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Mirror Neurons in Art Education

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MIRROR NEURONS IN ART EDUCATION

by

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A thesis submitted to the Graduate College
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MIRROR NEURONS IN ART EDUCATION

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Western Michigan University, 2021

In the following thesis, I will introduce the discovery of mirror neurons and explain why understanding mirror neurons is vital for student and teacher interactions as well as student and teacher mental health and engagement in the classroom. Understanding mirror neurons and the connections that teachers have with their students in terms of empathy, observational learning, aesthetic connections when viewing art and empathetic connections in regard to stress and emotional contagion can prove to be very beneficial in art classrooms and can influence the way teachers teach, the relationships that teachers have with their students and the type of classroom environments that can be created. Simply put, “Mirror neurons “mirror” the behavior and emotions of the people surrounding us in such a way that the others become a part of us” (Keysers, 2011, p.10).

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	ii
LIST OF FIGURES.....	v
Introduction.....	1
Literature Review.....	2
The Discovery of Mirror Neurons.....	2
Mirror Neurons: Emotions and Empathy.....	4
Facial Mimicry.....	5
Facial Expression Recognition, Emotional Responses, and Culture.....	7
Emotional Contagion.....	9
Emotional Contagion in Women Specifically.....	10
Stress Contagion.....	12
Mirror Neurons in the Art Room.....	12
Human Mirroring and Observational Learning.....	13
Simulation.....	15
Mirror Neurons are Goal Oriented.....	16
Mirror Neurons and Embodied Simulation When Viewing Art.....	18
Embodied Simulation: Actions and Intentions.....	23
Embodied Simulation: Objects.....	23
Embodied Simulation: Emotions and Sensations.....	24

Table of Contents - continued

Embodied Simulation: Feeling the Movement of Gestural Marks.....26

Conclusion.....27

References.....29

Appendix: Mirror Neuron Workshop for Secondary Art Educators.....34

LIST OF FIGURES

1. Echo of a Scream. David Alfaro Siqueiros. 1937.....21
2. Breakfast in Bed. Mary Cassatt. 1897.....22

Introduction

Have you ever noticed yourself smiling or laughing when someone else is expressing joy or happiness? Or tearing up when watching an actor cry in a movie? Or felt a visceral, bodily response when watching someone wince in pain? Are there people in your life who exude a sense of calm and, in turn, make you feel calmer and more relaxed to be around them? Have you ever looked at a work of art and felt a personal, emotional or even bodily reaction? These reactions are the result of mirror neurons in your brain. Aside from connected aesthetics when viewing art, in the classroom mirror neurons also contribute to teachers and students mirroring each other's behaviors, emotions and actions. The concept of mirror neurons provides multiple insights into why many teachers suffer from compassion fatigue and eventual burnout and also sheds some much-needed light onto the concept of empathy. The understanding of mirror neurons can be beneficial facilitating the creation of an engaging, connecting and stimulating classroom environment and curriculum.

Literature Review

The Discovery of Mirror Neurons

The discovery of mirror neurons happened quite by accident by a group of scientists at the University of Parma in Italy in the early 1990s (Keysers, 2011). The team of scientists, including Leonardo Fogassi, Vittorio Gallese and Giacomo Rizzolatti were using hair-thin electrodes placed inside the brain of a monkey to study neural activation when the monkeys reached for and grasped a variety of objects, such as a raisin. What astonished and excited them is that the scientists noticed that the same nerve cells fired when the monkey watched someone else grasp a raisin. “These cells are unique in that they respond not only when the monkey performs a particular action, such as grasping a small raisin, but also when the monkey sees someone else perform a similar action. It was as if the brain of the monkey was pretending to do the action it was observing.” (Keysers, 2011, p.13-15). The men could hardly believe what they had witnessed. After replicating that experiment and similar ones many times, they realized they had discovered something new, and in a series of 1996 papers they gave the “mirror neurons” their name (Dobbs, 2006, p.24-25). Rizzolatti and his team named the neurons ‘mirror neurons’ because the neurons fired and reacted to motor stimuli and created a visceral motor representation of that action in the brain (Schober & Sabitzer, 2013).

The nerve cell group that the scientists found was located in the premotor cortex which deals with the programming of actions, the specific neuron they found though, was active both when the monkey performed the action and also when it saw someone else perform the same action, this was surprising because prior to this discovery, responding to other peoples actions was thought to only be performed in the temporal visual cortex (Keysers, 2011).

Soon after the team in Parma discovered mirror neurons in monkeys, there was a sudden interest from neuroscientists everywhere who were curious to see if a similar system existed in humans. Unfortunately, it is difficult to directly investigate the existence of mirror neurons in humans due to the invasive nature of the experiments (Keysers, 2011, p.37) . The experiments involved the implantation of small wires directly into the brain which introduces a variety of risks including brain damage and infection. More recently, scientists have completed studies on humans using brain scanning technology but even this tactic is extremely limited with prefabricated simulations rather than spontaneous real life interactions (Keysers, 2011). “Unfortunately, most emotions are very difficult to trigger in a scanner environment” (p.96).

Despite these limitations, in 2010, Roy Mukamel provided the first concrete evidence of mirror neurons also being present in humans (Mukamel et al, 2010). The study used brain imaging technology instead of electrodes and was broken into three parts while monitoring the neural activity of participants. The participants were monitored while they were exposed to stimuli, including a variety of facial expressions, grasping objects, observing others grasping objects, and exposure to an action word without performing the action (Mukamel et al, 2010). The study remarkably found more groups of mirror neurons and in more locations than in the previously studied monkeys. “Mirror neurons revealed themselves in the premotor cortex and the inferior parietal areas—associated with movement and perception— as well as in the posterior parietal lobe, the superior temporal sulcus and the insula, regions that correspond to our abilities to comprehend someone else’s feelings, understand intention and use language (Dobbs, 2006, p.25).

“More recent findings also show that this special class of neurons prompts people to consciously and unconsciously mirror their fellow human beings’ body language, facial

expressions and emotion” (Bauer, J. 2006, as cited in Schober & Sabitzer, 2013). The discovery of mirror neurons causes us to reflect on how connected we actually are to the people we interact and engage with on a daily basis, more specifically with students in the classroom. Keysers (2011) explains that the discovery of mirror neurons opens up our understanding to the social nature of our individual minds and the connections that exist with people that we interact with mentally, physically and emotionally. “While we witness the actions (and emotions) of others, our own premotor cortex resonates as if it was doing the actions (and feeling the same emotions that) we observe. The mirror system builds a bridge between the minds of two people and shows us that our brains are deeply social” (Keysers, 2011, p.62). Mirror neurons play a crucial role in social interaction and personal relationships (Schober & Sabitzer, 2013). These connections are subconscious, and happen without conscious effort on our part. “This feat of our brain, the emotional connection with others is, to a large extent, what makes us human” (Keysers, 2011, p.8). This concept of social connection through mirror neurons can be revolutionary into digging deeper into student-teacher relationships as well as student-student relationships within the classroom setting.

Mirror Neurons: Emotions and Empathy

A major focus of mirror neurons is that they allow for empathic, emotional connections among people. Studies show that there seems to be a shared circuit that transmits emotional responses and reactions from one person to the next. These neurons are creating a sense understanding of those around us without us even consciously realizing it. Through the discovery of mirror neurons and the concept of shared circuits, Keysers (2011) explains how his research and experimentation has brought us closer to discovering how we understand other people. He explains that when we witness the actions and emotions of others, our brain causes

us to share these emotions and actions within ourselves. “Although this principle had first been observed for actions, it now became clear that it was more general. Emotions appear to obey the very same principle-I can feel what you feel” (Keysers, 2011, p.107).

We are all very interconnected and social beings, even more so than we realize. There is a constant and mostly unconscious exchange or transmission of actions, intentions and emotions. The actions and emotions of the people that we are surrounded by, physically impact our bodies and emotional states on a visceral level. This understanding can really open our eyes to the bigger picture, help us to understand why we may feel the way that we do and can also impact our relationships, particularly in regard to student-teacher relationships within the classroom setting. Keysers (2011) explains that there are two types of mechanisms involved in processing the emotions of others through mirror neurons, one being direct facial mimicry and the second through emotional contagion.

Facial Mimicry

“The expressions we see in the faces of others engage a number of different cognitive processes. Emotional expressions elicit rapid responses, which often imitate the emotion in the observed face...we are also very good at explicitly recognizing and describing the emotion being expressed” (Frith, 2009). When we see someone crying, we may feel ourselves tearing up; when someone smiles or laughs it is difficult not to respond in the same manner. This non-verbal communication indicates that we are actively engaged, empathetic and actively listening. There is a tendency to mimic without conscious effort at all. “If we see someone wince in pain, our face contracts as if in pain. We can then deduce the emotional state of that person by sensing the configuration of our own (mimicked) facial expression” (Keysers, 2011, p.92).

Majority of this cognition and transmission of emotions through facial expressions is done completely subconsciously. A study done by Dimberg et al., (2000) “show(s) that both positive and negative emotional reactions can be unconsciously evoked, and particularly that important aspects of emotional face-to-face communication can occur on an unconscious level” (Dimberg et al., 2000). Frith (2009) explains that because so much importance is placed on spoken language during human interactions, we often forget about non-verbal signals such as facial expressions and facial signals. Findings from recent studies performed by Wicker et al., (2003) suggest that the mirroring mechanisms that are activated during facial mimicry “trigger the neural activity typical of our own experience of the same emotion.” Facial expressions can be used as a form of emotional, visual communication between two individuals and is the first step toward creating empathic human connections. It is also important to note that sometimes our facial expressions may be intentionally exaggerated to show empathy. Frith (2009) explains that facial expression responses are not always subconscious, explaining that our empathic expressions of pain are not always simply a reflexive response to the sight of pain in another, since they are sometimes exaggerated when the empathizer knows he or she is being observed. It seems that we want people to know that we are empathetic.

This mirror neuron and facial mimicry connection takes place with a variety of emotions such as embarrassment, sadness, fear, joy, sorrow or even disgust as Wicker et al., (2003) discovered. By “Using functional magnetic resonance imaging (fMRI), Wicker et al., and his team found that feeling disgust and seeing a look of revulsion on someone’s face caused the same set of mirror neurons to fire in the insula, a part of the cortex active in synthesizing convergent information” (Dobbs, 2006). Another example that Frith (2009) explains is how the sight of a human face that is expressing fear elicits a fearful response in the observer such as

increased arousal and activity in the amygdala. This process of fear being elicited within the viewer when observing a fearful face is known as contagion, whereby the observer unconsciously mimics the observed behavior externally and internally (Frith, 2009). This contagion that occurs through facial mimicry is the foundation of social connection in general, but can also lead to deeper understanding and empathic connections between individuals.

Facial mimicry leads to empathy and an emotional simulation within us (Dimberg, Thunberg, 2012). Further studies done by Likowski et al., (2012) examined and confirmed that mirror neurons are the foundation of these facial reactions. Through the use of facial electromyography and functional magnetic resonance imaging (fMRI), it was possible to examine the more specific areas of mirror neurons that were associated with differences in facial mimicry such as the strength of the muscular facial reactions in response to emotional facial expressions. It was discovered that mimicry reactions had a strong correlation with not only mirror neurons but also with the areas of the brain that deal with emotional processing (Likowski et al., 2012). Facial mimicry leads to emotional contagion, and these facial reactions may constitute the basis of emotional experiences (Dimberg et al., 2000). The expression on a person's face is our first visual indication of how someone is feeling. These are just a few examples of mirror neurons unconsciously mimicking behavior and emotions, other studies have shown that similar neurological responses can also occur with limb movements and gestures which we will discuss further in regard to engagement in the art room.

Facial Expression Recognition, Emotional Responses, and Culture

Experiments done by a variety of scientists and Ekman (1977) in particular, have found “consistent and conclusive evidence that accurate judgment of facial expressions can be made” regardless of language or culture. Ekman (1977) explains that “evidence is now remarkably

broad in scope, consistent in findings, and conclusive in showing that there are at least some emotions for which the facial expression is universal...there are also cultural differences in regard to when these universal facial expressions are shown.” Sometimes, the intensity of a person's facial response depends on who is observing the reaction as well as cultural norms or expectations.

A study that Ekman (1977) conducted comparing an American college student to a college student in Japan showed that when the students were alone and viewing a film, they had the exact same facial reactions, however when viewing the film together the Japanese students masked their unpleasant feelings more than the American. “This study was particularly important in demonstrating what about facial expression is universal and what differs for each culture. The universal feature is the distinctive appearance of the face for each of the primary emotions. But people in various cultures differ in what they have been taught about managing or controlling their facial expressions of emotion” (Ekman, 1977). This may be something of importance to consider when observing emotional reactions in students. Some may be more subdued than others, due to personal comfort levels or cultural norms but these studies confirm that the internal response is very similar.

Furthermore, in another experiment observers in the United States, Japan, Chile, Argentine, and Brazil, were exposed to a variety of photographs of facial expressions and were told to match each photograph to the corresponding emotional word. “The same facial expressions were judged as showing the same emotions in all of these countries, regardless of language or culture” (Ekman, 1977). These studies confirm that the interpretation of the emotional meaning behind facial expressions is universal but the responses may be hindered or suppressed depending on cultural beliefs, cultural social norms and learned behaviors.

Emotional Contagion

“We weep with the weeping, laugh with the laughing, and grieve with the grieving.” (Alberti L.B.,1972. as cited in Piechowski-Jozwiak et al., 2017)

Keysers (2011) explains that the feelings and emotions that we embody extend much further than our own personal experiences and observations. We are susceptible to the emotional highs and lows of the people that we interact with especially when we care about them and they are significant in our lives. “The feelings of the people that surround us are contagious. We cannot help but feel our mood drop in a room full of sorrow, or our spirits elevate around cheerful people” (Keysers, 2011, p.91). The sharing of these emotional highs and lows are what cause us to feel a sense of connection and belonging to the people and the world around us. “In human behavior, emotional contagion is described as a simple state in which one simply “catches” the emotions of another producing a similar internal state in the observer that resulted directly from the observation (Hatfield, Cacioppo, & Rapson, 1993; Hoffman, 2000). Such contagion, also known as the “resonance” of emotion among individuals, is widespread, occurs early in development, and exists across species” (Preston & de Waal, 2002a, as cited in Buchanan et al., 2012). Ferrari and Rizzolatti (2014) explain how interest in the mirror mechanisms increased when it was discovered that these mechanisms are also present in the emotional brain centers, “...there is clear evidence that brain structures involved in the integration and control of emotions, like the insula and the anterior cingulate, respond both when one feels an emotion (e.g. pain or disgust) owing to natural stimuli, or when one observes that emotion in others. This mechanism allows a direct first-person understanding of ‘others’ emotions. Your pain is my pain” (Ferrari & Rizzolatti, 2014).

We are all very familiar with these reactions or feelings of emotional resonance within us when observing emotions in others. This emotional connection begins at a very young age

and continues to develop and become more intuitive as we get older. A study conducted by Waters et al., (2014) worked with mothers and infants to investigate this contagion. The mothers and babies were separated and the mothers were exposed to a positive stressful situation, a negative stressful situation and a neutral situation as a control on their own. When the mothers were reunited with their infants, the babies reacted accordingly to the stimuli that the mothers were exposed to. “These findings suggest that mothers’ stressful experiences are contagious to their infants and that members of close pairs, like mothers and infants, can reciprocally influence each other’s dynamic physiological reactivity” (Waters et al., 2014).

It has also been suggested that the emotional contagion that we feel and internalize is amplified when we engage with people that we care about, for example in a student-teacher relationship. The intensity of the emotional, empathic reaction depends greatly on the interdependence or interrelationship with the person or group of people. Iacoboni et al., (2002) explains that the concept of interdependence can be temporary and superficial, like when you have to work with colleagues or community members for a local goal or it can be long lasting and deep, like the interdependence created in relationships with family, spouses, close friends and students. He continues by emphasizing that the more invested and interrelated you are in the relationship with the person that you are interacting with, the more similar and intense your activated emotional responses will be. The personal relationship matters, when you are genuinely interested and care about the people that you interact with, you are more susceptible to absorbing their emotional highs and lows within your own bodily state.

Emotional Contagion in Women

Kessler and McLeod (1984) explain that women tend to be more emotionally impacted than men by life events that happen to people in their social network. From an early age, women

tend to develop a moral sense that focuses on caring for others over oneself. Women tend to be more attuned to the needs of those around them and put forth effort and concern in meeting those needs (Kessler & McLeod, 1984). Women seem to be more susceptible to emotional contagion and stress contagions due to their innate, empathic, 'care-giving' nature and often feel the need to help relieve the stress of others.

Women have been shown to have a stronger orientation than men to decipher the needs and desires of those around them, especially loved ones. This level of emotional involvement or the deep personal concern for the well-being of others could be categorized as empathy. (Kessler, McLeod, & Wethington, 1985, as cited in Kirby, 2007, p.3)

The term empathy was first developed in the nineteenth century and early twentieth century in regard to the aesthetic, bodily experience that takes place within a viewer when looking at and interacting with art. Robert Vischer and Theodor Lipps first coined the term 'Einfühlung' which literally translates as 'feeling into' (Ganczarek et al, 2018). Empathy can be characterized as the ability to take another's perspective and involves embodying and understanding what it would be like to be living and feeling as that person does. Empathy aids in understanding others emotions, intentions and actions (Ganczarek et al, 2018).

Nagoski (2013) has coined the phrase 'Human Giver Syndrome' related to this selfless, empathic care-giving nature in women. It is characterized by the deep seeded assumption that women should put everyone else's needs before their own, which depletes women of the energy to properly care for their own personal needs and it is common for women to actually view self care as 'selfish.' The National Center for Educational Statistics states that 76% of teachers are women (National Center for Educational Statistics, 2020). Research shows that teaching is one of the most stressful occupations and puts teachers at risk of burnout, poor social-emotional wellbeing, depersonalization, etc. (Skaalvik, 2010). It's not uncommon for educators to feel

overwhelmed, emotionally exhausted, and burned out despite their best efforts to set boundaries and manage a work/life balance.

Stress Contagion

Above and beyond empathy and emotional contagion, studies have also shown that there is a stress contagion transfer that takes place specifically with teachers and students. A stress contagion study was conducted by Oberle (2016) which measured the cortisol levels of both teachers and students in the morning and showed that teachers' occupational stress corresponds with student's psychological stress. Teachers not only absorb the stress from their students but the student's feel and absorb the stressful feelings from their teachers. Teachers have to be conscious of this transfer and emotional contagion when teaching and interacting with their students. When feeling stressed, anxious or overwhelmed students do not perform to their highest potential (Schonert-Reichl, 2017) and the same could be said for teachers. This awareness of emotional and stress contagion is important to consider when attempting to maintain a level of self care and personal boundaries.

Mirror Neurons in the Art Room

“Art is defined as expression or application of human creative skill and imagination producing works to be appreciated primarily for their aesthetic value or emotional power. This definition encompasses two very important elements—the creation and reception of art—and by doing so it establishes a link, a dialogue between the artist and spectator” (Piechowski-Jozwiak, B., Boller, F., & Bogousslavsky, J., 2017). This connection or dialogue between the artist, the artwork and the viewer is the focus on in the next section of this thesis. Mirror neurons evoke an embodied response with our minds and our bodies when creating and viewing art. These mirror neurons link our ability to form connections with the art making process, aid in emotional

connection and empathy, activate the motor system when viewing gestural marks in a completed work of art as well as when we observe someone working with art materials. Mirror neurons are what create this ‘dialogue between the artist and spectator’ and are what allow us to think outside of our own mind and body to realize that we are connected to the world around us. “We have to stop thinking in dualistic terms that asset the conscious logical rational mind in opposition against gut reactions. The body, brain, and conscious mind are partners, in permanent exchange” (Keysers, 2011, p.105).

Human Mirroring and Observational Learning

When introducing methods and techniques involved in the creation of various art forms we need to remind ourselves and be conscious of the fact that students may not have ever worked with these mediums before or are not in the regular practice of using these mediums and art making tools. It is important for the teacher to physically demonstrate how to interact with art mediums while explaining their actions and intentions behind techniques. “With the discovery of mirror neurons, understanding how we learn to perform an action by observing someone else perform a similar action becomes a tangible problem” (Keysers, 2011, p.60). Art teachers can use their bodies as channels of communication to aid in understanding and student engagement. As Keysers (2011) emphasises:

In terms of teaching, the mirror system suggests that abstract theory might not always be the most effective way of teaching. Language, the most widely used teaching tool, has been evolving for at most two million years. Learning by observation on the other hand is a capacity that is many hundreds of millions of years old. What that means is that, by focusing on verbal teaching, a teacher neglects learning channels that are ancient and immensely effective. Mirror neurons open an exquisitely privileged door between the brain of a teacher and his students. (p.63).

Imagine trying to properly center and throw clay on a wheel after someone simply explained it to you. Or attempting to communicate values or drawing from observation if you have never

attempted it before. It would be difficult to know where to start, to feel confident in your abilities and your muscles quite honestly, might not know what to do. Teachers need to lead by example with their students and attempt to get into their minds of inexperience.

I have to remind myself that even if I am familiar, confident and comfortable with an artmaking technique, that feeling has come from a lot of time and practice. Conversely, if my students have never attempted it themselves or have never been exposed to it, they are going to be confused, self conscious and hesitant to put forth real effort and truly engage. “Learning from observation...feels direct and intuitive. Tying a knot while we have an experienced sailor slowly demonstrating the knot feels natural; trying to tie the knot based on a description in a book is a frustrating experience” (Keysers, 2011, p.64). Making observational, bodily connections is key for student success in the art room.

Artistic skills are something that can be learned, practiced and developed. Students need to be shown techniques and skills in order to create a foundation for them to build on while creating their own personal styles. Teaching by example allows the students to observe these techniques and imitate them easier. Watching the movements of the teachers hands, the application of the paint, the spread of the paint on the canvas, rolling and throwing clay, etc. all becomes more tangible and understandable when students can observe the teacher demonstrating. Through emotional contagion, student’s feed off of the teacher’s state of mind and attitude. If students see and hear the teacher’s enthusiasm, that feeling and emotion is also communicated through mirror neurons. We also know that students have different learning styles whether it be kinesthetic, auditory or visual so explaining artmaking methods while showing the students at the same time can aid in their understanding and engagement. “Through

motor activation, the mirroring mechanism allows human beings to experience their own actions, as well as those of others, at an abstract level of representation” (Jeffers, 2009).

Simulation

It is helpful for students to be physically working with the art materials at the same time that the teacher is demonstrating those techniques. The entire premise of mirror neurons is that they are activated not only when someone is executing an action but also when it is observed, however studies show that the simulation and connection is stronger if students have performed the action themselves in the past. “A stronger mirror response occurs at the sight of a movement that has been practiced over and over again” (Keysers, 2011, p.54). This is something to consider when demonstrating and explaining new techniques. Another helpful analogy is to consider sports, obviously “we can perceive the basic movements of sports and activities we have never performed, but activities we have been trained in are perceived in a richer way” (Keysers, 2011, p.55). Take wheel throwing for example, when demonstrating and explaining the process to a student prior to them ever trying may seem very foreign to them. They will not be able to truly connect with the process or appreciate the difficulty for that matter until they physically attempt the process themselves and continue practicing and engaging with that material over time.

Simulation of the mirror system, more specifically the brain activity in the premotor regions, activates not only when viewing an action but also when hearing or imagining an action (Keysers, 2011). Simply imagining an action, a brush stroke, or a gestural line, can activate the feeling behind the action without actually performing it. Using descriptive language with students while describing artistic techniques and styles can help them to envision, understand and simulate what it would feel like to physically engage with those methods. “Imagining

actions, viewing actions, and hearing the sound of actions can thus all be seen as examples of simulation. The difference is what triggers the simulation. During imagination, the simulation is internally triggered through our will to imagine an action, whereas during action-observation or when listening, it is triggered by a stimulus in the outside world, such as the sight or sound of a similar action” (Keysers, 2011). “Before the discovery of mirror neurons, most people would have thought that imagining a situation and actually seeing the situation are quite different processes. The similarity of these processes in neural terms is a wonderful example of how brain science can remove conceptual barriers” (Keysers, 2011).

Mirror Neurons Are Goal Oriented

“The neurons firing in anticipation of a motor action (canonical neurons) are believed to work together with mirror neurons. That is to say that the human motor system codes both the goal of the motor action and the way it is executed” (Piechowski-Jozwiak, et al., 2017). Being clear about artistic intentions is valuable for student engagement and understanding. “In 2004, Rizzolatti et al. presented two hypotheses on the functional role of mirror neurons and suggested that they constitute a basis for action and intention understanding and action imitation” (Rizzolatti, G. & L. Craighero. 2004, as cited in Schober & Sabitzer, 2013). Mirror neurons are goal oriented so it is important for students to know the intentions and purpose behind the art techniques that are being employed and practiced. “Our ability to understand actions implies that mirror neurons are able to transform visual information of an observed action into knowledge allowing us to imitate it” (Rizzolatti, G. & L. Craighero. 2004, as cited in Schober & Sabitzer, 2013). Action imitation is a common consequence of action understanding (Keysers, 2011).

Our modern cultures, in which we write, speak, read, build spaceships and go to school, can work only because we are not restricted to the behavior we are born with or learn by

trial and error. We can learn a lot by simply watching others. [Because of Mirror Neurons, we have the] capacity to acquire skills and knowledge rapidly from other people. (p.59).

Mirror neurons and the activation of the motor system allow students to learn artistic techniques by imitating and practicing what teachers physically show them. To this point, it is important to note that encouraging autonomy is a must. Directly copying what the teacher demonstrates can be useful when the materials/techniques have just been introduced but autonomy and personal choice should be encouraged once students are feeling more comfortable. Students should be using the skills that they imitate to further develop their own personal styles. Creative exploration and experimentation is a must. There must be clarification that the demonstration is purely a visual example of one way to accomplish a task. It is important to emphasize that there are multiple paths to be taken in order to accomplish the same goal. Student's individual styles, strengths and weaknesses in different techniques and mediums are to be acknowledged, celebrated, encouraged and supported. When demoing how to execute a certain technique, it is important to clarify that the teacher's personal style and way of execution has developed over time and practice. If all students created the exact same project, in the exact same way, it would be repetitive and restrictive of their personal voices and styles.

Teachers can show their students the foundational skills and techniques in each medium that is introduced but then give them flexible parameters or goals for each project while encouraging them to embrace some autonomy and personal choice. Some students flourish with this type of freedom while others shutter at the idea that they have complete responsibility over their artistic decisions. The art room allows for individual freedom, voice, and style. Teachers have the ability to push their students to think deeply, to extend themselves out of their comfort zone, to take risks, to experiment and to push themselves to reach their full creative potential.

Learning from observation is the starting point to build their confidence and understanding of materials and techniques but it is imperative that they feel safe enough and confident enough to “develop their own way” (Keysers, 2011, p35).

Mirror Neurons and Embodied Simulation When Viewing Art

“Given human symbolic and abstract cognition, and the uniqueness of art production in human societies, we should assume that aesthetic reactions to art are humanly unique, too, and are couched in the same type of abstract cognition” (Zaidel et al., 2013). Student’s emotional reactions, visceral and verbal responses and empathic connections to various works of art may all be different. There is no correct way to interpret or respond to a work of art. It is important to acknowledge this and discuss it openly with students in order to create a safe and comfortable environment for students to respond to and discuss works of art. “Our aesthetic reaction is to the talent, skill, creativity, innovation, intellectual, and virtuosity we detect in the art” (Zaidel, 2013).

Most of us have experienced some sort of visceral reaction when viewing works of art. There is an intuitive response or what Freedberg and Gallese (2007) explain as *embodied simulation*, that refers to the way in which we empathize with others’ behaviors and experiences but more specifically that we have the ability to empathize with various aspects of works of art. Freedberg and Gallese (2007) explain that

Our capacity to pre-rationally make sense of the actions, emotions and sensations of others depends on embodied simulation, a functional mechanism through which the actions, emotions or sensations we see activate our own internal representations of the body states that are associated with these social stimuli, as if we were engaged in a similar action or experiencing a similar emotion or sensation. (p. 198).

Our mirror neurons allow us to empathize and understand the actions and intentions of the artist, they allow connection, we can feel the emotions of the depicted subject matter and our motor

systems also seem to mimic the gestural strokes and movements within a piece as if we were drawing or painting it ourselves in our mind (Freedberg & Gallese, 2007). “The importance of empathy for aesthetics was first emphasized by Robert Vischer in 1873. By *Einfühlung*, literally ‘feeling-in’, Vischer meant the physical responses that are generated by the observation of paintings. He described how particular forms aroused particular responsive feelings, depending on their conformity to the design and function of the muscles of the body” (Vischer, 1873 as cited in Freedberg & Gallese, 2007). Different emotions are provoked depending on artistic styles, color schemes and subject matter. “Embodied responses can, and often do, happen spontaneously as viewers encounter an artwork. Teachers attuned to their students' facial expressions, body gestures, and special sounds are in a good position to acknowledge physical and emotional reactions and to incorporate them into the art program” (Hubard, 2007). When students are exposed to a variety of styles, cultures, techniques, concepts and ideas in the art room it allows for more engagement and connection. It is beneficial to encourage conversation amongst students about these physical and emotional reactions when viewing works of art. Hubard (2007) claims that exposing students to various works of art that provoke a variety of embodied responses can encourage deeper learning, engagement and understanding in our students. In the art room, we have the opportunity to embrace and encourage emotional simulation and responses, unlike other school subjects where emotions are regarded as something that needs to be “tamed or controlled to achieve cognitive performance” (Kerka, 2002 as cited in Hubard, 2007).

When viewing works of art, this embodied simulation caused by our mirror neurons, can draw us in and intrigue us or even repulse us, depending on the media, subject matter, techniques, artist’s intentions or underlying concepts. For some works of art, the function and

purpose is meant to be simply decorative while others contain much deeper meanings, are meant to shock and provoke emotions, some are educational, some document certain events, opinions, cultures, traditions, social norms. The list goes on and on. Understanding the concept of embodied simulation can be very effective in the classroom when exposing students to various artists and works of art. Discussing student's reactions, provoked emotions and curiosities is a great way to supplement open and honest conversations and helps to build a sense of empathy between students and within the classroom setting. "The investigation of embodied learning is particularly relevant in art education. Unlike the contents of written texts, artworks present themselves as physical (or virtual) entities that exist in the same space as we do" (Hubard, 2007). Art is interactive, it begs for connection, conversations and embodied simulation in the viewer.

These are two extreme but effective examples to see if you can feel an embodied response, empathetic connection or bodily reaction. Freedberg and Gallese (2007) explain that researchers believe "that the feeling of physical involvement in artworks not only provoke(s) a sense of imitating the motion seen or implied in the work, but also enhances the spectator's emotional responses to it." In David Alfaro Siqueiros's 1937 painting, *Echo of a Scream*, the child looks as though he is in anguish amidst the rubble and debris left behind by the war. It implies trauma and a sense of death and great loss. The color scheme is dark and ominous while the stark contrast of the highlights on his face intensify the hysterical, painful expression. The sporadic lines and angles of the debris implies a feeling of chaos. He is alone. How does this painting make you feel? What do you imagine this would sound like? Have you ever been this upset about something? Can you relate to his pain and suffering?

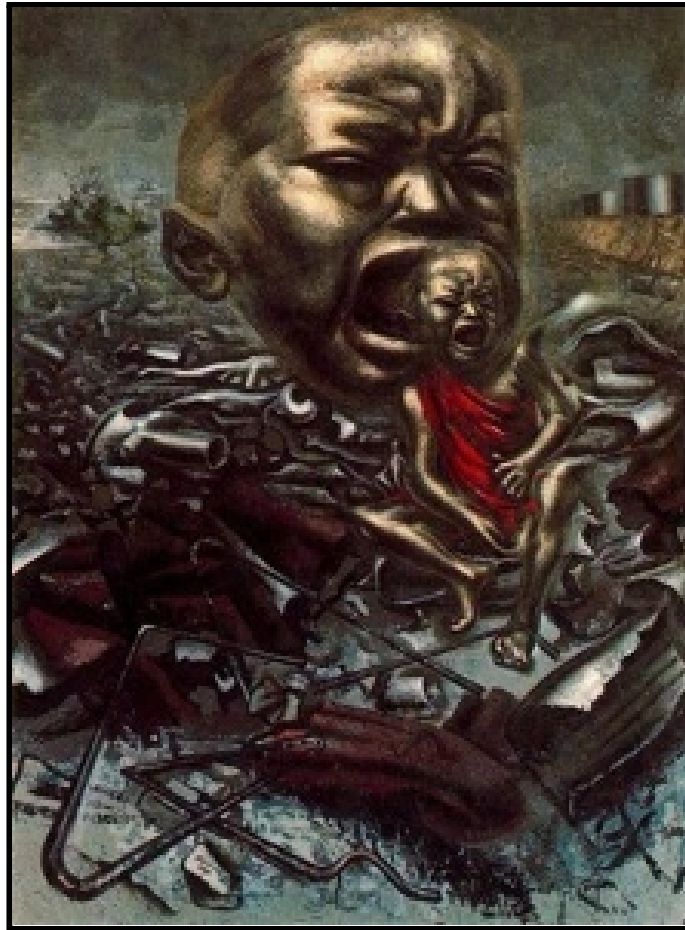


Figure 1. Echo of a Scream. David Alfaro Siqueiros. 1937. Image copyright The Museum of Modern Art, NY. Published under fair use.

In contrast, Mary Cassatt's 1897 painting, *Breakfast in Bed*, appears to set a mood that is loving, calming, comforting and caring. The viewer witnesses a sweet and private moment between mother and child. The color scheme is light, bright and pastel implying an airy light hearted mood. The brushstrokes are soft and gentle. The facial expressions on both the mother and child seem to express safety, belonging and security with one another. How does this painting make you feel? Can you imagine the soft sheets on your skin? Or the gentle embrace of the mother? What kind of relationship do you have in your life that imitates this feeling of love, vulnerability and belonging?



Figure 2. Breakfast in Bed. Mary Cassatt. 1897. Image copyright The Huntington Library. Published under fair use.

We have the ability to empathize with these scenes because our mirror neurons connect with our own personal emotions, experiences, trauma and relationships. Embodied simulation takes that initial intuitive reaction one step further and focuses on the physical, bodily sensations that are evoked when looking at art. We can notice these sensations taking place within our students when viewing various works of art. They may be physically disgusted, intrigued, confused, saddened, shocked, empathetic, happy, etc. or they might express these sensations verbally depending on the work of art they are viewing. Having open classroom discussions about these

embodied responses and the various ways in which they can also aid in building a sense of connection, community and understanding in the classroom setting. It is valuable for students to hear other reactions and opinions outside of their personal perspectives as well.

Embodied Simulation: Actions and Intentions

“Research on the human mirror neurons has shown that the observation even of static images of actions leads to action simulation in the brain of the observer” (Freedberg & Gallese, 2007). As stated previously, our mirror neurons are goal oriented, they want to understand the purpose or intention behind an action whether that is an action that we observe in real life or a static action depicted in a work of art. Mirror neurons have also been shown to respond to actions that are implied even when the final stage is omitted (Freedberg & Gallese, 2007). For example, if we see a painting of a hand grasping for an apple, our motor systems predict and envision the next steps. We intuitively predict the purpose of the action and what would happen if it were to take place in real life. Furthermore, our mirror neurons and motor systems represent actions in our brains as felt physical responses to works of art. One may feel responses in the parts of the body shown to be engaged in the physical actions they are observing, or “one might feel that one is copying the gestures and movements of the image one sees” (Freedberg & Gallese, 2007).

Embodied Simulation: Objects

Freedberg and Gallese (2007) explain that even when viewing static graspable objects in a work of art, such as tools, fruits, vegetables or clothes, simulates not only the visual area of the brain but also the motor areas that control the actions associated with said objects. The same motor neurons are activated from viewing a static object because seeing it triggers its familiar purpose or use in our brains. Our brain jumps to the intention of those objects or our normal

interactions with said objects. When viewing a hammer, for example, our motor systems engage as if we were using the hammer in real life. We can physically feel it grasped in our hand, the weight of it, we can feel our muscles contracting and the exertion of force involved as we envision hammering a nail. If you view a static apple in a still life, you may be simulated to the feeling of it in your hand, the sounds, textures, smells and even the crunch and sweet juices on your tongue as you imagine biting into it. “This mechanism of motor simulation, coupled with the emotional resonance it triggers, is likely to be a crucial component of the esthetic experience of objects in art works: even a still-life can be ‘animated’ by the embodied simulation it evokes in the observer’s brain” (Lipps, 1903, as cited in Freedberg & Gallese, 2007).

Embodied Simulation: Emotions and Sensations

It stands to reason that if our mirror neurons allow us to subconsciously and empathically connect with others and mimic their facial expressions when face to face, that we would react to the same expressions in static emotional depictions in works of art. Freedberg and Gallese (2007) claim that emotions are contagious even when viewed in a static work of art. As stated previously, “Studies reveal that when people are exposed to emotional facial expressions, they spontaneously react with distinct facial electromyographic (EMG) reactions in emotion-relevant facial muscles. These reactions reflect, in part, a tendency to mimic facial stimuli.” (Dimberg et al., 2000). “These results clarify the many ways that spectators precognitively grasp emotions that are either explicitly shown or implicitly suggested by works of art (as well as images more generally)” (Freedberg & Gallese, 2017). Majority of these studies were conducted by exposing participants to photographs of particular emotions while monitoring their physical and emotional responses. For example, Likowski et al., (2012) used digital avatars or graphic substitutions for real people to evoke a mimicry response in the

participants similar to what students might be exposed to in the art room. Face to face interactions with emotional people most likely evoke a stronger mimicking and mirrored response than when viewing these emotions depicted in a work of art, however, evidence shows that empathic connections exist when simply viewing photographs or graphic representations of people expressing certain emotions (Likowski et al., 2012, Dimberg et al., 2000, Ekman, 2007). It is important to note again, that students may outwardly express their reactions to the facial expressions in different manners depending on cultural and social norms.

In regard to sensation, studies have shown that even when viewing the sight of someone or something being touched evokes what Keysers et al., 2004, describes as tactile empathy. Our mirror neurons create a shared circuit for touch that so “when we witness touch, we do not just *see* touch but also *understand* touch through an automatic link with our own experience of touch. The brain implicitly transforms the sight of touch into the inner representation of touch” (Keysers et al., 2004). Freedberg and Gallese (2007) also claim that we respond not only to the emotions displayed in the work of art but also to the bodily sensations shown. They claim that when we see the body part of someone else being touched, caressed or damaged, our minds simulate a similar sensation as if we were the subject of the same interaction. For example, if you see someone's foot being tickled by a feather your foot simulates that ticklish feeling, or perhaps you witness someone with punctured skin you could very well imagine and “literally feel the pain, in a vivid and localized fashion” (Keysers, 2011). We can empathize with the sensations of others based on our own personal, past experiences as well as our imagination of it. These sensations can extend beyond simply touch and can also stimulate feelings of hotness, coldness, itching, etc. If we simply see the body of another individual being subjected to a certain stimulus we feel what the other person is feeling (Keysers, 2011). “In the context of the

existing results on actions and emotions, one might speculate that the brain is parsimonious: it uses the same mechanism of shared circuitry for actions, emotions, and sensations” (see the Shared Manifold Hypothesis, Gallese, 2003 as cited in Keysers et al., 2004)

Embodied Simulation: Feeling the movement of gestural marks

“With abstract paintings such as those by Jackson Pollock, viewers often experience a sense of bodily involvement with the movements that are implied by the physical traces – in brush marks or paint drippings – of the creative actions of the producer of the work” (Freedberg & Gallese, 2007). Viewing expressive artwork forces us to imagine the creation and movements behind the gestural strokes, the emotions felt as the artist made the strokes, the amount of pressure that was applied with the brush, etc. Freedberg & Gallese (2007) explain that,

Whether in response to a wide range of non-figurative works or to figurative works where the marks of the maker’s instruments are particularly clear, observers often feel a form of somatic response to vigorous handling of the artistic medium and to visual evidence of the movement of the hand more generally. Such issues cast considerable light on esthetic experience because it is here divorced from any form of overt imitation of a realistically portrayed gesture or movement, but rather it is related to what is implicit in the esthetic gesture or movement. (p. 201-202).

The marks, splatters, tears, impressions, streaks, etc. activate simulation of the motor programs that correspond to the implied gestures. “The marks on the painting or sculpture are the visible traces of goal-directed movements; hence, they are capable of activating the relevant motor areas in the observer’s brain” (Freedberg & Gallese, 2007). These felt motor simulations can be heard and seen in our students when viewing expressive works of art. They may mimic hand gestures or say *swoosh* as they trace their hands in the air (Hubard, 2007). Again, it is important to note that students will have a stronger connection to the gestures that they see if they, themselves have performed similar actions in the past. If a student has never thrown or splattered paint similar to Jackson Pollock may they may not have as strong of a connection, understanding or appreciation for the gestural movements and energy involved in its creation.

An interesting study done in 2006 focused on this concept and compared a group of participants who were experienced piano players to non piano playing participants (Keysers, 2011).

Both groups listened to recordings of a piano concert while the scientists measured their brain activity. The experienced piano players automatically activated the premotor programs involved in piano playing. Somehow, by learning to *play* the piano, they had changed the way they *hear* piano music. Suddenly, they not only heard the piano through their ears but also started to perceive it through movements of their own fingers, which was not the case for the musical novices. (p.54).

This needs to be anticipated within our students. Techniques and methods seem easier or less engaging from a distant or unknowing perspective. Students are not going to have an appreciation for the art that they see until they have personally attempted it themselves. They need to feel the materials, engage in the artmaking processes, and perhaps even struggle with the techniques. They will not have as strong of an empathetic connection or appreciation for the challenges and frustrations that go into creating a work of art until they have physically done it themselves. Teachers need to give them the freedom to play and experiment, to feel these gestures with their own hands so that they can connect with the artists and artwork on a more intensely visceral level.

Conclusion

It is my hope through these research findings and explanations that art teachers can use this information to work towards building deeply personal and empathic classroom environments and personal relationships with their students. Mirror neurons are the basis of empathy and empathy is what connects us emotionally. Understanding mirror neurons and embodied responses allow for more significant and meaningful experiences for students and the work that they see and create. I have organized and written an art educators workshop based on these findings that is geared towards 9-12th grade art teachers. The understanding of mirror

neurons has aided my understanding of human connection, emotions, personal interactions and aesthetic responses and I believe that it can be beneficial to other art teachers as well.

References

- Baird, A. D., Scheffer, I. E., & Wilson, S. J. (2011). Mirror neuron system involvement in empathy: A critical look at the evidence. *Social Neuroscience*, 6(4), 327-335.
doi:<http://dx.doi.org.libproxy.library.wmich.edu/10.1080/17470919.2010.547085>
- Bastiaansen, J. A., Thioux, M., & Keysers, C. (2009). Evidence for mirror systems in emotions. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, 364(1528), 2391–2404. <https://doi.org/10.1098/rstb.2009.0058>
- Buchanan T., Bagley S., Stansfield B., & Preston s. (2012) The empathic, physiological resonance of stress, *Social Neuroscience*, 7:2, 191-201,
<https://doi.org/10.1080/17470919.2011.588723>
- Dimberg, U., & Thunberg, M. (1998). Rapid facial reactions to emotional facial expressions. *Scandinavian journal of psychology*, 39(1), 39–45.
<https://doi.org/10.1111/1467-9450.00054>
- Dimberg, U., Thunberg, M., & Elmehed, K. (2000). Unconscious Facial Reactions to Emotional Facial Expressions. *Psychological Science*, 11(1), 86–89.
<https://doi.org/10.1111/1467-9280.00221>
- Dobbs, D. (2006). A Revealing Reflection. *Scientific American Mind*, 17(2), 22-27. Retrieved November 21, 2020, from <http://www.jstor.org/stable/24939445>.
- Ekman, P. (1977). University of California, San Francisco. NONVERBAL BEHAVIOR AND COMMUNICATION, A. Siegman & S Feldstein. (eds.) New Jersey: Lawrence Erlbaum Association.
<https://www.paulekman.com/wp-content/uploads/2013/07/Facial-Expression.pdf>

- Ferrari, P., & Rizzolatti, G. (2014). Introduction: Mirror neuron research: The past and the future. *Philosophical Transactions: Biological Sciences*, 369(1644), 1-4. Retrieved November 21, 2020, from <http://www.jstor.org/stable/24500752>
- Freedberg, D., & Gallese, V. (2007). Motion, emotion and empathy in aesthetic experience. *Trends in Cognitive Sciences*, 11(5), 197–203. <https://doi.org/10.1016/j.tics.2007.02.003>
- Frith, C. (2009). Role of Facial Expressions in Social Interactions. *Philosophical Transactions: Biological Sciences*, 364(1535), 3453-3458. Retrieved December 6, 2020, from <http://www.jstor.org/stable/40538139>
- Gablik, S. (1992). Connective Aesthetics. *American Art*, 6(2), 2-7. Retrieved March 8, 2021, from <http://www.jstor.org/stable/3109088>
- Gallese, V. 2003 The roots of empathy: the shared manifold hypothesis and the neural basis of intersubjectivity. *Psychopathology* 36, 171 –180. (doi:10.1159/000072786)
- Gallese V., Fadiga L., Fogassi L., Rizzolatti G. Action Recognition in the Premotor Cortex. *Brain*. 1996;119:593–609. doi: 10.1093/brain/119.2.593.
- Ganczarek, J., Hünefeldt, T., & Olivetti Belardinelli, M. (2018). From "Einführung" to empathy: exploring the relationship between aesthetic and interpersonal experience. *Cognitive processing*, 19(2), 141–145. <https://doi.org/10.1007/s10339-018-0861-x>
- Hubard, O. (2007). Complete engagement: Embodied Response in art museum education. *Art Education*, 61(6), 46-52.
- Iacoboni, M., & Lenzi, G. L. (2002). Mirror neurons, the insula, and empathy. *Behavioral and Brain Sciences*, 25(1), 39-40. Retrieved from <http://libproxy.library.wmich.edu/login?url=https://www-proquest-com.libproxy.library>.

wmich.edu/scholarly-journals/mirror-neurons-insula-empathy/docview/212309404/se-2?accountid=15099

Jeffers, C.S. (2009). Within Connections: Empathy, Mirror Neurons, and Art Education, *Art Education*, 62:2, 18-23, DOI: [10.1080/00043125.2009.11519008](https://doi.org/10.1080/00043125.2009.11519008)

Jeffers, C.S. (2010). A Still Life Is Really a Moving Life: The Role of Mirror Neurons and Empathy in Animating Aesthetic Response. *The Journal of Aesthetic Education* 44(2), 31-39. doi:10.1353/jae.0.0079.

Keen, S. (2006). A Theory of Narrative Empathy. *Narrative*, 14(3), 207-236. Retrieved March 7, 2021, from <http://www.jstor.org/stable/20107388>

Kessler, R., & McLeod, J. (1984). Sex Differences in Vulnerability to Undesirable Life Events. *American Sociological Review*, 49(5), 620-631. Retrieved March 17, 2021, from <http://www.jstor.org/stable/2095420>

Keysers, C. (2011). *The Empathic Brain*. Chicago: University of Chicago Press.

Keysers, C., Wicker, B., Gazzola, V., Anton, J. L., Fogassi, L., & Gallese, V. (2004). A touching sight: SII/PV activation during the observation and experience of touch. *Neuron*, 42(2), 335–346. [https://doi.org/10.1016/s0896-6273\(04\)00156-4](https://doi.org/10.1016/s0896-6273(04)00156-4)

Kirby, H. (2007). *The Relationship Between Level of Empathy and Stress Contagion*. Graduate Student Theses, Dissertations, & Professional Papers. 1061. <https://scholarworks.umt.edu/etd/1061>

Likowski, K. U., Mühlberger, A., Gerdes, A. B., Wieser, M. J., Pauli, P., & Weyers, P. (2012). Facial mimicry and the mirror neuron system: simultaneous acquisition of facial electromyography and functional magnetic resonance imaging. *Frontiers in human neuroscience*, 6, 214. <https://doi.org/10.3389/fnhum.2012.00214>

- Minahan, J. (2019). Building positive relationships with students struggling with mental health. *Phi Delta Kappan*, 100(6), 56-59.
doi:<http://dx.doi.org.libproxy.library.wmich.edu/10.1177/0031721719834030>
- Mukamel R., Ekstrom A. D., Kaplan J., Iacoboni M., Fried I. (2010). Single-neuron responses in humans during execution and observation of actions. *Curr. Biol.* 20, 750–756
10.1016/j.cub.2010.02.045.
- Nagoski, E. (2019). *Burnout: The Secret to Unlocking the Stress Cycle*. Random House Publishing Group.
- National Center for Educational Statistics. (2020, May). *Characteristics of public school teachers*. https://nces.ed.gov/programs/coe/indicator_clr.asp
- Oberle, E., & Schonert-Reichl, K. A. (2016). Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. *Social science & medicine (1982)*, 159, 30–37.
<https://doi.org/10.1016/j.socscimed.2016.04.031>
- Piechowski-Jozwiak, B., Boller, F., & Bogousslavsky, J. (2017). Universal Connection through Art: Role of Mirror Neurons in Art Production and Reception. *Behavioral sciences (Basel, Switzerland)*, 7(2), 29. <https://doi.org/10.3390/bs7020029>
- Rizzolatti, G. & L. Craighero. 2004. “The Mirror-Neuron System.” *Annual Review of Neuroscience*. 27, pp. 169-192.
- Ross, S. (1984). Painting the Passions: Charles LeBrun's Conference Sur L'Expression. *Journal of the History of Ideas*, 45(1), 25-47. doi:10.2307/2709329.
- Schober P., Sabitzer B. (2013). Mirror Neurons in Education. Proceedings of INTED2013 Conference 4th-6th March, Valencia, Spain.

- Schonert-Reichl, K. (2017). Social and Emotional Learning and Teachers. The Future of Children, 27(1), 137-155. Retrieved March 7, 2021, from <http://www.jstor.org/stable/44219025>
- Skaalvik, E., Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. Teaching and Teacher Education, 26(4), 1059-1069. Teaching and Teacher Education. 26. 1059-1069. 10.1016/j.tate.2009.11.001
- Waters, S. F., West, T. V., & Mendes, W. B. (2014). Stress contagion: physiological covariation between mothers and infants. *Psychological science*, 25(4), 934–942. <https://doi.org/10.1177/0956797613518352>.
- Wicker, B., Keysers, C., Plailly, J., Royet, J. P., Gallese, V., & Rizzolatti, G. (2003). Both of us disgusted in My insula: the common neural basis of seeing and feeling disgust. *Neuron*, 40(3), 655–664. [https://doi.org/10.1016/s0896-6273\(03\)00679-2](https://doi.org/10.1016/s0896-6273(03)00679-2)
- Zaidel, D. W., Nadal, M., Flexas, A., & Munar, E. (2013). An evolutionary approach to art and aesthetic experience. *Psychology of Aesthetics, Creativity, and the Arts*, 7(1), 100–109. <https://doi.org/10.1037/a0028797>

Appendix
Mirror Neuron Workshop
for Secondary Art Educators

Introduction - Mirror Neurons in Art Education

1. Required Materials:
 - a. White boards on stands for each table of participants
 - b. White board markers for each table
 - c. Each Participant needs a laptop with connection to wifi
 - d. Pictionary Cards for each table
 - e. Projector/smart board visible to all participants
 - f. Name tags with colors for teams (groups of 3, two teams per table)
 - g. Paper and writing materials for participants
 - h. Watercolor paints, paper, brushes, water cups, and paper towels for media studies

2. Welcome!
 - a. A little bit about me...
 - b. Research Findings
 - c. Goal/Purpose
 - d. Itinerary/Plans for the day
 - e. Part 1: Mirror Neurons and Empathy
 - f. Part 2: Mirror Neurons in the Art Room
 - g. Classroom Environment/Expectations

3. Classroom Environment - You get what you give.

It is important that everyone feels safe and comfortable. Please allow yourself to be open minded and exude an attitude of acceptance, kindness, respect and vulnerability.

4. Pictionary!
 - a. Each table is divided into two teams of 3 participants.
 - b. Each participant gets two turns at one minute each.
 - c. While you are playing, notice how you are feeling. Nervous? Excited? Anxious?
 - d. Ready, set, go!

5. Reflection of Mirror Neurons:
 - a. Did you feel anxious for the person drawing?
 - b. Were you excited by your peers?
 - c. Were you nervous when it was your turn?
 - d. What were you hesitant about?

- e. Vulnerability, comradery, friendly competition, student relationships.

Part 1: Mirror Neurons and Empathy

1. What are Mirror Neurons?

- a. Introduction and discovery of Mirror Neurons.
- b. Action understanding, prediction, motor activation, goal oriented.
- c. Mirror Neurons = Empathy.

Speaker Notes:

- University of Parma in the early 1990s. Found by accident when scientists were monitoring the motor activation of monkeys when they performed motor tasks such as reaching and grasping. Scientists discovered that the same neural activity happened in the brain not only when the monkeys performed a task but also when they observed someone performing said task.
- Rizzolatti and his team named these neurons “mirror neurons” and reasoned that they react to and maybe even create a motor representation of an action in our brains (Schober & Sabitzer, 2013).
- There is a stronger correlation to neural activation if the subject has performed the task themselves before.
- Mirror neurons provide clarity for action understanding/intentions, they allow for prediction and anticipation of the goal of the action.
- Roy Mukamel provided the first concrete evidence of mirror neurons also being present in humans (Mukamel et al, 2010). Facial mimicry using brain imaging technology.
- Mirror neurons fire when we experience something but also when we witness someone else going through the same experience. Examples: yawning, crying when someone else is crying, becoming thirsty when you watch someone take a drink, anticipating the end goal of someone’s actions.
- Mirror neurons allow us to understand the minds, actions and emotions of others through direct simulation and embodied responses.
- Mirror neurons provide a neural basis for imitation, empathy and human connection.
- Emotions are contagious. Consider the people that you interact with, some are innately calmer, anxious, angry...etc. how do you feel when you interact with those people?

2. Activating and Acknowledging Mirror Neurons

- a. “We weep with the weeping, laugh with the laughing, and grieve with the grieving.” (Alberti L.B.,1972. as cited in Piechowski-Jozwiak et al., 2017)
- b. Video Clips to Spark Emotional Responses...

3. Activating Mirror Neurons With Anxiety/Fear

<https://www.youtube.com/watch?v=SROayQcQK3o>

4. Activating Mirror Neurons With Sadness

Parenthood-Season 4 episode 11. Minutes 32-36

<https://www.hulu.com/watch/0e33337f-5923-4bec-9105-163bc304a741>

5. Activating Mirror Neurons With Laughter

https://www.youtube.com/watch?v=4KcVeg__c7o

6. Reflections and discussion.

Part II - Mirror Neurons and Social Connection

- a. Understanding others as oneself
- b. Social brain development
- c. Human connection

Speaker Notes:

- The discovery of mirror neurons causes us to reflect on how connected we actually are to the people we interact and engage with on a daily basis, more specifically with students in the classroom. Keyser (2011) explains that the discovery of mirror neurons opens up our understanding to the social nature of our individual minds and the connections that exist with people that we interact with mentally, physically and emotionally.
- “Through the discovery of shared circuits, the body becomes central not only to our own emotional lives but also to the exchanges between our minds. To understand the actions of other individuals, we need to map them onto our own body’s motor programs. To understand their emotions, we need to map them onto our own visceral feelings” (Keyser, 2011)
- “More recent findings also show that this special class of neurons prompts people to consciously and unconsciously mirror their fellow human beings’ body language, facial expressions and emotion” (Bauer, J. 2006, as cited in Schober & Sabitzer, 2013).

1. Empathy

- a. The ability to understand others
- b. Einfühlung or ‘feeling in’
- c. We bring our experiences to empathy
- d. It includes our ability for awareness and intuitive understanding
- e. Mirror Neurons allow us to feel what another person is feeling

Speaker Notes:

- “Neuroscientists have already declared that people scoring high on empathy tests have especially busy mirror neuron systems in their brains.” (Keen, 2006).
<http://www.jstor.org/stable/20107388>

2. Empathy vs Sympathy

Brene Brown Video Clip: <https://www.youtube.com/watch?v=1Evwgu369Jw>

Part III - Empathy, Stress Contagion, Compassion Fatigue, Burnout

- Teacher’s levels of stress and burnout with their work is linked with students’ physiological stress regulation.
Elementary students, cortisol levels
(Orbere, 2016)

Speaker Notes:

- Stress and emotional contagion.
- Because of mirror neurons, we literally absorb this trauma and stress. This stress contagion can lead to compassion fatigue and eventual burnout making us less effective and less engaged teachers. Understanding the root causes of burnout are what led me to this research. I wanted to understand why I was struggling. Why was I so overwhelmed. How could I improve?
- “Neuroscientists have already declared that people scoring high on empathy tests have especially busy mirror neuron systems in their brains” (Keen, 2006).
- It has also been suggested that the emotional contagion that we feel and internalize is amplified when we engage with people that we care about, for example in a student-teacher relationship. The intensity of your emotional, empathic reaction depends greatly on your interdependence or interrelationship with the person or group of people. Iacoboni et al., (2002) explains that the concept of interdependence can be temporary and superficial, like when you have to work with colleagues or community members for a local goal or it can be long lasting and deep, like the interdependence created in relationships with family, spouses, close friends and students.

1. Concerns for Teachers and Levels of Burnout

- Over 40% of teachers leave the profession within the first 5 years of working.
- 66% of teachers consider leaving the profession.
- 15% of the overall teacher workforce leave the profession each year.
Chang, M. (2009)

2. Levels of Burnout, Empathy and Women

- Human Giver Syndrome (Nagoski, 2019)
- 76% of Teachers are Women (<https://www.gse.upenn.edu/news/teacher-workforce>)

c. Emotional Contagion and Trait Empathy

3. Activity: Trait Empathy Scale Personal Assessment

a. The Davis Interpersonal Reactivity Index

<https://fetzer.org/sites/default/files/images/stories/pdf/selfmeasures/EMPATHY-InterpersonalReactivityIndex.pdf>

Speaker Notes:

- Human Giver Syndrome commonly found with women (Nagoski, 2019).
- “Human Giver Syndrome-the contagious belief that you have a moral obligation to give every drop of your humanity-your time, attention, energy and love- in support of others, no matter the cost to you”(Nagoski, p.102)
- “When we experience stress on behalf of others, we may dismiss it as inconsequential or “irrational” and ignore it. Givers may spend years tending to the needs of others, while dismissing their own stress generated in response to witnessing those need” (Nagoski, p.95).
- “At the heart of human giver syndrome lies the deeply buried, unspoken assumption that women should give everything, every moment of their lives, every drop of energy, to the care of others. “Self-care” is, indeed, selfish because it uses personal resources to promote a giver’s well-being, rather than someone else’s” (Nagoski, p.87).

4. Symptoms of Burnout

- a. Emotional Exhaustion
- b. Depersonalization
- c. Decreased sense of personal accomplishment
(Nagoski, 2019)

5. Activity: MBI: Educators Burnout Survey

6. Teacher and Student Mental Health

- a. Student trauma and teacher absorption of said trauma.
- b. Personal Stories.
- c. Being the anchor amidst their storm.

7. Activity: Think. Pair. Share.

Speaker Notes:

- Discussion of student feelings of isolation despite constant connection and high levels of preoccupation and distraction in regards to technology, social media, concept of multi tasking...etc. Emotional trauma from our students-we absorb their hurt, their trauma, their

stress, their worries. We take it home with us, we think about it in bed at night, it is a lot on top of life's challenges.

- Address student mental health and student trauma. Share personal student stories of students who have self harmed and attended outpatient facilities.
- We have a lot on our shoulders. We need to be the anchor in the storm for our students and use our position in the art room as a force for calm, creativity, acceptance, belonging and safety. We need to exude patience, we need to listen to hear and work towards being fully present. Exuding positivity can have a ripple effect on our students and allow them to reframe their thoughts that tend to be negative. Everyone falls, focus on how many times they get back up. In moments of student struggle, consider: what would be the most helpful for you to hear right now?
- Focusing on common humanity vs. isolation. Showing acceptance, listening, affirming and understanding towards our students.

Part III: Classroom Environment

- a. "No one cares how much you know, until they know how much you care"
~Theodore Roosevelt, US president 1901-1909.

1. Reflections on Classroom Environment

- a. What are you projecting?
- b. Ask yourself: What do you want your students walking away feeling, thinking and believing about themselves?

2. Partner Activity: Finish this sentence: It's a good day at school for me when...

Speaker Notes:

- Teachers are the engine that drives social and emotional learning (SEL) programs and practices in schools and classrooms, and their own social-emotional competence and wellbeing strongly influence their students. Classrooms with warm teacher-child relationships support deep learning and positive social and emotional development among students, writes Kimberly Schonert-Reichl. (Schonert-Reichl,2017).
- Safe Space
- Empathy and perspective
- Trust and cooperation
- Teacher-Student Relationships
- Social emotional learning
- Helping students understand their strengths
- Encouraging confidence and vulnerability
- Encouraging mistakes, risk taking and failure

- If you create the right environment, you will have successful students regardless of the curriculum. Inspire them with your enthusiasm, your intentions and your actions. Good teachers make students feel safe and accepted as they are.

3. Vulnerability

- a. The art room should be a space where students feel safe enough to raise their hand and say: I don't know what I am doing, I need help or I made a mistake.
- b. Students have fear of failure and lack self confidence, especially in their art making abilities!
- c. We ask students to be vulnerable but we don't show them how. We have to be brave and authentic to show them what it looks like.
- d. When do you feel the most vulnerable? When you are trying something new!
- e. Vulnerability = Courage
- f. Take a deeper look into what you are doing, showing, saying and expecting.
- g. You get what you give.

4. Writing Activity: Person of Significance

- a. Who is the most significant person in your life? Write about why they are important to you? How do they make you feel when you are around them? Do you feel trust? Non-Judgement? Acceptance? Are you able to be your most vulnerable, authentic self? Does their opinion of you matter? Don't want to disappoint? Do they support you? Build your confidence? Encourage you to take risks and try beyond what you think you are capable of? Do you feel pain when they are hurting? Joy when they are happy?
- b. Switch gears and think about the relationships that you have with your students. How do you want them to feel in your presence? What work do you do towards building those personal relationships? Showing interest, empathy, support, encouragement, trust, acceptance and non-judgement.
- c. Classroom Environment should be full of acceptance, connection, belonging and vulnerability.

5. Activity: Personal Description

- a. How would you describe yourself?
- b. How would your students describe you as a teacher?
- c. How would your best friend describe you?
- d. How would your students describe your classroom environment?
- e. Discussion leading back into the person of significance.
- f. We ask our students to be vulnerable, we ask them to express, but do we show them how? How do we make them feel safe enough to dig deeper and make it personal?

6. Starting with the Basics: Facial Mimicry

- a. Facial Expression Recognition, Emotional Responses and Different Cultures
- b. Facial expressions and eye contact are the first indication of interest, empathic connections and understanding.
- c. Experiments done by a variety of scientists and Ekman (1997) in particular, have found “...consistent and conclusive evidence that accurate judgment of facial expressions can be made regardless of language or culture.”
- d. These studies confirm that the interpretation of the emotional meaning behind facial expressions is universal but the responses may be hindered or suppressed depending on cultural beliefs, cultural social norms and learned behaviors.
- e. Facial Mimicry leads to emotional contagion.
- f. Facial Expression Visual Examples to prompt discussion and reflection.

7. Activity: Practicing Active Listening and Non-Verbal Communication

- a. With a partner please take turns explaining one struggle, one surprise and one point of pride regarding your day to day and overall experience in this profession. We are listening to hear, not to reply, interrupt or tell your own story. Use non verbal cues and eye contact to let your partner know that you are engaged and present in the conversation. Each partner will have 2 minutes to talk and then one minute for the other partner to respond. If there are moments of pause, let the silence allow for deeper thoughts and reflections.

Speaker Notes:

- “The expressions we see in the faces of others engage a number of different cognitive processes. Emotional expressions elicit rapid responses, which often imitate the emotion in the observed face...we are also very good at explicitly recognizing and describing the emotion being expressed” (Frith, 2009).
- In another experiment observers in the United States, Japan, Chile, Argentina, and Brazil, were exposed to a variety of photographs of facial expressions and were told to match each photograph to the corresponding emotional word. “The same facial expressions were judged as showing the same emotions in all of these countries, regardless of language or culture” (Ekman, 1997). These studies confirm that the interpretation of the emotional meaning behind facial expressions is universal but the responses may be hindered or suppressed depending on cultural beliefs, cultural social norms and learned behaviors.
- Frith (2009) explains that because so much importance is placed on spoken language during human interactions, we often forget about non-verbal signals such as facial expressions and facial signals. Findings from recent studies performed by Wicker et al., (2003) suggest that the mirroring mechanisms that are activated during facial mimicry “... trigger the neural activity typical of our own experience of the same emotion.” Facial expressions can be used as a form of emotional, visual communication between two individuals and is the first step towards creating empathic human connections.

- This mirror neuron and facial mimicry connection takes place with a variety of emotions such as embarrassment, sadness, fear, joy, sorrow or even disgust as Wicker et al., (2003) discovered.
- Fear elicits fear, sadness elicits sadness, joy elicits joy.
- Facial mimicry leads to emotional contagion, “...these facial reactions may constitute an important mechanism and form the basis for affecting emotional experience” (Dimberg et al., 2000).
- Activity: Active Listening-As a teacher please explain one struggle, one surprise and one point of pride regarding your day to day and overall experience in this profession. Listening to hear, not to reply, interrupt or tell your story.
- Each participant is grouped into partners at their table, partner A and B. Partner A is given 2 minutes to speak and answer the questions while partner B only responds visually, partner B does not interrupt, they simply listen. After 2 minutes partner B is able to respond to partner A with an open discussion for one minute. The activity then repeats itself with partner B having 2 minutes to answer the questions while partner A simply listens. Participants then discuss what verbal cues allowed them to know that their partner was actively listening, understanding and empathetic to their explanation regarding facial expressions. This is a great activity to use with students as well, it allows students to practice active listening skills, as well as eye contact and empathy. I also use this activity during class critiques both midway and after projects are completed. We will discuss critiques in more detail later on.

8. Fluidity Chart: Mirror Neurons and Embodied Simulation/Responses for Classroom Use and Guidance

a. Classroom Environment

Safe Space, Teacher-Student Relationships, Student-Student Relationships, Acceptance, Autonomy, Authenticity, Vulnerability, Belonging, Sense of Calm, Empathic Connections, Facilitating Connection and Community Amongst Students

Notes: Set clear expectations. The bigger ‘why’ behind the projects. Why is this worth their time? What do you want them to walk away thinking, feeling, knowing? Students invest when there is a clear purpose. Allow autonomy and choice. Play devil’s advocate-ask ‘why’ about their artistic decisions and reactions. Allow for brave moments of inspiration and discussion. Getting away from input-output teaching and creating.

b. Embodied Simulations, Responses, Connections and Motor Activation

Freedom of expression, demonstrations, experimentation, play, exposure, failures/mistakes, function and purpose behind projects and activities, curatorial practice-viewer response, peer reviews and critiques

Notes: Bravery not perfection. Perseverance requires failure and imperfection. Material/technique demonstrations and media studies. Clear expectations. Guiding

questions to evoke deeper thinking and personal connections. Allow time and space for critique and discussion. Critiques don't work if the foundation of the classroom environment is not poured. Put the decision making on the students. Effort based grading vs. rubric driven curriculum. They inspire each other through empathic connections. Teacher as student and artist. Students appreciate your participation and learn from you as a guide. Imagine a coach who doesn't do the drills. Be hands on. We ask them to take risks and be vulnerable-we need to do the same.

c. Embodied Responses

Reflection, student sharing, connection, deeper thinking, feedback, function and purpose, critiques

Notes: Process Portfolio - causes students to reflect on the function and purpose behind their personal artmaking. Students defend/explain their artistic decisions, reflect on the creative process, discuss areas of refinement while proving understanding. Did you meet your goal? The process portfolio makes it personal. Writing encourages personal reflection and contemplation. Facilitates embodied simulation, inspiration and empathic connections between students. Peer reviews and final critiques/discussions as a class. Non-Discursive communication.

- d. Explanation: This can be fluid throughout the creating process. If you notice a student is hesitant to create, experiment or share, revisit the classroom environment. Ask yourself: Do they feel safe enough to be vulnerable? Or perhaps the student has experimented with materials and has a clear vision but as they create their path changes or their intended purpose could be enhanced, in that case, revisit motor activation, experimentation. Feedback and critiques can cause them to go back to experimentation and reevaluate the function and purpose as well. Viewer response needs to be a consideration. If the students are not fostering productive and judgement free critiques, revisit aspects of the classroom environment.

Part IV: Mirror Neurons in the Art Room

1. Embodied Simulation in Regard to Aesthetic Connections

- a. How does it make you feel vs intuitive response.
- b. Dialogue between artist and spectator.
- c. Visceral, bodily response in reaction to what we witness in a work of art.
- d. Gestural movements activate motor neurons.
- e. We connect with the facial expressions, bodily actions, pain, joy, suffering, fear...etc.
- f. Aesthetic responses and embodied simulations depend on if we can relate to the subject matter, technique or materials. Highly personal.
- g. Appreciation for the artmaking only after student's have done it themselves which leads to the importance of exposure and demonstration.

- h. Personal reactions and engagement will differ for each student depending on personal experiences, exposure and situations. Be aware of cultural norms/comfort levels.

Speaker Notes:

- Our mirror neurons allow us to empathize and understand the actions and intentions of the artist, they allow connection, we can feel the emotions of the depicted subject matter and our motor systems also seem to mimic the gestural strokes and movements within a piece as if we were drawing or painting it ourselves in our mind (Freedberg and Gallese, 2014).
 - “The importance of empathy for aesthetics was first emphasized by Robert Vischer in 1873. By *Einfühlung*, literally ‘feeling-in’, Vischer meant the physical responses that are generated by the observation of paintings. He described how particular forms aroused particular responsive feelings, depending on their conformity to the design and function of the muscles of the body” (Vischer, 1873 as cited in Freedberg, Gallese 2007). Different emotions are provoked depending on artistic styles, color schemes and subject matter. “Embodied responses can, and often do, happen spontaneously as viewers encounter an artwork. Teachers attuned to their students' facial expressions, body gestures, and special sounds are in a good position to acknowledge physical and emotional reactions and to incorporate them into the art program” (Hubard, 2007).
2. “The investigation of embodied learning is particularly relevant in art education. Unlike the contents of written texts, artworks present themselves as physical (or virtual) entities that exist in the same space as we do” (Hubard, 2007). We can use the concept of embodied learning through mirror neurons to fully engage our students in whole body interactions with art and art making, activating their minds, bodies, emotions, motor channels, rational and imaginative thought processes (Gablik, 1992).
3. Embodied Simulation Through Aesthetics Comparison
- a. Echo of a Scream. David Alfaro Siqueiros. 1937.
<https://www.moma.org/collection/works/80144>
 - b. Breakfast in Bed. Mary Cassatt. 1897.
<https://emuseum.huntington.org/objects/5291/breakfast-in-bed?ctx=e6d8a11c-8aec-4ef3-a5cc-ce69ec54e655&idx=15>

Speaker Notes:

- Example of embodied simulation and visceral, personal response. Discussion of intuitive reactions. Freedberg and Gallese (2007) claim that emotions are contagious even when viewed in a static work of art.
- We have the ability to empathize with these scenes because our mirror neurons connect with our own personal emotions, experiences, trauma and relationships. Embodied simulation

takes that initial intuitive reaction one step further and focuses on the physical, bodily sensations that are evoked when looking at art.

- We can notice these sensations taking place within our students when viewing various works of art. They may be physically disgusted, intrigued, confused, saddened, shocked, empathetic, happy...etc. or they might express these sensations verbally depending on the work of art they are viewing.
- Having open classroom discussions about these embodied responses and the various ways in which they can occur also aids in building a sense of connection, community and understanding in the classroom setting. It is also valuable for students to hear other reactions and opinions outside of their personal perspectives.

4. Human Mirroring and Observational Learning

- a. Learning by seeing and physically doing. Motor activation/Understanding Intentions.
- b. Importance of demonstration.
- c. Remember that these materials and techniques may be foreign to our students.
- d. When do you feel the most vulnerable? When you are doing something for the first time.
- e. Teacher as student and artist. Physically demonstrate techniques while providing reassurance that they are free to explore, experiment, take risks and play.
- f. Importance of media studies and mistakes. Facilitating and supporting learning moments.
- g. Artistic skills are something to be learned, practiced and developed. We are not striving for perfection.

Speaker Notes:

- When introducing methods and techniques involved in the creation of various art forms we need to remind ourselves and be conscious of the fact that our students may not have ever worked with these mediums before or are not in the regular practice of using these mediums and art making tools. It is important to physically demonstrate how to interact with art mediums while explaining your actions and intentions behind techniques. “With the discovery of mirror neurons, understanding how we learn to perform an action by observing someone else perform a similar action becomes a tangible problem” (Keysers, 2011, p.60). As art teachers, we can use our bodies as channels of communication to aid in understanding and student engagement.
- Artistic skills are something that can be learned, practiced and developed. Teaching by example allows the students to observe these techniques and imitate them easier. Watching the movements of your hands, the application of the paint, the spread of the paint on the canvas, rolling and throwing clay...etc. all becomes more tangible and understandable when students can observe you demonstrating
- Simulation of the mirror system, more specifically the brain activity in the premotor regions, activates not only when viewing an action but also when hearing or imagining an action

(Keyesers, 2011). Simply imagining an action, a brush stroke, or a gestural line, can activate the feeling behind the action without actually performing it. Using descriptive language with students while describing artistic techniques and styles can help them to envision, understand and simulate what it would feel like to physically engage with those methods.

- Mirror neurons and the activation of the motor system allow our students to learn artistic techniques by imitating and practicing what we physically show them. To this point, I think that it is important to note that we don't want our students to directly copy the techniques but rather to use the skills that they imitate to further develop their own personal styles.

5. Mirror Neurons Are Goal Oriented

- a. Embodied Simulation and Motor Activation
- b. Anticipation of the next move or the purpose behind the action.
- c. Can be simulated simply by seeing an object that serves a function and purpose.
- d. It is important for students to know the intentions and purpose behind the art techniques that are being employed and practiced.
- e. Student Mirroring of Teacher Attitude, Mindset, Experimentation
- f. Understanding the Physicality Behind the Artmaking

Speaker Notes:

- Use the example of a hammer. When we see the object or even a picture of it our minds take us to a place of action and imagination of using the tool. When students use artmaking tools, it only takes them imagining the tool or seeing an image of it for the embodied simulation and motor activation to take place. Students connect more with the art making techniques once they have interacted with them. There is more of an aesthetic appreciation for the work behind the end product after interaction.
- Verbally and visually explain, hesitancy to give examples-make clear that these are just ideas for inspiration. Examples can stifle their creativity. Emphasis on practice and development, experimentation, failure and play. Sufficient time to develop required skills. Artistic decisions are for the student to make. Clear purpose for each project. Students are more invested and engaged when they understand the function and purpose behind the projects they are creating.
- An effective teaching strategy for many youth emphasizes the importance of active forms of learning that require youth to act on the material (Active). "It is well documented that practice is a necessary condition for skill acquisition" (Salas & Cannon-Bowers, 2001, p. 480). Sufficient time and attention must also be devoted to any task for learning to occur (Focus). Therefore, some time should be set aside primarily for skill development. Finally, clear and specific learning objectives over general ones are preferred because it is important that youth know what they are expected to learn (Explicit). (p.408).

https://www.casel.org/wp-content/uploads/2016/08/PDF-3-Durlak-Weissberg-Dymnicki-Taylor_-Schellinger-2011-Meta-analysis.pdf

6. Demonstration Example

- a. Activity: Watercolor media studies with the opposite hand. Getting into the minds of your students when they are trying something for the first time.
- b. Describing the task vs showing the task and performing it together.

7. Personally Relevant Choice Based Art Making

- a. Explaining the purpose/function of each unit/project creates investment in the process and end product
- b. Daily/Weekly Artists as inspiration
- c. Discussing personal reactions
- d. Allowing room for personal choice, autonomy and problem solving
- e. Exposure to a variety of cultures, materials, techniques, subject matter and concepts
- f. Getting away from rubric driven grading, focusing on effort
- g. Process portfolios for reflection and documentation of the process

Speaker Notes:

- Placing artistic decisions in the hands of the creator. Asking the ‘why’ behind their choices and art projects. What concepts are they exploring? What is the function and purpose of their art? Allowing choice encourages engagement and personal investment in the end product.
- Hubard (2007) claims that exposing students to various works of art that provoke a variety of embodied responses can encourage deeper learning, engagement and understanding in our students. In the art room, we have the opportunity to embrace and encourage emotional simulation and responses, unlike other school subjects where emotions are regarded as something that needs to be "tamed or controlled to achieve cognitive performance" (Kerka, 2002 as cited in Hubard, 2007).
- Discussing student’s reactions, provoked emotions and curiosities is a great way to supplement open and honest conversations and helps to build a sense of empathy between students and within the classroom setting. “The investigation of embodied learning is particularly relevant in art education. Unlike the contents of written texts, artworks present themselves as physical (or virtual) entities that exist in the same space as we do” (Hubard, 2007). Art is interactive, it begs for connection, conversations and embodied simulation in the viewer.
- Focus on Effort, Encourage Autonomy and Authenticity
- Function and Purpose Over Rubric Driven Grading
- Rubrics create input output teaching and learning. Students feel that they are checking a box depending on how the rubric is phrased and it doesn’t allow for deeper thinking or personal decisions. Students are more invested in the outcome of the project if they contribute to the choices in creating it.

8. Daily Inspiration Examples

- a. Aesthetic Reactions Activity
- b. Facilitating conversation, descriptive, subject specific language. Partner activity. Allows for exposure, discussion, inspiration and social connection. One partner can see the image, the other has their back to the image and listens to the description while attempting to use the given information to visualize the piece in their mind.
- c. I ask my students to explain: What is it? What materials are used? How are they applied? What is the subject matter? What is the mood? Why? What do you think is the deeper meaning? What is the function and purpose?
- d. Be cautious not to explain what the actual meaning is to allow open conversations and reactions. A nice option is to begin compiling artists as inspiration on a group/class Padlet or slides that can also be created during the art making process. This creates a sense of community and personal sharing. Students can contribute which helps to create a wealth of artists, concepts and techniques.
- e. Discussion to follow. What other information did they need to visualize this piece? Helps with art analysis. Creates fun and engaging classroom conversations surrounding embodied and intuitive responses.
- f. Creating teamwork, conversation, expression and connection. While getting them used to descriptive language and discussing the elements and principles. Can be shocking, can be fun. Allows for classroom conversation, visual examples of concepts, subject matter and techniques.
- g. 50/50 Journal as personal exploration/research/inspiration.
- h. Class Padlet/Jamboard for sharing and critiques.

9. Johnson Tsang: 4 Baby Faces in Ribbon

<https://webneel.com/i/15-ceramic-sculpture-byjohnson-tsang/9-17/e?n=11398>

10. Nikos Giftikus: Stressed Out Self Portrait

<https://mymodernmet.com/nikos-gyftakis-liquid-friends-self-portraits/>

11. Do Ho Su: Floor

<https://www.anothermag.com/fashion-beauty/2320/floor-by-do-ho-suh>

12. Connected Aesthetics and Mirror Neurons

- a. Notion of individualism vs art being deeply social
- b. Intuitive response, personal experience...etc.
- c. Empathic connections to aesthetics

13. Activity: Personal Embodied Response/Simulation: Participant adlet of favorite works of art and description of why. Guiding questions to provoke activation of embodied simulation.

14. Embodied Responses: Communication and Reflection

- a. The importance of Critiques
- b. How to lead a successful critique to provoke embodied simulation and empathic connections
- c. Facilitating honest conversations amongst peers
- d. Constructive feedback to promote growth
- e. Guiding questions
- f. Peer reviews-holds students accountable, reminds them of the function and purpose behind the work that they are creating
- g. Student-Student Artwork Sharing is vital for building community in the art room

Speaker Notes:

- Using each other as a source of inspiration. Can't grow without feedback. Peer critiques also reminds students of the ultimate goal/outcome or rubric if used. Have students give each other predicted grades-changes the roles. Puts them in an alternative position. Asking questions to further the conversation such as "Can anyone add to that?" Asking students to paraphrase other student comments, instead of the teacher guiding the conversation.
- Encouraging non-judgemental observations and interactions.
- Respecting introverts and extroverts so that everyone has the opportunity to contribute their thoughts and opinions. Critiques allow students the opportunity to practice sharing perspectives and actively listening.

15. Process Portfolio

- a. Allows for documentation, acknowledgement, failure, success, reflection and defense of artistic decisions.
- b. Makes them conscious of their choices, their risks, their mistakes, their perseverance, resilience and end goals.
- c. Makes them think: what is the function and purpose and why?
- d. PP Rubric Example
- e. Student Examples
- f. Allows for exposure and practice with digital layouts

Speaker Notes:

- Reasoning behind documentation of the process-digging for embodied responses, discussions, reactions, investigations.
- Proposed rubric with guiding questions, process portfolio weighted the same as the project. Exposure to digital layouts and formatting. Proves all of the efforts

- and reflections throughout the creative process. Serves as a nice compilation of everything they have done.

16. Process Portfolio Rubric Visual

17. Process Portfolio Breakdown

- Media studies force experimentation and play outside of what is demoed in class. Allows for risk taking.
- Inspiration forces exploration and deeper thinking, research of materials, artists, concepts, techniques-not to copy but to inspire and aim for. Can be something that I have shown them or something they have found. 50/50 journal examples.
- Your first idea isn't always your best idea.
- Process pictures force them to document and reflect on the highs and lows of the artmaking process-creates resilience. Rough drafts. Trial and error of compositional arrangements, mind maps, brainstorming, materials, techniques...etc.
- Final reflection-summarizes, elements and principles, defense of artistic decision, opportunities for refinement, learning moments, areas of growth past and future
- Equally weighted to the project grade. Promotes deeper thinking and accountability. Not teacher led but student created, invented and produced.

Speaker Notes:

- Process portfolio documents moments of struggle, allows for writing to purge those frustrations and allows students at the end to look back on what they have accomplished and worked through. Allows for documentation of moments of struggle, surprise and pride.
- In moments of struggle and frustration/challenge/mistakes: So what. Now what?

18. Example of Artist as Inspiration: Abramovic The Artist is Present

- An art made of trust, vulnerability and connection
- Keep it diverse culturally, concept, materials, techniques
- Expose. Inspire. Question. Discuss.

19. Marina Abramovic': Performance Artist from Serbia

- The Artist is Present Video Clip: <https://www.youtube.com/watch?v=2TIZjFGriLw>

20. Connection Activity: 2 minutes of eye contact with fellow participants.