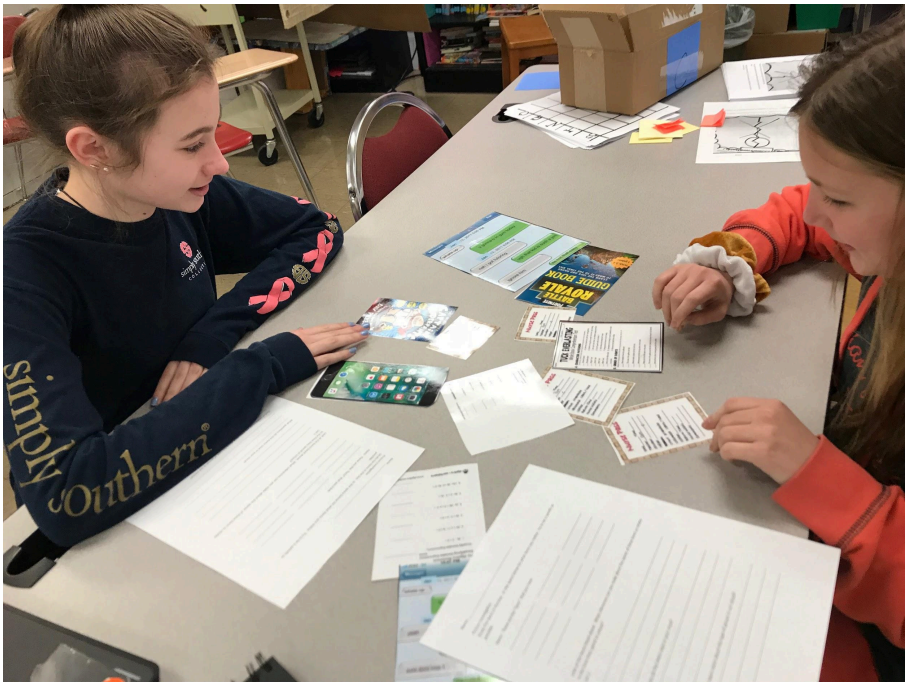
After sharing their ideas with a partner and considering the conversation, each participant moved on to the next iteration of a solution for Dory. In this stage, all current solutions were sketched together in the overall model. The packet provided an entire page to bring all the ideas together. Students had four minutes to put together all the ideas based on their first sketches and partner feedback and then create an overall plan on how to meet Dory's needs.

After the complete model was sketched, students were instructed to build a physical model, or prototype, of their solution within certain parameters. They could only use the materials provided and they only had ten minutes. Materials provided vary from time to time. However, typically the supplies include a wide variety of items such

as: Legos, popsicle sticks, cardboard, styrofoam, yarn, string, paper triangles, a box of old pen lids, paper plates, beads, crayons, tinsel, and markers or crayons. Additionally, the only binding material they may use is scotch tape.

After they built, they shared the prototype's design with a partner for feedback. Each person took a turn. As the group moved to reflection, they were asked to share an interesting design or facet of a design that surprised them. Then, participants were asked if they would like to share their design with the whole group. Through this process which takes two class periods, the students begin to learn both the vocabulary of Design Thinking as well as how the pieces act as tools to problem-solve.

Empathy Boxes. The concept of using empathy boxes comes from Maureen Carroll of the d.school. She describes using empathy boxes in conjunction with literature units to adapt DT to literacy instruction (Carroll, 2018). In order to use this activity to help develop the students' understanding of the students within their school, the researcher created three characters for the empathy boxes. Each box held artifacts that may or may not be helpful to understanding the character as a person. For example, in each box, students found a variety of school assignments, texts from friends and family, and other items that serve as evidence of the experiences and emotions of the character. (See Picture 1.) First, groups of 3-4 students were instructed to list the items they observed as factually as they could. Next, they tried to make inferences about the character based upon the items provided. After that, the whole group discussed what they wondered about this student. Finally, the group talked about what strategies one might use to gain a better understanding of this kind of student.



Picture 1: Students completing Empathy Box activity.

Empathy Box Character Creation. Next, students individually created a sketch of the character. The instructor and students discussed the idea that these characters, just like real people, have thoughts and feelings that they share with others, but they also have thoughts and feelings that they keep inside. Students created their characters to reflect those external as well as internal facets of each character's personality. After creating the individual sketch, the students came together with other students who investigated the same character. They worked on a large whiteboard to create a version of their character idea which reflects the plans that each of them made separately on their papers. Finally, they took turns explaining to other groups' members what they learned about this character and how the character may feel on the inside and outside. While they do this, another member of the group created a final, more permanent image of their character on poster paper.

Everyday Situations Activity. On the following day of class, the students received a paper with a variety of situations described. They had to make an inference about how their character would react in the situation and then offer evidence for why they believed the character would react this way. This page was used as students discussed their character's unique perspectives in pairs and as a whole-group discussion.

Character Reflection with Post-Its. In order to help connect students to people's needs in the building and to develop students' skills concerning how they might learn more about their peers, the students participated in an analytic activity of the posters they created. First, the students hung up their posters. Then, in small groups, they went from one poster to another to try to determine what some ideas were that came to their minds as they investigated the images. Their instructions were to use the following questions: *What do you notice? What do you wonder? What information would you need to have greater empathy for each student?* For each poster, students placed Post-It notes on them with questions or observations they had as they considered the character.

Question Generation for Interview Activity. After students had a chance to submit their questions or observations on Post-Its, the original creators of the poster took the poster back and read over the questions. Then, they submitted questions on Google Docs of the top questions generated through the activity. These questions were organized and combined by the instructors to guide the interviews in the next step.

Stakeholder Interviews. In small groups, students interviewed various stakeholders in the school community including the building principal, teachers, the school counselor, eighth-grade students, and each other. They recorded these interviews

on their papers and then came together as a group to discuss their findings.

Character Poster Reflection. One final connection to the Empathy Box characters was made after the interviews. Students again visited the posters and attempted to use what they learned in the interviews to more accurately interpret what the needs of these particular students might be.

Jack and Jill Design Thinking Process Practice. Much like the Dory example earlier, students participated in another two-day Design Thinking practice. Once again, the instructors used an adapted form of the d.school's Bootcamp Bootleg packet to guide the process. Students were shown a copy of the nursery rhyme "Jack and Jill." They were then instructed through the Design Thinking process as they worked to create a safer working environment for Jack and Jill. This process concludes with a prototype that students share with others and the whole group.

Brain-storming Student Concerns. With their interview results near them, students were asked to create a list of concerns they learned about as a result of their stakeholder interviews and personal experiences. After writing their list individually, students shared out one at a time in order to create a combined list on the board. Next, students discussed how certain concerns connected to others and the effects these could have on a school community. From this conversation, students listed the top three concerns that they felt most interested in and moved to help with. From this list, they chose the one topic that they would like to research in order to answer the question: How might we improve this school in order to better meet the needs of all students?

Topic Research. Once students decided on the best topic for them to investigate,

the instructor provided articles to annotate, gather information from, and discuss. They were also asked to find information on the Internet concerning their topic.

Design Thinking Final Prototype. After investigation of the students' topics, they worked again through the Design Thinking process using the Bootcamp Bootleg handout. This time, they used the driving question to help focus on a possible solution for the topic they chose. As with the Dory and Jack and Jill practices, students ended up with a prototype at the conclusion of the activity. This prototype was shared with classmates, and students created a short, informational video on their solution on either Flipgrid or Seesaw which are examples of student portfolio websites.

Design Thinking Final Project. For the final week of the unit, students worked to pull all of their ideas together to show some of the conclusions they came to on how to improve their school. Projects were required to have the following:

-Statement of the problem you are trying to address.
-Information about the problem.
-Relevant pictures to help understand the subject of your research.
-Information presented in a creative and interesting way.
-Text evidence to support your explanation of the problem and text evidence to support your solutions.
-Information presented with appropriate spelling, capitalization, and punctuation.

Students were encouraged to create their final presentations in a poster, digital presentation, or any other medium that they felt would best support their ideas. Presentations were discussed with each other in the classroom in a gallery walk style. Also, students with particularly innovative and insightful solutions were invited to share those in a separate event attended by student leaders, building and district administrators, and their parents.

Reader's Workshop Unit

In the Reader's Workshop model of instruction, students worked with a fictional text through read-alouds, skill-based mini-lessons, small group work, independent reading, conferences with the instructor, and reflection (Atwell, 1998). The book *Wonder* was chosen as it focuses on August Pullman's transition from homeschooling to middle school (Palacio, 2012). In the novel, due to a rare genetic condition, August's facial features are atypical. The book concerns how he and his family come to terms with this change as well as how some in his school community attempt to make him feel welcome while others work to ostracize him. Themes and characters in this book are conducive to both the curricular needs of ELA, understanding and reading complex texts, developing vocabulary, finding themes, and making inferences, as well as to the social and emotional development of adolescents.

While reading, students analyzed the main characters of the book and worked to both take their perspectives as well as to draw inferences about the characters based on text evidence. For example, Auggie, the main character, shows bravery and resilience as he struggles to become a part of the school community. Jack, Auggie's best friend, betrays Auggie, but he does not learn until later why Auggie quits speaking to him. Summer, one of Auggie's truest friends, refuses to let him give up on their friendship after Jack's betrayal. Finally, Julian works to turn everyone against August because of Auggie's disabilities.

Throughout the six-week unit, students completed vocabulary exercises, collected text evidence based on guiding questions such as: *How is Auggie's year going so far?*

What kind of person is Jack Will? What kind of person is Via? How is what Auggie says or shows on the outside different from what he is feeling or thinking on the inside? participated in group and individual discussions, participated in group activities such as an exercise at the end of the book that asks students as a group to decide which events in the story most impact Auggie's development as a person, and completed text-based comprehension quizzes.

Traditional ELA Unit

Contrastingly, students participating in the control group followed the current iteration of the district's curriculum on the driving question of *How can people overcome adversity in the face of overwhelming obstacles?* Students worked with non-fiction texts concerning a variety of subjects as well as working on independent reading, vocabulary, and grammar skills. Specifically, students read about people who had overcome life difficulties such as Captain Sullenberger who landed a disabled plane in the Hudson River and a girl who faced bullying for a skin condition. Students were instructed in note-taking and annotation strategies while learning how to create both simple and paragraph-long summaries. Additionally, students in groups that only have one unit of either Reading Workshop or Design Thinking, began with the non-fiction unit first.

Data Collection

Throughout the six-week treatments, data in the form of the AMES survey were collected from all groups before the first unit; at the first unit's completion, three weeks later; and at the second unit's completion. The writing prompt was collected before the first unit and at the end of the second unit.

Variables

This study is concerned with the usefulness of Design Thinking as a tool to develop empathy in the context of middle school English-Language Arts. Empathy served as the dependent variable and was measured at the group level through the results of the AMES. As empathy is a construct of multidimensionality, each of the facets of empathy, cognitive and affective, were analyzed utilizing two scales of the AMES separately as dependent variables. Additionally, a written response was collected from participants which will also be analyzed as a dependent variable at the group level. Independent variables in the study include instructor and group assignment.

Measures

This study was concerned with the development of empathy in participants in the context of seventh-grade English-Language Arts. Quantitative measures were used to assess the level of empathy of students. In these measures, consideration was given to the multidimensionality of empathy as a construct, specifically, cognitive empathy and affective empathy. Additionally, pre and post writing samples were employed and rubrics were used to assess students' growth in empathy in these samples.

Adolescent Measure of Empathy and Sympathy. The AMES, Adolescent Measure of Empathy and Sympathy, survey with its three subscales of affective empathy, cognitive empathy, and sympathy was used to evaluate the students' levels of empathy (see Appendix A). The AMES was created as an alternative to previous empathy measurement instruments (Vossen, Piotrowski, & Valkenburg, 2015). The development focuses on the difference between empathy and sympathy with consideration of affective

empathy and cognitive empathy as distinct constructs. Additionally, the AMES's authors worked to eliminate ambiguous language from the instrument which might yield unclear results.

The AMES consists of one 12-item questionnaire using a 5-point Likert scale with three subscales: affective empathy, cognitive empathy, and sympathy. Affective empathy concerns the sharing of another's emotion, also known as emotional congruence (Mehrabian & Epstein, 1972); cognitive empathy refers to the understanding of another's emotional state (Hogan, 1969); and sympathy relates to feeling sorrow for another's sad or distressing state (Clark, 2010). For each item, respondents answered with the choices *never, almost never, sometimes, often,* and *always.* On the first run of the AMES 499 adolescents participated, and on the second run, there were 450 adolescent participants.

The AMES was tested through factor analysis, and the confirmatory factor analysis supported the 3-factor structure (cognitive empathy α = .86, affective empathy α = .75, and sympathy α = .76) (Vossen, Piotrowski, & Valkenburg, 2015). Correlations between the factors were: r = .34 between affective empathy and cognitive empathy, r = .39 between affective empathy and sympathy, and r = .54 between cognitive empathy and sympathy. Additionally, researchers report that all correlations were below .80 (cognitive empathy and affective empathy, .33; affective empathy and sympathy, .42; sympathy and cognitive empathy, .69) which confirms that there was no multicollinearity and, in fact, each subscale had discriminant validity meaning that each subscale measures distinctly different constructs.

As an outside comparison, the AMES was compared and found to be consistent with other empathy measures in reliability (Vossen, Piotrowski, & Valkenburg, 2015). Specifically, the comparison to the Interpersonal Reactivity Index's (IRI) empathic concern scale found a positive relationship. Additionally, it was especially positively related to the sympathy subscale of the IRI. The Perspective Taking scale of the IRI was also positively correlated with all three subscales of the AMES and was most strongly related to cognitive empathy. All three subscales were positively related to prosocial behavior. While the affective empathy and sympathy scales were negatively related to physically aggressive behavior, cognitive empathy was not correlated with physically aggressive behavior.

Additionally, researchers ran an ANCOVA, which corrected for social desirability utilizing a version of the *Social Desirability Scale,* supporting the construct validity of the scales in that females scored higher on all three subscales than males as would be expected in a measure of empathy.

The survey questionnaire was web-based using the program Qualtrics. Students accessed the survey on each teacher's Google Classroom through a URL before the students' first unit, before the students' second unit, and after completion of the second unit. All surveys were taken during the students' ELA class time. Instructor S administered the AMES in her classes for each of her sections, and instructor W administered the AMES in her classes for each of her sections.

Writing Prompts and Rubrics. In order to attempt to capture changes in empathy through an additional measure, participants completed a writing prompt before

all of the units and after the completion of the units (see Appendix B). Rubrics are a common tool to evaluate performance data in a focused yet adaptable way (Dickinson & Adams, 2017). Their use when evaluating authentic, performance tasks can increase the "consistency of judgment" from one rater to another and improve evaluation of products across students when used in an educational setting (Jonsson & Svingby, 2007, p. 132). The academic portion of the rubric was taken from Krathwohl's Taxonomy while the empathy portion of the rubric was adapted from a prototype version of The Performative Task Rubric available online through the d.school at Stanford.

Empathy Rubric. The empathy portion of the rubric was derived from Carroll's (2017) empathy indicators from the Performative Task Assessment Rubric for Design Thinking. The scale begins at the lowest level with the analysis of the designer's ability to infer the feelings and needs of another. Next, the designer is able to infer another's feelings but also to apply self-focused role taking to the information to create a connection between the external and internal information. Finally, in the highest-scoring indicator, the designer is able to not only connect to the other's feelings as well as reflect on her own emotions, but she is also able to illustrate how this might impact or connect to humanity as a whole. After an initial trial run of the rubric was applied to writing samples of students not participating in the study, the researcher and her co-evaluators decided that there needed to be a lower level for those samples which did not meet the basic level of empathy described in the original rubric. Therefore, the final rubric which was used in the data analysis has four levels as opposed to the original three in The Design Team's scale.

Krathwohl's Taxonomy Table. While it is one aim of this research to determine which of the types of ELA instruction have the greatest impact on empathy, it is also important to analyze if the interventions support students' academic instruction. Krathwohl's Taxonomy developed out of an attempt to revise Bloom's Taxonomy, a one-dimensional framework used to analyze, compare, and categorize instruction which was created by a collection of scholars in 1956 (Krathwohl, 2002). This current Taxonomy creates a two-dimensional scale that combines both the knowledge as well as the cognitive processes necessary to meet instructional goals. For the purpose of this study, the scale will be used to analyze the students' responses to look for growth in students' knowledge and cognitive processes in conjunction with their participation in the treatment groups (see Figure 5).

The Learning Taxonomy for Krathwohl's Affective Domain describes affective learning as such that is "demonstrated by behaviors indicating awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study" (Krathwohl, 2002). Overall, this rubric measures to what degree participants have internalized empathy into their writing in comparison to their pretest.

The rubric is divided into five levels: receiving, responding, valuing, organization, and characterization by a value or value set. The first level, receiving, is characterized by verbs such as *describes, follows,* and *replies*. At the receiving level, the student would passively be doing what is asked, but would not be seeking out any greater level of

Figure 5: Learning Taxonomy- Krathwohl's Affective Domain

Affective learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study

Level and Definition	Illustrative Verbs	Example
Receiving refers to the student's willingness to attend to particular phenomena of stimuli (classroom activities, textbook, music, etc.). Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain.	asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses	Listening to discussions of controversial issues with an open mind. Respecting the rights of others. Listen for and remember the name of newly introduced people.
Responding refers to active participation on the part of the student. At this level he or she not only attends to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond (voluntarily reads beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). The higher levels of this category include those instructional objectives that are commonly classified under "interest"; that is, those that stress the seeking out and enjoyment of particular activities.	answers, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes	Completing homework assignments. Participating in team problem-solving activities. Questions new ideals, concepts, models, etc. in order to fully understand them.
Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behavior. This ranges in degree from the simpler acceptance of a value (desires to improve group skills) to the more complex level of commitment (assumes responsibility for the effective functioning of the group). Valuing is based on the internalization of a set of specified values, but clues to these values are expressed in the student's overt behavior. Learning outcomes in this area are concerned with behavior that is consistent and stable enough to make the value clearly identifiable. Instructional objectives that are commonly classified under "attitudes" and "appreciation" would fall into this category.	completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works	Accepting the idea that integrated curricula is a good way to learn. Participating in a campus blood drive. Demonstrates belief in the democratic process. Shows the ability to solve problems. Informs management on matters that one feels strongly about.
Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating, and synthesizing values. Learning outcomes may be concerned with the conceptualization of a value (recognizes the responsibility of each individual for improving human relations) or with the organization of a value system (develops a vocational plan that satisfies his or her need for both economic security and social service). Instructional objectives relating to the development of a philosophy of life would fall into this category.	adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes	Recognizing own abilities, limitations, and values and developing realistic aspirations. Accepts responsibility fro one's behavior. Explains the role of systematic planning in solving problems. Accepts professional ethical standards. Prioritizes time effectively to meet the needs of the organization, family, and self.
Characterization by a value or value set. The individual has a value system that has controlled his or her behavior for a sufficiently long time for him or her to develop a characteristic "life-style." Thus the behavior is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities, but the major emphasis is on the fact that the behavior is typical or characteristic of the student. Instructional objectives that are concerned with the student's general patterns of adjustment (personal, social, emotional) would be appropriate here.	acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies	A person's lifestyle influences reactions to many different kinds of situations. Shows self-reliance when working independently. Uses an objective approach in problem solving. Displays a professional commitment to ethical practice on a daily basis. Revises judgments and changes behavior in light of new evidence.

https://global.indiana.edu/documents/Learning-Taxonomy-Affective.pdf

engagement with the task. This would be similar to a recall-type question format and is the lowest level of student engagement. Level two, responding, would require more active participation on the student's part. Corresponding verbs include: *assists, reports,* and *presents.* At this level, the student begins to show signs of action beyond what is

right in front of her. Instead, she will seek out opportunities for her own ideas and choices. In the third level, valuing, the student not only understands concepts, but she now begins to act upon those. This would be characterized by taking action or leadership in the running of a group or putting into practice some of the theoretical concepts she learns. Verbs in this level are: *initiates, joins,* and *justifies.*

At the top two levels of the Learning Taxonomy, the student needs to integrate her own values into her daily academic activities. Organization would be characterized by her ability to *adhere, organize,* and *synthesize.* At this level, she would be managing tasks with regard to a variety of personal and academic perspectives, bringing together all facets of life to see the larger impact of her beliefs in regards to where she fits into the organization of which she is part. Finally, at the level characterization by a value or value set, the student has come to a set of principles that she employs consistently throughout her life. These values would be expressed through all aspects of her life and present through her daily actions and intentions. Verbs consistent at this level would be: *influences, practices,* and *solves.*

Overall, this rubric was utilized as a lens through which to interpret students' responses to the writing prompt which reflected both the ability to analyze the students' ideas from an academic perspective while also analyzing more objectively the evidence of their internalization of empathy in the context of their own school. While this rubric is typically used to assess how the educator formulates instruction to achieve certain

learning outcomes, in this case, the rubric was used to analyze how students began or in what way they reported their answers to the writing prompt before the intervention compared with what they were able to report after participation in the groups' activities.

Written Responses. Before any of the interventions and at the conclusion of the study, the following writing prompt was given to all participants through their Google Classroom accounts: *In your opinion, what are the concerns of today's students? What do you think that you can do to help these concerns?*

Data Analysis

All AMES data were collected using Qualtrics and analyzed using SPSS version 21 software. Writing prompt data were collected through each instructor's Google Classroom. SPSS was used to enter data and to perform statistical analyses.

AMES Data

To analyze the data from the AMES survey, the researcher used SPSS to complete the statistical calculations for the cognitive empathy scale as well as the affective empathy scale of the AMES. Initially, the data were analyzed for equivalency to combine in the areas of instructor and gender. After tests of normality were run, the researcher ran independent *t*-tests on the groups' pretest scores. However, gender data were found to be not normal. Therefore, the researcher ran the non-parametric test, Mann-Whitney U, to analyze the groups' differences. Additionally, to analyze each group's change over the course of the intervention, independent *t*-tests were run for both cognitive empathy and

affective empathy. The independent variable was the treatment group (Design Thinking, Reader's Workshop, or control). While the dependent variable was the mean scale score of the group after the intervention's completion. Each group's pre and post-scores were compared to each other after the study's completion.

Empathy and Krathwohl Rubric Data

In order to analyze the data from the writing samples' rubrics, the researcher used SPSS to complete the statistical calculations. Initially, the data were analyzed for equivalency to combine in the areas of instructor and gender. After tests of normality were run, data were found to be not normally distributed for either set. Therefore, the researcher ran the non-parametric test, Related-Samples Wilcoxon Signed Rank Test, to analyze if there had been a statistically significant change in each group's scores from the pretest to the post-test.

Quality Standards

The researcher worked to uphold the highest level of quality standards.

Internal Validity. All groups were assigned a treatment using a random number generator. Although the researcher randomly assigned students to groups, participants were welcome at any time to revoke their assent to participate. Before analysis, groups were evaluated for similarity by instructor and gender. Since differences in beginning AMES data were found using the non-parametric test Mann-Whitney U and the literature on empathy supports the separation of male and female data, groups were separated for analysis by gender.

Inference and empathy writing prompt data analysis.

Interrater Reliability. To ensure that the application of the rubrics was consistent and well-defined, the researcher and two co-evaluators met multiple times to compare text interpretations and identify qualities of responses that would fit into each level of the rubric. When a discrepancy was found between evaluators' ratings, the three would reconsider the reasons for the rating and come to a consensus on what that example's rating should be. The primary researcher rechecked all written responses for accuracy in reporting. When consensus could not be reached, the researcher chose to err on the conservative side of the rubric as to not inflate scores on more ambiguously worded samples. Additionally, sample evidence was collected to provide guidance on what words or phrases might be indicative of the different levels of the two rubrics. This process was meant to bring understanding to the concept of Design Thinking within an ELA context and to help develop a more nuanced way to speak about how levels of empathy may be affected with application in a middle school ELA setting.

Because this rubric had not been tested previously for reliability and validity, the researcher needed to establish protocols to ensure the soundness of analysis using this tool.

Empathy Rubric. The empathy portion of the rubric was derived from Carroll's (2017) empathy indicators from the Performative Task Assessment Rubric for Design Thinking. The scale begins at the lowest level with the analysis of the designer's ability to infer the feelings and needs of another. Next, the designer is able to infer another's feelings but also to apply self-focused role taking to the information to create a

connection between the external and internal information. Finally, in the highest-scoring indicator, the designer is able to not only connect to the other's feelings as well as reflect on her own emotions, but she is also able to illustrate how this might impact or connect to humanity as a whole. After an initial trial run of the rubric was applied to writing samples of students not participating in the study, the researcher and her co-evaluators decided that there needed to be a lower level for those samples which did not meet the basic level of empathy described in the original rubric. Therefore, the final rubric that was used in the data analysis has four levels as opposed to the original three in The Design Team's scale.

Krathwohl's Taxonomy Table. While it is one aim of this research to determine which of the types of ELA instruction have the greatest impact on empathy, it is also important to analyze if the interventions support students' academic instruction. Krathwohl's Taxonomy developed out of an attempt to revise Bloom's Taxonomy, a one-dimensional framework used to analyze, compare, and categorize instruction, which was created by a collection of scholars in 1956 (Krathwohl, 2002). This current Taxonomy creates a two-dimensional scale that combines both the knowledge as well as the cognitive processes necessary to meet instructional goals. For the purpose of this study, the scale will be used to analyze the students' responses to look for growth in students' knowledge and cognitive processes in conjunction with their participation in the treatment groups.

Ethical considerations

All participants were treated in accordance with the ethical guidelines of the University of Missouri–Saint Louis Institutional Review Board. Approval has been obtained from the board.

Informed consent

All participants in the study were required to have both individual assent and parental consent forms in order to participate in the study (see Appendix C). Those who did not give assent still participated in all daily classroom activities as both Reader's Workshop and Design Thinking represent units supportive of the district's curricular goals. However, if consent or assent was not given, students had no study data collected from their classroom activities, nor did they participate in the AMES.

Confidentiality

Every effort was made to keep students' identifying information private and secure. Students were randomly assigned a number and this number was used to identify all data collected in conjunction with that student. The codebook of student identification was kept in a locked and password-protected computer to which only the researcher had access. Any artifacts created as part of these units were collected, and, before analysis, any identifying information was removed and artifacts were organized by participant identification number. All artifacts were kept in a locked cabinet in the researcher's classroom. Finally, the videos were also kept on a locked, password-protected computer. Per university policy, all data and consent documents will be kept in a locked cabinet or

password-protected computer for at least three years after the completion of the research activity.

The researcher was also one of the instructors of the units. She has been teaching ELA for 10 years at the school where the research took place. Previously, she worked as a mental health counselor and obtained her Master's in Community Counseling from UMSL, so she felt capable of supporting students in the unlikely event that participation in the units created distress for the participants. Additionally, the school's counseling department had a supportive and capable staff for her to refer students.

The biases on the part of the researcher are the following: First, the researcher has personally found the practice of Design Thinking beneficial as she has used it with previous classes as well as using it as a problem-solving strategy through professional development. Additionally, developing a caring school community has always been one of her goals, and she wanted to learn more about how Design Thinking might support rigorous academic content while also helping students to be willing to support each other.

Chapter 3: Results

In this chapter, results are presented and organized by measurement instrument and hypothesis. The following hypotheses were considered:

In the context of English Language Arts Curricula:

H_1: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking followed by Reader's Workshop.

H_2: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Reader's Workshop alone.

H_3: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking alone.

H_4: Participants in Section 1, Reader's Workshop followed by Design Thinking, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_5: Participants in Section 2, Design Thinking followed by Reader's Workshop, will demonstrate significantly higher empathy mean scores as measured by the

AMES compared to participants in Reader's Workshop alone.

$H_{6:}$ Participants in Section 2, Design Thinking followed by Reader's Workshop, will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in Design Thinking alone.

$H_{7:}$ Participants in Design Thinking followed by Reader's Workshop will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_8: Participants in Reader's Workshop alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_9: Participants in Design Thinking alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in the traditional ELA group.

H_{10}: Participants in Design Thinking alone will demonstrate significantly higher empathy mean scores as measured by the AMES compared to participants in group Reader's Workshop alone, as measured by the AMES.

Quantitative Analysis

This section will report descriptive statistics for all measures of all groups and report results for each hypothesis for the AMES and writing prompt data.

Results were obtained through the use of the statistical software SPSS version 21 to analyze the intervention groups' and control group's mean scale scores on the AMES.

Independent t-tests were run to investigate the group differences in change in the five sections of the previously listed hypotheses. SPSS was also used to analyze the results of the writing prompt using non-parametric analyses due to the data not being normally distributed. Changes in writing prompt scores were measured within-group using median scores.

Equivalency of groups

Initially, data needed to be analyzed to determine each group's equivalency specifically in the areas of instructor and gender for each of the scales and rubrics.

AMES group equivalency. Because there were two different instructors, data needed to be analyzed to see if those groups were appropriate to combine. Additionally, the literature related to empathy research suggests that data be divided by males and females for analysis (Damon, 1988; Jolliffe & Farrington, 2006).

The analysis began by testing for equality of groups by instructor. After tests of normality were run, independent *t*-tests were run and no statistically significant differences were found between the groups in regards to instructor, $p > .05$, for either the affective empathy scales or cognitive empathy scales of the AMES (see Tables 1 and 2, Appendix E). Therefore, the researcher concluded that the data were appropriate to combine.

Next, the researcher looked at the groups to determine if they were able to be combined in regard to gender. After visual inspection and tests of normality were run, the researcher concluded that the data were not normally distributed in all groups. As a result, the researcher ran the non-parametric test, Mann-Whitney U, in order to test for

the groups' similarity by gender. This test is indicated for non-normally distributed data with two independent variables and an interval-level dependent variable (Field, 2005). The results of the Mann-Whitney U revealed that Section One, Reader's Workshop/ Design Thinking, was significantly different for males (*Mdn* = 3.375) and females (*Mdn* = 4.00) on the cognitive empathy scale pretest, U=65.5, p <.01, r=-.47, as well as for males (*Mdn* = 2.75) and females (*Mdn* = 3.25) on the affective empathy scale pretest, U=47.5, p <.01, r=-.58. Additionally, in Section Four, ELA/ Design Thinking, the groups were unequal for males (*Mdn* = 2.50) and females (*Mdn* = 3.0.) on the affective empathy scale pretest, U=69, p< *.05*, r=-.34 (see Appendix E). Based upon the differences in gender in the primary intervention group as well as the literature's support of separate examination of data by gender, the researcher determined it was most practical as well as theoretically sound to analyze each group's data separately for males and females.

Writing prompt group equivalency. Similar to the AMES analysis, data needed to be examined to determine each group's equivalency specifically in the areas of instructor and gender. Because there were two different instructors, data needed to be analyzed to see if those groups were appropriate to combine. Additionally, the literature related to empathy research suggests that data be divided by males and females for the purposes of analysis.

The researcher began by testing for equality of groups by instructor. After tests of Normality were run, the researcher determined that the pretest data were not normally distributed for either rubric's scores. Therefore, the researcher ran the non-parametric test Mann-Whitney U to determine if the data were similar enough to combine by instructor

and gender. None of the sections were statistically significant, $p > .05$. Therefore, the researcher determined that the rubric data could be combined for each group in regards to instructor and gender.

Development of empathy and hypotheses' results

Based on the previously listed assumptions, the data were divided into the five treatment sections by gender for the AMES scales and kept intact by gender for both rubrics resulting in the following descriptive data (see Tables 3-5).

After establishing that the groups' AMES data could be combined in regards to instructor but kept separate concerning gender, the researcher compared each group's mean scale scores to all other groups' scores using the independent *t*-tests as outlined by hypotheses 1-10 (see Appendix E). This test is appropriate because the data are normally distributed and interval-level (Field, 2005). Although it would have been more convenient and possibly more informative to run an ANOVA, this was not possible due to the small number of participants per group once they were divided by gender. For the rubric data, the groups were able to be combined by gender, but due to the non-normality of the data, the researcher used the Wilcoxon Signed Test to compare the pre and post-write data for both the empathy rubric and the Krathwohl rubric (see Appendix E).

Table 3

Descriptive Statistics for the AMES on Cognitive and Affective Empathy

	CE Change			AE Change		
	n	Mean	SD	n	Mean	SD
Reader's Workshop/ Design Thinking						
Males	18	.129	.372	18	.250	.454
Females	16	.063	.423	16	.094	.539
Design Thinking/ Reader's Workshop						
Males	8	-.250	.627	8	-.094	.500
Females	12	-.091	.491	11	.201	.437
ELA 1/ Reader's Workshop						
Males	9	-.028	.551	9	-.139	.741
Females	9	.111	.356	9	.000	.673
ELA 1/ Design Thinking						
Males	13	-.115	.403	13	-.139	.741
Females	16	-.125	.354	17	.118	.961
ELA 1/ ELA 2						
Males	14	-.411	.853	14	.036	1.00
Females	12	-.208	.317	12	.167	.660

Table 4

Descriptive Statistics for the Empathy Rubric

		Pretest		Post-test	
	n	Mean	SD	Mean	SD
Reader's Workshop/ Design Thinking	32	1.32	.535	1.56	.561
Design Thinking/ Reader's Workshop	19	1.22	.428	1.60	.589
ELA1/ Design Thinking	17	1.24	.562	1.17	.383
ELA1/ Reader's Workshop	27	1.28	.445	1.59	.501
ELA1/ ELA2	25	1.29	.550	1.24	.523

Table 5

Descriptive Statistics for the Krathwohl Rubric

		Pretest		Post-test	
	n	Mean	SD	Mean	SD
Reader's Workshop/ Design Thinking	32	1.44	.504	1.74	.448
Design Thinking/ Reader's Workshop	19	1.56	.511	1.60	.503
ELA1/ Design Thinking	17	1.35	.493	1.22	.428
ELA1/ Reader's Workshop	27	1.38	.494	1.62	.494
ELA1/ ELA2	25	1.29	.464	1.44	.507

Table 6

Summary of Hypotheses Results for Cognitive Empathy Change on the AMES

Hypothesis	Cognitive Empathy			
	Males		Females	
	Sig.	Non-sig.	Sig.	Non-sig.
1 RW/DT > DT/RW		x		x
2 RW/DT > RW		x		x
3 RW/DT > DT		x		x
4 RW/DT > Control	x			x
5 DT/RW > RW		x		x
6 DT/RW > DT		x		x
7 DT/RW > Control		x		x
8 RW > Control		x	x	
9 DT > Control		x		x
10 DT > RW		x		x

Note. DT stands for Design Thinking. RW stands for Reader's Workshop. Control is the group that participated in two units of traditional ELA instruction.

Table 7

Summary of Empathy and Krathwohl Rubric Results from Pretest to Post-test

Treatment	Statistically Significant Change			
	Empathy Rubric		Krathwohl Rubric	
	Sig.	Non-sig.	Sig.	Non-sig.
1 RW/DT		x	x	
2 DT/RW	x			x
3 RW	x		x	
4 DT		x		x
5 Control		x		x

Note. DT stands for Design Thinking. RW stands for Reader's Workshop. Control is the group that participated in two units of traditional ELA instruction.

Hypothesis 1: Participants in Reader's Workshop followed by Design Thinking have higher empathy scores than Design Thinking followed by Reader's Workshop. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 18 males in RW/DT and the 8 male participants in the DT/RW group for either cognitive empathy, t (24)= 1.94, *ns,* or affective empathy, t (25)=1.73, *ns.* Additionally, no statistically significant difference was detected for the 16 females in the RW/DT and the 11 females in DT/RW group on either cognitive empathy, t (23)= -.867, *ns,* or affective empathy, t (25)=1.73, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the DT/RW group, Z= -2.828 , $p < .005$, but not for RW/DT group, Z= -1.886 , *ns.* Conversely, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for the RW/DT group, Z= -2.50 , $p < .012$, but not for DT/RW group, Z= -8.16 , *ns* (see tables 6 and 7).

Hypothesis 2: Participants in the combination of Reader's Workshop and Design Thinking have higher empathy scores than Reader's Workshop alone. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 18 males in RW/DT and the 9 male participants in the ELA/RW group for either cognitive empathy, t (11.763)= .772, *ns,* or affective empathy, t (25)=1.696, *ns.* Additionally, no statistically significant difference was detected for the 16 females in the RW/DT and the 9 females in ELA/RW group on either cognitive empathy, t (23)= -.291, *ns,* or affective empathy, t (23)= -.382, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the ELA/RW group, Z= -2.496, p < .013, but did not show growth on the empathy rubric for the RW/DT group Z= -1.886 , *ns.* Additionally, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for both groups, RW/DT, Z= -2.50 , p < .012 and ELA/RW, Z= -2.333 , p < .020 (see tables 6 and 7).

Hypothesis 3: Participants in the combination of Reader's Workshop and Design Thinking have higher empathy scores than Design Thinking alone. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 18 males in RW/DT and the 13 male participants in the ELA/DT group for either cognitive empathy, *t* (29) = 1.747, *ns,* or affective empathy, *t* (29) = -.105, *ns.* Additionally, no statistically significant difference was detected for the 16 females in RW/DT and the 16 females in ELA/DT on either cognitive empathy, *t* (30) = 1.36, *ns,* or affective empathy, *t* (31)= -.087, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test did not show growth from the pretest to the posttest empathy rubric for the RW/DT group, Z= -1.886 , *ns,* or the ELA/DT group, Z= -.378 , *ns*. However, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for the RW/DT, Z= -2.50, p < .012, but not for the ELA/DT group, Z= -.707, *ns* (see tables 6 and 7).

Hypothesis 4: Participants in the combination of Reader's Workshop and Design Thinking have higher empathy scores than the control. Independent t Tests were run to test the null hypothesis. There was a statistically significant difference

detected between the 18 males in RW/DT and the 14 male participants in the control group for cognitive empathy, t (16.843)= 2.213, p <.05, but not for affective empathy, t (30)= .808, *ns*. Additionally, no statistically significant difference was detected for the 16 females in RW/DT and the 12 females in control on either cognitive empathy, t (26)= 1.857, *ns,* or affective empathy, t (26)= -.322, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test did not show growth from the pretest to the posttest empathy rubric for the RW/DT group, Z= -1.886 , *ns,* or the control group, Z= -.264 , *ns*. However, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for the RW/DT, Z= -2.50, p < .012, but not for the control group, Z= -1.414, *ns* (see tables 6 and 7).

Hypothesis 5: Participants in the combination of Design Thinking/ Reader's Workshop will have higher empathy scores than Reader's Workshop alone. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 8 male participants in the DT/RW group and the 9 males in the ELA/RW group for either cognitive empathy, t (15) = -.778, *ns,* or affective empathy, t (15)= .145, *ns.* Additionally, no statistically significant difference was detected for the 11 females in DT/RW group and 9 females in the ELA/RW on either cognitive empathy, t (18)= -1.031, *ns,* or affective empathy, t (19)= .860, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for both the group DT/RW, Z= -2.828 , p < .005, and the ELA/RW group, Z= -2.496, p < .013. Additionally, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the

Krathwohl rubric for ELA/RW, Z= -2.33 , p < .020, but not for DT/RW, Z= -8.16 , *ns* (see tables 6 and 7).

Hypothesis 6: Participants in the combination of Design Thinking/ Reader's Workshop will have higher empathy scores than Design Thinking alone. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 8 male participants in the DT/RW group and the 13 males in the ELA/DT group for either cognitive empathy, *t* (19)= -.602, *ns,* or affective empathy, *t* (19)= -1.495, *ns.* Additionally, no statistically significant difference was detected for the 11 females in DT/RW group and 16 females in the ELA/DT on either cognitive empathy, *t* (25)= .210, *ns,* or affective empathy, *t* (27)= .304, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the group DT/RW, Z= -2.828 , p < .005, but not the ELA/DT group, Z= -.378, *ns.* Additionally, a Wilcoxon Signed-Ranks Test did not detect growth from the pretest to the posttest on the Krathwohl rubric for DT/RW, Z= -8.16 , *ns,* or ELA/DT, Z= -.707, *ns* (see tables 6 and 7).

Hypothesis 7: Participants in the combination of Design Thinking/ Reader's Workshop will have higher empathy scores than the control. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 8 male participants in the DT/RW group and the 14 males in the control group for either cognitive empathy, *t* (20)= .464, *ns,* or affective empathy, *t* (20)= -.339, *ns.* Additionally, no statistically significant difference was detected for the 11 females in

DT/RW group and 12 females in the control on either cognitive empathy, *t* (21)= .668, *ns,* or affective empathy, *t* (22)= .182, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the group DT/RW, Z= -2.828 , p < .005, but not the control group, Z= -.264, *ns*. Additionally, a Wilcoxon Signed-Ranks Test did not detect growth from the pretest to the posttest on the Krathwohl rubric for DT/RW, Z= -8.16 , *ns,* or for the control group, Z= -1.414, *ns* (see tables 6 and 7).

Hypothesis 8: Participants in Reader's Workshop alone will have higher empathy scores than the control. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 9 male participants in the ELA/RW group and the 14 males in the control group for either cognitive empathy, *t* (21)= 1.192, *ns,* or affective empathy, *t* (21)= -.448, *ns.* However, a statistically significant difference was detected for the 9 females in the ELA/RW group and 12 females in the control for cognitive empathy, *t* (19)= 2.170, *p <.05,* but not for affective empathy, *t* (19)= -.568, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the ELA/RW group, Z= -2.496, p < .013, but not the control group, Z= -.264, *ns.* Additionally, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for ELA/RW, Z= -2.333 , p < .020, but not for the control group, Z= -1.414, *ns* (see tables 6 and 7).

Hypothesis 9: Participants in Design Thinking alone will have higher empathy scores than the control. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 13 male participants in the ELA/DT group and the 14 males in the control group for either cognitive empathy, t (25)= 1.135, *ns,* or affective empathy, t (25)= .737, *ns.* Additionally, no statistically significant difference was detected for the 17 females in the ELA/DT group and 12 females in the control on either cognitive empathy, t (26)= .645, *ns,* or affective empathy, t (27)= -.153, *ns.*

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test did not show growth from the pretest to the posttest on the empathy rubric for the group ELA/DT group, Z= -.378, *ns,* or the control Z= -.264, *ns.* Additionally, a Wilcoxon Signed-Ranks Test did not detect growth from the pretest to the posttest on the Krathwohl rubric for ELA/DT, Z= -.707, *ns*, or the control, Z= -1.414, *ns* (see tables 6 and 7).

Hypothesis 10: Participants in Design Thinking alone will have higher empathy scores than Reader's Workshop alone. Independent t Tests were run to test the null hypothesis. There was no statistically significant difference detected between the 13 male participants in the ELA/DT group and the 9 males in the ELA/RW group for either cognitive empathy, t (20)= -.432, *ns,* or affective empathy, t (20)= 1.470, *ns.* Additionally, no statistically significant difference was detected for the 16 females in the ELA/DT group and 9 females in the ELA/RW on either cognitive empathy, t (23)= -1.599, *ns,* or affective empathy, t (24)= .426, *ns*.

When the rubric data were analyzed, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the empathy rubric for the ELA/RW group, Z= -2.496, $p < .013$, but not ELA/DT, Z= -.378, *ns.* Additionally, a Wilcoxon Signed-Ranks Test showed growth from the pretest to the posttest on the Krathwohl rubric for ELA/RW, Z= -2.333 , $p < .020$, but not for ELA/DT, Z= -.707, *ns* (see tables 6 and 7).

Overall, there were three interventions with statistically significant results: Reader's Workshop/ Design Thinking, ELA1/ Reader's Workshop, and Design Thinking/ Reader's Workshop (see Table 8). Notably, none of the groups showed statistically significant results for affective empathy.

Table 8

Statistically Significant Results of All Hypotheses

Overall Hypothesis: Design Thinking + Reader's Workshop will increase empathy more than other combinations will increase empathy.

Exp. Group	**n**	**AMES**		**Writing Prompt**				
		Cognitive Emp.		Emp. Rubric		Krathwohl		Stat. test
		M	F	Pre-test	Post-test	Pre-test	Post-test	
RW/DT	18	M =.129 SD = .372						$t(16.843) = 2.213^{*}$, p = .041
vs. Control	14	M = -.411 SD =.853						
Pre/Post	32					Mdn= 1.00	Mdn= 2.00	Z= -2.50, p = .012
ELA1/ RW	9	M =.111 SD = .356						
vs. Control	12	M = -.028 SD =.853						
Pre/Post	17			Mdn= 1.00	Mdn= 2.00			Z= -2.496, p = .013
Pre/Post	17					Mdn= 1.00	Mdn= 2.00	Z= -2.333, p = .020
DT/RW								
Pre/Post	20			Mdn= 1.00	Mdn= 2.00			Z= -2.828, p = .005

* Denotes equal variances not assumed

Note. DT stands for Design Thinking. RW stands for Reader's Workshop. Control is the group that participated in two units of traditional ELA instruction.

Summary of Results. After analysis of all the data, there was statistically significant growth in empathy as measured by the AMES, empathy rubric, and Krathwohl rubric (see Table 8). In regards to the two scales of the AMES, males in the group RW/DT and females in the group ELA1/RW showed growth in cognitive empathy, also known as perspective-taking. However, none of the groups showed statistically significant growth in affective empathy, the sharing of another's emotional state. The empathy rubric, based on the prototype scale created by the d.school at Stanford, was able to detect differences in empathy levels in two groups' writing samples, DT/ RW and ELA1/ RW. Additionally, the Krathwohl rubric related to the affective domain detected growth in empathy from the pretest to the posttest in two groups, RW/DT and ELA1/ RW. Two groups failed to show statistically significant results on any of the measures, ELA1/ Design Thinking and ELA1/ELA2, the control.

Chapter 4: Discussion

This chapter begins with a brief overview of the study. The majority of this chapter summarizes and offers an interpretation of the findings of this study based on the hypotheses. Implications of the findings, limitations of the study, and directions for future research in this area are also addressed.

Study Purpose

The purpose of this study was to investigate the effects of Design Thinking on students' empathy development in middle school Language Arts classrooms. Specifically, Design Thinking was evaluated as a way to develop students' empathy while students engaged in rigorous academic content. Design Thinking was incorporated by two English Language Arts instructors in six English Language Arts courses in a Midwestern, suburban middle school. Additionally, Reader's Workshop and the book *Wonder,* a novel that has been shown to increase students' perspective-taking abilities and ability to generalize empathy to a wider social circle, was added to four of the treatment groups that also included Design Thinking (Guarisco & Freeman, 2015). Reader's Workshop and *Wonder* were also added to two courses of ELA and paired with the traditional curriculum. Finally, two courses were taught only with the Traditional ELA curriculum and provided the control for this study. The AMES, an adolescent empathy measure, and rubrics to evaluate student writing samples were administered to better understand the convergence of empathy development and Design Thinking.

Findings

In this section, the researcher will focus on the explanation of the pairings of Reader's Workshop/ Design Thinking (RW/DT), Traditional English-Language Arts/ Reader's Workshop (ELA/RW), and Design Thinking/ Reader's Workshop (DT/RW), the findings for cognitive empathy, and the lack of growth for affective empathy (see Table 8)**.**

Reader's Workshop Proved the Most Significant Intervention

The researcher theorized that in the pairing of Reader's Workshop and Design Thinking in that order RW/DT would perform better to increase student empathy than any other combination. However, while there were statistically significant findings for that pairing, the most successful individual intervention overall in the development of empathy was Reader's Workshop, independent of its pairing with the other two interventions, Design Thinking or ELA. First of all, two treatment groups, Reader's Workshop/ Design Thinking and ELA/Reader's Workshop, had statistically significant findings for cognitive empathy on the AMES as well as on the Krathwohl rubric. Additionally, the empathy rubric was able to detect differences in empathy levels in two groups' writing samples, ELA/ Reader's Workshop and Design Thinking/ Reader's Workshop.

Overall, the finding that Reader's Workshop in general but the reading of fiction specifically as a method to increase empathy was not a complete surprise. The book *Wonder* was specifically chosen as there is research to support its use as a way to increase

empathy (Guarisco & Freeman, 2015). Additionally, reading fiction is an effective way to develop empathy as the reader feels more free to connect with fictional characters (Barnes, 2017; Mar & Oatley, 2008; Mar, Oatley, & Peterson, 2009; Masten, Eisenberger, Pfeifer, Colich, & Dapretto, 2013).

Moreover, the mode of instruction in Reader's Workshop when combined with the text *Wonder,* may have helped support the growth in student empathy. This is due to the face-to-face interactions which are an integral part of the Reader's Workshop process. Specifically, students engage in interactions with others to discuss the plight of the protagonist, August Pullman, as he struggles to find his place in middle school. Additionally, Reader's Workshop focuses on interactions between the teacher and student to reflect on how the story's plot develops. These in-person interactions help develop familiarity with the other members of the classroom and thus support empathy development for not only the fictional characters of a book but can also work to build cohesion and caring among the class participants.

However, with two different approaches or tools used for instruction, it is difficult to disentangle where the growth in cognitive empathy originated. While the researcher believes that *Wonder* is an excellent novel, she does not believe that reading it in isolation would garner the same positive outcomes as would reading it in the context of Reader's Workshop or other similar intervention. In their article about using *Wonder* to build perspective-taking, Guarisco and Freeman (2015) added activities specifically designed to highlight salient features of the story that would help develop students' understanding of the struggles of the story's protagonist. While they did not use a Reader's Workshop

approach, their use of *Wonder* was supported by supplementary interventions. Therefore, it may be that if one finds a text that focuses on characters from different backgrounds with relatable concerns, it would be worth considering what facets of Reader's Workshop or other supportive instructional tools might enhance the messages within fictional texts.

Design Thinking as a Method of Empathy Development

Design Thinking may prove to be a viable option for both real-world problem-solving and empathy development. In this study, the group Reader's Workshop/ Design Thinking had statistically significant findings for cognitive empathy on the AMES as well as on the Krathwohl rubric. Additionally, the empathy rubric was able to detect differences in empathy levels in the group Design Thinking/ Reader's Workshop.

While the group Design Thinking alone did not elicit a statistically significant outcome, the combination of Design Thinking with Reader's Workshop did. Before the study, the researcher hypothesized that the combination of these two interventions would complement each other. In the book *Wonder,* the main character August struggles with adapting to a new school due to his physical differences. Kids and parents initially judge him. Having this character to connect with likely helped the students as they thought about how to address the concerns of students in their own school which is what both the design challenges were for the Design Thinking portion as well as the pre- and post-write questions.

In the future, the researcher would like to investigate more focused, extended combinations of strategies

to see if or how Design Thinking might be able to develop participant empathy as a stand-alone intervention. With the interactive features of Design Thinking, real-world problem solving, and human-centered focus, it may be that this study was not able to discern the effects of the Design Thinking portion of the intervention in isolation. Additionally, the researcher feels that she has benefitted from the attempt to study Design Thinking in the classroom setting, and she would be able to better implement the process in future attempts. Specifically, she would focus on analyzing students' thoughts and feelings after integral steps in the Design Thinking process. Possibly this could include more participant journals, one-on-one interviews, or exit tickets at pivotal points in the process.

Additionally, as the researcher looks to the future of Design Thinking in ELA, it may be beneficial to rework the use of Reader's Workshop and Design Thinking together to see how to hone the effects of the two together. For example, what other texts might help foster empathy when used in conjunction with Reader's Workshop while taking into consideration some of the improvements for the process of Design Thinking?

Cognitive Empathy Growth

There were variations in the increase in cognitive empathy. First of all only males showed statistically significant outcomes on the AMES for cognitive empathy in the group Reader's Workshop/ Design Thinking. However, only females showed growth on the AMES for cognitive empathy in the group ELA/ Reader's Workshop. Some factors may explain participants' varied abilities in expressing cognitive empathy. Overall, the strongest empathic response is elicited by self-focused role-taking (Hoffman, 2000). In

this action, the observer connects a person's distress to how she might feel when placed in a similar situation. The students likely vary widely in their abilities to use self-focused role-taking as it is dependent upon one's cognitive ability as well as maturity. Specifically, as adolescents develop from ages 10 to 13, their ability to perceive and relate to the suffering of others also develops (Masten, Eisenberger, Pfeifer, Colich., & Dapretto, 2013). It may be that the variation in development levels of the subjects affected their abilities to understand and react to the struggles of others.

Also, the participants' abilities to grow in the area of cognitive empathy or affective empathy may have been mitigated by verbal mediation, where the observer acquires the information through the use of language whether written or oral. In a mediated form of association, the observer must gather the meanings of the words semantically and then interpret how these messages relate to their own experiences and understanding of the situation described. This mode of empathic arousal is far slower than the involuntary responses of mimicry, conditioning, and direct association because it requires the observer to analyze the information without the direct benefit of input to the central nervous system (de Waal, 2008). In the future, it might be beneficial to add a viewing of the movie *Wonder* in order to help access a greater empathic response and reinforce the message of the novel. Additionally, as the researcher to looks to tie this unit to academic outcomes, this comparison of a variety of formats of text is often a part of ELA instruction as designated by ELA standards specifically, 6-12.3.A, Synthesize Ideas from Multiple Texts (MODESE, 2016)

Additionally, in the case of some students' answers to their feelings or actions in support of peers, they may have moved into egoistic drift which occurs when the observer over-activates feelings to the point that she is no longer thinking about the plight of the victim but can only think about how she would feel in this situation or how the situation is affecting her personally (Hoffman, 2000).

Based on the researcher's understanding of the students' writings and interactions, the researcher designed this model to show the effects of both positive and negative interactions on the development of empathy (see Figure 6). In this model, the researcher attempts to illustrate what might get in the way of greater feelings of empathy as well as what might evolve from successful prosocial interactions.

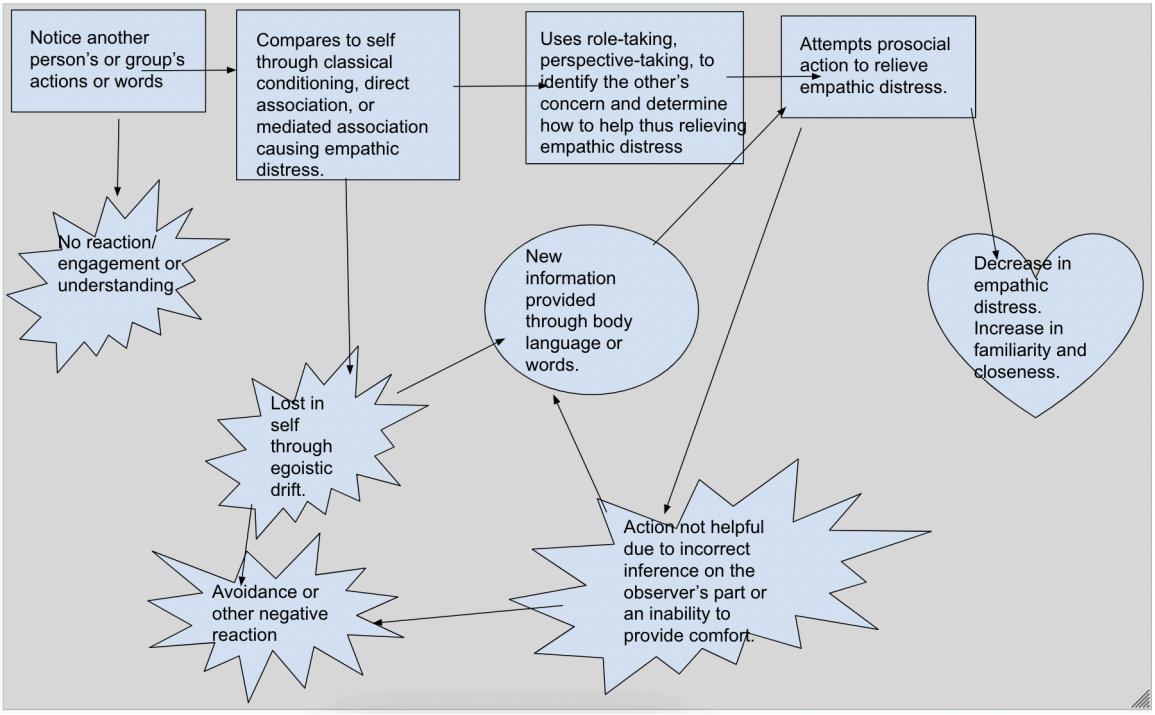


Figure 6- Model of successful and unsuccessful interactions regarding an individual's attempts at empathy development.

Specifically on the topic of gender and empathy, the data show there were differences in the ways that males and females performed in the treatment groups. While not unexpected as males and females historically in research have different levels of empathy development, it also proved difficult to discern exactly what may cause the gender difference in this study. One factor that influenced the researcher's ability to discern greater nuance from these data is that she was unable to use the pretest score on the AMES as a control. The smaller sample sizes for each treatment precluded that option when divided by gender. Had the treatment groups been larger, the researcher may have been able to look more closely at individual growth rather than just using a group pre/post-analysis.

Overall, the research on gender and empathy has already been clear on the fact that there are differences between males and females in the areas of empathy development (Damon, 1988; Jolliffe & Farrington, 2006). For example, the EQUIP Program, an intervention for youth with antisocial tendencies, showed significant decreased recidivism only for females in the program (Stam et al., 2014). However, this study showed mixed results in that males grew in cognitive empathy in the Reader's Workshop/ Design Thinking group while females grew in cognitive empathy in the ELA/ Reader's Workshop group. The researcher does not believe that there are adequate data in this study to discern these differences. Future research could possibly discern more nuance from the data by utilizing larger groups of participants so that the participants' pretest data could be used as a control. Additionally, using a mixed-methods approach

could highlight subtleties of language in the participants' artifacts which could illuminate findings.

Lack of Growth in Affective Empathy

While there were a variety of outcomes in the area of cognitive empathy, no growth was found for any group in affective empathy. Some of the reasons may be that even though there were in-person interactions, they were not often or consistent enough to help enact the participants' feelings of emotional contagion or the task was too broad for them to feel that they had a role to play in the alleviation of any individual's or group's plight. As affective empathy is well-considered to be integral to altruistic behavior, this may be another short-coming of the study's design and will need to be considered in future implementation of Reader's Workshop or Design Thinking if the desired outcome is related to prosocial action (deWaal, 2008; Edele, Dziobek, & Monika, 2013).

Although reading about another's plight through fiction has been shown to increase an empathic response, the interaction is mitigated by the reader's own ability to access the text, specifically mediated association. This mode of empathic arousal is far slower than the involuntary responses of mimicry, conditioning, and direct association because it requires the observer to analyze the information without the direct benefit of input to the central nervous system (de Waal, 2008). Therefore, while reading may support the impetus for altruistic action, there will be limitations to the affective activation because of the indirect path the information takes to the viewer's brain.

Researcher Reflections on Empathy Development

Overall, the researcher herself gained not only academic benefits from the study, but it also provided the experience of speaking one-on-one with students about their concerns and insights into the school's support of students. For example, Sam, a shy, quiet student in class, proved to have an aptitude for as well as a personal passion for helping and articulating the needs of others. Her work throughout the units and insight in her one-on-one interactions allowed the researcher a glimpse into her caring for her family and for her desire to support other students.

Additionally, the daily interactions discussing students' concerns as well as the in-person connections helped develop the researcher's feelings of empathy and understanding for the students who participated. Although there is not a quantifiable measurement of the researcher's growth, the factors that added to that growth are supported by the research on empathy development. First of all, the researcher and students interacted in person which helps enact the involuntary systems of affective empathy. Additionally, throughout the research, the researcher became more familiar with the personalities and struggles of the participants, which is a factor present in the development of greater cognitive empathy. Having one-on-one conversations allowed the researcher to observe the students' body language in a way that helped her gain greater insight into their personal concerns and sincerity.

Finally, the researcher believes that this study benefited from the mindsets of the researcher herself and the other teacher in the study. As practitioners, they both believe in the efficacy of developing authentic relationships with their students whether they are

engaged in Reader's Workshop-type activities or project-based learning activities like Design Thinking. Additionally, both are eager about and invested in learning the students' viewpoints on how to create better learning systems as well as how to develop a school where students feel cared for and supported. It may be that some of the mindsets of Design Thinking such as "Fail better" and the idea that systems need to be human-centered were already present in their approach to education, but the procedures of the Design Thinking process helped to operationalize this way of engaging in classroom activities and with students.

Integration of Findings With Literature

The current study is not the first study to look at Design Thinking's effect on participant empathy. However, much of the previous information was anecdotal in nature. The following section illustrates how the current study fits in with the findings of previous research. One study used the drawings of solutions to problems to gauge how much students considered the users when problem-solving. The presence of more people in the students' drawings indicated to these researchers that the students were beginning to understand the users behind the system or product, and this focus on the needs of the "user" has been how researchers have pointed out Design Thinking as a mode of empathy development (Goldman et al., 2017; Goldman & Kabayadondo, 2017). Similar results were found in a study of fourth-grade student-designers (Noel, Liu, & Rider, 2020). As both users and designers for the school community, participants in this study had the benefit of working to develop supportive systems of which they were integrally a part. This allowed them to access role-taking by moving from their own interpretation of the

system and how they experienced it with the benefit of understanding others' concerns and seeing first-hand the effects of those concerns. This input allowed participants to consider others' perspectives and reflect on how they align with or differ from their own understanding of the system. Additionally, in a study of eighth-graders designing for kindergarten students, researchers found evidence of empathy in the participants' final designs (Bosch, Harkki, & Seitamaa-Hakkarainen, 2022). This was similar in the current study as well. Nearly all participants were able to offer concerns and solutions to problems facing their concerns, reflecting an understanding of others' needs and a willingness to engage in supporting them.

In the area of professional development, teachers who used empathy through the Design Thinking process were found to develop more effective instructional practices to meet their students' needs and to develop more understanding of the perspectives of their students (Sun, 2017). Although this was not one of the empirical outcomes sought by this study, the researcher feels that having students problem-solve for their peers and share both their concerns and their solutions helped her have a greater understanding of their social and emotional needs within the learning community.

Implications of Findings

This study used quantitative methods to investigate student empathy development as they participated in Design Thinking activities. Most of the previous information on empathy development and Design Thinking was either anecdotal or based on qualitative methods alone. This study allowed the researcher to isolate the outcome of change in

cognitive empathy while, in this study, change in affective empathy was not detected. This differentiation may open up new ways to analyze the effects of Design Thinking on participants.

Additionally, this project highlighted students' willingness and abilities to participate as stakeholders in their own learning communities. Most students were eager to learn from other students, ask questions, and attempt to formulate solutions. Also, they were able to articulate how these concerns were impacting their own and others' lives.

Finally, this study supports the use of Design Thinking as a tool not only for STEM but also a valuable, curricularly-supportive method in English-Language Arts as well. Students used a variety of skills aligned with the state standards all while also learning more about their peers' needs and the needs of the school community (See fig. 4). Future research would benefit from closer analysis of curricular outcomes and measurement of priority standards as students participate in Design Thinking activities. Specifically, Design Thinking allows students to engage as problem-solvers for those in their own community. This process provides tools and opportunities to learn about the strengths and struggles of the people they pass in the halls every day in an authentic way that is absent in most other educational practices.

While actively participating in the community, they delve into focused research based upon the needs of their peers which can help them understand the needs of others, but may also allow them to learn about better self-care. For example, many of the students learned that their peers were facing stress due to outside influences.

Consequently, their solutions included ways to manage stress both individually and systemically.

From a classroom perspective, students were able to practice cooperative learning while being encouraged to take chances and "fail better" as they worked. This hands-on learning had the benefit of keeping students engaged which cut down on classroom management concerns. Students enjoyed sharing what they learned about from their observations and research that might help others. This interactive process helped to formulate the "iterations" of their solutions as they learned together and built on each other's ideas.

As the instructor, the researcher learned more about her students and their experiences of the school day than ever before. Although an optimist at heart, before the chance to interact with students in this way, the researcher may have felt some students to be indifferent to their school experiences or purposefully defiant in their attitudes. After this process, she learned more about what motivated many indvidual's reticence or misbehavior. This process has helped her be more empathetic to and aware of her current students even when the daily challenges of the job may cause her to lose focus. In short, Design Thinking has a vast potential to support the academic as well as social and emotional health of school communities.

Limitations

As with any research project, certain limitations applied to this research study. Before the study's inception and during the study, problems arose that contributed to

these limitations. The researcher made every effort to address these limitations. However, if the limitations were not able to be addressed, the research worked toward transparency for the reader and for those who may investigate this topic in the future.

Internal validity. The researcher worked to ensure internal validity throughout the study. However, several limitations arose in this area. Although the researcher randomly assigned treatments to the Language Arts classes, the class sizes were fixed, and, therefore, the treatment groups were not even. This was additionally affected by the number of participants who chose to give permission to participate in the study although the groups were found to be equivalent enough for comparison (see Appendix E). Specifically, the researcher could not control for differences in the gender of participants; the number of students in each class; students' willingness to participate in daily Language Arts activities; their ability to write, listen, and communicate in English; or their baseline AMES scores on cognitive and affective empathy. Having to subdivide classes by gender may have created a smaller sample size which made changes less detectable.

Another limitation may be that there were two instructors in the study. The researcher provided the other instructor with all materials and daily lesson plans. However, the other instructor was new to the Design Thinking Process. Before the combination of the data, tests of equivalency were run, and it was determined that the data were similar enough to be combined by instructor.

Additionally, cognitive empathy was found to be statistically significant in some groups, but the researcher was not able to use any scores of intelligence or proficiency to create groups that were more intellectually balanced or to control for academic proficiency, so the lack of measurement of this factor may mean that there are other outside reasons that were not measured that could have affected the results.

In addition to this, as has been mentioned previously, one of the Language Arts instructors was also the researcher. A bias on the part of the experimenter is that she believes strongly in the academic benefits of Design Thinking and was hopeful about its use as a tool to increase student empathy. She attempted to remain neutral in her implementation of the units and her analysis of the data. Additionally, the researcher collected all data, artifacts, and interviews while working as a full-time Language Arts teacher in the building. This dual role became difficult to manage at times, but the researcher worked diligently to keep all artifacts, notes, and interviews organized and consistent.

The final limitation is one that the researcher believes should be considered for future Design Thinking implementations whenever possible. Students spoke with others in the building and worked to address the concerns of the students interviewed. Also, at the end of the project, students presented their solutions to administration-level stakeholders in the building. However, the exercise never became more than a theoretical one. To truly help the students develop empathy, there should have been a plan to implement the students' solutions or prototypes and let them work with adapting those

prototypes in the real world with all the successes and failures that real-world implementation would contain. This real-world adaptation would create greater intrinsic motivation and take this from an academic exercise to a way to add authentic student voice, choice, and ownership to the learning community.

External validity.

This study was conducted at a suburban middle school in the Midwest. Though the population has some diversity, the majority of the students are White. The majority of the students in the study were also Caucasian. However, there is no information that would indicate that Design Thinking's impact would be affected by rural, suburban, or urban settings or the diversity of the student population. In terms of students with diverse learning needs, cognitive empathy has been found to be related to overall intelligence, so students with special learning needs might struggle with the open-ended format of the Design Thinking process. Finally, the researcher benefitted from working in a school district that allowed her to implement this study without formal curricular alignment check-ins. Solid formative assessments on basic Language Arts skills would support Design Thinking's academic value in the future.

Measurement tool. Overall, the AMES was an appropriate measure to use with middle school students; however, some students may have answered without understanding the question if they felt embarrassed or did not care enough to ask. Because of the need to divide all groups into males and females due to the previous

indications on empathy research and statistical indications of their differences, the overall sample size was relatively small.

Future Directions

As researchers look to the possibilities of Design Thinking, there is a wide-open field of investigation available. Future studies would benefit from not only measuring student empathy development but also measuring specific English- Language Arts standards. With this support, it would be easier to convince those who make curricular decisions that Design Thinking does not only need to be an add-on to the unit. It could be a cross-curricular opportunity to support students' educational and empathic development.

Additionally, Design Thinking could be used as a tool to support and improve learning communities as well as creating connections with the wider communities outside of the school. This could be used to answer many of the questions and challenges posed in the scope of Project Based Learning (PBL) which has been shown to support student's social and emotional growth while addressing their academic growth (Berger, 2003). As part of the projects' analyses, researchers could assess standards for the relationship to affective and cognitive domains and empathy in addition to analyzing academic standards. All these features could be enhanced by conducting a qualitative analysis of student work as well.

Also, the concept of empathy as a multi-faceted construct could be analyzed. How are the features of Design Thinking organized in ways more conducive to the development of cognitive empathy? Is affective empathy also impacted, and if so, how? What facets of the design process might better support the development of affective empathy, or are there other ways researchers can detect changes in affective empathy?

Finally, as empathy levels in males and females have been proven to be statistically different, are there Design Thinking processes that might benefit one or another more? What different modes help the designer focus on the user's needs? Are any of these modes impacted by the gender of the designer?

Conclusion

As our educational communities work to recover from the COVID pandemic's effects on students' academic and social-emotional wellness, Design Thinking could be an integral part of this recovery. Students need to practice how to interact with each other not only in the school community but also as future workers, leaders, and family members. Additionally, Design Thinking's open-ended structure can provide a tool to support teachers without expensive software or materials.

In 1990 the New London Group called for change in the format of education from didactic and rote, to a system that creates confident problem-solvers to meet the needs of an ever-changing job market. Using Design Thinking as a tool to improve students' empathy and empowerment as they participate in creating better solutions and systems for themselves and their peers could be another step toward meeting their vision.

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Appendices

Appendix A: Adolescent Measure of Empathy and Sympathy

UMSL University of Missouri–St. Louis

What hour are you in ELA?

- 2
- 4
- 5
- 6
- 8

Are you

- Male
- Female

For each statement, please indicate how often this occurs:

1. I can easily tell how others are feeling.

- Never
- Almost never
- Sometimes
- Often
- Always

2. I feel sorry for a friend who feels sad.

- Never
- Almost never
- Sometimes
- Often
- Always

3. I can often understand how people are feeling even before they tell me.

- Never
- Almost never
- Sometimes
- Often
- Always

4. I feel sorry for someone who is treated unfairly.

- Never
- Almost never
- Sometimes
- Often
- Always

5. When a friend is angry, I feel angry too.

- Never
- Almost never
- Sometimes
- Often
- Always

6. I am concerned for animals that are hurt.

- Never
- Almost never
- Sometimes
- Often
- Always

7. When my friend is sad, I become sad too.

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

8. I can tell when a friend is angry even if he/she tries to hide it.

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

9. When a friend is scared, I feel afraid.

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

10. I can tell when someone acts happy, when they actually are not.

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

11. I feel concerned for other people who are sick.

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

12. When people around me are nervous, I become nervous too

- ◯ Never
- ◯ Almost never
- ◯ Sometimes
- ◯ Often
- ◯ Always

Appendix B: Empathy and Inference Prompt and Rubrics

The student is provided a digital copy of this prompt:

In the space below, please answer the following questions to the best of your ability.

In your opinion, what are the concerns of today's students? What do you think that you can do to help these concerns?

Rubric for evaluation of student responses:

Krathwohl's Affective Domain	**Level**	**1**	**2**	**3**	**4**	5
	Definition	Receiving refers to the student's willingness to attend to particular phenomena of stimuli (classroom activities, textbook, music, etc.) Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain.	Responding refers to active participation on the part of the student. At this level he or she not only attends to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond(voluntarily reads beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). The higher levels of this category include those instructional objectives that are commonly classified under "interest"; that is, those that stress the seeking out and enjoyment of particular activities.	Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behavior. This ranges in degree from the simpler acceptance of a value (desires to improve group skills) to the more complex level of commitment (assumes responsibility for the effective functioning of the group). Valuing is based on the internalization of a set of specified values, but clues to these values are expressed in the student's overt behavior. Learning outcomes in this area are concerned with behavior that is consistent and stable enough to make the value clearly identifiable. Instructional objectives that are commonly classified under "attitudes" and "appreciation" would fall into this category.	Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating, and synthesizing values. Learning outcomes may be concerned with the conceptualization of a value (recognizes the responsibility of each individual for improving human relations) or with the organization of a value system (develops a vocational plan that satisfies his or her need for both economic security and social service). Instructional objectives relating to the development of a philosophy of life would fall into this category.	Characterization by a value or value set. The individual has a value system that has controlled his or her behavior for a sufficiently long time for him or her to develop a characteristic "life-style." Thus the behavior is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities, but the major emphasis is on the fact that the behavior is typical or characteristic of the student. Instructional objectives that are concerned with the student's general patterns of adjustment (personal, social, emotional) would be appropriate here.
	Illustrative Verbs	asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses, describes,	answers, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes	completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works	adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes	acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies
Empathy	**Level**	**1**	**2**	**3**	**4**	
	Definition	Self-focused or superficial statement	Exhibits empathy by describing another person's feelings and needs	Exhibits empathy by describing another person's feelings and needs and connecting to his or her own experiences	Exhibits empathy by describing another person's feelings and needs and connecting to his or her own experiences and the larger human experience.	

Appendix C: Sample Week's Instruction for Design Thinking and Reader's Workshop Units

Teacher: Starkey	WEEKLY LESSON PLANS			Unit # Wonder	
Subject: ELA	Grade Level: 7th		Period:	Unit Title:	
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
	Mini-lesson- Interact with text/ vocabulary	*Whole group- learning about characters*	*Lulu Williams article*	*mini-lesson Characters inside and out*	*Who is Auggie? Character analysis.*
	Silent reading/ Partner share	*Read with a purpose: What kind of person in Auggie?*	Inference- How to you think Lulu felt when her classmates did not support her?	*Silent reading*	
UNIT OBJECTIVES:	Development of student empathy through design thinking				
	Work with classmates in a productive and respectful way				
	Develop inferencing skils				
	Use text evidece to support conclusions or opinions				
Power STANDARDS	*Read and comprehend various grade level informational texts to show growth and understanding.*				
	Vocabulary - Determine and clarify the meaning of unknown and multiple-meaning words.				
	Response writing (fiction and nonfiction) - Select key details and explain their significance using text evidence				
	Note-taking and summary - Read to take notes, organize, interpret, and remember information.				

Teacher: Starkey	WEEKLY LESSON PLANS			Unit # Design Thinking	
Subject: ELA	Grade Level: 7th		Period:	Unit Title:	
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
	Jack and Jill	*Intro to terms and Jack and Jill*	*Non-fiction article*	*Emapthy Artifact Activity/ Carroll*	*Begin Empathy Map*
	DT Video	*DT Video Day 2*	Inference Activity		
UNIT OBJECTIVES:	Development of student empathy through				
	Work with classmates in a productive and respectful way				
	Develop inferencing skils				
	Use text evidece to support conclusions or opinions				
Power STANDARDS	*Read and comprehend various grade level informational texts to show growth and understanding.*				
	Vocabulary - Determine and clarify the meaning of unknown and multiple-meaning words.				
	Response writing (fiction and nonfiction) - Select key details and explain their significance using text evidence				
	Note-taking and summary - Read to take notes, organize, interpret, and remember information.				

Appendix D: Consent Forms

College of Education

One University Blvd.
St. Louis, Missouri 63121-4499
Telephone: 314-516-5937

E-mail: kmwmq3@umsl.edu

Assent to Participate in Research Activities (Minors)

Design Thinking's effect on middle school students in English-Language Arts

1. My name is Kim Starkey.

2. I am asking you to take part in a research study because we are trying to learn more about how a new learning format affects middle school students. All students enrolled in seventh grade English Language Arts, Advanced English Language Arts, and CWC (Class within a Class) Language Arts will be eligible for the study.

3. If you agree to be in this study, I will collect work you create as part of your Language Arts class. Also, I will ask you to complete a survey with 12 questions at the beginning, middle, and end of the study. At certain times in class, you may be recorded on camera. Next, I would like to collect data from your previous standardized tests like MAP or ACT Aspire. Finally, I may ask a few people to answer questions in an interview about their experiences in class and record their answers on an audio or video recorder. All video recordings will be used to gather information about classroom processes around Design Thinking.

4. It is unlikely that there will be any risk to you if you participate. However, you could feel uncomfortable answering questions about your feelings or emotions on the survey.

5. On the other hand, your participation in both Reader's Workshop as well as Design Thinking could help you learn better how to positively deal with these negative feelings through class discussions and activities.

6. If you don't want to be in this study, you don't have to participate. Remember, being in this study is up to you, and no one will be upset if you don't want to

participate or if you change your mind later and want to stop. If you change your mind, please tell me. In that case, you will still participate in the classroom assignments as usual; however, you will not be recorded in video or audio, you will not have your work collected as part of the study, and you will not have any of your information collected for research purposes.

7. You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can email me at starkeyk@foxc6.org or you can stop by and see me in room 25.

8. If you agree to participate, I will share the information with other people in the form of presentations and publications. I will keep all personal information about you and your participation confidential. All records will be stored on a password-protected computer or in a locked file cabinet.

9. Signing your name at the bottom means that you agree to be in this study. You will be given a copy of this form after you have signed it.

_____ _____

Participant's Signature Date Participant's Printed Name

_____ _____

Participant's Age Grade in School

College of Education

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E-mail: kmwmq3@umsl.edu

Informed Consent for Child Participation in Research Activities
Design Thinking's effect on middle school students in English-Language Arts

Participant _____HSC Approval Number _____

Principal Investigator _____Kim Starkey_____PI's Phone Number ____314-607-3427___

---

1. Your child is invited to participate in a research study conducted by Kim Starkey and Dr. Marvin Berkowitz. The purpose of this research is to see how reading the book Wonder and/ or using the problem-solving tool, Design Thinking affects students. The book Wonder was chosen as it focuses on August Pullman's transition from homeschool to middle school. Additionally, due to a rare genetic condition, August's facial features are atypical. The book concerns how he and his family come to terms with this change as well as how some in his school community attempt to make him feel welcome while others work to ostracize him.
   In the Design Thinking module, students will be asked to answer the question: How might we improve Fox Middle School in order to meet the needs of all students? This question represents a typical frame of Design Thinking activities which was originally used as a process designers used to innovate products such as computer mice and transportation systems; it has since expanded to the worlds of business, medical care, and education. Students may participate in one but not the other modules based upon the hour of their Language Arts Class. Activities will be randomly assigned to each section. Students will not participate in all the activities described below.

2. a) Your child's participation may include:

- ➢ Working through activities which will be determined randomly based on their hour of Language Arts. They will either read the book Wonder and/or participate in a Design Thinking unit, or participate in the traditional district curriculum of narrative writing. All of the activities include work that is typical in Language Arts classrooms: looking for text evidence, working with groups, writing in a clear and detailed manner, and reading both fiction and non-fiction texts.
- ➢ Consideration of others' perspective through the use of fiction and non-fiction texts. These activities are geared to help them develop problem-solving skills while learning the skills of English Language Arts. In order to see how well these interventions work, they will be asked to take a 12-item survey three times over the course of their activities. This will help determine which activities are most helpful to students' development. In order to help me understand the students' results, I would like to collect data from their previous standardized tests such as MAP or ACT Aspire.
- ➢ Individual interviews about their experience. These interviews, all data collected from surveys, and work created through their participation will be kept completely confidential in a password-protected computer and locked cabinet.
- ➢ Video of classroom activity in order to analyze student interaction and teacher instruction. Student identity will be protected in the videos, and they will be kept in a password-protected computer and locked cabinet.

Approximately 300 students may be involved in this research. All students enrolled in seventh grade English Language Arts, Advanced English Language Arts, and CWC (Class within a Class) Language Arts will be eligible for the study.

b) The amount of time involved in your child's participation will be not more than 16 weeks.

3. The possible risks or discomforts of the study are minimal. Subjects may feel some discomfort at answering questions regarding their feelings. They may have minimal negative feelings when recalling previous events for the survey as well as being asked to consider their own role in the school community.

4. This research could give more support to how adolescents develop emotionally in a real-world setting or to what the barriers to this development might be. Additionally, it could help teachers learn more about the combination of social and emotional instruction within the core curriculum.

5. Your child's participation is voluntary and you may choose not to let your child participate in this research study or to withdraw your consent for your child's participation at any time. Your child may choose not to answer any questions that he or she does not want to answer. You and your child will NOT be penalized in any way should you choose not to let your child participate or to withdraw your child. In that case, your child will still participate in the classroom assignments as usual; however,

no recordings will be made by video or audio, no work will be collected as part of the study, and no information will be collected for research purposes.

6. We will do everything we can to protect your child's privacy. By agreeing to let your child participate, you understand and agree that your child's data may be shared with other researchers and educators in the form of presentations and/or publications. In all cases, your child's identity will not be revealed. In rare instances, a researcher's study must undergo an audit or program evaluation by an oversight agency (such as the Office for Human Research Protection). That agency would be required to maintain the confidentiality of your child's data.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Kim Starkey at 314-607-3427 or the Faculty Advisor, Dr. Marvin Berkowitz at 314-516-7521. You may also ask questions or state concerns regarding your child's rights as a research participant to the Office of Research Administration, at 516-5897.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my child's participation in the research described above.

Parent's/Guardian's Signature	Date	Parent's/Guardian's Printed Name
Child's Printed Name		
Signature of Investigator or Designee	Date	Investigator/Designee Printed Name

Appendix E: Data Tables

Table 1 Results of Instructor Equivalency on Cognitive Empathy Scale

	Overall, *n* (%)	Mean	SD	*t*
Reader's Workshop/ Design Thinking				*t* (32)= -1.58, *p* = .123
Instructor 1	16 (47%)	3.48	.588	
Instructor 2	18 (53%)	3.79	.544	
Design Thinking/ Reader's Workshop				*t* (6.247)= .372, *p* = .722*
Instructor 1	13 (68%)	3.60	.439	
Instructor 2	6 (32%)	3.46	.858	
Traditional ELA1/ Reader's Workshop				*t* (16)= -.143, *p* = .888
Instructor 1	12 (67%)	3.50	.464	
Instructor 2	6 (33%)	3.54	.781	
Traditional ELA1/ Design Thinking				*t* (28)= .289, *p* = .775
Instructor 1	18 (60%)	3.64	.456	
Instructor 2	12 (40%)	3.58	.597	
Traditional ELA1/ Traditional ELA2				*t* (23)= -1.07, *p* = .297
Instructor 1	18 (69%)	3.36	.464	
Instructor 2	8 (31%)	3.56	.395	

* Equal variances not assumed

Table 2 Results of Instructor Equivalency on Affective Empathy Scale

	Overall, *n* (%)	Mean	SD	*t*
Reader's Workshop/ Design Thinking				*t* (32)= -1.31, *p* = .199
Instructor 1	16 (47%)	2.80	.848	
Instructor 2	18 (53%)	3.13	.602	
Design Thinking/ Reader's Workshop				*t* (18)= -.039, *p* = .969
Instructor 1	13 (65%)	2.85	.650	
Instructor 2	7 (35%)	2.86	.476	
Traditional ELA1/ Reader's Workshop				*t* (16)= -.943, *p* = .360
Instructor 1	12 (67%)	2.73	.914	
Instructor 2	6 (33%)	3.13	.648	
Traditional ELA1/ Design Thinking				*t* (29)= .443, *p* = .661
Instructor 1	19 (61%)	2.79	.914	
Instructor 2	12 (39%)	3.13	.647	
Traditional ELA1/ Traditional ELA2				*t* (9.056)= -.073, *p* = .943*
Instructor 1	18 (69%)	2.40	.708	
Instructor 2	8 (31%)	2.44	1.25	

*Equal variances not assumed

Results of Group Equivalency on Cognitive and Affective Empathy Scales for Males and Females

	Overall, n (%) CE	*U* Cognitive Empathy	Overall, n (%) AE	*U* Affective Empathy
Reader's Workshop/ Design Thinking		*U*=65.5, *p* <.01, *r*=-.47		*U*=47.5, *p* <.01, *r*=-.58
Male	18 (53%)		18 (53%)	
Female	16 (47%)		16 (47%)	
Design Thinking/ Reader's Workshop		*U*=24, *ns*, *r*=-.38		*U*=25, *ns*, *r*=-.40
Male	8 (42%)		8 (40%)	
Female	11 (58%)		12 (60%)	
Traditional ELA1/ Reader's Workshop		*U*=38.5, *ns*, *r*=-.04		*U*=20.5, *ns*, *r*=-.42
Male	9 (50%)		9 (50%)	
Female	9 (50%)		9 (50%)	
Traditional ELA1/ Design Thinking		*U*=98.5, *ns*, *r*=-.10		*U*=69, *p*< *.05*, *r*=-.34
Male	14 (47%)		14 (60%)	
Female	16 (53%)		17 (40%)	
Traditional ELA1/ Traditional ELA2		*U*=48.5, *ns*, *r*=-.37		*U*=98.5, *ns*, *r*=-.29
Male	14 (45%)		14 (45%)	
Female	12 (55%)		12 (55%)	

Results of Independent t Tests for Males and Females for H_1

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (24)= 1.94, *ns*	.37
Reader's Workshop/ Design Thinking	18	.129	.371		
Design Thinking/ Reader's Workshop	8	-.250	.627		
Females				*t* (23)= -.867, *ns*	.17
Reader's Workshop/ Design Thinking	16	.063	.423		
Design Thinking/ Reader's Workshop	11	-.091	.491		
Affective Empathy					
Males				*t* (25)=1.73, *ns*	.33
Reader's Workshop/ Design Thinking	18	.250	.454		
Design Thinking/ Reader's Workshop	8	-.098	.499		
Females				*t* (26)= -.602, *ns*	.1
Reader's Workshop/ Design Thinking	16	.094	.540		
Design Thinking/ Reader's Workshop	12	.208	.437		

Results of Independent t Tests for Males and Females for H_2

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (11.763)= .772, *ns*[*]	.22
Reader's Workshop/ Design Thinking	18	.129	.371		
ELA/ Reader's Workshop	9	-.028	.551		
Females				*t* (23)= -.291, *ns*	.06
Reader's Workshop/ Design Thinking	16	.063	.423		
ELA/ Reader's Workshop	9	.111	.356		
Affective Empathy					
Males				*t* (25)=1.696, *ns*	.32
Reader's Workshop/ Design Thinking	18	.250	.454		
ELA/ Reader's Workshop	9	-.139	.741		
Females				*t* (23)= -.382, *ns*	.01
Reader's Workshop/ Design Thinking	16	.094	.540		
ELA/ Reader's Workshop	9	.000	.673		

[*]Equal variances not assumed

Results of Independent t Tests for Males and Females for H_3

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (29) = 1.747, *ns*	.31
Reader's Workshop/ Design Thinking	18	.129	.371		
ELA/ Design Thinking	13	-.115	.403		
Females				*t* (30) = 1.36, *ns*	.24
Reader's Workshop/ Design Thinking	16	.063	.423		
ELA/ Design Thinking	16	-.125	.354		
Affective Empathy					
Males				*t* (29)= -.105, *ns*	.02
Reader's Workshop/ Design Thinking	18	.250	.454		
ELA/ Design Thinking	13	.269	.563		
Females				*t* (31)= -.087, *ns*	.02
Reader's Workshop/ Design Thinking	16	.094	.539		
ELA/ Design Thinking	17	.118	.961		

Results of Independent t Tests for Males and Females for H_4

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (16.843)= 2.213, *p* <.05*	.47
Reader's Workshop/ Design Thinking	18	.129	.372		
ELA1/ ELA2	14	-.411	.853		
Females				*t* (26)= 1.857, *ns*	.34
Reader's Workshop/ Design Thinking	16	.063	.423		
ELA1/ ELA2	12	-.208	.316		
Affective Empathy					
Males				*t* (30)= .808, *ns*	.15
Reader's Workshop/ Design Thinking	18	.250	.453		
ELA1/ ELA2	14	.036	1.01		
Females				*t* (26)= -.322, *ns*	.06
Reader's Workshop/ Design Thinking	16	.094	.539		
ELA1/ ELA2	12	.167	.660		

*Equal variances not assumed

Results of Independent t Tests for Males and Females for H_5

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (15)= -.778, *ns*	.20
Design Thinking/ Reader's Workshop	8	-.250	.627		
ELA1/ Reader's Workshop	9	-.028	.551		
Females				*t* (18)= -1.031, *ns*	.24
Design Thinking/ Reader's Workshop	11	-.091	.491		
ELA1/ Reader's Workshop	9	.111	.356		
Affective Empathy					
Males				*t* (15)= .145, *ns*	.04
Design Thinking/ Reader's Workshop	8	-.093	.499		
ELA1/ Reader's Workshop	9	-.139	.740		
Females				*t* (19)= .860, *ns*	.19
Design Thinking/ Reader's Workshop	12	.208	.437		
ELA1/ Reader's Workshop	9	.000	.673		

Results of Independent t Tests for Males and Females for H_6

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (19)= -.602, *ns*	.14
Design Thinking/ Reader's Workshop	8	-.250	.627		
ELA1/ Design Thinking	13	-.115	.403		
Females				*t* (25)= .210, *ns*	.04
Design Thinking/ Reader's Workshop	11	-.091	.491		
ELA1/ Design Thinking	16	-.125	.354		
Affective Empathy					
Males				*t* (19)= -1.495, *ns*	.32
Design Thinking/ Reader's Workshop	8	-.093	.499		
ELA1/ Design Thinking	13	-.269	.563		
Females				*t* (27)= .304, *ns*	.06
Design Thinking/ Reader's Workshop	12	.208	.437		
ELA1/ Design Thinking	17	.118	.961		

Results of Independent t Tests for Males and Females for H_7

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (20)= .464, *ns*	.10
Design Thinking/ Reader's Workshop	8	-.250	.627		
ELA1/ ELA2	14	-.411	.853		
Females				*t* (21)= .668, *ns*	.14
Design Thinking/ Reader's Workshop	11	-.091	.491		
ELA1/ ELA2	12	-.208	.316		
Affective Empathy					
Males				*t* (20)= -.339, *ns*	.08
Design Thinking/ Reader's Workshop	8	-.093	.499		
ELA1/ ELA2	14	.036	1.00		
Females				*t* (22)= .182, *ns*	.04
Design Thinking/ Reader's Workshop	12	.208	.437		
ELA1/ ELA2	12	.167	.660		

Results of Independent t Tests for Males and Females for H_8

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (21)= 1.192, *ns*	.25
ELA1/Reader's Workshop	9	-.028	.551		
ELA1/ ELA2	14	-.411	.853		
Females				*t* (19)= 2.170, *p <.05*	.45
ELA1/Reader's Workshop	9	.111	.356		
ELA1/ ELA2	12	-.208	.316		
Affective Empathy					
Males				*t* (21)= -.448, *ns*	.01
ELA1/Reader's Workshop	9	-.139	.741		
ELA1/ ELA2	14	.036	1.00		
Females				*t* (19)= -.568, *ns*	.13
ELA1/Reader's Workshop	9	.000	.673		
ELA1/ ELA2	12	.167	.660		

Results of Independent t Tests for Males and Females for H_9

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (25)= 1.135, *ns*	.22
ELA1/Design Thinking	13	-.116	.403		
ELA1/ ELA2	14	-.411	.853		
Females				*t* (26)= .645, *ns*	.13
ELA1/Design Thinking	16	-.125	.354		
ELA1/ ELA2	12	-.208	.316		
Affective Empathy					
Males				*t* (25)= .737, *ns*	.15
ELA1/Design Thinking	13	.269	.563		
ELA1/ ELA2	14	.036	1.00		
Females				*t* (27)= -.153, *ns*	.03
ELA1/Design Thinking	17	.118	.961		
ELA1/ ELA2	12	.167	.660		

Results of Independent t Tests for Males and Females for H_{10}

	n	Mean	SD	*t*	*r*
Cognitive Empathy					
Males				*t* (20)= -.432, *ns*	.10
ELA1/Design Thinking	13	-.116	.403		
ELA1/Reader's Workshop	9	-.028	.551		
Females				*t* (23)= -1.599, *ns*	.32
ELA1/Design Thinking	16	-.125	.354		
ELA1/Reader's Workshop	9	.111	.356		
Affective Empathy					
Males				*t* (20)= 1.470, *ns*	.31
ELA1/Design Thinking	13	.269	.563		
ELA1/Reader's Workshop	9	-.139	.740		
Females				*t* (24)= .426, *ns*	.09
ELA1/Design Thinking	17	.118	.961		
ELA1/Reader's Workshop	9	.000	.673		

Results of Wilcoxon Signed-Ranks Test of Related Samples for the Empathy Rubric

		Pretest		Post-test				
	n	Mean	SD	Mean	SD	Z	*p*	*r*
Reader's Workshop/ Design Thinking	32	1.32	.535	1.56	.561	-1.886	*ns*	.23
Design Thinking/ Reader's Workshop	19	1.22	.428	1.60	.589	-2.828	.005	.47
ELA1/ Design Thinking	17	1.24	.562	1.17	.383	-.378	*ns*	.07
ELA1/ Reader's Workshop	27	1.28	.445	1.59	.501	-2.496	.013	.33
ELA1/ ELA2	25	1.29	.550	1.24	.523	-.264	*ns*	.04

Results of Wilcoxon Signed-Ranks Test of Related Samples for the Krathwohl Rubric

	Pretest		Post-test				
	Mean	SD	Mean	SD	Z	*p*	*r*
Reader's Workshop/ Design Thinking	1.44	.504	1.74	.448	-2.50	*.012*	*.30*
Design Thinking/ Reader's Workshop	1.56	.511	1.60	.503	-.816	*ns*	.14
ELA1/ Design Thinking	1.35	.493	1.22	.428	-.707	*ns*	.12
ELA1/ Reader's Workshop	1.38	.494	1.62	.494	-2.333	.020	.31
ELA1/ ELA2	1.29	.464	1.44	.507	-1.414	*ns*	.20