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**Dispelling Perceptions:
Montessori Education – Attaining Common Ground with Public Schools**

By

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University of California at Berkeley

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Education

in

Educational Leadership

in the

Graduate Division

of the

University of California, Berkeley

Committee in Charge:

Professor Bruce Fuller

Professor Heinrich Mintrop

Professor Susan Stone

Summer 2016

**Dispelling Perceptions:
Montessori Education – Attaining Common Ground with Public Schools**

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By: Shirlinda Bernice Acker

Abstract

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Shirlinda Bernice Acker

Doctor of Education

University of California, Berkeley

Professor Bruce Fuller, Chair

Using concepts from cognitive science, this dissertation explored changes in perception among Montessori education leaders and traditional education leaders. Although Montessori education programs have grown as an option in the public school sector, their unique features in mainstream environments have brought to the fore serious challenges in understanding and communication between decision makers at the institutional level of public education and among Montessori academies. Nationally, Montessori education entities have fostered a strong momentum for improvement at the state policy level. However in some states, including California, differing perceptions still hinder inclusive decision making, resulting in lack of teacher credential recognition, denial of eligibility and funding.

My study implemented a communication intervention through which an iterative conversation between both sides aimed to address perceptions and language and provide shared understandings. Using the challenge between Montessori and traditional public education and framed under the cognitive theories of mental models, framing, schemas, metaphors and embodiment, this intervention addressed whether perceptions can begin to shift when one is more fully informed at a deeper cognitive level.

Incorporating a workshop intervention involving several modalities, my findings suggested a shift in perception which seemed to persist over time. The effects in shifting actors' perceptions of Montessori education were statistically significant and modest in terms of magnitude. I also found a weaker perceptual shift among traditional educators in California compared with peers in other states. I obtained specific suggestions for future iterations of kinesthetic learning, along with how to best share perspectives between Montessori and traditional leaders, along with possible collaborations between these pedagogies.

For Liesbeth (my light in this journey):
Rumi says, *“When you go through a hard period, when everything seems to oppose you...
When you feel you cannot even bear one more minute,
NEVER GIVE UP!”*

Thank you for those many moments when I felt I couldn’t finish, wasn’t enough, couldn’t go on, couldn’t speak up – and you held the light in front of me, encouraging me – pushing me, urging me, supporting me to reach this very moment. Thank you for helping me to hear the words of Rumi in my heart. And thank you especially for when it felt that there was no other support close around me, that I could feel the ever enduring strength of yours.

In memory and in honor of my dad (Washington Maxwell)
and my mom (Darline Bell Maxwell Spinks):
Malcom X said, *“Nobody can give you freedom, nobody can give you equality or justice...you take it.”*

Thank you for keeping me in the dark about what I might have thought I couldn’t achieve. Through that ignorance, and even though you were no longer physically in my life, I continued to strive for more – because I believed that it was always mine to have from the beginning. And it was. Through my journey, I uphold your story and my appreciation for all those in whose footprints I walk – all the way back to my Mende roots in Sierra Leone. I hold your names up in this book, because although you never had your names on a college diploma, through me, your life wisdom and your struggle came through greater than any piece of paper could have.

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Cindy (Shirlinda) Acker

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Glossary of Key Terms and Frameworks

Note: This paper captures words that across disciplines and ages have different meanings. For the purpose of this paper, especially because it is about perceptions, clarification of how those words will be used, has been provided.

Misconception/Misperception - Variety of definitions include:

Conception: the ability to form or understand mental concepts and abstractions to form something in the mind or to develop an understanding

Perception: recognition and interpretation of sensory stimuli based chiefly on memory to become aware of something directly through the senses

Perceiving is merely seeing, and *conceiving* is deeper.¹

Misconception: First appeared in the 1660s, the word comes from the prefix “mis”-, meaning "bad, wrong," and the word “conception”, meaning "act of conceiving." A *misconception* was considered something that usually results from incorrect thinking or a flawed understanding².

Misperception: mistaken belief, idea or interpretation about something

Misconception/Misperception: The two words are now considered interchangeable³

For the purpose of this paper, the idea that knowledge is embodied, we choose to embrace the idea that conception may involve a deeper awareness. However, to rid the concept of “right” and “wrong” for the way we have received information from our experiences, the words “differing perceptions” and misperception (indicating a belief that may be based on what is not considered fact, OR on our own ideologies) will be used, at times, interchangeably.

Mental Models/Schema/Frames:

In some areas, these words are interchangeable. Common to social cognition theory are cognitive schemas (schemata); to political psychology – frames; in the philosophy of science, paradigms; in cultural studies, social scripts. Some definitions include:

Mental Models: cognitive representations of one’s external reality; temporary structures that occupy working memory

Schema: a kind of unitary and bounded representation of an object or event conceptual structures and processes which enable human beings to store information about the world and make interpretations of events through abstraction

Image schemas: abstract concepts consisting of patterns emerging from repeated instances of embodied experience; sensory experience gives rise to a conceptual representation.

Frames: cognitive shortcuts used to help make sense of complex information. Frames help us to interpret the world around us and represent that world to others. They help us organize complex phenomena into coherent, understandable categories.

¹ (Apeh & Tobin. 1988) Word Systems in Modern Hebrew.

² (Chitambira,) Every Woman is Born with a Crown.

³ (Houghton Mifflin, 2011) American Heritage® Dictionary of the English Language, Fifth Edition.

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Chapter One

Problem of Practice

Introduction

Although the Montessori model has grown as an option in the public school sector, its unique features in mainstream environments has brought to the fore serious challenges in understanding and communication among education policy makers and practitioners. Strategies such as ongoing assessment, multisensory teaching and multi-aged learning models have been signature approaches in Montessori schools. These elements have also been applied to improve teaching and learning within conventional school districts. Even so, this has not resulted in a stronger connection and deeper understanding within the field of public and Montessori education in California.

Montessori education, in fact, seems to be one evidence-based system which supports student learning at high levels, but has in some states, like California, been received with reservation.

In my study, I examine perceptions of Montessori education within traditional public school circles and perceptions of traditional education within the Montessori community. Using theories of cognitive psychology, this paper explores how views and perceptions hinder connections, the potential for changing perceptions, the possible indicators of change and the outcome of change between the Montessori and public sectors.

Problem of Practice

Recent research indicates that Montessori schools produce solid student outcomes, confidence and critical thinking skills in students (Lillard & Else-Quest, 2006; Miller and Bizell (1983), and Porter et al. (2011). Since 2011, credentialing authorities have shown greater openness and respect for Montessori options. Recognition of the Montessori Accreditation Council for Teacher Education (MACTE) has occurred in many areas as, “state registries are now recognizing a credential from a MACTE accredited program at the highest level on the lattice. South Carolina, Wisconsin and Ohio recognize a credential from MACTE accredited programs for licensure to teach in a public Montessori School” (Pelton, communication, 2015). The recent accreditation recognition in those states however, has not been mirrored in California.

Historically, a basic perception of Montessori education in the public sector has been that of an unaccredited method of education without substantial teacher or student coursework, lending itself to challenges with teacher recognition, funding and acceptance within the wider academic arenas. For example, in California, districts have resisted recognition of Montessori credentials. Montessori teacher education programs in California that are accredited by MACTE are only recognized if they are within universities accredited by the Western Association of Schools and Colleges (WASC). In California, a teacher education program must be affiliated with a WASC accredited college or university for a teacher’s coursework to be recognized and/or transferable. A California adult learner may alternatively have to pay additional unit fees (the university cost *in addition* to the cost of the teacher program) in order to have the units recognized (Bedell & Huizinga, 2004). This is despite the fact that across the nation, MACTE accredits Montessori teacher education programs including those accredited by WASC.

The result is that in general, Montessori credentialed teachers in California face several particular challenges. They are unable to access many education grants. Their Montessori

credential is not considered valid to teach in a public school (WASC, 2015). Montessori teachers cannot apply their coursework fully as education units toward a higher-level degree in a California university, or toward a teaching credential. This is also the case for Montessori teachers who teach in Montessori public charter schools. The opposition to recognition of Montessori credentials in California seems to issue from perceptions regarding the rigor of Montessori teacher education coursework and the uniqueness of the actual method of teaching.

At the district level, public Montessori education has not been as easily accepted as an innovative school model. This may be in part due to fear of lower student outcomes and a view held in part by some, that Montessori education is not meant to serve students from all socioeconomic levels. Differing perceptions from a district standpoint include the view that Montessori environments lack the socio-emotional component to be inclusive of the kindergarten year, that Montessori teachers are insufficiently educated and non-credentialed, and that Montessori is a pedagogy which does not foster language development.

These views were also held by other credentialing officials within four-year universities, who seemed to believe that preparation in Montessori techniques remains insufficient relative to traditional preservice programs. Underpinning these views is the perception that Montessori education was created for, and serves only affluent children. Such differing perceptions call into question the image of Montessori education and its legitimacy as a viable learning model in the public sector.

Montessori leaders have held dissimilar views regarding the public sector at times, viewing public education as lacking the ability to address individual learning styles. A commonly held view was also that districts choose to limit a child's knowledge, teaching only to the test, rather than to a student's need or ability. Caught in the middle between alternative methodology and high stakes accountability, I discovered a third group of leaders - public Montessori leaders, who were seemingly under the microscope of legitimacy: adherence to the tenets of Montessori pedagogy and obedience to the rules governing performance through the lens of test-based instructional practice.

Understandably, public school leaders have created their own perception of Montessori education, based on assumption and their own ideologies. If Hagel's words hold true that reason is logic and humans accept logic as fact, our own reasoning shapes our view of self and others (Singh & Mohapatra, 2008). In this case, the image of Montessori education has been historically shaped by the reasoning of others, shaped by what they have assumed and accepted as fact. This has comprehensibly created a chasm, as perception connects with the mental models which shape how we view our world, and in this case, how leaders view teaching and learning and resultant decisions. When we juxtapose this against the already strong challenge of student outcomes, quality of education and external and internal accountability, one can imagine how an 'us and them' position may have been assumed over time.

Perhaps the most poignant misperception between groups involves political relationships within the public sector. Whether due to past feelings of discrimination or not, some Montessori educators have historically seemed to hold the view that Montessori education does not need to prove its authenticity, and that educational reform does not require partnerships with the public sector. Additionally, Montessori leaders have been cautious of public school/Montessori school partnerships and wary of the dilution of their pedagogy due to forced district policy adherence. The importance of advocacy in public policy is relatively new for the Montessori community and consequently due to their silence, the public sector left them behind; reform shaping the field and changing regulations and legislation. In some cases, traditional leaders have historically

extended a limited hand by allowing Montessori educators to be present in general discourse. However, Montessori leaders were sometimes absent from such conversations or spoke with disunity in their message. The historical confusion or silence by the Montessori community may have created the assumption that non-participation represents non-interest.

Misconceptions between the public sector and Montessori educators have resulted in a lack of partnership in the field of education in the areas of teacher credentialing, public policy and teaching and learning – the very areas within reform which affect Montessori schools nationwide. Differing beliefs based on incomplete information regarding Montessori education have resulted in decision-making by traditional policy makers or leading conventional educators that has limited equitable access to education for Montessori teachers.

Differing perceptions often arise from the way people individually process cultural stimuli, misinterpret views, and attribute any information or assumed behavior as characteristic of the whole of a population (Perkins, 1997). When normativity becomes confused with identity, differences or preferences can begin to undermine one's sense of normality. Rather than seeking to understand the difference, decision makers have a tendency to perceive all situations in light of whatever concerns are most pressing (Jarvis, 1976). The literature suggests that beneath the differing perceptions on both sides sits a stronghold of deep-seated beliefs and a feeling of being pedagogically threatened. Additionally, out of fear, individuals may seek to fiercely protect their interests, even if it results in isolation. They may hold onto differing perceptions, even advocating incorrect views than risk change or adjustment in their thinking.

This division, during a time when quality education reform and partnership is critical, calls for a way to bridge these multiple differing perceptions in California. Indeed, Fuller (2003) argues that a different voice in education can invoke community building, and need not be perceived as a way to weaken the state's treasury, but evidence of a joint effort to raise children well (p.15). Perceptions about what Montessori education is and is not have created a detour in the road toward partnership. Conversely, perceptions about the stagnation of public education have failed to widen the path of communication between Montessori and traditional decision makers. At a time when quality education reform and partnership is critical, understanding the historical components of the multiple differing perceptions in California will serve as a first step to shape this "different voice". The second step is then to create a communication intervention which allows this "voice" to come to the fore.

Research Design Rationale and Purpose

The most intriguing part of this study is that the research is based on multiple theories within cognitive science that all come together. Collectively, they provide insight into our thoughts and how we perceive, our feelings and how we make meaning, our language and how its production changes our view, our bodies and how they respond to unconscious thoughts. That is, I am not only interested in creating a tool that will better inform public educators about Montessori - I am curious about *how* to alter perceptions of this non-standard classroom model - through different kinds of cognitive processes.

Design Purpose

Research suggests that education is a powerful tool to change perception and to empower individuals to action (Wallerstein & Bernstein, 1988). If open dialogue and equitable practice produce informed decision-making, this tool may have an effect in changing decades of misperception. Accordingly, I proposed a tool to address the problem of differing perception in

various layers (values, beliefs, prejudices, self-interest, common commitment and purpose). It touches on such concrete topics as competence, curriculum and pedagogy. Using the challenge within the Montessori and traditional communities, the desired outcome was to test the communication (training) model as a vehicle to fully inform and dispel myths about the practices of the Montessori method and traditional education. The extended desired outcome from the use of this tool is to address information deficits and assist districts and Montessori public schools to find common ground. This intervention was informed by theories of embodiment, metaphor, loop learning and mental models based on the research of Lakoff and Johnson (1999), Argyris and Schön (1978) and McKinney and Terry, Jr (1995). It was designed to lead to open discussion and equitable consideration of Montessori education at the district level, and may inspire a change from a culture of uninformed resisters to one of informed partners or advocates.

At the onset of this research, I felt that being informed was the answer to address biases and find a unifying common denominator. Inasmuch as Cuban (1990) referenced the churning of reform due to deep seated ideologies, it appeared that being fully informed and reflective would result in a recession of incorrect presumptions and assertions. However, after much research in cognitive science, it became clear that merely feeding information was not the answer to alleviating bias and finding common ground. The idea that providing information will in itself change views and perceptions misses the mark when considering how the mind works. Recent cognitive research informs us that behavioral change does not come from using the brain as a computational data receiving mechanism alone, but rather from also accessing the brain as an embodied organ which unconsciously reasons and holistically develops perceptions from information within the body (Lakoff and Johnson, 1999). Unconscious thought theorists posit that knowledge is an outcome of reason and that most reason is not accessible to conscious thought. Since perceptions are rooted in our unconscious, internal views, values and beliefs that shape how we see the world, conscious questioning, different language and embodied practice is needed to make a shift toward understanding another view.

We have no more fundamental way of comprehending the world than through our embodied, basic-level concepts and the basic-level experiences that they generalize over. Such basic concepts are fundamental not only to our literal conception of the world but to our metaphorical conceptualization as well (Lakoff and Johnson, 1999, p.231).

Embodied cognition as a way to open information dialogue or change thought or behavior through the experiences we have, requires a different way of looking at the content and method of providing information. The research design therefore, involved more than providing evidence to address information deficits. **Since humans create mental models for every aspect in life, which form a basis for how we view the world, and since our minds carry the experiences which shape our perceptions, the design intervention had to include some form of living experience as a part of the learning or “knowing”** (Lakoff & Johnson, 1999). This research design therefore included information as a primary vehicle, including the use of metaphors to change the tone of the discourse. Then, in its final iteration, this component of embodied knowledge was incorporated into the research design by including a kinesthetic experience in the form of hands on practice with Montessori materials. I examined the impact that experience through discussion and kinesthetic/embodied practice may have had in opening the possibility of a shift of understanding.

Finally, this design which also analyzes perceptual shift can only measure whether there are indicators of the beginning of a shift along a continuum. From a cognitive science

perspective, *any* shift which involves deep seated belief systems takes time to integrate, because it involves the neural circuitry of the brain and the structure of reason itself which comes from deep reflection and embodied experiences. I take the position that as the brain has the capacity to change, all connected constructs, like mental models are both products and ongoing processes – able to shift, grow and mature – all of which takes time.

My work proposed the creation and implementation of a multi-faceted communication intervention between Montessori leaders at the school district level and conventional educators in leadership positions within the same districts. I build on the work of McKenney and Terry, Jr (1995), who studied the effectiveness of workshops to change perceptions regarding environmental concerns, and found that the combination of surveys, information and discussion session and written materials were effective in changing perceptions and attitudes. Through an iterative process, the intervention creates within education a discourse and embodied experience that aims to address perceptions and language and provide shared understandings. Using the challenge between Montessori and traditional public education and framed under the cognitive theories of mental models, framing, schemas, metaphors and embodiment, this intervention addresses whether perceptions can begin to shift when one is more fully informed on a deeper embodied cognitive level.

The empirical questions on which I focused include:

1. How do deep-seated views and cognitive biases affect perception and decision making?
2. How is it possible to shift perceptions of groups that hold dissimilar views based on their own deep-seated ideologies?
3. What conditions are needed to fully inform or make a shift in perception possible?
4. Is there a political climate that affects perceptions?

Pilot Information: Basic Areas of Differing Perception

The groundwork for my design intervention was laid in part following a stakeholders' meeting in California regarding acceptance of non-regional accrediting bodies. This meeting involved a presentation by representatives from universities, the Department of Education and other agencies, most of whom were against accepting Montessori teacher credentials from non-regionally accredited institutions. From the stakeholders' meeting, I selected the individuals with the strongest oppositional views toward Montessori education and interviewed them to gather information regarding their perceptions of Montessori education and their fears concerning student education and outcomes in general. I operationalized some of the general differing perceptions derived from the pilot interviews. I aligned the perception with factual information regarding Montessori education. In general, these differing perceptions involved teacher authenticity or quality, accountability and curriculum (Table 1).

Table 1
Perceptions and Facts: Montessori Education

Perception About Montessori Education	Montessori Factual Information
“there may not be a requirement for any college experience, say in general education as a prerequisite”	“To be eligible to earn a full <i>Montessori credential</i> at an AMS-affiliated teacher <i>education</i> program, you must hold a BA or BS degree (or higher)” (AMS, 2011)
“They are not professionals. Professionals are considered experts; governed by a code of ethics”	“AMS requires that all member schools and affiliated teacher education programs agree to comply with the AMS Code of Ethics.” (AMS, 2011).

“[They need] field specific credentials... rigorously educated.. The coursework does not have special academic focus”	“Our programs are recognized internationally for their quality and rigor and are accredited...include focus on specific academic areas, including strengths in mathematics and the sciences”
“They do not have active involvement in professional associations”	Montessori teacher education programs are affiliated with MACTE, NCATE (AMS, 2011)
“They are not governed by WASC”	“this letter is to provide support for California Montessori teacher education programs.” (Wolff, 2011 WASC)

Table 1
Perceptions and Facts: Montessori Education

I then met with a delegation of Montessori leaders who had differing opinions of conventional public educators. I held a focus group to identify their perceptions of public education and to understand the beliefs which they imagined educators in the public sector might hold about Montessori education. The perceptions of both groups fell within the same themes. I used the overarching themes from the feedback and divided them into three domains upon which I based pre-survey questions, discussion and information in my workshops. The difference between the two sets of misconceptions was that Montessori leaders seemed to lack current knowledge and experience about public school. Traditional leaders seemed to lack relevant historical information regarding Montessori education. In some cases, a lack of knowledge seemed to give rise to other perceptions.

For example, there was a perception that Montessori education is not applicable for students with special needs, but is a method for the gifted. However, Montessori’s method of education was originally designed for children who were considered lower functioning. Montessori later presented her scientific findings to others. Additionally, although the beginnings of Montessori education sprung from the slums of Rome, a common differing perception is that Montessori education is for the elite. Although this can be perceived as surface misinformation, this view is a part of a larger misperception, which calls into question the discriminatory practice of a methodology.

Summary

Design research accomplishes a two-fold purpose: comprehension of the phenomenon of the design itself and through a process of iterations, the development of design improvements. As well, the study has two primary research components: assessment of the design as an intervention and consideration of the design’s potential impact in altering perceptions of the Montessori model. This intervention employed a mixed methods design informed by multidisciplinary theories in cognitive science (van den Akker, 1999).

Reeves (2001) suggests that research design involves the following:

- identification and analysis of problems from the view of practitioners and researchers
- the development of prototype solutions informed by innovative practice
- iterative cycles of testing, refinement and reflection
- adjustment to produce solid design principles and solution vehicles.

The research was accomplished via a workshop. Through four iterative sessions I deployed visual and auditory information via slides and then video of a classroom, discussion and written surveys. There was a final presentation which involved a hands-on kinesthetic demonstration and practice of Montessori materials (Table 2).

Table 2
Components of Research Design

Qualitative / Quantitative	Cognitive Science Theories	Development of Design
Analysis of observations, survey comments Analysis of workshop videos Analysis of pre-survey comments Analysis of post-survey comment	▪ Unconscious Thought ▪ Mental Models ▪ Schema ▪ Framing ▪ Loop Learning ▪ Metaphors ▪ Embodiment	▪ Introduction of Design ▪ Rework Design ▪ Iteration #1 ▪ Rework Design ▪ Iteration #2 ▪ Rework Design ▪ Iteration #3

Table 2 Components of Research Design

Chapter Two

Theory of Action, Change and Intervention

Introduction

A theory of action is a malleable conceptualization of the trajectory of achieving desired outcomes from problem to solution, and addresses how actions will affect the outcomes. Theory of change is sometimes used synonymously with theory of action. In this paper, theory of action will be used to explain why the design should work and theory of change will be used to delineate how the change will occur. The theory of change represents the details about how the change will occur (Argyris & Schön, 1978). In this section, I explain my theory of action and theory of change, delineating the steps toward reaching the desired outcomes of this communication intervention. I explore how change might occur through the communication intervention and what actions might affect that change. I will explain how a multimodal reflective intervention may support leaders to explore areas of common ground, interpret new information and evaluate previously held differing perceptions. Lastly, I provide information regarding the preconditions needed for this study, which includes the sample population, the design components and the platform for implementation.

Theory of Action

A theory of action articulates the rationale and plan of action for the implementation of a design. In this study, information derived from research suggests that there is a framework needed to lessen people's differing perceptions. This includes building on an individual's prior knowledge to develop meaning and find common values in order to change mental models. My theory of action further expands on this information, and recognizes the impact of deep-seated values on one's ideologies and beliefs. The theory of action was used to help develop indicators to measure whether the communication intervention had an effect on shifting perception. My theory of action explores three components directly connected to my theory of change: the information, the format and an evaluation of the design's effectiveness.

The central intervention of this research design involved a three hour workshop. The content of this workshop was designed to provide clarification in areas in which the initial exploratory interviews had revealed either misconceptions or a lack of knowledge. Discussion followed to allow people to share thoughts and experiences, and to ask and answer questions based on that experience. I analyzed the metaphorical language used by each group, and used that information to incorporate metaphors of partnership within the next workshop. Videos were

used to show differences in Montessori vs traditional education, and in the final iteration, leaders were invited to kinesthetically experience teaching and learning in according to Montessori pedagogy.

Proposed outcome.

The proposed outcome was that by the end of the workshop, leaders would have engaged in an open dialogue, become more informed about the other group and display more receptiveness to further dialogue. It was expected that the dialogue and experience would become evident in a change after the intervention, gauged by change in conventional educators' responses to pre and post intervention survey responses. This would represent a shift and suggest tangible evidence of the significant effects of the study intervention.

Theory of Change

A theory of change articulates the fundamental belief system that guides a strategy for modification or transformation of an idea or tool. It should connect the subjects and strategic needs with the desired outcome. The theory of change reflects what is needed in order to create change and identifies the taskmasters in the execution of the change model. In this paper, the theory of change demonstrates how an intervention can assist in identifying and possibly modifying previously held beliefs and perceptions, who the actors are, and how the final proposed outcome looks.

Drawing from the literature, it appears that over time perceptual change may occur when one makes sense from one's own knowledge and deep reflection of new knowledge gathered. **This begins to change mental models** allowing one to see the commonalities with others who hold different beliefs, norms, and values. Spillane and Miele (2007) argue that practitioners do not merely receive information and simply change the norms and values upon which perceptions are based. They must notice and interpret new information before it can be incorporated within their understanding as evidence. To dispel differing perceptions, there must be an understanding of new information to overlay the old. Finally, in order to find common ground, educators and leaders need to be able to see others as they do themselves – to look beyond the difference to what norms, values and overarching goals are the same. This 'sense making' process requires information that is presented in a variety of modalities for deeper understanding and interpretation, opportunity for reflection and a connection of new information through the lens of their existing knowledge. Two clear areas of change are being addressed in this intervention:

- 1) On the surface level: misinformation due to an information deficit
- 2) On a deeper level: differing perceptions (require a change in one's mental model)

Type of learning required.

The theory of change describes how this change might occur: what kind of learning would be required in order to begin to experience a shift along a continuum (Table 3):

- Information Presented: clarifying information concerning the three primary areas of misconception identified in the pilot interviews: teacher authenticity (also called teacher quality); the rigor of teacher coursework; and the existence/depth of accountability
- Deep understanding/ Embodied experience:
 - visual: Participants observed a video which focused on a single student in a Montessori classroom over a three-hour period
 - auditory: Discussion over materials (metaphors incorporated for understanding)
 - kinesthetic: participants worked with hand-on materials

Table 3
Areas of Learning, Needs and Modalities

Area of Learning	Information Deficit	Modality of Learning
Teacher quality	Ability for teachers to balance structure and freedom; readiness	Visual (slides of information) Auditory (discussion)
Teacher preparation standards	Teacher requirements for Montessori and public school teachers; practicum	Visual (slides of information) Visual (video of class in action) Kinesthetic (use of materials)
Accountability	Accountability measures: Montessori scope and sequence vs Common Core standards; including those of children with special needs	Auditory (discussion)

Table 3 Areas of Learning, Needs and Modalities

The kind of learning needed involved some of the basic knowledge about teaching requirements. According to my pilot study, neither group had a clear understanding of what the academic requirements were to become a teacher. Traditional educators didn't realize that the American Montessori Society requires a bachelor's degree as the minimum requirement to receive a Montessori teaching credential. Montessori leaders didn't seem to know the breadth of the requirements of a public school teacher, involving coursework and testing for acceptance. Traditional leaders didn't understand that Montessori education has a viable accrediting body; Traditional leaders in California could not understand that a non-regionally accredited body could be a legitimate vehicle for teacher accreditation. Both groups needed information regarding how levels of internal and external accountability affects the other; Montessori leaders needed more understanding about what external accountability does and what it could look like. Montessori leaders didn't seem to understand that there were measures of accountability inherent within public school models which raised the bar on accountability and called into question the accountability measures and therefore the legitimacy of other pedagogies.

Additionally, there was an internal understanding that needed to be established at the very beginning of each workshop and emphasized again at the end: there is no one right way. We set the framework at the beginning of each workshop with an understanding of communication ground rules and the request to really listen with an appreciation of ambiguity or difference. I replaced the use of metaphorical words often used to describe possibly contentious discussion in warlike terms (strategy, attack, on target, shot down, defend, debate) and employed peacemaking metaphors that framed such discussions instead as a peaceful journey (travelers, destination, treasure, dialogue). I also included phrases such as consciousness raising and deeper insight (Tannen, 1998).

Theory of Intervention

The theory of intervention describes the process by which the intervention occurs. It includes the procedures and activities that are involved in the actual execution of the intervention (Chaiklin, 2004). The communication intervention in this design involved a workshop, with presentation of information, discussion, video and experiential practice with materials for learning and curriculum for teaching (Figure 1).

Presentation of information.

From the pilot study, I discovered three primary areas of differing perceptions, accountability, teacher quality and standards. The presentation of information was created to provide evidence-based clarification of information. For information, I presented the academic requirements for a public school elementary teacher and a preschool teacher, and compared it with the requirements of a Montessori elementary teacher and a credentialed Montessori preschool teacher. I included internship requirement comparison for public and Montessori teachers.

For student standards, I provided the delineation of the Common Core standards in language and mathematics, and compared them with the Montessori scope and sequence plan for the same age range. A Montessori scope and sequence outlines the Montessori student standards in a suggested cognitive and developmental order, along with materials and/or academic lessons to achieve those standards.

Discussion.

To set the stage for comfortability, I initiated and concluded each presentation of information with a discussion. I introduced teacher quality with discussion, presenting the definition of a professional teacher according to the American Federation of Teachers, and compared it to the definition of a teacher according to the American Montessori Association. There were also discussion components to address feelings and responses to information regarding standards, public Montessori schools and accountability.

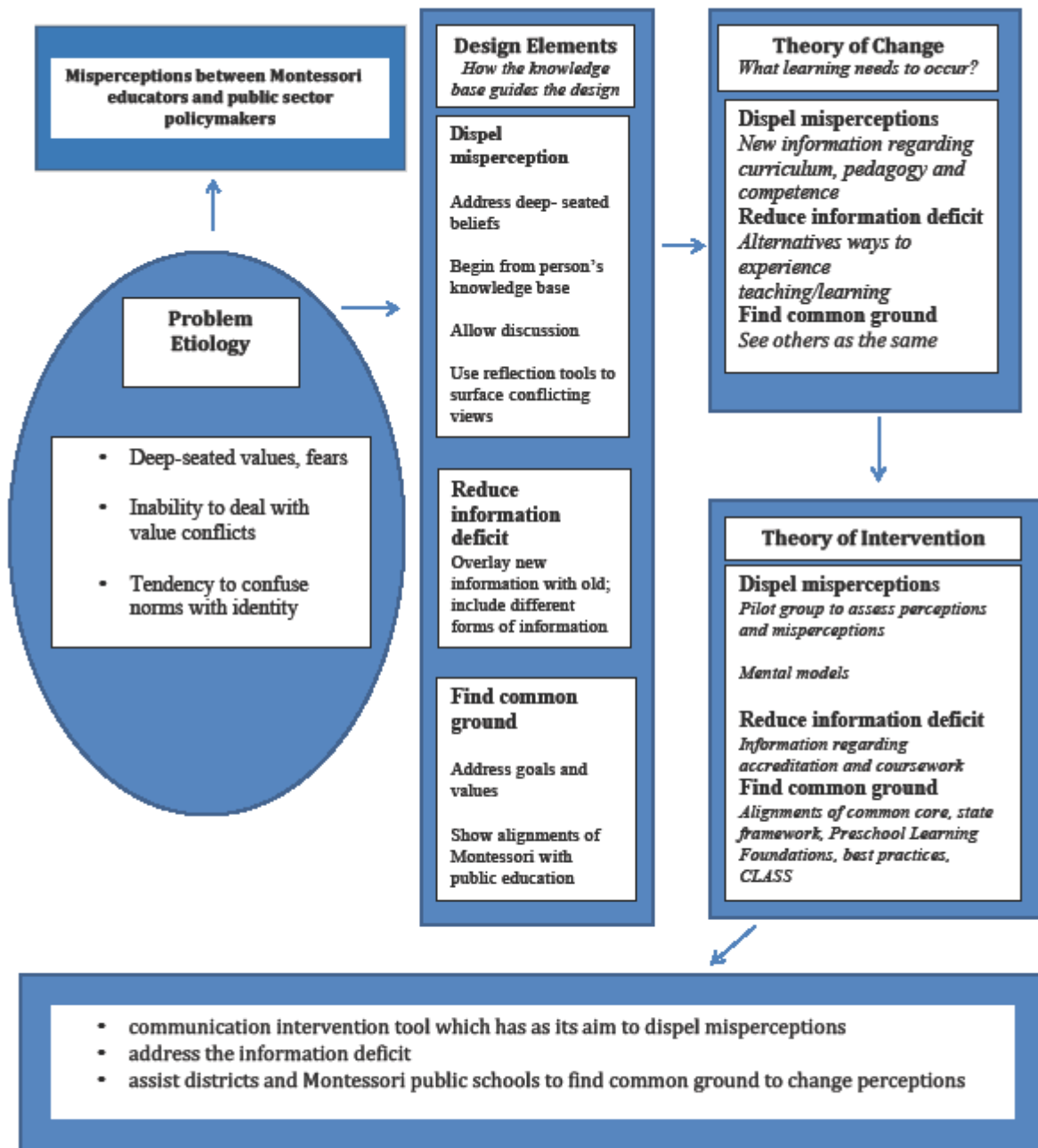
Video.

Three videos were shown in every intervention, with a fourth video added in the final iteration of the work. The first video shown in every intervention was a portion of a stakeholders' meeting in which teacher quality and professionalism were defined by a school district representative; the second video was a spotlight on one Montessori student over a three hour classroom period; and the third video was from the Common Core Initiative explaining the rationale underlying Common Core. In the final workshop, the depiction of the Montessori classroom experience was counter balanced by a video of a public school classroom.

Experiential (embodied) learning.

In a follow up meeting, a sample of leaders spent four hours in a visceral, hands-on experience in teaching and learning from a Montessori teacher and student perspective. They learned how to use and learn from materials in the areas of language arts, geography, zoology, mathematics, sensorial discrimination, botany and earth science. All materials used involved kinesthetic learning with several modalities.

Figure 1. Theory of Change and Intervention



Design Challenge

My unit of study is educational leaders of private Montessori schools, leaders of public Montessori schools and leaders of traditional schools (public and private). There were several challenges involving these groups:

Deep-seated ideologies

A challenging two-level process in working with education stake holders was identifying and addressing deep-seated values, while holding crucial conversations about controversial issues. Addressing quality issues that connect with the construct of teacher self-efficacy is difficult, especially when pedagogical differences are the basis of perceptions of teacher quality.

Perception

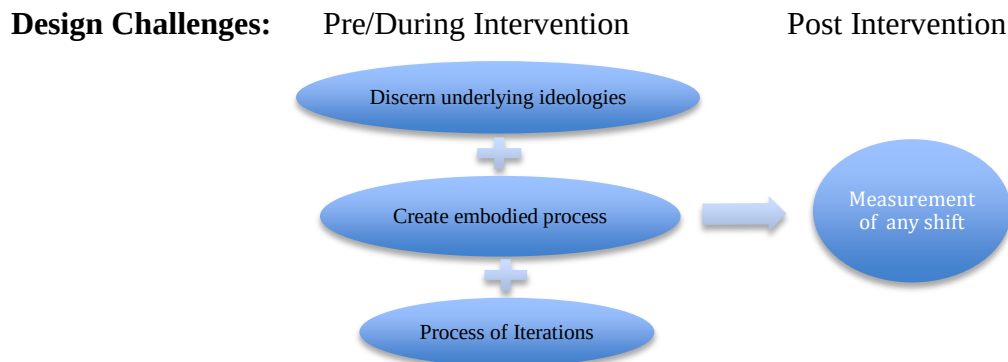
This study focuses on perception and yet perception was one of the greatest challenges in this study. However scrupulous the intention was to design an objective instrument, the researcher and the subjects are all human beings. Humans have underlying values and unconscious thoughts that inevitably color processes of communication. The concern was that even unpacking this information could be perceived by either group as a counter-normative process. It was possible that Montessori leaders would be hesitant to engage in opening doors to information-sharing for fear of pedagogical assimilation. A similar concern was that individuals who were biased toward Montessori education or who felt pedagogically threatened might not be willing to engage in an information exchange.

Iterative changes

The changes needed for the subsequent iteration were difficult because they required the ability to do the following:

1. discern deeply some underlying reasons for long-held differing perceptions;
2. create a process which matched the best way to reach individuals with strongly held values, expand one's world view, and open a door to find commonalities
3. take risks through changes made in subsequent iterations based on evaluation
4. create a valid way to measure perceptions and an indication of any shift in a long-term process

Figure 2.
Design Challenges (Pre and Post Intervention)



Assessment

I found it challenging to determine the best process for assessment and analysis. In the end, I employed a variety of methods to increase the accuracy of the analysis, including questions, the proper survey scale, Likert scale formatting and inclusion of “unsure” in the rating scale.

Pre-Conditions/Conditions for Tool Development

There were three preconditions that had to be met in design development to ensure a successful study: a sufficient number of leaders who could participate; the participants needed to be individuals who were likely to engage in authentic discussion about debatable, perhaps even controversial subjects. Additionally, participants had to be willing and likely to participate in all components of the project: answering pre-and post-surveys, attending the entire presentation, and – if selected – being available for a follow up interview.

There were two conditions for successful implementation of this design: decision makers as participants (leaders with the authority or influence to affect decisions at the school or district level) and a platform for implementation (workshops).

Prior to creating and implementing this communication protocol, I queried Montessori educational leaders and traditional public schools leaders regarding their views and perceptions of each other, and used the emergent themes in my intervention. To measure the impact of the intervention, I used interviews and pre and post surveys, focused on identifying participants' changing views concerning the three primary themes which I used as the foci of my workshops: teacher authenticity and accreditation, common standards (including Common Core) and accountability (internal and external). I developed a format which included a presentation with a slideshow, videos, discussion and written information.

Main Activities and Sequence of Activities

The main activity consisted of a one day, approximately three hour, stand-alone workshop. The workshop sessions were divided into 30 minute segments. Each workshop segment included a brief discussion opportunity.

Preparation: Tool development

The activities in their pre-implementation stage (van den Akker, 1999) involved interviews and needs assessment surveys. The results of the pilot surveys provided the information to create a basic list of differing and common views between Montessori and public sector leaders. I used the information to compile the following material for a workshop presentation:

- 1) teacher authenticity or quality accreditation alignment: components of teacher efficacy including the ability to provide classroom balance of structure, freedom and individual needs
- 2) information detailing Montessori teacher accreditation and public school accreditation, featuring a comparison of accreditation bodies and missing components
- 3) common core standards and Montessori scope and sequence – to provide information regarding alignment and missing elements; video presentation regarding the execution of common core standards within a Montessori classroom
- 4) Montessori and district assessments and accountability – slide presentation

Pre-Workshop Survey Questions

I prepared questions which were provided to all participants and served as pre and post elements of shift comparison and to identify possible elements of cognitive bias which may alter perceptions and therefore decision making. The questions served to address visual images, metaphors, ideologies and types of cognitive bias (specifically framing, confirmation and bandwagon effect).

The survey questions for the public school leaders were:

1. How well do Montessori classrooms provide the type of structure that is needed to promote sufficient student learning? (*tests confirmation bias*)
2. How does Montessori education (compared to traditional education) prepare children to be academically ready for the next grade? (*tests bandwagon effect*)
3. To what extent are Montessori teachers equipped to meet the academic needs of all types of students? (*framing*: see question 5)

5. Compared to traditional teacher education coursework, how rigorous is Montessori teacher preparation coursework?
6. To what extent is a Montessori curriculum able to address children with special learning needs? (*framing*: see question 3)

The survey questions for Montessori leaders were:

1. How well do public classrooms provide the type of freedom that is needed to promote sufficient student learning? (*tests confirmation bias*)
2. To what extent do public schools prepare children to be academically ready for the next grade? (*tests bandwagon effect*)
3. To what extent are public school teachers equipped to meet the academic needs of all types of students? (*framing*: see question 5)
4. Compared to Montessori teacher preparation coursework, how rigorous is public school teacher preparation coursework?
5. To what extent is the Common Core curriculum able to address children with special learning needs? (*framing*: see question 3)

Post-Survey Questions

There were two sets of post survey questions, to test immediate and later responses. The questions immediately following the workshop were aimed at addressing learning targets: particular aspects of Montessori education and traditional education which were addressed in the discussion portions of the workshop. The participants were asked to complete the first set of survey questions before leaving the workshop. The initial post survey questions for public school or traditional leaders were:

- 1) How well do you know/like a Montessori/traditional approach to teaching and learning?
- 2) How well do you feel Montessori/traditional teachers are educated?
- 3) Do you feel that Montessori education is a program that caters to the upper middle class? Do you feel that public school leaders think that Montessori education caters to the UM class?
- 4) Do you feel that children can learn the same overall information in a Montessori/traditional setting? Explain the reason for your view.
- 5) Do you feel that Montessori/traditional educators are held accountable for quality teaching? Explain the reason for your view.
- 6) Do you feel that there are more commonly held views between Montessori and public school? If so, what are they?
- 7) Do you think there are many Montessori public schools?

The initial post survey questions for Montessori leaders were:

- 1) How well do you know/like the traditional approach to teaching and learning?
- 2) How well do you feel traditional teachers are educated?
- 3) Do you feel that Montessori education is a program that caters to the upper middle class? Do you feel that public school leaders think that Montessori education caters to the UM class?
- 4) Do you feel that children can learn the same overall information in a Montessori or traditional setting? Explain the reason for your view.
- 5) Do you feel that Montessori and traditional educators are held accountable for quality teaching? Explain the reason for your view.
- 6) Do you feel that there are more commonly held views between Montessori and public school? If so, what are they?

7) Do you think there are many Montessori public schools?

Second reflection post-survey questions.

The original pre-survey questions were also used post survey, at a 4-8 month interval, to test the effectiveness of a continual perceptual shift which might constitute double-loop learning (Argyris & Schön). The post survey questions were posed in dual fashion for clarity (eg: How rigorous is Montessori teacher education coursework? How rigorous is public school teacher education coursework?

Interview Questions

In addition to the post survey questions, a sample of participants (Montessori leaders, 70% of Montessori public education leaders and traditional educators) were interviewed post intervention. The in-depth interview questions for public/traditional leaders, designed for deep reflection were:

1. When someone says Montessori education, what image comes to mind? What does that image infer for you?
2. What if anything is missing in a Montessori environment to prepare a student to be academically ready for the next grade?
3. What do you feel makes a teacher preparation course of study valid?
4. What is one similarity between Montessori schools or teachers and public schools or teachers?
5. What three words would you use to describe a Montessori classroom?
6. What would child centered instruction look like to you?
7. What would a traditional approach look like to you? a non-traditional approach?
8. Are there common values that Montessori education and public education share?

The in-depth interview questions for Montessori leaders were the same for questions 3, 4, 6 7, and 8. Questions 1, 2 and 5 were framed the same, substituting Montessori with “public or traditional school” (eg: “When someone says public education, what image comes to mind? What does that image infer for you?”)

Chapter Three

Previous Research: Consulting the Literature and Professional Knowledge Base

I consulted the professional knowledge base with several goals in mind. One was to elucidate the etiology and situational context of the main areas of confusion about Montessori education [Hargreaves and Giles; Scot, Calahan and Urquhart (2008)]. Additionally, **my study was informed by cognitive science theories to explain the process of comprehensive perceptual change** (Spillane, 2007; Kennedy, 1984; Coburn, 2009; Argyris and Schön (1978).

Additionally, since deep understanding of critical elements of Montessori education seemed to be at the root of misconceptions, I provide an introduction into Montessori education through a background on multisensory education, and the history of Montessori schools, including the historical circumstances which caused the growth of Montessori schools to yield to negative perceptions.

The Control of Quality in Public and Alternative Education

The desire for quality in education has been at the forefront of the nation’s agenda for decades. Following the publication of A Nation at Risk (National Commission, 1983), corporate

and governmental pressure forced schools to address accountability, standards and student achievement. Under the structure of standards, policymakers at all levels developed rules which define and govern teaching and learning, challenging deeply rooted beliefs regarding how much one can learn and how such learning should take place (Spillane, 2007; Reiser & Reimer, 2002). The issue of how quality was defined, who can administer that education and measures to hold individuals accountable became politically charged.

Overtime, these matters appeared to loom larger than the issue of quality itself. In times of challenge, value conflicts emerged and out of fear, people remained steadfast to what was comfortable and commonly held (Cuban, 1990). Local control shifted toward state and federal governance of schools, culminating in standardized testing as a mechanism to assess accountability of school and teacher (Hursh, 2005). The result of this focus on accountability to significantly raise test scores has resulted in educators who teach commensurate to the achievement of high scores on a test (Scot, Callahan & Urquhart, 2009).

The focus on high stakes testing, accountability and teaching practices however, has not rested only with public education. This critical juncture of high stakes testing and student/teacher accountability has shaken the core values of traditional *and* non-traditional education. While public schools were challenged with strict adherence to measures of top down district accountability, attention turned to alternative education to prove its legitimacy. That legitimacy, as in the public schools, was increasingly highly correlated with standardized testing results. Alternative schools were not immune from being expected to prove its ability to adequately teach children, given the overall demands of high stakes accountability.

Legitimate alternative education has been characterized as that which contains certain components to improve student outcomes and meet the needs of at-risk students who have been enrolled in alternative schools. Such components include assessment, effective instructional strategies, sufficient staff training, a rigorous curriculum and comprehensive systems connecting the educational institution to the larger community (Quinn and Rutherford, 1988; Fitzsimons, Hughes, et al., 2006). However, there is a dearth of research assessing the ability of alternative models to meet these and other criteria, which contributes to the inadequately informed perception that nontraditional education methods are insufficient (Gable, Bullock, Evans, 2010).

Therefore, pressure has been heavily placed on non-traditional schools to conform to traditional standardization in teaching, often fueled by the combination of status quo beliefs, deep-seated values and inaccurate information (Hargreaves & Giles, 2006; Tyack & Tobin, 1994; Cuban, 1990). Negative perceptions regarding alternative education ensued and threatened the sustainability of alternative models (Hargreaves & Giles, 2006).

Under pressure, many innovative educational systems either buckle, trade in their unique difference as a sustainable model, or become “inward looking” and disconnected from the wider community, which can in turn further exacerbate concerns regarding the legitimacy of the alternative educational methodology (Sipple, 2011). This has been the situation with some alternative systems, one of which is Montessori education.

To provide a foundation to compare the educational philosophy to the misconceptions, the next section provides historical background regarding the migration of the philosophy to the United States. I then provide some basis for pedagogy: concrete, multisensory education.

Multisensory Education: Underpinning of Montessori Education

The underpinning of Montessori education is multisensory, hands-on learning through didactic materials with a student centered approach to such learning. It is based on the concept

that children learn best through the use of concrete materials that are designed to enhance learning through more than one sensory modality.

Multisensory teaching links the eye, ear, voice and hand in concrete or symbolic learning. This sensory integration method of teaching has as its aim to maximize a student's ability to make associations between visual and verbal information by connecting them through the other available senses. Allowing for more than one way of receiving information requires the teacher to teach to the learner's style of learning. Humans have a particular way of processing information which emanates from an area of the brain and is predominantly connected to one or more of the senses (Bahrick & Lickliter, 2000). As a result each human develops their own particular style of learning. This unique manner in which individuals are inclined to approach a learning situation has a direct impact on their performance and achievement (Riding & Cheema, 1991). Multisensory education, also called multimodal education, involves the presentation or teaching of information via different learning modalities.

The ability of the brain to integrate information from multiple senses has been studied across disciplines. Although most research concerning the brain's plasticity has been connected to unilateral functioning, studies emerged concerning the causal interaction between senses. Intersensory redundancy hypothesis (IRH), which emerged from developmental psychology, suggests that information presented redundantly across two sensory modalities at a young age, results in neural attentiveness to those areas, while the same event presented across one sensory modality results in fixation of one area to the exclusion of others. (Bahrick & Lickliter, 2000). Bahrick & Lickliter's (2000) work indicated that this ability to learn via multimodalities begins at infancy. Multisensory interactions continue to occur across the lifespan in areas and pathways of the brain, including the brain stem, sensory cortical areas and feedback pathways. Shams and Seitz (2005) link the brain's unlimited learning ability with its capacity to unite different senses for deeper comprehension, and they posit that we have been 'hardwired' for multimodal teaching and learning for centuries. Multisensory education emerged in response to this research on the superior parallel processing ability of the brain and its ability to simultaneously incorporate two or more sensory modalities to effectively enhance memory and learning (Birsh, 2005).

Multisensory teaching effects on language development.

Hanna's (2008) research review addressed the salience of kinesthetic instruction in connection with language acquisition, intertwining dance education with cognition, emotion, and kinesthetic intelligence. She pointed to the Wernicke and Broca areas of the brain as a key example of the potentiality of multimodal learning. These two areas - associated with 1) verbal language expression and comprehension, 2) analytic and symbolic function and 3) sequential processing are the identical areas responsible for complex body movement. The same neural processes involved in creating dance, engage the identical conceptual and creative processes that are required for creating poetry (Hanna, 2008). Hanna reported results from Ball and Heath's (1993, 1998, 2001) 10-year study, which examined the impact of dance on learning. Her findings indicated that students who engaged in dance for 3 hours, 3 days each week demonstrated a significant academic improvement. Hanna (2008) posited that effective teaching in this way should have an impact across academic subject areas, including language, mathematics and science.

Multisensory teaching effects on second language acquisition.

Since acquired vocabulary is the greatest predictor of language proficiency and reading ability, young children seem to respond well to a multisensory approach to second language acquisition. Through an experimental design involving a combination of storybook reading in Portuguese and English and “rich” (complex) explanation of vocabulary, Collins (2008) used a multisensory process by pairing sensory instruction involving auditory and visual stimulation with enriched verbal information and peer interaction. Three weeks post intervention, the experimental group reflected higher receptive and expressive language and higher Peabody Picture Vocabulary Test (PPVT) scores (Dunn & Dunn, 1997). English language learners (ELL)’s without rich explanations of words acquired understanding of 33% of new words by contextual assumption. Conversely, those with complex word explanations acquired 50% understanding of new words (Collins, 2008).

Additionally, research on the impact of a multisensory science instruction on limited English and English speaking middle school students suggested high student outcomes (Crossley, 2007). Using a teaching method incorporating auditory, kinesthetic, and tactile skills with 282 middle school students, ELL students yielded higher test scores when instructed using a multisensory rather than a traditional teaching approach with the same students. There were significantly higher test scores for both ELL students and English speaking students when using a multisensory approach over a traditional teaching approach.

This is validated by Botta, et al. (2011), whose four-part experimental research regarding multisensory cueing, focused on the effect of multisensory cues on working memory performance. Findings showed that in 3 of 4 experiments, the combination of auditory and visual cueing produced a higher level of accuracy in student responses (8.6%) than for unimodal cuing (3.6%) (Botta, et al., 2011). The brain’s ability to process information involving more than one sensory modality correlates with its ability to focus more attention to one task when more than one modality is used (Bahrick & Lickliter, 2000). When student learning is multimodal, either proficiency or the knowledge quotient increases across domains (Riding & Cheema, 1991; Bahrick & Lickliter, 2000; Shams & Seitz, 2005).

Multisensory teaching effectiveness: Mathematics.

Research has broadened our understanding of the developmental beginnings of mathematics in young children, who innately incorporate what is termed informal mathematics into their understanding of their surroundings (Copley, 2000). This understanding allows a child to translate their sensorial experiences of the world into simple mathematical concepts (Caine & Caine, 1990; Baroody & Ginsburg, 1986). Piaget identified four periods of development that are particularly fertile moments for children to explore and understand many concepts which are mathematical in their orientation (Ojose, 2008). His theories laid the foundation for later math based multisensory research (Reedal, 2010).

Aligned with Piaget’s theory, Jordan and Baker (2011) conducted experimental research with 24 preschool children to determine whether information presented in a multisensory rather than unimodal manner was more effective in numeric discrimination and learning. Findings indicated that across age and gender, children showed higher accuracy in promoting numeric matching when the sample numbers were presented in audiovisual (65.77%) versus auditory (52.56%) or visual (50.02%) alone. There is a correlation between redundancy of information via multimodalities and mathematics proficiency (Bahrick & Lickliter, 2000). This indicates that

learning achieved through exposure to different sensory modalities serves to embed the understanding in the brain.

Correspondingly, Thornton, Jones and Tooley (1982) examined the effectiveness of using several sensory modalities when teaching addition. Using purposive sampling (students with varying levels of mathematics difficulty), they studied 115 groups of 3-4 children in grades 2 – 6, over a period of 11 weeks. A multisensory program was utilized for teaching, with no additional addition strategies employed. Findings indicated that in all grade levels except grade 2, a consistent pattern of improvement occurred with multimodal activities and lessons. This lack of improvement at second grade was remarkably significant compared to the other grades with a multisensory component.

Across several subjects, research suggests the impact of multisensory teaching: when students engage in tasks via more than one modality, the concentrated focus results in increased content learning ability (Rains, 2008). What is assumed by this practice is that teaching and learning are not mutually exclusive. Multisensory teaching is an interactive process for the teacher who creates the environment for learning and for the student who engages therein. What is significant is that it is this student driven, multisensory interactive process which informs Montessori education. Studies in the field of Montessori education are limited. However, some aspects of the approach, such as multisensory learning, seem to be validated in research (Hannah, 2008; Schunk, 1999; Kennedy, 2008; Crossley, 2007).

Montessori Education as an Alternative Pedagogy

The signature of a Montessori classroom includes: mixed aged grouping; research-based Montessori materials, an adult who is effectively trained to use them, experiential inspiration regarding the interconnectedness of living and non-living things, a student directed/teacher guided environment that includes support for extended periods of work without unnatural disruption; and guidance which has the aim of engaging the brain through multiple sensorial pathways. Undergirding almost any lesson is the simultaneous inclusion of more than one mode of sensory input. This sensory replication of information allows for engagement of many sensory modalities affording different ways for information to channel into the brain.

Historical Background

Understanding the background of the connection between Montessori education and traditional public schooling provides an understanding of how differing perceptions may have originated. Interestingly, this pedagogy was initiated and based on the findings from Dr. Maria Montessori's scientific research on behalf of lower income children in Italy. Although in practice, this pedagogy sets Montessori classrooms apart from traditional education, the origins of Montessori schools are rooted in common equitable ideals of public education.

Montessori opened her first school as a part of an urban renewal project in the slums of the Lorenzo district in Rome, Italy. In 1873, housing for lower classes was placed on the outskirts of Rome as a "deliberate strategy to weaken the potential of organized working-class" (Forgacs, 2014, p.32). A 1929 report by the city administration further indicated that the intent was to "remove 'unruly, illegal, undisciplined families' from the centre and transport them to 'land...not visible from the arterial roads'" (Forgacs, 2014, p.32). As they were built farther out, the characteristics of a slum/tenement became apparent, devoid of running water, drains and inside toilets. It is here that Montessori established the first school in 1907 (Creese, 2004).

Montessori's success with the children in Rome was widely published in McClure's magazine, an American publication, the editor of which became Montessori's financial backer. In 1911, McClure invited Montessori to the US, under the assumption that "once informed," Americans would change their educational technique and implement Montessori's method of practice. Following Montessori's well received presentations, 67 US teachers traveled to Rome to study Montessori education, and return to teach in some of the first Montessori schools in the United States (Whitescarver & Cossentino, 2008). In that same year, the first Montessori school opened in New York, backed by and in the home of the president of National City Bank of New York (now Citibank). The following year, the family of Alexander Graham Bell, one of Montessori's financial backers, opened a school in Washington, D.C. The students in the first Montessori American schools represented the population of its financial backers – wealthy children, not the type of children who had been the successful subjects of Dr. Montessori's scientific observation and implementation in Italy, which had drawn such international interest." The educational principles were the same. However the schools naturally carried a sense of economic privilege which was not present in the original Montessori schools.

Shortly thereafter, in 1915 until 1960, the dominant culture dramatically changed their initial positive assessment of Montessori education to an unfavorable one. It is suggested that language and immigration issues affected public sentiment. However, there are other possible notable factors:

- The American Report, published in 1914, reported the dissatisfaction of teachers who left the US to train in Italy. Expecting the same affluence of the American school, teachers found the materials in Italy to be substandard to the materials in America – the method therefore also considered inferior to the quality of education in America (Hymes, 1965).
- Montessori insisted on a measure of 'doctrinal purity' – convinced that her ideas needed to be practiced exactly as developed, to maintain scientific validity. This made it impossible to embrace portions of her pedagogy to complement the newly adopted kindergarten design (Gutek, 2004). This control over her method also affected Mussolini's acceptance of Montessori education as the national education program.
- When tenets of Mussolini's fascism became a threat to Montessori's peace education pedagogy, Montessori left Italy. However a perceived connection between Montessori education and fascism remained, challenging the method's image and legitimacy.

Image and Organizational Legitimacy

Image, especially in times of crisis or reform, directly connects with legitimacy. At the micro-political level, organizations must view each other as legitimate to find common ground. Grimmett, Flemming and Trotter (2009) argue that in education, organizations create identity and legitimacy through what appears to be a conflicted dual process. Based on DiMaggio and Powell's (1983) theory of isomorphic change, over time educational organizations approach a place of mutual recognition of legitimacy. Within the field, groups which find commonalities begin to resemble each other in their politics or structure or begin to have the appearance of homogeneity. The similarity or appearance thereof produces acceptance and therefore legitimizes the other. This process of creating legitimacy occurs by adopting recognizable forms or connections - constructing legitimacy through measures of uniformity or similarity – norms and values. The process of legitimacy creation and identity formation ultimately incorporates an exchange of learning, lessens the information deficit, and contributes to the construction of meaning.

More recently, Montessori organizations have stepped up to establish legitimacy through partnership and information sharing. Three Montessori associations politically coalesced to standardize teacher accreditation and thus confer legitimacy. The creation of MACTE established congruence with the norms and values embraced by traditional education regarding accreditation, accountability and educational rigor. MACTE holds value as one of the two assemblies of accrediting bodies: one assembly of accreditors for colleges and universities and a second assembly of accreditors for “professional, specialized and free-standing institutions” (MACTE, 2015). MACTE is recognized and positions itself within the second group of accreditors, with exclusive specialization in Montessori teacher education (Figure 3).

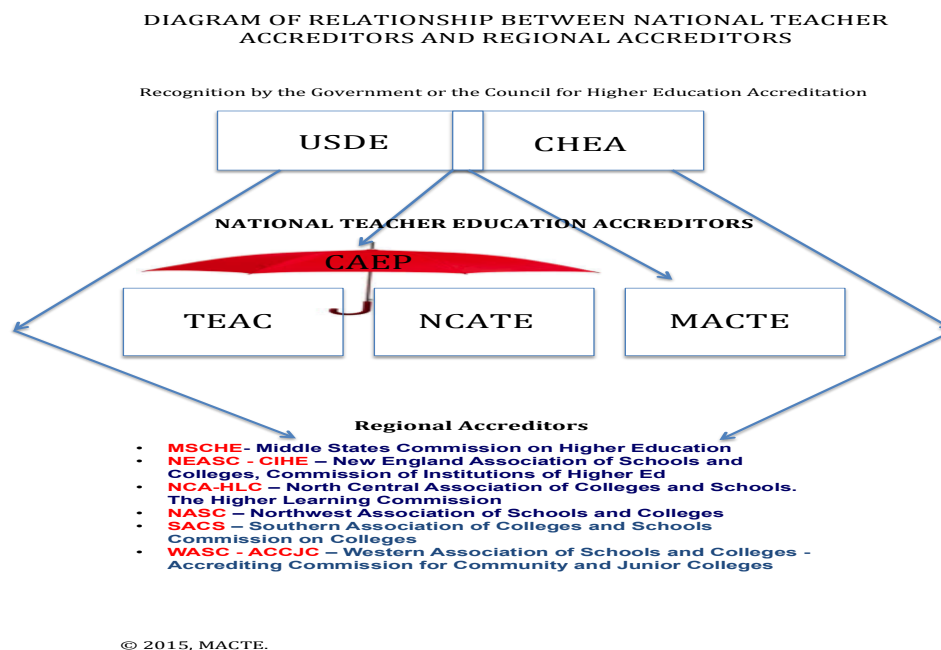


Figure 3. Relationship between MACTE and Regional and National Accreditors

Summary: Montessori Legitimacy and Teacher Education

MACTE has been active with several states to create articulation regarding teacher education coursework. The equivalency differs from state to state, from no recognition to the equivalence of an associate degree. One of the factors not quite recognized fully is the global knowledge involved in the study of Montessori teacher education. Apart from readings, class participation, papers, required observations, some competency tests and student practicum, Montessori teachers must learn detailed and complex information such as the etymology of words, and identification, description, classification and nomenclature in most areas of the sciences and social sciences, including botany, zoology and geography. They construct their own teaching manuals in 5 main subject areas, including over 400 presentations and lesson plans with methods of differentiated instruction. They create materials which extend or vary the use of the Montessori material, including materials needed to individualize the instruction for children with learning differences, challenges or strengths in a certain area. The time or resulting education does not appear to be captured or properly appreciated within the confines of traditional equivalencies (Figure 4).

MACTE Clock Hour to Credit Hour Teacher Education Equivalency Formula

The following translation should be used to indicate the MACTE Free Standing Institute's Teacher Education Equivalency (teacher education not taken for college credit) based on MACTE's threshold of required hours for accreditation; many affiliations exceed this standard.

Using the formula provided by the Accrediting Council for Independent Colleges and Schools (ACICS, 2011), the prepared equivalency should be used to help clarify the college credit comparability of the following Teacher Education levels.

This in no way indicates students from these institutions are entitled to or will receive equivalent transfer credits but simply equates the work completed to more traditional college credit equivalency for the purposes of Teacher Education recognition relevant to State Registries and/or Teacher Licensure Pathways.

According to the ACICS (2011) formula for translating clock hour into college credit equivalency, 37.5 hours are required for every credit hour.

MACTE Teacher Education Level Cumulative Hours breakdown: total direct instruction required, break-down for in and out of class, and equivalency totals.

<i>Clock Hours By Program Level</i>	<i>Ages</i>	<i>Total Min. Direct Hours of Instruction Required</i>	<i>Academic In Class</i>	<i>Academic Out of Class</i>	<i>Practices In Class</i>	<i>Practices Out of Class</i>	<i>Additional Exp. Hours</i>	<i>Additional Out of Class</i>	<i>Cumulative Total</i>	<i>Divided by 37.5 req. min</i>	<i>College Credit Equivalency</i>
<i>Infant/Toddler</i>	<i>0-3</i>	600	200	400	400	240	0		1240	33	CCPE
<i>ECCE</i>	<i>3-6</i>	600	200	400	400	240	0		1240	33	CCPE
<i>Elementary I</i>	<i>6-9</i>	800	200	400	400	240	200	120	1560	42	CCPE
<i>Elementary II-III</i>	<i>6-12</i>	1200	375	750	400	240	425	255	2445	65	CCPE
<i>Secondary I</i>	<i>12-15</i>	1200	200	400	1000	600	0		2200	59	CCPE
<i>Secondary II-IV</i>	<i>12-18</i>	1500	500	1000	1000	600	0		3100	83	CCPE

*Out of Class Clock Hours, based on the ACICS definition, include work related to: Reading and Writing Assignments, Projects, Practical Application, Practice and Other Related Learning Experiences.

**In the MACTE Teacher Education Program, out of class work will include: independent research, material making, album preparation, and practice with materials. Out of Class Clock Hours, based on the MACTE definition, do not include Oral or Written Exams.
<http://www.acics.org/news/content.aspx?id=4419>

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Figure 4. Example of MACTE Teacher Hour Equivalency

Apart with research about teaching and learning, the acceptance of teacher accreditation programs and the rigor of teacher preparation programs connect with individual and group perception of views concerning 'what makes a good teacher'. Enlarging such views and widening those perceptions is connected to the theoretical concepts in this study, which are elucidated in the next section.

Previous Research on Theoretical Concepts Embodied Cognition, Mental Models and Loop Learning

Embodied Cognition

Historically and traditionally, cognitive science has represented the brain as an information processing unit directly connected to cognition, but fairly separated from the body other than in a command-response situation. Although the form that the embodiment takes is viewed differently by some cognitive scientists, this paper is primarily informed by the work of Lakoff and Johnson (1999), and Argyris and Schön (1978). I posit that cognition is embodied and that a certain type of learning is required for information to be incorporated within one's mental model or world view. Embodied cognition challenges the idea that the brain is a separate

cognitive organ. It represents the belief that the brain is not simply an input and output organ, but part of a larger mutually inclusive system dependent on it for perception, decisions and responses. It has been posited that “intelligence ... cannot merely exist in the form of an abstract algorithm, but requires a physical instantiation, a body” (Pfeifer & Scheier, 1999, p.649). Intelligence and cognition are then seen as emergent from and connected to the interaction between the body and experience (the world). This is apparent since mental imagery and neural perception use the same circuits of the brain. Unconsciously, our thoughts and feelings are “grounded in sensory experiences and bodily states” (Lakoff, 2013). It is the context through which we view the world and “frame” it – creating mental models of how the world exists to us. The experience of the body in the world within the environment or physical interaction shapes the way we think and reason about things.

Some cognitive scientists suggest that “cognition is embodied when it is deeply dependent upon features of the physical body of an agent, that is, when aspects of the agent's body beyond the brain play a significant causal or physically constitutive role in cognitive processing”. This aligns with Lakoff and Johnson’s view that “all meaningful thought” - any deep understanding is embodied (Lakoff, 2013). Additionally, metaphors are inherent within our expressive and recessive language. They play a significant role in embodied cognition and are directly connected to perception and behavior (Lakoff, 1999).

Metaphors

A growing body of research points to the role of the body and language in thought and decision making. Metaphors connect directly with embodiment because they map concrete bodily experiences onto abstract constructs (Lakoff & Johnson, 1999). Metaphors shape language and impact understanding, perception and decisions. Barsalou (1999) found that, “An embodied and metaphorical approach adds that mental representations are multi-modal instead of amodal and hence can be activated through diverse sensory experiences... To date most demonstrations of metaphorical effects on judgment and decision making seem to occur through this process—bodily experiences activating metaphorically associated thoughts, goals, and feelings” (as cited in Lee & Schwarz, 2012, p.2). Metaphors can be comparatively confusing, abnormally abstracting and emotionally entrenched. Since metaphors are a regular part of daily conversation, humans can confuse and misinterpret metaphors, but they can also ‘live out’ the metaphors – as they affect our everyday perception and functioning.

Metaphors are impactful linguistic but primarily embodied conceptual ideas (or bodies of knowledge) which are understood in terms of another. It is too simplistic to refer to metaphors as parts of language. Metaphors represent thought, mapped across conceptual domains. Lakoff (1980) describes metaphors as “pervasive in everyday life...in thought and action...our concepts structure what we perceive...how we relate to people.” They subconsciously shape how we think and act. Metaphors are embodied, that is, the embodied nature of an experience is captured and held unconsciously within the thought processes which connect the metaphor within the brain’s neuro circuitry, and can be retrieved when the metaphor is consciously used.

According to this cognitive theory, the majority of our normal conceptual system is “metaphorically structured” – most concepts or experiences are cross-mapped: understood in terms of other concepts or experiences. The metaphor, or embodied thought, is independent of language and connects within the body to create response. Simple words connected to metaphorical expressions take on different dynamics: the concept of conversation received in the brain metaphorically in argument terms takes on an ‘argument is war’ position (he took my side),

mapping the concept of war; whereas the concept of conversation received metaphorically in dialogue terms takes on an 'dialogue is sharing' position (taking turns), mapping the concept of sharing over conversation (Lakoff & Johnson, 1980).

Within the structure of the metaphorical concept, the schema gives shape to the experience. Aforementioned, schema incorporates information regarding the interrelationship between structures – the objects, series of events, situations or relationships within a larger picture (Rumelhart & Ortony, 1977; Rumelhart, 1977). In the example of conversation, schemata form the situational elements that comprise the conversation: dialogue/argument. The role of the brain becomes to embody the experience within the framework of the metaphorical term, hence 'argument' takes on a warlike connotation in the body – and thus gives rise to the need to protect, defend and rebuke. The combined role of metaphors, mental models and schema together with the brain's neuro circuitry influences how we unconsciously perceive things, and how our body unconsciously responds to that perception. These metaphors therefore are influenced by our experience, biases and that of others (Lakoff, 1980). The unconscious elements of perception and decision making are therefore encapsulated under the embodied cognition theory, and include the idea of the construction of mental models, schema and loop learning.

As metaphors can define people and actions, a part of the iterative cycle in this design was an analysis of metaphors that could come up in education discussions, including those used by Montessori leaders and non-Montessori leaders to describe self and others. I also examined whether changed metaphors appeared to make a difference in how one constructs mental models.

Mental Models

Mental models are an internal reflection of an external reality - our conception of our world and how it is structured. They allow us to edit the world around us, extract the essential elements and form views. They are analogous to an architect's model or diagram inasmuch as they are similar but not an actuality of the situation they represent (Senge, 1990). Additionally, assumptions or perceptions are sifted through one's mental models and in some instances, regarded as fact. However, mental models are not factual. They are representations of one possibility out of many possibilities of how a situation may occur – based on the prior individual or group experiences, views and ideologies which frame it. Some posit that mental models represent inferences – inferring that a situation is probable in a particular way, that way representing truth *for them*. Because mental models are constructed by our own perceptions, knowledge and imagination, "they present constraints because they are the first screen through which new information" passes (Craik, 1943, Leithwood, et al., 2004, p. 76). What we perceive and how we interpret it depends on the frame through which we view a situation. This framing is a mental model. Argyris & Schön (1974) assert that people operate from previously established mental models, and these mental models unconsciously govern their actions. Mental models "not only shape what we see and how we understand the world but also how we act in it. In a real sense, what we think is what we see, and what we see is what we think." (Wind, Cook & Gunther, 2005, ii). Consequently, mental models determine how we perceive and interact with others. They affect the partnerships and relationships we form or fail to form and how we view those relationships. Furthermore, they also guide the individual and group decision making processes within those partnerships.

Group models.

Research suggests that organizations (Senge, 1990) also have mental models (Argyris & Schön (1978). People construct joint models or “maps.” Thus, if information is not encoded in the mental model of the individuals and the maps they construct with others, individual learning will occur, but the organization’s mental map will remain unchanged. Using a prescribed process to reach individuals in a way that may make them more receptive to information is as important if not more important than the concrete information. Sensemaking theorists posit that pre-existing worldviews or mental models shape the way individuals or organizations interpret evidence (Coburn, Toure & Yamashita, 2009). From that interpretation, perceptions and an image of the individual or group is constructed. This makes the idea of the image within an organization and the perception of legitimacy as regarded by others important in changing mental models. The perception held by others shapes the view, imprints the image and determines the perception and subsequent responses and actions (Norman, 1983).

Mental models and schema.

There are differing views of the definition of mental models and schema in cognitive psychology (Doyle, 1998). For the purpose of this paper, mental models are analogous to the macro expression of one’s world view, while schema represents the micro cognitive framework from which we operate to organize and make sense of everyday events. While mental models are referred to as “fuzzy,” incomplete abstractions and assumptions which guide one’s view, this paper references the view of schema as a more exact reference. Schema theory suggests that knowledge is comprised of units – each unit, a schema which delineates specific information which contributes to the knowledge base from which perception and decision emanate (Rumelhart & Ortony, 1977). Unlike mental models, schemata are simple images through which people make inferences about small daily constructs (Cannon-Bowers, S., 1993).

Schema incorporates information regarding the interrelationship between structures, particular situation and events (Rumelhart & Ortony, 1977). They differ from mental models in their scope – mental models representing the overarching world view; schemata – the objects, series of events, situations or relationships within a larger picture (Rumelhart, 1977). Schema defines how data connects with certain patterns, providing more specificity to the overall image contained in a mental model (Fiske, 1980). Mental models then are schema *along with* cognitive processes with which one can utilize or modify the knowledge derived from the schema (Merrill, M.D. (2000). Schemata are the unconsciously derived knowledge bites, which frame our conception of pieces of our experiences and relationships. These pieces frame our interpretations and are almost like our mini theoretical concepts concerning all aspects of living (Rumelhart, 1977).

Although what we take in through our senses shape our schema, our schema is more far-reaching than what we hear or observe. Upon making an observation of the ocean, we incorporate other aspects within our ocean schema: waves, boats, tide, sand, etc., and we theorize that they exist within that schematic framework and thus “our interpretation far outstrips our observation” (Kesson, Ortony, & Craik, 1991). The term image schema was coined from the understanding that humans receive information somatically – image schema represents cognitive understanding of situations that we experience multimodally. Image schema is possibly more powerful and impressionable since what we experience in our bodies may live more deeply and experientially than what we have simply become aware of visually or auditorially (Lakoff, 1980; Johnson, 1987). Humans therefore have a schema for separate aspects of living, from a schema for waking up or grocery shopping to a schema about an individual or a time period (Rumelhart,

1977; Long, 2007). Without recognizing our ability to do so, humans create and shape their schemata and they become a basis for our view and subsequent judgment of others. We question individuals with differing habits, interests or taste, as their schemata and therefore their lens differ from our own.

We must deduce that our schema is malleable, but limited to our own interpretation, and therefore perhaps subjective or representative of a mismatch of other schemata concerning other daily events (Cannon-Bower, 1993). Schemata therefore comprise our mental models, but they may also lead to cognitive biases, as humans have a natural tendency to judge and make attributions of causality in our social encounters.

Cognitive Biases

Cognitive biases are said to represent patterns of deviation in judgment that sometimes occur in decision making (Tversky & Kahneman, 1974). These “patterns of deviation” may be more clearly defined as identifiable patterns of thinking which shape, explain or create a leaning or tendency in one’s views or decisions. Viewed in this way, cognitive biases are less akin to a deviation from normative thinking and more a partial explanation of the differences in cognitive structures in the individual and group decision making process. Kahneman (1974) defines decisions which issue from cognitive bias as fast thinking – quick, simplified information processing, rather than deep, critical thought-based decisions and views. A cognitive bias is not necessarily a purposeful judgment against an individual or group. Instead it may be a subconscious mental structure that influences rational thinking, which explains the human error or differences in critical thinking and decision making.

Cognitive biases are distinguished along a number of different dimensions. Some of the most common are confirmation bias (filter through which one sees information which confirms one’s beliefs or preconceptions), bandwagon effect (tendency to develop ‘group think’ mentality – accepting a belief because it is held by others, sometimes despite evidence at hand), and framing (drawing different conclusions from the same information, depending on how that information is delivered). Understanding biases and shaping language is a part of the process involved in changing views and mental models (Kahneman, 1982).

Changing views or actions emanating from one’s mental model is a complex process, which involves reconciling a mismatch between one’s ideology and a new and different individual or group position. To make a shift from deep-seated thinking to adjust perceptions, there must be a shift in one’s mental model (Cuban, 1990; Spillane, 2007; Kennedy, 1984; Coburn, 2009; Marsh, 2007; Orasanu, 1993) or a change in one’s schema. Sense-making (a cognitive process that involves interpretation) occurs in response to a paradigm shift. This shift involves an individual supplanting the old information - overlaying new information with what is already known. This requires a process by which individuals are able to make sense of new information to make new meaning of previously held views.

Summary

After exploring the literature on cognitive theories I extrapolated two theories, which seem to highlight other core structures of our cognition: embodied experiences and metaphorical language. These elements have a clear part in shaping mental models. I incorporated the elements of these theories into my intervention to determine whether deeper understanding could exist, opening a gateway to examine our own biases and whether the potential existed to reshape one’s mental model.

How Mental Models Change: Single and Double Loop Learning

Loop Learning

The fields of organizational and reflective practice inform us about how the embodied brain is involved in perceptions and change. Spillane & Miele (2007) argue that the practice of sensemaking and changing mental models is neither simple nor automatic. Sense making is a process through which salient pieces of information and experiences converge and convert into actions. Individuals, for example, tend to be more comfortable attempting to improve on their current model (Weick, 1995). For others, there is an inability to readjust from an ingrained mindset to new thinking. Argyris & Schön (1978) describe a process that allows for interpreting and making sense of the new information before it can alter what sits as the current mental framework. This process involves first examining the assumptions which frame the current model, and then, actively constructing a reality (active discussion and generation of information) in a single or double loop learning cycle. As encompassed within embodiment theory, knowledge is not merely a system of inputs, and learning is not simply accumulated knowledge. Deep knowledge represents the attempt at understanding a mismatch involving decisions and actions. Loop learning is the result of a reflective consideration of mismatches that may have occurred between an action and intention.

Single Loop Learning

Single loop learning focuses on improving strategies or techniques within one's underlying belief system (Argyris & Schön, 1978). It does not involve questioning beliefs, values or goals. In single loop learning, a decision may be changed, but the mental model reverts to its original state – or is only changed temporarily. In single loop learning, there would be refining of existing processes or ideas. However in single loop learning, one's future would tend to be continually guided by that same mental model (Figure 5).

Double Loop Learning

Double loop learning involves the reflection and questioning of underlying values, goals and strategies. If those are adapted, double loop learning provides a high chance that in the future different decisions will be made. According to Argyris and Schön (1978), it involves a deep reflexive and iterative process that is both backward reflecting and forward looking. It involves “a reflexive approach to our old ways of understanding things, in the sense that we arrive back at our personal frameworks with new ‘lenses’” (Badger-Charleson, 2012). Double loop learning opens a channel to change the mental model upon which a decision depends or a view is shaped. It makes a shift in understanding; single loop learning does not (Smith, 2001; Jamieson, et al., 2007; Tovstiga, et al., 2004; Duffy, 2003).

Double loop learning is considered explorative in nature and may include moving beyond what is comfortable. It involves learning through risk taking. Cognitive psychologists posit that double-loop learning is difficult because the human tendency is to recall and include information that confirms prior beliefs, nullifying a need for change. However, to expand the literature, it would appear that the reflective nature of double-loop learning and “deep learning” share the same sense of embodiment. Embodiment theory reflects the view that “[the mind] arises from the nature of our brains, bodies, and bodily experiences...the very structure of reason itself comes from the details of our embodiment” (Lakoff, 2011).

Double-loop learning incorporates the understanding and willingness to uncover or recognize that which may be unconscious underlying issues. It includes the understanding that

there is more under the surface, including biases and deep-seated beliefs which underpin choices and decisions. Double-loop learning may essentially represent *very deep learning*, as it is a conscious examination of what may be held within the unconscious and within the body as a basis for our views and perceptions, and represents a step toward a shift in those perceptions. (Figure 6).

Figure 5. Mental models
Single loop learning

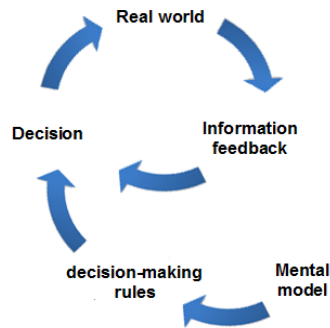
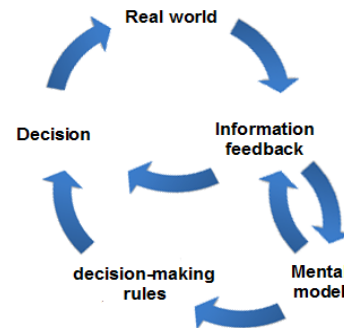


Figure 6. Mental models
Double loop learning



Examining loop learning from a business perspective, the embodied example of double-loop learning is a “pivot” in which a group may iteratively examine the achievement of company’s objectives by reflecting on the basis for and soundness of the objective, obstacles and consideration of adjustments. In our current stage of education reform, in which beliefs and assumptions shape our view of teaching and learning under the pressure of high stakes accountability (Hargreaves and Giles; Scot, Calahan and Urquhart (2008), changing mental models requires such reflection and consideration.

Therefore, in this design, the **process of double loop learning in changing mental models is a critical factor in determining whether or how understanding alters pre-existing worldviews** in the public and the Montessori sectors. For Montessori educators, an adjusted worldview may represent the furtherance of partnerships and understanding. This change in mental models on the part of the public sector might represent a growing shift in the image of Montessori education. The process of changing mental models is important in how the public sector and Montessori sector perceive each other and hold each other as legitimate organizations. It is important to note that this shift has occurred within the Montessori and public sector in some states. Why this shift has not occurred in other states, particularly California, is a question ripe for consideration.

Summary

The answer to my third research question indicates that something deeper is needed for a shift to occur. Skimming the surface of information would be insufficient for deep learning, which was a necessary component for this intervention. The literature suggests that questioning one’s ideologies and values is the challenge inherent in double loop learning. However, for a sustained shift in one’s perception, this mental wrestling is necessary, and was the goal in my intervention. It required formulating a way to encourage participants to be open and intensely reflective. In the next section, I provide information concerning the method used in my design research.

Chapter Four

Methodology

Participants

The original design of this study involved participants in two groups: one group composed of leaders within the non-Montessori public sector (traditional educators) and another group was composed of leaders in Montessori education. These individuals were adults in some leadership capacity who held decision making authority over educational policies and procedures. Such individuals included district leaders, school principals, consultants, directors of traditional preschools, representatives from four year institutions and representatives from teacher associations and teacher training programs.

However, in short order, a third group emerged. There were certain individuals who did not fall neatly into either group. Leaders who were Montessori credentialed/certificated/educated but who had become leaders within the public school system fell into a different category. They were Montessori leaders within Montessori schools but governed by the district. I quickly discovered that for them, the identification of being “Montessori” or not generally reflected one’s pedagogical belief system and not necessarily one’s training. I had to consider: does the Montessori or non-Montessori identification strictly indicate pedagogical beliefs or placement within the overlap of two educational systems? In the first workshop, this third group was strikingly apparent. I realized that although identification may have been related to pedagogy, the third group clearly believed that their pedagogical position and belief system was embedded within a different educational structure - and that made them different.

Before the intervention, I queried individuals from all groups with a survey and series of interviews, which served as the basis for the perceptions which framed the content of the intervention (a workshop, including presentation, discussion, video and written materials). Post intervention, I surveyed the groups, and conducted interviews from a sampling of each group to assess whether there was any shift in perception.

In the first workshop, the three groups were present: six (6) Montessori leaders, two (2) public school leaders and four (4) leaders of Montessori public schools (Table 5). This information informed the other workshops, as I needed to make note of how the perception of a third group may have shifted the perception of the others. This was pertinent, since the functionality of the third group involved the integration of the pedagogy and the requirements of Montessori and the public sector. One individual, who was clearly a public sector Montessori principal, self-identified as Montessori only. For the purpose of this study, as it appeared that her ideological core was embedded strongly within the Montessori belief system, I coded her perceptions along with Montessori leaders, not public school Montessori leaders.

The second workshop involved 13 participants: six (6) Montessori leaders, two (2) traditional public school leaders and four (4) public Montessori school leaders. The second workshop involved seven (7) Montessori leaders, five (5) traditional Early Education leaders, and one (1) public Montessori school leader. The third workshop involved one (1) Montessori leader (attended remotely) and (3) traditional Early Education leaders. The fourth workshop involved one (1) Montessori leader and five (5) traditional leaders. The fourth workshop included Montessori and non-Montessori Early Education leaders. There was a fifth workshop, which involved primarily public school principals. The data was not used from this workshop, as the criteria for Montessori leaders and time required for information was not present.

Selection of study participants.

Originally, I chose via purposive sampling to narrow the participants, my unit of analysis, to two groups: one group of twenty-five (25) leaders representing the public sector and one group representing twenty-five (25) leaders from the Montessori sector. After I made the discovery that there were actually three groups I adjusted my design accordingly. Since my study centers on perceptions which drive decision making, I sought decision making leaders within the field of education and education policy within those two groups. I selected comparable leaders from each group – representatives of accreditation bodies, teacher education programs, education policy, charter schools, etc. Where Montessori education did not have an exact match at the district level, I selected a local leader as a representative of that association.

The reason for narrowing to this population was to limit the ‘noise’ – the superfluous variables inherent within the possible differing perceptions between Montessori educators and the public sector. Representatives from organizations were sent a memo of understanding (MOU) requesting a return with signature, indicating their willingness to participate and share an invitation to their organization members. Participants were also invited via telephone introduction and workshop flyers and conference brochures explaining the details of the study. The MOU and flyer indicated that interviews and survey information will remain anonymous.

Although the intention was to engage an even number of Montessori leaders and non-Montessori leaders at each venue, it was not possible to achieve an even balance consistently. The first workshop was held at a Montessori conference (individuals from public schools attended the workshop free of charge). We met in a small conference room during the afternoon of the conference. Some of the adults knew each other but the majority of them were strangers to each other and worked in different areas of education (principals, board leaders, district office, etc). They represented both genders, spanned ages, years of experience and several ethnicities. A significant number of attendees had more than ten years of experience in education and were female. Table 4 shows the aggregate data; Tables 5-8 show the disaggregated data by workshop.

Table 4
Total Participants

#	Education Leader Affiliation	Male	Female
16	Private Montessori	-	16
4	Public Montessori	-	1
15	Traditional/Public School	4	11

Table 4 Total Participants

Table 5
Workshop #1 Participants

Number of Participants	Education Type	Male	Female
6	Montessori (Private)	-	7
4	Public Montessori	-	3
2	Public/Traditional	2	-

Table 5 Workshop #1 Participants

Table 6
Workshop #2 Participants

Number of Participants	Education Type	Male	Female
7	Montessori (Private)	-	7
1	Public Montessori	-	1
5	Public/Traditional	-	5

Table 6 Workshop #2 Participants

Table 7
Workshop #3 Participants

Number of Participants	Education Type	Male	Female
1	Montessori (Private - remote)	-	1
3	Public/Traditional	1	2

Table 7 Workshop #3 Participants

Table 8
Workshop #4 Participants

Number of Participants	Education Type	Male	Female
1	Montessori (Private)	-	1
5	Public/Traditional	1	4

Table 8: Workshop #4 Participants

Workshop 1 and 4 had an almost equal number of participants, with similar numbers of the sample population from Montessori and non-Montessori backgrounds. Workshop 2 and 3 had smaller populations, but were almost mirrors of each other in their number of participants and demographic percentage. Settings for all four workshops were the same, however Workshop 1 occurred during the day of a conference; all other workshops occurred at the end of the day. Workshop 1 was held on location during a Montessori conference; all other workshops were held on location at the end of a public school or traditional conference. Participants at Workshop 1 and 3 were at a large conference table, one Montessori leader viewing the workshop remotely; the setting for Workshops 2 and 4 were theater-style seating.

Basic Elements: Types of Data

My study involved both quantitative and qualitative data. Quantitative data involved survey results, which have rating scale responses. Qualitative data involved (Table 9):

1. needs assessment (to determine pre/post individual perceptions from each group),
2. pre and post information from interviews
3. archived video observation from Commission meetings involving Montessori and the district
4. field notes
5. surveys

This study, which holds a real world lens for applicability, used the research regarding the rationale of the study and connected the creation of an intervention (a workshop) that is theoretically established through a cyclical process of testing and evaluation of the intervention activities (van den Akker, 1993). The workshop, which served as a communication protocol, included within the format certain elements critical to pedagogical shifts: in person anecdotal information (lived experience), living examples of unknown or confused information (these included classroom models, which were more easily presented via video), and open dialogue.

Table 9

Qualitative Data Delineation

Survey Questions	identify elements of cognitive bias, perceptions, deep-seated ideologies
Interviews	generate questions regarding same conceptual areas
Obsv/Field Notes	body language, group dynamics
Recordings	field note information, themes
In-depth interviews	explore range of bias, perception, change post intervention

Table 9 Qualitative Data Delineation

Establishing Baseline Data

My research design, along with data collection and analysis, provided the components for the empirical testing of my research. The baseline data involved conducting needs assessments regarding what perceptions existed between groups, whether differing perceptions existed, and if so, what they were. Baseline data was used to establish pre-test perceptions of Montessori education and of the public sector and formed the basis for my needs assessment. This occurred as mentioned, via a stakeholders' meeting and a Montessori workshop (see Problem of Practice). One year later, at a Montessori conference, I surveyed Montessori educators regarding their perceptions of school districts. I compared both sets of perceptions against accurate information from aligned data. This data was sorted into categories. From the transcribed interview, I noted how often certain perceptions emerged and chose three primary differing perceptions. From the Montessori surveys, I did a subsequent survey to assess the perceptions in order of importance. I then noted the frequency of their differing perceptions and chose the three most frequent differing perceptions: teacher competence was consistently questioned; the other two areas were curriculum and accountability. This pilot information provided the basis for my workshop content and format.

Impact and Process Data

To investigate the effectiveness of my communication protocol, I gathered impact and process data. I used impact data to measure a shift in perceptions of Montessori and public/traditional leaders in the three identified areas of difference: teacher authenticity and accreditation, common standards (including Common Core) and accountability (internal and external). The process data was used to examine my process as researcher-facilitator and to determine ways in which the workshop format or elements within the workshop needed adjustment. The process data involved videos, transcripts of the video recordings and post intervention interviews. Following each workshop, I reviewed the videos, created memos regarding the workshop content and process and analyzed the effectiveness of my intervention in practice, including any ambiguities that might create additional challenges in communication. I then made adjustments for the next workshop intervention.

Process Data

The process data involved notes taken during the workshops and reflective field notes which were captured following observation of the videos from each workshop. These included changing thoughts or feelings exhibited physically throughout the duration of the research. Video recordings were taken from four different vantage points, and each video was observed four times: once for language content, once for body language (gestures, facial expression and posture) and metaphors, once to note language (including reactions, questions or responses) indicating possible perceptions or ideological frames and once to note changes in overall feeling

or connection between individuals. Coding (the assignment of a word or phrase that summarizes language or visual data) was, for the purpose of this paper, whatever language, actions or responses emerged that connected with shift or perception. They were coded for emergent similarities to reflect common themes. Themes concerning metaphors were informed by Lakoff and Johnson (1999); information regarding framing/mental models was informed by Spillane (1999) and Johnson-Laird (1999).

I took extensive field notes during the pre-implementation and implementation phase, and used a series of behavioral observation protocols to supplement assessment of the success of the intervention. The protocols guided my assessment of the effectiveness of the communication tool (Cresswell, 1998). Following implementation of the intervention, there was a process of evaluation/reflection/practice via post-design implementation, reflecting on such questions as:

- Has the intervention changed perceptions?
- Have the participants become more accurate in their assumptions?
- Are there dimensions of cognitive bias reflected?
- Has it opened the possibility of change in decision-making?

The critical and most challenging part of process data was establishing a way to measure deep, unconscious perceptions – the extent to which double loop learning has occurred. I completed a standardized interview with a Likert rating measurement. It was accompanied by clarifying questions and additional commentary/anecdotal information from the participant. I compared the standard ratings from the Likert scale, and created a rubric to indicate the range of understanding and change in perspective inferred from the commentary.

Impact Data

First, I used pre and post survey questions and interviews for my impact data. The five pre- and post-survey questions were the same and focused on the themes from the pilot study: authentic teaching (eg: the ability of a public or Montessori school to provide sufficient freedom or structure within the classroom), common standards (eg: Common Core standards vs. Montessori curriculum scope and sequence; the ability to meet the needs of students and prepare them academically), and accountability (eg: teacher preparation coursework rigor). One survey question was separated from analysis, as the question was slightly different for Montessori vs. non-Montessori leaders (“does public education provide sufficient freedom?” and “does Montessori education provide sufficient structure?”). Since the questions were approached from opposing perspectives, they could not be fairly analyzed along with the other four survey questions, but were kept for later analysis with a set of additional survey responses for elaboration.

Each attendee was asked to complete a pre- and post-workshop survey, which had a Likert-type scale rubric (eg: not well, fairly well, very well, unsure). The purpose of the scale was to establish a baseline for leaders to rate their perceptions within the three themes mentioned above. For each iteration, I chose to use a survey that was not an ordinal Likert-type model, but involved boxes which showed a continuum (table 10). I felt that for this study, it was critical to analyze pre and post perceptions this way. My study was measuring *any* shift; since the variables involved non-dichotomous data (consisting of a spectrum of values). I chose this method to allow a bit more freedom of fluidity within each person’s view. Their perception could therefore more closely indicate the magnitude of difference and potential of a shift along a continuum. The post survey involved the same basic questions, rated in the same way. For my analysis, however, I did later mark continuous perception variables numerically, attaching

numeric value to each box, as a way to compare the scale mean of survey responses (table 11). There were nine boxes, with a value of 1-8; I assigned a zero (0) value to the category of “unsure.”

Table 10

Pre-survey question scale example for participants

How rigorous is Montessori teacher preparation coursework?								
Not rigorous			Fairly rigorous			Very rigorous		
						Unsure		

Table 10 Pre-survey question scale example for participants

Table 11

Pre-survey question scale example (for numeric analysis)

How rigorous is Montessori teacher preparation coursework?								
Not rigorous			Fairly rigorous			Very rigorous		
1	2	3	4	5	6	7	8	0

Table 11: Pre-survey question scale example (for numeric analysis)

The issue of having or where to place a midpoint was of serious consideration in this study – both in the creation of the survey and in the actual analysis. I chose not to have any words appear in the actual midpoint, especially “unsure” as it tends to be a default place of choice for respondents (Garland, 1991, Kulas et al, 2008).

Second, there were ten additional post survey questions, used to elaborate on answers from the short survey and to identify possible biases in perceptions. Participants were given time before and after the workshop to complete the surveys. I sent a final survey of the original five questions 2-3 weeks post intervention, to assess whether their views had shifted over a brief time. The survey information was coded and analyzed manually and using SBSS software. The survey responses were mapped onto an 8 point rubric, which was used to indicate a shift in the quality of their perceptions. Since perceptions tend to shift in minor degrees over time, I chose to deviate from a standard 4-5 point rubric to allow for finer analysis – to catch the nuances in a possible perceptual shift.

Third, I used a semi-structured interview for a sampling of participants several weeks post intervention, and later for overtime comparative analysis. The interview involved questions concerning the following: conceptual metaphors (eg: what words come to mind when you think of traditional education? Montessori education?); mental models (eg: What would child centered instruction look like to you?) and visual images (eg: When someone says Montessori education, what image comes to mind? What does that image infer for you?). I conducted the semi-structured interviews via Skype when possible; others were conducted via telephone. All interviews were recorded and transcribed. The transcriptions were coded. I used the categories of metaphors, visual images and mental models as a rubric basis and scored them from 1- 5 (with a system of possible responses representing each number from 1 to 5). I operationalized the rubric using words to describe levels along a continuum of conceptual shift for images and metaphors: none (1), slightly (2), very (3), extremely (4) and unsure (5). A rubric was created. The data derived from this rubric suggests the impact of the intervention.

With each workshop, I examined components of my intervention. For example, I considered whether the use of a common language and metaphors made a difference in the openness of conversation for double-loop learning and perceptual shifts, indicated by body language, post survey and interview responses. I also examined whether the intervention seemed to help lower defensiveness and create receptivity. From the first workshop, I quickly assessed two challenges which required revision of the design. As stated before, the first workshop created the issue of a third group, as public school Montessori leaders identified differently, so I adjusted to consider three populations. I used aggregate and disaggregated data to examine individual shifts and shifts within both types of Montessori leaders and public school leaders. Additionally, a result of my cycle of discovery as more workshops were conducted, was the awareness that it was important for the participants to meet the other individuals in the room, or engage in some way, to lessen the sense of social or pedagogical ‘otherness’ (Siedman, 2012; de Beauvoir, 1949). In workshop #2 and in the embodiment exercise, participants were invited to introduce themselves, which allowed each one to see the other as an individual, prior to hearing about their ideological differences.

Basic Design Components

My study involved a formative needs assessment of two groups (Montessori and public school district) concerning their mutual perceptions, their beliefs about possible differing perceptions that others hold about them. This needs assessment was accomplished through focus groups, surveys and individual interviews. Since reliability and validity requires a measure of consistency and accuracy, for the purposes of this study, my needs assessment needed to establish a similarity of perceptions, and consistent top priorities for a ‘need to understand’ criteria.

Construct Validity

Construct validity indicates whether an impact measure is valid and whether it is specifically linked – does it measure what is intended, what the researcher is seeking to measure (van den Akker, 1999). It answers whether the instrument being used effectively captures what is being measured. In my research, I used a ranking system in surveys at the pre and post implementation stages to measure the impact of change in one’s perception. Specifically, I asked questions concerning two items which seemed to most clearly involve misperceptions, using a ranking to determine the level of a person’s views pre and post intervention.

External and Internal Validity

Although design development studies would not be thought of as generalizable, external validity is usually high, as it has real world application (Cresswell, 2007). I triangulated the pre and post presentation using focus groups, surveys and interviews.

Internal validity indicates that it is reasonable to assume that the intervention, as opposed to other factors and conditions, was the cause of the impact (Yin, 2009). Since measuring perceptions is difficult, this study involved triangulation of data: a process which strengthens the study by combining methods. This study engaged multiple methods, including observation, interviews and recordings to reflect valid, reliable and “multiple perceptions about a single reality” (Healy and Perry, 2000). It is impossible to assume that this intervention would be the

sole causal factor indicating change however the study does indicate that the approach is promising.

Reliability

Reliability ensures the possibility of transferability, and may include the degree to which a measurement or a data collection strategy remains stable through repetitions of the same intervention (Golafshani, 2003). Reliability requires that consistency exists in procedures. For my research, I used the same procedures for the pre-intervention interviews and focus groups and the same observation protocols. I followed the same data collection strategies, and evaluated the post intervention responses in the same quantitative manner. However, to ensure reliability, Joppe argues that (as cited in Golafshani, 2003) using the same participants to retest an intervention compromises the integrity of the tool as it sensitizes the participants to the subject matter and therefore influences the responses. I mitigated against this possible distortion by involving additional workshops with different participants in my cycle of evaluation.

Golafshani (2003) also compares reliability in qualitative and quantitative research and posits that quantitative researchers seek to fragment and delimit phenomena into measurable or common categories that can be applied to more subjects or with wider and similar situations. I believe that if my intervention was successful within a second sample of equal composition, it could be established as a tool which can be used in larger venues in which there is an information deficit and differing perceptions. However, to ensure reliability, it was important for this study to have a narrow focus of participants in both groups.

As Lincoln and Guba (1985) posit, it was essential to engage in such things as persistent observation, triangulation of data where possible, checking one's interpretation against raw data and peer debriefing, to improve the credibility of research results. Additionally, I had a transparent process for all data gathered.

Generalizability

Design studies are rarely considered generalizable, since most design studies, as this one, involved a prescribed sample for a prescribed intervention. Since generalizability refers to the extent that findings in a study can be applicable to a wider population, a random population sample is called for. In an effort to strengthen this study, the design domains and questions were deliberately based on the views of education leaders with the farthest apart positions.

Bias and Rigor

Inherent in design studies is the fact that they are subject to challenges of bias and accusations or questions regarding rigor. Two reasons, which connect directly to this study are the potential for advocacy bias (Stake, 2006) and the integrity of participant response in the presence of the researcher (Patton, 1990).

In this design study, the researcher develops the design, is behind the implementation, and then evaluates the success of the intervention. This naturally creates the possibility of failure to see clear design needs, and the possibility of failure to be more objective in reflection and adaptation. In this design development study, research procedures were established prior to the inclusion of participants in the actual intervention, and actual implementation of the intervention. I chose to be transparent that I was a Montessori educator.

Advocacy bias occurs when the values of the researcher affect the implementation of the study or the findings (Stake, 2006). Advocacy bias can be in the form of undue support of a

particular position. This sometimes occurs without others knowing that the researcher has a strong view. My role as principal in a Montessori school and my work in public policy required the utmost consideration concerning the possibility of advocacy bias. The natural desire to improve inequitable or differing conditions can cause one to overstep the line as a researcher, and be guilty of advocacy bias. To ensure that there was not even unconscious imposition of my views upon the participants, I reviewed all recordings and did post interviews regarding my process. I also purposefully added critical thinking questions to include for each group, when comments appeared to be one-sided. I also added fact based clarifications, where needed.

To avoid and to address questions of rigor, I shared observation and interview notes with colleagues to identify potential inconsistencies in data collection. I actively sought disconfirming information to avoid bias and solicited input regarding such from colleagues (Cresswell, 2007). I also held deep reflection of my data, accepting and analyzing all pertinent information.

Data Collection and Analysis

Data Collection

I transcribed all interviews and recordings of meetings and collected field notes connected to observations and interviews. I conducted post surveys to assess whether perceptions had changed and whether/how the written information assisted changing those perceptions (Table 12). Most of my data, however, was captured in the midst of the intervention.

Table 12
Data Collection Components

Pre/Post Interviews	Researcher/recording	Transcription Coding software
Pre/post surveys	Researcher/participants	Coding software
Field Notes	Researcher	Researcher/Coding software
Observations	Researcher	Researcher/Coding software
Archived Videos		Transcription Coding software

Table 12. Data Collection Components

Data Analysis

I used schema and cognitive bias theory to identify what occurred in each group in their views and decisions regarding the other. I looked for any salient association of Montessori education or traditional public school.

My data analysis generally followed Creswell's steps for analyzing data in a qualitative study (Creswell, 2009). I used a mixed methods approach utilizing qualitative and quantitative data analysis procedures. In my data analysis, I drew from my knowledge base to code for words that revealed dimensions of cognitive bias, perceptions, shift in perceptions, schemas and deep seated ideologies. I also relied on an inductive coding strategy so that unexpected issues that arose in the data would be captured. I analyzed my field notes to identify preliminary patterns and connections (Miles and Huberman, 1994), and generated numerical information from pre- and post-surveys.

Chapter Five

Findings: Analysis of Impact Data

Maybe each human being lives in a unique world, a private world different from those inhabited and experienced by all other humans. . . If reality differs from person to person, can we speak of reality singular, or shouldn't we really be talking about plural realities? And if there are plural realities, are some more true (more real) than others?...The problem, then, is that if subjective worlds are experienced too differently, there occurs a breakdown in communication ... and there is the real illness" (Phillip K. Dirk, 1953).

Introduction

In this chapter, I provide a summary, analysis and conclusion of my impact data. I present the findings of the implementation of the communication tool through the analysis of impact data. As an introduction, I begin with an explanation for the data separation of group responses. I then explain how the data is organized, and present the analysis of the data. I provide the analysis of my impact data according to the three identified domains of study delineated by each workshop. Using those domains, pre and post workshop surveys provided baseline and impact data regarding perceptual shift. During this process, I engaged the assistance of a critical friend, who provided input into improvements for subsequent iterations of my intervention.

Separation of Responses

I presented my communication protocol in four (4) different workshops over a period of ten months, which incorporated a total of approximately 35 attendees who were either leaders in Montessori education (public or private) and traditional education (public or private). The leaders fell into categories classified as Montessori or non-Montessori. I labeled non-Montessori leaders as Public/Traditional. As mentioned, I learned that Montessori leaders within public schools represented a third group whose experience and therefore their views required a separate analysis from the other two groups. Since I was examining how each group perceived the other, and whether that perception changed post intervention, I analyzed the data according to group, with public Montessori leaders representing a separate (third) group.

Organization of Impact Data

The following section organizes the data according to the three domains of discussion in the workshops. The questions emerged from discussion in the pilot study connected to those domains, and were grouped accordingly. The categories that were scored in the rubric within those domains were: sufficient classroom structure or freedom, ability to meet varying student needs (Teacher Authenticity/Quality), school accountability for student readiness, appropriate curriculum for different learning styles (Accountability) and rigor in teacher coursework (Standards). These indicators are directly connected to the design challenge which aims to examine 1) perceptions of Montessori and traditional leaders, 2) possible measurement of any shift perceptions 3) misconceptions, to fully inform and dispel myths 4) commonalities in norms and values. I analyzed the responses from the pre and post surveys to examine potential shift.

I mapped the responses to the pre and post survey questions on a 9 point rubric scale (with the possibility of mapping 0 as unsure). The results in each table below provides the pre (baseline) and post (impact) mean of the responses (by group: Montessori leaders, public/traditional school leaders), followed by an analysis of those responses. The responses

allowed for choices along a continuum. Although 9 is an uncommon dimension for a Likert scale, I wanted to ensure a measurement of continuous variables and an increase in the sensitivity of the measurement, particularly because the study deals with perceptions (Chimnek, 2000). The scale also allowed for the use of “unsure”. Since the ability to indicate lack of knowledge or the acceptance of more than one viewpoint is tantamount to this study, “unsure” was given a baseline rating from which to move. ‘Unsure’ was therefore not considered as an indication of middle ground, but characterized either a lack of knowledge or the view that either outcome is possible. Unsure was also not eliminated, typical in most analyses. In this study, uncertainty was a key factor in misperceptions, so I wanted to clearly understand and incorporate the “unsure” factor.

Additionally, the analysis was to determine shift – any shift. The words “positive” and “negative” shift are used to denote a shift towards the higher numbers on the scale (positive) or lower numbers on the scale (negative). It does not necessarily indicate a negative view, but could be indicative of a struggle in the process of changing one’s view. The analysis is organized first by domain, and then by workshop. I first provide a brief summary of the domain, the rubric score data connected to that domain and my analysis of shift via rubric level (or points). Then I provide more precise quantitative analysis due to the small sample size. Additionally, I provide tables and analysis by workshop and a final summary. Since shift, any shift, was being measured among a very small sample size, I used several different quantitative measures (paired t test, bootstrapping) for accuracy of measurement and indication of effect size. The subsequent chapter will contain my process data, represented by anecdotal responses and interviews.

Analysis by Domain

Domain#1: Teacher Authenticity

We unpacked the notion of the authenticity of a teacher (what a teacher is and does). We began with descriptors for teacher authenticity which came from the American Montessori Society (Table 13) and the National Board for Teaching Standards (Table 14).

Table 13
American Montessori Society Teacher Standards

Teachers systematically observe students and interpret their needs.
 They are constantly experimenting and modifying the environment.
 They prepare an environment to facilitate a child’s independence.
 They observe each child’s progress/evaluate the effectiveness of their work.
 They facilitate communication among the children.
 They present clear, interesting and relevant lessons to the children.
 They are diagnosticians who interpret patterns of growth, development, and behavior

Table 13 American Montessori Society Teacher Standards

We compared and contrasted the descriptions from each association, and I led a discussion to find common ground or a new understanding of the definition of a teacher, using the tenets from both. As leaders metaphorically compared Montessori or traditional teachers to facilitators/choreographers or dictators/conductors, I used a video of a Montessori classroom, focused on a child, in which the teacher is clearly not the central component of the classroom. Discussion ensued regarding whether ‘teaching’ was occurring or not. We pondered whether

participants were seeing unconventional teaching, judged through normative public sector lenses. I asked them to consider if it was teaching, framed differently.

Table 14
National Board for Teaching Standards

Teachers are committed to students and their learning.
Teachers know the subjects they teach and how to teach those subjects to students.
Teachers are responsible for managing and monitoring student learning.
Teachers think systematically about their practice and learn from experience.
Teachers are members of learning communities

Table 14 National Board for Teaching Standards

For teacher authenticity, the questions involved whether teachers provided sufficient freedom (or structure) for classroom learning, and whether teachers could sufficiently design teaching to meet the learning needs of each student. These two rubric indicators were used to measure a shift in perception in the area of teacher authenticity (Table 15).

Montessori Leaders Perception of Traditional Teacher Authenticity

1. How well do public/traditional school teachers provide the type of freedom that is needed to promote sufficient student learning?
2. To what extent are public/traditional teachers equipped to meet the academic needs of all types of students?

Table 15
Summary of mean survey responses of Montessori Leaders: Teacher Authenticity

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Sufficient degree of child freedom in classroom	2.2	3.6	2.9	2.3	2.0	4.0	2.0	4.0
Teacher ability to meet needs of all students	2.7	3.8	3.4	4.0	2.0	4.0	2.0	4.0
Average of all workshops:	Pre: 2.4		Post 3.7		Shift		1.3*	

Table 15 Summary of mean survey responses of Montessori Leaders: Teacher Authenticity

There were shifts in all of the responses from Montessori Leaders in the area of Teacher Authenticity. Overall, Montessori leaders made a positive (*) shift of ~1 rubric level in the area of teacher authenticity. There was a significant negative shift in Workshop 2 concerning how Montessori leaders viewed the ability of traditional education to provide sufficient freedom in the classroom. Workshops 3 and 4 experienced no shift.

Table 16
Comparison of All Montessori Leader Responses: Teacher Authenticity

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4		Average
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Public Montessori	1.9	3.0	7.0	1.5	--	--	--	--	2.2*
Private Montessori	2.8	4.2	2.9	3.1	2.0	4.0	2.0	4.0	3.13*

Table 16 Comparison of All Montessori Leader Responses: Teacher Authenticity

Overall, there was a shift in all Montessori leader responses (Table 16). Private Montessori leaders experienced a significant positive shift over Public Montessori leaders in the domain of Teacher Authenticity. There was a significant negative shift in Workshop 2 concerning how Montessori leaders viewed the ability of traditional education to provide sufficient freedom in the classroom. There were no Public Montessori leaders in Workshops 3 and 4 (the mean was determined by scores of Workshops 1 and 2).

Public/Traditional Leaders Perception of Montessori Teacher Authenticity

1. How well do Montessori teachers provide the type of structure that is needed to promote sufficient student learning?
2. To what extent are Montessori teachers equipped to meet the academic needs of all types of students?

Table 17

Summary of mean survey responses of Traditional Leaders: Teacher Authenticity

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Sufficient degree of child structure in classroom	4.7	7.3*	3.0	2.8	4.7	7.3*	7.0	6.0
Teacher ability to meet needs of all students	7.0	6.5	4.4	4.2	6.7	6.3	5.0	6.8*

Average of all workshops: Pre: 5.39 Post 5.8 Shift -.39

Table 17 Summary of mean survey responses of Traditional Leaders: Teacher Authenticity

Overall, in the area of Montessori Teacher Authenticity, non-Montessori leaders made an insignificant negative shift (-.39). The most significant positive rubric level shift was reflected in the view concerning whether Montessori classrooms provided a sufficient amount of structure. Workshop #3 reflected a 1.8 shift and overall scores reflected a significant shift of 2.6 post intervention (Table 17).

Summary

Due to the small sample size, the data was bootstrapped to confirm the shift significance. The pre-and post -survey mean responses for the first question within the domain of Teacher Authenticity were 3.0 and 4.0, respectively. This implies that there was a positive shift in perception overall. The magnitude of the difference in shift is 0.9928 (Table 18).

Table 18
Statistical Bootstrapping: Overall Perceptions Teacher Authenticity

Results of Bootstrapping Comparing Overall Perceptions of All Leaders: Teacher Authenticity

Perception	Bootstrap sample size(n)	Mean	Mean Diff (d)	t-statistic	Degree of freedom (df)	p-value
Q1 M+PM+T/P						
Pre	10000	3.005467	0.9928	131.81	9999	0
Post	10000	3.998267				
Q3 M+PM+T/P						
Pre	10000	3.424992	0.8154583	89.333	9999	0
Post	10000	4.24045				
p-value < 2.2e-16						
95 percent confidence interval: 0.9780356 1.0075644						

95 percent confidence interval:						
0.7975651 0.8333516						

Table 18 Statistical Bootstrapping: Overall Perceptions Teacher Authenticity

The pre and post survey mean responses for the second question (3) within the domain of Teacher Authenticity were 3.424992 and 4.24045, respectively. This implies that there was a positive shift in perception overall in the domain of Teacher Authenticity/Quality. The magnitude of the difference in shift is 0.8154583. The bootstrapping analysis confirmed the analysis of my rubric score data.

Domain #2: Teacher Standards

Perceptions under the domain of standards initiated and focused on the examination of rigor of teacher preparation programs. Overall, most groups considered their coursework as most rigorous pre-intervention. The overarching discovery was the disconnect between:

- 1) traditional leaders with Pre-K programs regarding whether an early education teacher should hold a degree.
- 2) public and private Montessori leaders over whether Montessori teachers should also hold a teaching credential
- 3) Montessori and traditional leaders over whether a teacher practicum should be required AND should the required Montessori practicum be validated in lieu of some of the traditional teacher requirements
- 4) Montessori and traditional leaders over whether alternative models of testing can be accepted as equivalents to certain traditional test models in traditional teacher preparation programs.

We discussed the possibility of the integration or intersection of two differing sets of teacher standards. In one workshop, I included the use of autopoiesis as a metaphor - a living system capable of self-reproduction and self-maintenance. As an autopoietic system functions within itself as the producer and product, we discussed whether it could be possible to consider the components within both models of teacher preparation testing sufficient, and unite to find an acceptable articulation. We discussed the intersection and alignment of standards between Montessori and public education. As an autopoietic system uses its own internal structure for renewal and survival, could there be congruence within systems involving standards which, when seen together, serve as one seamless albeit different lens regarding teacher preparation?

Montessori Leaders Perception of Traditional Teacher Standards

1. How rigorous is public/traditional teacher preparation coursework?

Table 19

Summary of mean survey responses of Montessori Leaders: Teacher Standards

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Rigor of Traditional Teacher Preparation Coursework	2.5	5.0*	4.6	5.0	4.0	5.0	7.0	7.0

Average of all workshops: Pre: 4.5 Post 5.5 Shift 1.0*

Table 19 Summary of mean survey responses of Montessori Leaders: Teacher Standards

There were shifts in 75% of leader responses, with an overall positive shift of 1 rubric level (Table 19). Workshop 1 experienced the most significant positive shift (2.5). In Workshop 2, there was an insignificant shift; in workshops 3 and 4, there was no change.

Table 20

Comparison of All Responses: Private vs. Public Montessori Leaders: Teacher Standards

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4		Average
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Public Montessori	1.5	4.0	7.0	4.0	--	--	--	--	-.05
Private Montessori	3.2	6.8	4.3	5.1	4.0	5.0	7.0	7.0	1.38*

Table 20 Comparison of All Responses: Private vs. Public Montessori Leaders: Teacher Standards

When disaggregating the data, it appears that overall, there was a significant negative shift by Public Montessori leaders (Table 20). The significant negative shift occurred in Workshop 2. Overall, Private Montessori leaders experienced a significant positive shift over Public Montessori leaders in the domain of Teacher Standards. There were no Public Montessori leaders in Workshops 3 and 4 (the mean was determined by scores of Workshops 1 and 2).

Public/Traditional Leaders Perception of Montessori Teacher Standards

1. How rigorous is Montessori teacher preparation coursework?

Table 21

Summary of mean survey responses of Traditional Leaders: Teacher Standards

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Rigor of Traditional Teacher Preparation Coursework	3.8	7.0*	2.4	3.6	4.3	5.0*	3.0	5.5*

Average of all workshops: Pre: 3.4 Post 5.3 Shift 1.9*

Table 21 Summary of mean survey responses of Traditional Leaders: Teacher Standards

There was a consistent positive significant shift of 1 or more rubric levels per workshop in the domain of Teacher Standards (Table 21). Workshop #1 experienced the greatest significant shift of ~3 rubric scores (3.2). Individually and overall, traditional leaders experienced a significant shift in perception regarding Montessori teacher preparation standards post intervention.

Summary

Due to the small sample size, the data was bootstrapped to confirm the shift significance. The pre-and post -survey mean response for the one question within the domain of Standards

were 3.4 and 4.0, respectively. This implies that there was a positive shift in perception overall. The magnitude of the difference in shift is 0.81 (Table 22).

Table 22
Statistical Bootstrapping: Overall Perceptions Standards

Results of Bootstrapping Comparing Overall Perceptions of All Leaders: Standards

Perception	Bootstrap sample size(n)	Mean	Mean Diff (d)	t-statistic	Degree of freedom (df)	p-value
Q4 M+PM+T/P						
Pre	10000	3.424992	0.8154583	89.333	9999	0
Post	10000	3.998267				
p-value < 2.2e-16						
95 percent confidence interval: 0.7975651 0.8333516						

Table 22 Statistical Bootstrapping: Overall Perceptions Standards

Domain#3: Accountability

Perceptions regarding accountability were examined via questions concerning the ability of traditional education to ensure that children were academically prepared for the next grade and that a student's differing ways of learning were met. During the workshop intervention, the video created by the Common Core Initiative was used (which included the metaphor of a staircase denoting levels of academic ability) It was negatively received by some leaders. Internal and external accountability seemed to be more clearly understood by Public leaders – Montessori Public and traditional. The concept that teachers and schools may not be sufficient accountability agents, was juxtaposed against the idea that high stakes accountability is incongruent with high quality teaching and learning. Additionally, the prescriptive nature of Montessori teacher preparation was seen as a way to ensure accountability in schools. Finally, the historical background of Montessori education as a method for teaching students with special needs was unknown by many traditional leaders, whose perception was that the method was created for wealthy, high achieving children.

Montessori Leaders' Perception of Traditional Teacher Standards

1. How does public/traditional education compare to traditional education in preparing children to be academically ready for the next grade?
2. To what extent is a public/traditional curriculum able to address children with special learning needs?

Table 23
Summary of mean survey responses of Montessori Leaders: Accountability

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Capable to prepare children - academically ready for next grade	3.7	5.4	5.3	5.3	5.3	7.0*	6.2	6.4*
public/traditional curriculum able to address children with special learning needs	2.9	2.4	4.0	2.6	2.0	5.0	0.0	3.0*

Average of all workshops: Pre: 3.7 Post 4.6 Shift .94*

Table 23 Summary of mean survey responses of Montessori Leaders: Accountability

There was a consistent significant shift of 1 or more rubric scores per workshop (Table 23). The shift was primarily positive, but held no patterns concerning workshop or specific domain related questions. Overall there was a significant shift of ~1 rubric level.

Table 24

Comparison of All Responses: Private vs. Public Montessori Leaders: Accountability

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4		Average
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Public Montessori	3.8	3.8	5.5	4.5	--	--	--	--	-.5
Private Montessori	3.0	4.0*	3.3	3.2	3.5	5.5	2.0	4.5	1.4

Table 24 **Comparison of All Responses: Private vs. Public Montessori Leaders: Accountability**

There was a significant shift by Private Montessori leaders in the domain of Accountability (Table 24). There was a slightly significant negative shift by Public Montessori leaders. Note: There were no Public Montessori leaders in Workshops 3 and 4 (the mean was determined by scores of Workshops 1 and 2).

Public/Traditional Leaders Perception of Accountability

1. How does Montessori education compare to traditional education in preparing children to be academically ready for the next grade?
2. To what extent is a Montessori curriculum able to address children with special learning needs?

Table 25

Summary of mean survey responses of Public/Traditional Leaders: Accountability

PERCEPTUAL INDICATORS	WS1		WS2		WS3		WS4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Capable to prepare children - academically ready for next grade	6.5	6.0	4.0	4.2	5.3	7.3*	6.4	6.4
public/traditional curriculum able to address children with special learning needs	6.0	6.0	1.6	1.6	4.6	5.7	5.3	5.3

Average of all workshops: Pre: 3.7 Post 4.6 Shift .94*

Table 25 **Summary of mean survey responses of Public/Traditional Leaders: Accountability**

With the exception of Workshop 3, all other workshops reflected either no shift or an insignificant shift in the domain of Accountability. The most significant shift, which was positive, occurred regarding the question of whether Traditional/Public School leaders viewed the Montessori educational system as capable of ensuring a child's academic readiness for the next grade (Table 25).

Summary

Due to the small sample size, the data was bootstrapped to confirm the shift significance. The pre-and post -survey mean responses for the first question within the domain of Accountability were 4.2 and 5.5 respectively. This implies that there was a positive shift in perception. The pre-and post -survey mean responses for the second question within the domain of Accountability were 3.4 and 3.0 respectively. This implies that there was a negative shift in perception regarding Common Core (Table 26). There was an overall positive shift of ~1.0.

Table 26
Statistics Bootstrapping Overall Perceptions Accountability

Results of Bootstrapping Comparing Overall Perceptions of All Leaders: Accountability

Perception	Bootstrap sample size(n)	Mean	Mean Diff (d)	t-statistic	Degree of freedom (df)	p-value
Q2 M+PM+T/P						
Pre	10000	4.172717	1.3257	198.15	9999	0
Post	10000	5.498417				
Q5 M+PM+T/P						
Pre	10000	3.421475	-0.4183917	-41.111	9999	0
Post	10000	3.003083				
p-value < 2.2e-16						
95 percent confidence interval: 0.9780356 1.0075644						
95 percent confidence interval:						
-0.4383407 -0.3984427						

Table 26 Statistics Bootstrapping Overall Perceptions Accountability

Summary: Disaggregating the Data Across Domains

When further disaggregating the data by looking across domains, it suggests that the greater shift occurred concerning the rigor of teacher coursework. Although there was no change in Workshop 3 and an insignificant shift in Workshop 2, there was a positive shift of two rubric points in Workshop 4 and increase of over 3 rubric points (3.1 to 6.8) in Workshop 1. Four out of twelve Montessori leaders made positive shift of 2 or more levels on the rubric, suggesting that their understanding or perception of the rigor of public school teacher education had shifted – to a view that public school teacher coursework is more rigorous than previously assumed. This shift was primarily on the part of private Montessori leaders (3 of the 4 aforementioned).

Analysis by Groups and Workshop

I further examined the data via groups of educational leaders per workshop to see whether certain groups tended to shift during certain interventions. I used a paired t-test to indicate any shift including any significant shift. To obtain a more accurate mean of the differences and statistical significance across workshops, I used a paired t-test, based on a ratio scale of measurement (Table 27). The following hypotheses are based on research question #2: Is it possible to shift perceptions of groups that hold dissimilar views based on their own deep-seated ideologies?

Hypothesis 1: There would be a shift in the perceptions of Montessori or Public/Traditional leaders pre to post intervention (after attending Workshop 1).

Table 27
Paired t-test Overall Perceptions Workshop 1

Results of Paired t-Tests Comparing Overall Perceptions of Educational Leaders Pre and Post Workshop 1						
Perception shift	n	Mean	SD	t ^a	df	r ^{2b}
Pair 1: Traditional/Public						
Pre	5	1.60	0.86	-1.34	4	0.4
Post	5	2.53	0.84			
Pair 2: Montessori Public						
Pre	5	2.55	1.12	-1.53	4	0.0
Post	5	3.50	0.92			
Pair 3: Montessori Private						
Pre	5	2.97	0.70	-2.80*	4	0.6
Post	5	4.63	1.82			

Note. * $p < 0.05$. ^aPositive t-value indicates a negative shift in perception while a negative t-value indicates a positive shift in perception. ^bEffect size in terms of minimum (r^2) value: small: 0.1; medium: 0.3; large: 0.5.

Table 27 Paired t-test Overall Perceptions Workshop 1

In workshop 1, overall, there was a shift in the perceptions of all leaders from pre to post intervention. The shift in every case was a significant positive shift. The shift of greatest significance was by Montessori leaders in the area of Teacher Authenticity. The most significant positive shift occurred in the perception of Montessori private leaders, $t(4) = -2.80, p < .05; r^2 = 0.6$ (Table 27). The effect size of the shift of Public School leaders and Montessori Private School leaders is considered significant.

Hypothesis 2: There would be a shift in the perceptions of Montessori or Public/Traditional leaders pre to post intervention (after attending workshop 2).

Table 28
Paired t-tests Overall Perceptions Workshop 2

Results of Paired t-Tests Comparing Overall Perceptions of Educational Leaders Pre and Post Workshop 2						
Perception shift	n	Mean	SD	t ^a	df	r ^{2b}
Pair 1: Traditional/Public						
Pre	5	3.20	1.17	0.62	4	0.2
Post	5	2.88	1.08			
Pair 2: Montessori Public						
Pre	5	6.40	0.89	3.00*	4	0.6
Post	5	3.20	1.64			
Pair 3: Montessori Private						
Pre	5	3.29	0.85	-1.37	4	0.9
Post	5	3.54	1.19			

Note. * p < 0.05. ^aPositive t-value indicates a downshift in perception while a negative t-value indicates an upshift in perception.
^bEffect size in terms of minimum (*r*²) value: small: 0.1; medium: 0.3; large: 0.5.

Table 28 Paired t-tests Overall Perceptions Workshop 2

In Workshop 2, overall, there was a shift across all groups. The most significant shift was a negative shift of Montessori Public Leaders $t(4) = 3.00, p < .05; r^2 = 0.6$. The magnitude (effect size) of the shift of Montessori Public School leaders and Montessori Private School leaders ($r^2 = 0.6$) is significant (Table 28).

Hypothesis 3: There would be a shift in the perceptions of Montessori or Public/Traditional leaders pre to post intervention (after attending workshop 3).

Table 29
Paired t-tests Overall Perceptions Workshop 3

<i>Results of Paired t-Tests Comparing Overall Perceptions of Educational Leaders Pre and Post Workshop 3</i>						
Perception shift	n	Mean	SD	t ^a	df	r ^{2b}
Pair 1: Traditional/Public						
Pre	5	5.13	0.93	0.20	4	0.4
Post	5	5.07	0.92			
Pair 2: Montessori Public ^c						
Pair 3: Montessori Private						
Pre	5	1.95	0.65	-1.53	4	0.0
Post	5	2.45	0.41			

Note. ** $p < 0.01$. ^aPositive t-value indicates a downshift in perception while a negative t-value indicates an upshift in perception.

^bEffect size in terms of minimum (r^2) value: small: 0.1; medium: 0.3; large: 0.5. ^cNo Montessori Public participation in this workshop.

Table 29 Paired t-tests Overall Perceptions Workshop 2

In Workshop 3, there was a negative and positive shift pre to post intervention. There was an insignificant negative shift by Traditional/Public Leaders and a significant positive shift by Montessori Leaders. Note: Public Montessori leaders did not participate in this workshop. The only positive shift occurred in the perceptions of Montessori Leaders pre to post workshop (Table 29).

Hypothesis 4: There would be a shift in the perceptions of Montessori or Public/Traditional leaders pre to post intervention (after attending workshop 4).

Table 30 Paired t-tests Overall Perceptions Workshop 4

<i>Results of Paired t-Tests Comparing Overall Perceptions of Educational Leaders Pre and Post Workshop 4</i>						
Perception shift	n	Mean	SD	t ^a	df	r ^{2b}
Pair 1: Traditional/Public						
Pre	5	2.40	8.89	3.27	4	0.7
Post						
Pair 2: Montessori Public						
Pre	5	3.00	2.65	-3.67*	4	1.0
Post	5	4.80	1.64			
Pair 3: Montessori Private ^c						

Note. * $p < 0.05$. ^aPositive t-value indicates a downshift in perception while a negative t-value indicates an upshift in perception.

^bEffect size in terms of minimum (r^2) value: small: 0.1; medium: 0.3; large: 0.5. ^cNo Montessori Private participation in this workshop.

Table 30 Paired t-tests Overall Perceptions Workshop 2

In Workshop 4, there was a negative and positive shift. There was a negative shift by Traditional/Public Leaders. Note: Public Montessori leaders did not participate in this workshop. The only significant shift occurred in the perception of Private Montessori Leaders. This was a positive shift, $t(4) = -3.67$, $p < .05$; $r^2 = 1.0$ (Table 30).

Summary

Shifts occurred in every workshop. The most significant shifts occurred within Private Montessori leaders. **I conclude that research question #2, regarding whether a shift might occur is that given the right conditions, a shift in perception is possible.**

Overall Shift by Group and Workshop

To analyze the actual impact of the intervention, I examined how each workshop may have impacted a shift in perceptions, based on each rubric indicator, and the overall positive or negative shift in relation to each rubric indicator (Table 31). I indicated positive shifts (shift up the rubric [rightward] toward a larger number, indicating a greater level of satisfaction or understanding) with '+', negative shifts (shift down the rubric [leftward] toward a larger number, indicating a greater level of satisfaction or understanding) with '-' and no shift (no change) with a 'NS'. The charts indicate, that overall, shifts in perception did occur. The greatest shifts occurred in Workshop 1.

Table 31
Overall Positive/Negative Shift of Montessori Leaders by Rubric Indicator

Rubric Indicator (Question)	Shift +/-
How well do public schools prepare children to be academically ready for the next grade?	+
How well are public school teachers equipped to meet the academic needs of all types of students?	+
Compared to Montessori coursework, how rigorous is public school teacher education coursework?	+
To what extent is Common Core able to address children with special learning needs?	+

Table 31. Overall Positive/Negative Shift of Montessori Leaders by Rubric Indicator

Overall, there were shifts across all workshops pre and post intervention. Montessori leaders experienced a positive shift in the Teacher Authenticity/Quality domain. Public/Traditional leaders experienced a positive shift in the domains of Teacher Quality and Standards (Table 32). Disaggregating by workshops, Workshop #4 had the most significant positive shift (-3.67); Workshop #2 experienced the most significant negative shift (3.27). However, across workshops, Workshop #1 (representing states other than California) experienced the greatest positive shift. Workshop #1 also had the greatest positive shift of Traditional/Public Leaders than the average of Workshops 2-4 (leaders within the state of California).

Table 32
Overall Positive/Negative Shift of Traditional/Public Leaders by Rubric Indicator

Rubric Indicator (Question)	Shift +/-
How well do Montessori schools prepare children to be academically ready for the next grade?	+
How well are Montessori teachers equipped to meet the academic needs of all types of students?	+
Compared to public education teacher preparation coursework, how rigorous is Montessori school teacher preparation coursework?	+
To what extent is Montessori education able to address children with special learning needs?	+

Table 32. Overall Positive/Negative Shift of Traditional/Public Leaders by Rubric Indicator

Effect Sizes

Effect size allows one to measure the magnitude of mean differences between pre and post intervention. Effect size quantifies the effectiveness of a particular intervention or the effect of the independent variable (in this case the workshop) on the dependent variable (shift in

perception). Effect size allows one to determine not only that the intervention worked, but how well it worked. It becomes a yardstick to measure the effectiveness or strength of the intervention. It allows one to measure, “not just does a treatment affect people, but how much does it affect them” (Kline, 2004). I wanted understanding of whether a minor change within a short period of time represented a major shift relative to openness or understanding. Since effect size has little meaning unless the pre and post differences are statistically significant, I examined the effect size of workshops with the most significant differences, which were Workshop 1 and 4 (Table 28 and 31). The effect size (r^2) was between medium and large (.06). This suggests that the post intervention differences in perception were noteworthy. It is very possible that this depth of this effect is similar to the depth of reflection that occurs in double-loop learning.

Shift Patterns

Shift from “unsure”

The consideration of “unsure” was significant, and difficult to measure within a scale. I analyzed each score in which “unsure” appeared pre or post intervention. The data reflected an almost consistent shift from pre-intervention ‘unsure’ scores to post intervention data analysis. Post intervention scores shifted a **minimum of two rubric levels** and up to a maximum of eight (Table 33). There were a few responses that began with a low score and shifted to an “unsure” status in post intervention testing. The table below shows the amount of rubric level shift which occurred from a pre-intervention status of “unsure”. Numbers in **bold** indicate scores of non-Montessori leaders. The average shift from “unsure” for non-Montessori leaders was 4.5; the average shift for Montessori leaders was 6 rubric levels. There were a greater number of non-Montessori leaders who had unsure scores pre-intervention. There were 3 Traditional leaders who remained unsure pre and post intervention in the domains of Teacher Authenticity and Accountability in Workshop 2 and 4.

Table 33
Unsure Status Shift

Workshop	Shift	Shift	Shift	Shift	Shift	Shift	Shift	Shift	Shift	Shift	Avg Shift
1	6	8	5	6	5						6
2	3	4	5	4	2	3	5	5	2	7	4
3	7										7
4	3	6	7	9	5						6
Overall											5.75

Table 33 Unsure Status Shift

Interestingly, the area which both non-Montessori leaders and Montessori leaders rated unsure the most was coursework. It is one of the most discussed areas in education policy concerning Montessori education, and yet out of 21 unsure ratings, 50% (10 of 21) of leaders were unsure about the rigor of teacher coursework pre-intervention. However, post intervention, 100% of leaders in both categories shifted greater than 4 rubric levels. Table 34 indicates the number of unsure ratings in the highest categories, and the level of post-intervention shift. Shifts of greater than 3 have an ‘X’. Shifts of less than three are left blank.

Table 34
Unsure ratings based on rubric descriptor (out of 21)

Category (rubric descriptor)	#	Shift
Rigor of Montessori teacher coursework (Public school leader responses)	6	X
Rigor of public school teacher coursework (Montessori leader school)	4	X

Table 34 Unsure ratings based on rubric descriptor (out of 21)

Impact Data Summary - Shifts and Patterns

The impact data suggests that a shift definitely occurred across every workshop and across every rubric descriptor. Although shifts appeared to be small, as indicated in Workshop 1, a pattern emerged with every response except one in every workshop, in which any leader with a pre-intervention score of “unsure” shifted on average 4 – 7 rubric levels.

Shift - What May Have Accounted for it

My design study was not intended to create a total change in perception on the part of leaders, but to open the opportunity of the possibility of some shift, any shift occurring. Mental models, representations formulated in the brain, are based on a number of factors, all of which take some time to frame. Concepts about what constitutes good teaching, student engagement, and effective learning models have emerged from working prototypes developed and enhanced over time. Inasmuch as mental models both shape and inhibit our thinking (keeping us from being expansive in our mindset), they are also created by many experiences, visual images and actions.

A few factors contributing to the shift are possible. Single-loop learning involves response based on observation and initial understanding of a possible necessary change (Argyris,). Double-loop learning requires depth; reflection on the deeper variables involved in the decisions we make. It was impossible for a three hour workshop to explore in depth the deep-seated ideologies that govern education decision-making. However, the workshop process may have enabled a more complex consideration than usually possible of issues which impact our decisions. Rather than merely presenting information, the workshop included the deeper thoughts and lived experiences of leaders, visual image (including videos of living examples of teaching concepts) and metaphors, which helped to frame sensitive topics. In each workshop, I encouraged out of the box thinking (eg: If in a Montessori classroom, the teacher is barely visible, in what ways could this be a teacher who meets the definition of a good teacher according to the American Montessori Society or the National Board for Teaching Standards?). Participants heard and saw lived experiences. They engaged in critical conversations with the courage to ask or make statements about things which affected their own self-image. Listening and engaging may have created an openness to see another side. Additionally, some may have let go of “bandwagon bias” and felt courageous enough to express their own view rather than buying into the view of their peers.

Areas of No Shift

I analyzed factors which may have contributed to a lack of shift by rubric descriptor and by workshop. I completed semi-structured interviews with leaders in workshops 2 and 4. I asked the following questions: “I noticed that your response to this question (named) did not change after the workshop. Do you know what may have accounted for the lack of change? Was there something missing for you that may have shifted your thoughts regarding this question?” The responses were recorded, coded and analyzed according to categories (structure of workshop, data, (Table 35):

Table 35
Interviewed responses from leaders regarding shift

Workshop #2	Workshop #4
“I couldn’t quite tell what other people were saying. But I don’t think they said anything	“I just wanted you to tell me the answers. It didn’t want to figure out who was right - what

that would have changed my mind.”	was right.”
“It seemed slanted toward Montessori.”	“I needed more time to compare and just sit with it...maybe break off 1:1 with someone”
“The Montessori people were invigorated (<i>I don’t know if they went to the conference earlier in the day</i>). Some of us were tired and kind of listening. I know for me, the information was new, so I just needed to take it in, but I couldn’t have changed my mind. I would have to have sifted a bit, heard more, seen more, come back together and talked again.	“Well, I already have a higher opinion of Montessori. And that’s kind of what I think this is about, isn’t it? Is the coming together really letting Montessori have a place finally? So, I can do that, but I already felt that way about them, so nothing really shifted – maybe what shifted for me, couldn’t fit into the questions. I moved over and made a place at the table – heard them, supported them out loud. We’re one field”.
“It felt like if I changed, I was saying everything I have been doing all of the past 26 years was wrong. It’s like dual citizenship - if my answers changed, was I changing my citizenship or being asked to have dual citizenship?”	“I’m a visual learner. I needed to see their faces, and I wish I could have seen a child and teacher doing something together in real time, so I could ask questions. I mean there was the video, but it went fast, and I wanted more time.”

Table 35 Interviewed responses from leaders regarding shift

Secondary Post Survey: Non-Montessori Leaders

Non-Montessori leaders also responded to a secondary post survey completed 6-8 months post intervention. Responses were analyzed and scored via a rubric. A positive score of 1 was given for any response of “fairly well” or “to some extent”. A positive score of 2 was given for any “very well” or “definitely yes” response. No score was given for a “not well” or “absolutely not” response (Table 34).

Table 36
Secondary Post Survey Rubric Scores(Mean)

Additional Rubric Indicators Regarding Teaching	Wk1	Wk2	Wk3	Wk4	Avg
How well do you like the Montessori approach to teaching?	2	1	1.5	1.5	1.7
How well do you feel Montessori teachers are educated?	2	1.5	2	2	1.7
Do you feel children can learn the same overall information in a Montessori or traditional setting?	2	1.6	1.8	1	1.7
Overall Average	2.0	1.4	1.8	1.5	1.7

Table 36. Secondary Post Survey Rubric Scores(Mean)

Overall, the data suggests that the post intervention response of non-Montessori leaders is fairly aligned with the shift in their perception regarding teacher authenticity. In Workshop 1, leaders reflected a consistent ‘2’ score. The lower score in Workshop 2 reflected the lower shift of rubric levels in that workshop.

Chapter Six

Analysis of Process Data

Introduction

In this study, I endeavored to discover whether the implementation of a multimodal workshop, based on the theories of embodiment and double-loop learning, would begin a process of openness and shifting of one's mental models. Process data complemented my impact data analysis, as each iteration provided additional insight regarding the connection to my design and the knowledge research base. With each workshop and the subsequent iteration, I examined the responses and body language of participants. Information that emerged from their discussions was noteworthy in illuminating why Californian leaders seem to have a greater challenge in finding common ground. I present my process data according to each critical event- in this study defined as workshops - and then according to domain. I conclude by connecting my findings to the theoretical basis of my research.

Workshop Format

The workshop design, informed by research and carefully crafted to lay a foundation for open communication, understanding, and critical thinking - involved a presentation with videos, followed by questions and discussion, prompted by audience commentary (Decker, et al, 1988; McKenney & Terry, 1995). The format combined a presentation of information and videos, followed by live discussion including personal anecdotes. The presentation began with a comparative analysis of teacher requirements (public school, Montessori, early education); continued with a video portion from a meeting held by the California Commission on Teacher Credentialing on the definition of a teacher, and concluded with a video of a Montessori classroom, and later, a public school classroom in action. This set the foundation for discussion as teachers considered the definition of a teacher, teacher styles and teacher academic requirements. At most points, comparisons or commonalities were elicited. The most notable moments in each workshop were the personal stories of individuals and the body language of the listener in response to the information heard.

In most of the workshops, participants seemed generally eager to respond. In the second workshop, there were 50% more Montessori leaders present than traditional education leaders. I observed that the Montessori leaders were far more vocal during the workshop than the traditional education leaders. I am merely noting this, not attempting to assert causality: I do not know if the level of verbal participation would have changed if the participants had been equally dispersed across professional groupings. It did not seem to affect other workshops. In the first workshop, Montessori public school leaders seemed to have the greater number of comments. In the third workshop, traditional early education leaders outnumbered the Montessori educator 3:1, however, their comments were many and their views were strongly supportive of Montessori philosophy.

Some participants refrained from being video-recorded. Nonetheless, all participants wanted their views to be heard and included in the study. One participant (workshop 3) requested to share their views separate from the group. Ground rules for participation were established, including the provision of ample time for all views to be heard. At the workshop, attendees were asked if they were willing to be interviewed regarding latent thoughts which may have emerged from the workshop discussions.

I will first provide information concerning each workshop as a critical event. I will delineate the workshop's intent, the participants' responses or the issues that arose which shaped

my adjustments for the next workshop iteration. I will then share workshop information according to the three domains. Lastly, I will present and analyze the information which ensued from the follow-up interviews.

Critical Events

Critical event: Workshop #1.

Goal: Positive shift of 2 Groups: Montessori and Traditional Leaders

Result: Positive shift of Montessori and Traditional Leaders

Emergence of 3rd Group: Public Montessori Leaders

Metaphorically altered negative shift

The first workshop had a solid mix of Montessori and Traditional leaders, however within the first ten minutes I discovered that asking leaders to self-identify as either Montessori or Public leaders was unsuccessful. There were several leaders of public Montessori schools, including one leader who had both a traditional public school and a Montessori public school on the same campus. There were heads of Montessori magnet schools and of Montessori charter schools, and there were consultants who were trained Montessori teachers, but who had become consultants for public and private schools – Montessori and traditional. I quickly separated them into three groups for data analysis: Montessori, Public Montessori and Public/Traditional. I also discovered that they naturally separated themselves into camps and held different opinions. The public Montessori group tended to hold the ‘tension of the two opposites’ – often breaking two opposing views with either a combined or completely different way of consideration.

Issues that Arose

Facilitation of workshop #1 uncovered the power of words to build understanding or create division. Use of the word “standard” and the phrase “Common Core” created a change in body language, tone and energy in the room. I decided first to tease out the definition of the word “standard” and then to allow the participants to unpack their own feelings around not only Common Core, but the notion of a common curriculum.

The introduction to the Common Core discussion began with an animated video, created by the Common Core Initiative. The video explained the rationale behind the need for Common Core using the analogy of a staircase to illustrate the necessity of common standards for equal international academic competition. Inasmuch as the video was not well received by some, and interestingly was changed by the Common Core Initiative, by the final iteration of my intervention.

The metaphor of a staircase and the need for students to reach the top set the tone for the discussion. The video, narrated using an inner city vernacular, and using the stairstep image, discussed in an over simplified manner discussing the need for children to be on equal footing with the rest of the world. During the discussion, there was a marked difference in the affect of the participants. The metaphorical usage coupled with the language and social inference tainted the discussion of the validity of common curriculum. It provoked instead, a deeper consideration of the cultural implications of such a move and the “all in” marketing behind it. During the discussion, there was a marked difference in the affect of the participants. One Montessori leader, visibly distressed by the video, intimated that the intent of Common Core was being propagandized and slanted toward a lower achieving audience, which tainted one’s views regarding its validity:

The stairsteps – having that linear progression of learning, is implying that there is a regression [that some students are on lower steps than others]. They use these images symbolically – the steps the idea of no child left behind, even though they are saying we are getting away from that. The fact that there is no pace or duration associated with the steps, I don't want to say it's troubling...but by leaving that out and by not addressing that on purpose, it's assuming that parents are really ignorant. They've chosen a very specific voice to market to a very specific people, yet the person drawing - to most people, the stereotype doesn't match the voice. I find that troubling but at the same time, not surprised, because everything like that is going to be designed to pitch ... what it is you want to sell. And what they're selling here is their idea and their value set. (sets pencil down forcefully) This is what it represents: "...Can your child compete? Don't you deserve more? Doesn't your child deserve more?".... And they can't possibly be on two sets of stairs at the same time. The idea is that there is only one way to possibly prepare your child for life. Why do you have to be at the same spot...at the same time? (confidential, personal communication, November 7, 2015)

Based on this participant's reaction, the animated discussion in the workshop, and my own assessment, I made conclusions regarding how one's perception could be visually and metaphorically impacted. I discerned that the metaphor of a stairstep (going up, down, being on the same stair) hit directly against two Montessori tenets: 1) allowing children to progress according to their developmental ability, while the teacher is guiding the child in their area of challenge and 2) fostering an environment of non-competitiveness. Additionally, although it is a common view from the outside that Montessori education is for the elite, the above comment regarding the stereotypical bent of the video 'called out' the lack of cultural respect reflected in the choice of metaphor employed in a mainstream educational instrument. In the subsequent workshop, although I shared the video, I chose to highlight Common Core and Montessori Scope and Sequence in comparing how we use them and the outcome, rather than where we want children to land. I switched to a metaphoric example of cooking and utilizing different ingredients.

Critical event: Workshop #2.

Goal: Potential shift of 2 Groups: Montessori and Traditional Leaders

Result: Strong Montessori position

Less participation among traditional leaders

Setup: Theater style seating (mostly Montessori leaders on one side)

The first workshop had leaders from outside of the state of California; the second and subsequent workshops represented leaders who were only from California. This is noteworthy because California has been unlike the many other states who have had a progressive position regarding Montessori acceptance. My goal for this workshop was not a positive shift – but any shift along a continuum. I hoped for opening for additional dialogue with California leaders, and to get a sense of the ideological barrier that is apparently different than in other states.

There were surprisingly more Montessori leaders at this workshop than traditional leaders. I sought to engage the traditional educators in dialogue to even out the continued comments of the Montessori leaders. Unlike workshop #1, the chairs were theater style, and this may have affected audience participation. Unlike the first workshop, this workshop was held at

the end of a traditional education conference. Traditional leaders had been in attendance all day; Montessori leaders came in specifically for the workshop. There were remarkably different energy levels: the Montessori leaders with a lot of energy; the traditional leaders were quiet and seemed subdued, perhaps tired. This continued throughout the workshop, with the Montessori leaders becoming more vocal, while most of the traditional leaders remained quieter.

Issues that Arose.

One video that I presented focused on a child in a Montessori classroom over a 3-hour period. It showed the child as independent and successful in a child-driven environment. Due to the strong Montessori representation at this workshop, I felt the airing of the video emphasized the Montessori voice too much. There seemed to be insufficient information sharing from traditional leaders to balance the Montessori leaders. I also had a sense from the Montessori leaders that in larger numbers, they felt quite empowered to share their view. I was unsure whether they absorbed the information as expressed by traditional leaders. I made a particular point of explaining the factual information about such things as teacher education and accountability – areas often misunderstood by Montessori leaders.

I analyzed the metaphors used in the workshop to determine how to change my language and open the language within dialogue during the next iteration. I drew from Argyris and Schön (1978) regarding double-loop learning as a practice which required reflection and questioning of underlying values, goals and strategies.

I realized that in workshop #1, there was more reflective questioning, which seemed to draw out participants. It was difficult in this workshop, as there seemed to be more defensiveness, but I decided that for the next iteration, I would make a determined effort incorporate more questions, drawing from responses.

At some point, I introduced the word “we” in finding connections, solutions (eg: “how do we view each other on this point” rather than the separation of “us” and “them”), which seemed to change the separation tide to some extent. One participant in fact, who was not a Montessori leader, began to identify herself with pronoun ‘we’ when speaking of both Montessori leaders *and* non-Montessori leaders, made the following observations about assessments and accountability:

I think many programs in our field really gets bogged down with some of the labels – some programs are going to use a DAP model and they’re going to use tools for assessment depending on where their funding streams are....the tools that people use... it’s not that complicated to have a set of tools that would be applicable to Montessori, to head start, to state funded preschool – I’ve been trained in every rating scale there is, and I’m just wondering why do we bail? Why can’t we have a universal model...[for assessments]?

Critical event: Workshop #3.

Goal: shift of a group

Deeper reflection from either group

Result: no shift

Setup: Meeting style (chairs around table)

Drawing on my observations from the previous two workshops, I made an effort to draw the leaders out with additional questions which emerged from their comments (eg: do you feel that there is a connection between credentials and teacher quality?). Traditional leaders spoke of

Montessori education and had reflective discussions between themselves over their own ideologies. They had very different opinions regarding teacher quality, which shaped not only their view of Montessori teachers but traditional educators as well.

The issue of whether teachers should have credentials from Pre-K through 12th grade was strongly disputed. The conversation regarding this issue seemed so strong, that the connection to Montessori teachers was less important. There was concern addressed over the need to have teachers of preschool children mandated to have credentials. One leader felt that she made the error of seeing the credential before the teacher, and realized that, at the Pre-K level, a teacher's level of care should surpass a teaching credential or degree. The idea that Montessori teachers with MACTE teaching credentials held bachelor's degrees seemed threatening to some, appropriate to others.

I asked them to compare teacher authenticity, standards, and accountability, to what they knew or felt about Montessori education. I asked them to comment especially on what they felt might be missing in Montessori education. Some leaders seemed to feel that Montessori leaders resist changes that traditional education has made. I introduced the metaphor of a playing field and invited thoughts about how one might view these three areas in a way that would be satisfactory to all – creating a level playing field. This metaphorical question opened up additional conversation between the traditional leaders of their own ideological basis for their views.

What was noteworthy in this workshop was the very clear view that equity should exist between Montessori education and traditional education. There were equal views that there was an imbalance that existed in each domain, which reflected lower standards on the part of Montessori education. There was a view that Montessori education needed to widen its pedagogy to include components that are scientifically defined as important to education. The need for accountability for Montessori schools was voiced. One traditional leader suggested that Montessori associations hold the responsibility for widely disseminating that information about Montessori education in an effort to alleviate some of the stigma that exists

Issues that Arose.

Two refinements came out of this workshop. First, one participant requested that the slides containing information regarding Montessori and traditional information be formatted differently so that the similarities and differences could be taken in at the same time. This came up again at a subsequent workshop and so is noted for future iterations. A request was made to show a video – especially for the education of Montessori leaders – that would depict a positive traditional classroom and illustrate how traditional education is changing. I was unable to find something that would have cast a totally positive light by the time the next iteration occurred, but would also be an adjustment for future consideration.

Critical event: Workshop #4.

Goal: incorporation of double-loop learning and mental models theory through
reflective questions and discussion
incorporation of positive metaphors in language
Deeper reflection from either group

Result: slight shift

Setup: Theater style

In workshop #4, I endeavored to incorporate the lessons that I learned from the previous workshops about including metaphors, double-loop learning, and embodiment theory. I included metaphorical examples in each domain as a part of discussion. I invited the group into deeper reflection of information that appeared to connect with their perceptions and ideologies.

Realization.

I realized in the midst of the fourth workshop that embodiment played a part in the formation of seating. The table seating (workshops #1 and #3), where people could see each other clearly, had a different outcome than the workshops in which seating (workshop #2 and #4) was in theater style.

Workshop #2 and #4 were also at the conclusion of a conference as well, so it is possible that individuals were more tired. One participant was frustrated over the dialogue back and forth, and wanted to just know which group was “right.” He asked if I could just tell everyone the “right” view, the “right answer,” rather than needing to sort it out. It is possible that exhaustion contributed to the frustration of one participant. He expressed impatience with the back and forth dialogue, I mentioned to him that the goal of the workshop was really to question whether there really was one right answer, since the areas of discussion were primarily based on perceptions, not undeniable truths.

It is noteworthy that this group, in observing the video of a Montessori child in the classroom, took apart the concept of teacher authenticity in a very different way from previous groups. They had a lively internal discussion of the correlation between the product a teacher creates as an earmark of teacher quality and the credentials of that teacher:

Facilitator: Is that a teacher?

Person 1: Yes

Person 2: How can you assess that?

Person 1: The child was completely independent, self-directed, clearly had lessons in everything he did, so the teacher had done the foundation work.

Person 3: there was evidence of a teacher because of the whole environment, the way it was set up and how to use the materials - how he knew what to do with them when He was done using them...it showed there was a lot done before that, a lot of thinking went into that...showing him how to do things, but leaving him with a lot of freedom, providing this environment like it's for him so he could do that.

Person 2: my observation is I've never been in a Montessori school, never had experience in a Montessori school. It was a very impressive learning environment, I agree... there was probably someone behind the scenes to make that environment happen but that in no way allows me to assess the capabilities of the individual/s who created that environment....it's not enough for me to know if it's a good teacher.

I then asked what was not conveyed from the video. The child was obviously doing many successful things, but what was missing to give a fuller sense of the authenticity of that teacher?

Person 1: The natural connection with the child.

Person 2: The performance of the teacher.

Person 3: It would be impossible to see that video and think there wasn't a teacher – it's like he [the child] was given a roadmap and a place to go, but it was up to him to determine how he was going to get there.

Person 4: I have been in many Montessori programs and the process of the training – the way the children interact - it's really quite beautiful actually... To get to the point of what we saw it would have to be a teacher... [But] what's extremely important to me is the socio-emotional connection and I didn't see that opportunity. Children interacting with one another... being playful with one another. There was beautiful independent work... I didn't see the personal interaction, the hand on the shoulder... ways children learn about social interaction. I didn't see that. It's the piece of Montessori I can't embrace - not having opportunity for that – the complete closing circle of interaction – adult to child and child to child and child to parent – there's this sort of process that looks really good but is it really good.? Does it complete the circle of socio-emotional?

Person 5: Our 27 year old – I put him in a Montessori school when he was two, and for two weeks, he cried... and Montessori? It's supposed to be the best school out there, right? And because he didn't stop crying after the two weeks – I thought two weeks was enough time to let him stop crying. I moved him to another school that was not Montessori, and he didn't cry for the very first day. So, I think that's – that's something that's missing – you'd think that every kid would be good for Montessori, if it's that great of a curriculum? But, maybe not. We talk about feedback from teachers, but maybe we need feedback from kids, too. That kid [in the video] obviously excelled in Montessori ...

Person 1: But Montessori *isn't* for every child.... It doesn't work for everybody.

Person 5: Oh... Then, I'm wondering if in a different Montessori school [with a different teacher], he would've been ok?

Missing Factors in the Design

From the feedback I received from interviews and survey notations and from what I observed in the workshops and incorporated within my cycle of discovery, the following information emerged. I have divided it into categories to facilitate easy analysis: (Table 37):

Table 37
Design Response Changes

Equal Representation	Adjustment	Changed in process
"The video of the Montessori classroom was so perfect, and the video of traditional preschool was not. It was hard to lump traditional education into one pot, because Montessori is one single pedagogy, and traditional education is a salad bowl of all kinds of things."	I think an example of 3-4 traditional classrooms showing differing teaching styles or flavors in short video snippets would have given perhaps a better flavor of traditional education. However, it is	I adjusted the video after the last workshop however, more research is needed for an appropriate

		classroom video.
Clarity of Information	Adjustment	Changed in process
“I would have like to [have] seen the comparative information on one slide so that I can see it better”	I need to adjust the slides accordingly	--
“I would like to see clear outcomes; better data.”	I can provide outcomes for the Common Core discussion	--
Inability to hear and see well	I would always to circular seating	--
Needed better Common Core alignment	Time needed for better explanation	Added Montessori handout
Timing	Adjustment	Changed in process
“This is a longer process; we needed additional workshops in a sequence or over a longer trajectory with workshops at intervals.”	Will include this in future follow up possibilities	--
Miscellaneous	Adjustment	Changed in process
Adjust format of discussion for clearer ability to shift discussion: 1) Here are some facts 2) Explain where outcomes might differ 3) Ask what could have changed in the workshop that would have changed their mind? 4) How could this be better measured	Will note in discussion	Added in more data in Workshops 2-4

Table 37 Design Response Changes

Additional Realization

I recognized, after reflecting on embodiment in a conversation with Dr. Lakoff, each iteration should have begun with a physical example of the domain areas. This method of enhancing a presentation was demonstrated in 1915, when Montessori first presented her method of education in the United States. For four months, on the grounds of the Palace of Fine Arts, the “glass classroom” was on display at the Panama Pacific International Exposition in San Francisco, with 30 children attending school in a glass area, providing an “intimate view of the new education model” (AMS website, 2016). This indeed provided an example of an embodied experience.

Although I provided a video, it is not completely possible to understand the depth of what teachers or children are learning without the kinesthetic experience. For a true next iteration, within the workshop time, I would have incorporated a real life experience in teaching *and learning*. I would have allowed leaders become a part of a teaching lesson and to experience working and being taught in a classroom. Additionally, Montessori teachers would need to see the experience of a progressive traditional education classroom and the experience of learning

for a credential and accompanying testing to understand the rigor of public school education and the transition that traditional education has made over time.

To discern whether I needed to include additional information regarding Common Core, I researched how well individuals understand Common Core. My motivation to research how well individuals understand Common Core was based on the realization that in 50% of the workshops, people reflected errors in their understanding of the elements of Common Core. I discovered a study regarding Californians understanding of Common Core, which revealed that overall, communities hold a higher level of confidence regarding what they do not actually know (Hossen, 2015). The study confirmed what was evidenced in the workshops, namely that those “[voters] who claim to have more knowledge of the standards are often considerably more likely to hold misconceptions about the standards than those who claim to have less knowledge” (Ballasone, 2015). I realized that even though their understanding was based on incorrect information, they not only voiced their perceptions with conviction, but made decisions based on that error-based perception with total assuredness. I felt that I witnessed theory in action: the potential for inaccurate beliefs to shape mental models and form decision making.

Process Data Analysis by Domain

My process data included the workshop discussions that were captured on video and the interviews of a sampling of the participants. I used this process data to identify themes, most of which centered around the three areas of difference between Montessori and traditional education. I will present the anecdotal information which arose concerning those themes, and then I will provide information from the later interviews.

Teacher Authenticity/Quality

The common definition of a teacher went through a repetitive discussion process of ease and challenge. All teachers initially felt that they shared the same view of an authentic teacher, until the differences and similarities as defined by teaching organizations arose. The fact that a teacher responds to the child and environment was agreed upon. However, opinions about the manner in which that ought to occur were markedly different. Montessori leaders felt that it was inherent within the pedagogy and therefore common practice among the majority of Montessori teachers. Traditional leaders felt that it was the earmark of a good teacher to respond to the needs of the students in whatever way possible, but that there was not a prescribed method for doing so.

After listening to Montessori leaders describe Montessori education as a pedagogy with prepared lessons, objectives, and particular guidelines, traditional leaders tended to label it as a prescribed method (which was challenging for Montessori leaders). In workshop #3, upon discussion of freedom within the classroom, there was struggle which began with traditional leaders feeling like Montessori was too free from structure, and concluding with the thought that perhaps such a prescribed method of education was in fact not free enough.

Although the room began with a certain amount of tenseness as we began to discuss what a teacher is, the mood changed after watching a video in which an educational leader questions whether Montessori teachers are professionals:

It involves a culling process. There are people we would all acknowledge in our quiet moments that should not be in this profession - they should not be with children; they should not be anywhere near children and we need to get rid of them...Professionalism

serves as a way to screen people who do not belong in the field” (CTC Stakeholders’ Meeting, 2011).

In all four workshops, the tone of the room changed following that video, and there was an engagement of seeking common views or recognizing all teachers as teachers (Table 38):

Table 38
Comments Regarding Commonalities

“there’s more than one way to teach or mentor”	“it’s apples to oranges.... Just different styles”
“you can have a Montessori teacher and not have quality” and “you can have a certificated public school teacher with a degree in a high performing school and not have quality”	“We still have all this pressure to perform there’s is a huge need to support the ‘how’ and there are master teachers in many different forms – we need them all”
“we just need a seat at the table”	“it’s about building bridges”

Table 38. Comments Regarding Commonalities

With the exception of workshop #2, no one expressed the opinion that the difference in teaching style or pedagogy between Montessori teachers and public or traditional teachers made either one methodology less than the other in any way. In workshop #2, one Montessori leader said of traditional education leaders that “they aren’t following the child” – intimating that child-centered education separated out quality of teaching. It was consistently public/traditional teachers or public Montessori teachers who broadened their view to recognize Montessori teachers as authentic. Public Montessori leaders expressed that overtime, teachers within the field tended to have more blended pedagogies and practices.

In workshop #1, public Montessori leaders spoke to a blending of the ideas of freedom and structure that is no longer confined strictly within either environment:

I just wanted to make a comment on when we were talking about the teachers’ authenticity. I think it originally used to be that in the Montessori school - or in the traditional school, you had the active teacher, and then in the Montessori school, you had the active child, that the teacher is a facilitator there, they’re not doing everything. But just with my experience with the [Montessori public school] education, that is all shifting, and traditional – the environment in a traditional school used to be nobody leaves their desks, and at Montessori you’re on the floor, you’re at a table, you’re at a desk, you’re wherever. That is shifting, and in our area, I’m seeing not only the classroom environment shifting as far as furniture and that sort of thing, but they’re also doing a lot more multi-grade classrooms, and again having that flexibility. . . I think that’s been part of Montessori, and I think traditional schools [are changing]...(confidential, personal communication, November 7, 2015).

As the conversation regarding teacher quality continued, it was the public Montessori leaders who represented the different, unheard voice, calling out to both sides to understand teacher quality differently. A striking series of comments echoed the fact that a mindset that has been in place for decades regarding both Montessori education and traditional education is now obsolete:

I’ve seen a change in traditional education to try to implement things like centers and more able to provide different needs but certainly special ed[ucation] has always been accommodating children and their needs differently so when you look at a traditional model, there are different models within the model that some do foster independence and

help the child grow and learn... so it depends on where you're starting – [if you're looking at] traditional education historically.

In workshop #3, where leaders represented programs with Pre-K children, the emphasis in the definition of a teacher was weighted differently. In this workshop, there were no Montessori leaders present, and traditional leaders discussed teacher quality, stressing the need for teachers who understand the education of children and the attention to their social emotion development.

P1: Montessori is very strong in many areas I think that the focus is on the individual child....especially special needs children... I think the area that might need some strengthening is how can we facilitate the child's growth and assist them to interact...and grow socially and emotionally”

In this workshop, traditional leaders differed in their view of how much education a Montessori teacher or any teacher should have in order to be considered authentic. There was a strong discussion that occurred regarding the need for credentials or degrees at the Pre-K level. In workshops #3 and #4, traditional leaders differed in their views in this area two of them expressed the opinion that their non-degreed teachers do a better job. Views were strongly expressed on both sides:

P1: I feel that some people who have education don't have that heart...I do believe that education does play a big role in the quality of the program, but I think you have to look at the ... whole teacher...I have found that you can have the certificate and you can have that degree and they're all teachers, but are they quality teachers? I would say, yes, it's a teacher because there is a standard there, but what's a quality teacher?

P3: I think it's a complete package... Teachers need to have both the training - knowledge and education, and they also need the heart. If you have the heart for the child without the education, then you can be really well intended...Studies show that there is a positive correlation between the amount of education that a teacher has had and the success that they have in the classroom.

Summary of themes and findings.

The most common theme regarding teacher authenticity was the conceptualization of teacher efficacy – defining that construct for and among teachers based on changing standards and differing pedagogies. Leaders struggled with the identifying qualities of teacher performance, and in doing so they seemed to be examining their own sense of self. How they made meaning of the construct of a quality teacher connected deeply with how they fit their own definition (Tschannen-Moran & Hoy, 2001). One Montessori leader, who currently does not meet the traditional requirements of a teacher, struggled within the same conversation, saying “I was a teacher, but now I'm not” and “but I *am* a teacher.”

For at least half of the Montessori leaders, addressing teacher performance based on changing standards seemed to be less of a challenge in itself and more a judgement against their own image. The fact that others did not understand how Montessori teaching and learning accomplished student goals was frustrating because quality teaching was being defined on the basis of that lack of knowledge.

The second common theme was teachers as ‘information literate’ people - teachers who “have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them” (Matheus, Longo and Norton, 2005).

Standards: Teacher Coursework/Accreditation

The issue of standards, which centered on the rigor of teacher coursework and accreditation, began with relatively difficult conversations in the first two workshops. Private Montessori leaders in workshop #1 posited that Montessori education does not have standards, which required the need to first unpack the word “standards” and how it lives and breathes among both groups. Traditional leaders had clear mental definitions of what constituted the academic requirements for teachers, but did not include student teaching – practicum as a necessary element to couple with coursework.

Workshop #1 provided a rich reflective experience, with both sides intently listening and sharing personal and professional views. The challenge of the differing perceptions of quality was seen as due to the variation of integrity within teaching programs and within districts:

There are some Montessori charter organizations that have dumbed down [the philosophy] by making a business...they are advising ... schools to not invest in the training because it's too expensive, so you've got Montessori charters who are starting out their first year with maybe one trained Montessori teacher, or [saying] “boy are those materials too expensive!” So that's what's happening in some of the Montessori schools in Utah. Schools that are saying that they are Montessori charters, but it's not what they are providing is not [Montessori] (confidential, communication, 2014).

One Montessori leader spoke to the differences in the quality of teacher education programs in general. She referred to the rigor of Montessori teacher education programs and the AMS Montessori administrative education program she attended:

I just finished the AMS (American Montessori Society) administrative program... AMS has this, but not *all* schools, Montessori schools - are AMS schools...and so that was a big challenge ... the difference in the types of training, and then...it was very up to the individual student and their ability to maintain rigor, because some of the training programs were run too loose. And so, really then, at least for our State, a lot of the schools have just really embraced having a college level program, because it's held the students in a way that some of the other programs didn't...[But] I think the test of a Montessori teacher is one that, in that classroom they are capable of being involved with that child and that's very different from the rigor - it's how the theory touches your heart.

Another leader said that although she wouldn't attach rigor to the concept of her practicum, she felt that a practicum is an important value added in Montessori teacher education, and that it stood out as a significant difference in the quality of teacher training:

I've been affiliated with three teacher trainer programs at different stages and now I'm a teacher trainer and I taught at a university at the college of education, so from a teacher's perspective, in traditional models, it was academic- theoretical. Whereas in Montessori [teacher education], you have to practice your journals with the children. I don't know of any Montessori teacher training center – I can't think of one that wouldn't need children. I'm laughing at my own words, because it just seems logical, but I do know people who went through getting their Masters in Elementary Ed and never once stepped into an Elementary Ed classroom and never once saw any children! (confidential, conversation, 2014)

The tone of the room changed for a while when the discussion focused on different Montessori teacher education programs and the history of teachers who were trained prior to the implementation of set standards:

We keep talking about that in the IMC (International Montessori Council) world as fully implemented Montessori – which everybody is trying to come to the table to define what that is. But one of the huge elements of that is MACTE trained teachers. If you don't have that – it's hard enough when they are going through training, but [without that training], you just can't do it (confidential, communication, 2014).

One Montessori consultant, who said that she was having trouble with the entire discussion of what inevitably disqualifies a teacher, shared her academic and professional history. She mentioned that she has a business degree and assisted in the creation of her children's school. She took Montessori training with David Kahn and Montessori upper elementary training and was lead teacher in a classroom for six years. However, her certification was from a program that was not MACTE certified, and said, "I can never be MACTE certified...I'm a highly qualified teacher, facilitator, leader, mentor ...but I don't fit in that [MACTE model], so that's another problem! and Dr. Montessori would say there are teachers all over the world who will never have that piece of paper and they're better than most of the teachers who are in the classroom, so I think that's another issue (confidential, communication, 2014). The greater challenge, someone suggested, was that there is a parallel problem which juxtaposes those who have historically been trained according to different or unclear standards, and those who hold authority or accountability, who feel that there must be something in place to prove that they have qualified personnel.

In workshop 3, one traditional leader broke into a conversation to insist on the importance of standards and equality within the field. As she spoke, her words exited from her mouth slowly at first, but with clear and distinct articulation. It was almost as if within each word, any doubts or confusion she may have held were transcended by the vigor of her conviction. She stated that requirements must be present for all schools and all teachers, regardless of pedagogical differences:

We have to have rules and measurements. Our society cannot function without rules and measurements. Not every ability is organic... They have a saying, "great teachers are born that way, they only take classes to refine their tools," and so - therefore - looking at Montessori or whatever the other system is that's not Montessori and that is – each one of them should be accountable to something...a standard is developed that people can achieve...and so whether it's Montessori or whatever the other system is – we must all meet together when it comes to certification...In order for that teacher to be recognized within our state, they have to qualify the way the rest of us have to qualify – all these systems need to meet here (confidential, conversation, 2015).

Summary/common themes.

The most common themes regarding teacher authenticity were education vs. quality of, equating and validating previously accepted standards, shift the paradigm about teaching, legitimacy within the field and creating an equal and valid seamless system of assessment.

However, views and feelings varied between all three groups and within the groups. For example, in one workshop, the issue of teacher preparation rigor emerged. At the beginning of the workshop, the perception of most of the traditional leaders was that Montessori teachers were either missing academic rigor or well-rounded teaching. There was also conflict within the public school group regarding the academic requirements of public school teachers. There was dissension among the traditional preschool group regarding the California matrix requirements

for preschool teachers. Groups were shown a slide from the American Montessori Society, which presented the minimum requirement for a teacher credential: a bachelor's degree, followed by the two year coursework across 5-10 academic subjects, testing out of presentations in those subjects and a one year student teaching practicum.

Some Pre-K leaders seemed threatened when they discovered that for Montessori teachers, MACTE holds higher teacher education standards in addition to the one year practicum. Within the course of the discussion, it became apparent that although the issue of sufficient academic background is still an issue in California, the American Montessori Society had already surpassed that issue at the Pre-K level with requirements that exceeded traditional education for public and privately funded preschools. Even so, in California, leaders considered Montessori coursework lacking needed breadth.

Accountability

By what means education systems hold responsibility for children and what children learn was the final discussion among leaders. Within that discussion, Common Core Standards and Montessori standards were discussed as measurements for academic achievement. The idea of curriculum mapping to meet standards and whether Montessori had a prescribed curriculum within the method of teacher preparedness and the Montessori scope and sequence was a topic of discourse. Common Core acceptance differed among traditional and both public and private Montessori leaders. A quote from the International Montessori Council was read, stating that at least Common Core settled the "what" and the "when" and left open the "how" to teach children. I asked, "if Common Core provides freedom within the "how", then, what is the challenge? Why is there a challenge, as though the standards are seen as infiltrations?" One public Montessori consultant expressed what appeared to be conflicting views:

I don't have any problem with Common Core.... In our school, we were one of the first public Montessori schools, and the teachers that were trained – they were all trained - a full complement of materials that were used. And there was research done on how those students performed and we are also a very high poverty school district that is 98% African American. And when you look at the data from their test scores, they were in the 90's ...[but] over the course of 20 years, that method was not supported and so now we've been brought in as consultants to try and bring Montessori back. There are several teachers that are trained. There's 5 lower elementary, 6 upper elementary and 3 middle school classrooms... Some have materials, some don't have materials, some use materials, most do not. And they feel no support for using them. Now, all this pressure has been put on them, because now, in the course of the past three years, they've gone to the lowest performing school in our state. So the math rate right now is 3% and reading is 12%. So so when you look at what the data was and what kids are doing now, you ask questions – "why did you stop doing Montessori?" And the dialogue at the table is, 'Well, we'll try to do Montessori next year, because now we have to do this Common Core. And they are not understanding that, we have a map that has all of the Common Core standards and the Montessori materials that match it. This is a method that - we can deliver what you're asking, but you have to let us use the materials... They just spent another quarter of a million dollars on workbooks, textbooks and manipulatives that are not Montessori materials. So to me, the "how" really does matter.

Some Public Montessori leaders felt the standards provided a frame for a Montessori teacher to work within; others felt that it constrained authentic practice (Table 39).

Table 39

Comments: Link and Mismatch Between Common Core and Montessori

Link Between Common Core and Montessori	Mismatch With Common Core and Montessori
I think it's helpful because if you've got a group of teachers who needs to go back to those learning communities of teachers – if I've got a child who's struggling...teacher is able to go talk to and the 3rd grade teachers go talk to the 2nd grade teachers about what the child is missing out on, bring those skills in, it doesn't matter what they're using...they bring in what the child needs, but that list – those standards helps them to know exactly where that child needs to be. It's the same with Montessori standards.	I think the huge disconnect is lack of trained teachers. Because it takes a very long time, even if they are state certified, to incorporate the traditional with the Montessori...and oftentimes somebody with a bachelor's degree that's a state certified teacher, is not going to just walk in and be insistent that they want to have the training, so they go to training during the summer. But it's elementary, so it's about two years long. So that whole time, they're learning the Montessori way and they have the traditional and they feel that pressure of the Common Core. And they just don't know that Montessori [curriculum] is covering [it], because they don't know everything about Montessori yet. And they are trying to straddle both worlds. If they had training and it was done and they spent that year of internship ... that are so worried that they're not doing what they should be doing, and they start resorting to the workbooks and the traditional stuff.
We start with Montessori and then standards – that's the formal system. Here's Montessori and here's how the standards work within that. Pay attention to this [Montessori Scope and Sequence] first and do your Montessori well, and it will beat all of the other things! But it's another best check and balance to organize your thoughts – by the end of the 3 year cycle*....these things are already in Montessori. They're already there.	our district has adopted computer based report cards which is tied into the Common Core ... So our school has adopted the public school workbooks that cover all of the Common Core standards. Our teachers have been intimidated by trying to do the Montessori and the Common Core workbook so they [school]elected to have all the 3rd graders in one class for math... they were scared that there would be too much work along with a report card tied into every single standard.

*a clearly-defined and discrete educational framework with a beginning, a middle, and end, with the third year in each sequence a capstone year – the cycle is developmental and culminating and simultaneously iterative incorporating academic, emotional, social, and developmental experience

Table 39. Comments: Link and Mismatch Between Common Core and Montessori

Summary/common themes.

In the end, there was agreement that we have and need standards, but the concern and disagreement regarding their implementation and lens of assessment was palpable: “What we need is data,” one educational consultant stated. “Our world is changing and we need data to support it...[to see] how high performing teachers operate within the structure and within a measurement in a way that is holistic”. One leader explained the challenge of assessing readiness and success according to a blend of Montessori standards and Common Core, emphasizing the need to come together in this way:

“It was troubling to me...just the reality of the [concept of a] stair step - ‘you have to know this to get to this to get to this’... I don’t think that education is like that. It’s interconnected and so, while I appreciate the dialog and the idea – let’s at least just talk about the same thing: $2 + 2 = 4$. Whether they use Montessori materials or not, it’s still $2 + 2$, and there are different ways to teach it.... Part of the issue that I have encountered at the public school that we’re at – is that there is such a focus on well, we have to get from here to here, [but] our kids are down here. There’s no discussion about the kinds of teachers or how we’re treating the students, or are they ready to learn, or have they even had breakfast... and when you talk about Montessori -- we do tend to talk about the whole child... Montessori education is holistic, and it’s not just about context. And so, I think that is part of the dialog that needs to happen to be able to say, this is what we commonly accept as public education in a traditional format and this is Montessori – and how can we add that Montessori to public education?”

As I listened to these leaders, I wondered if we have grappled with and emerged satisfactorily from the concepts like self-regulated learning, which enhances the self-esteem of students. I wondered why it is still embedded within the mental models of many leaders that we cannot entrust teachers to execute the “how” that ensures children are taught in a way that encourages the child to be a pilot of their own educational journey (Boekaerts, 1997). In the next section, I will then examine how the theoretical basis for my research was interwoven successfully into the design and its implementation.

How Theory Lends Order to Process Findings (Findings Within Context of Literature)

Introduction

The cognitive theories used in this research were not indiscriminate selections. Embodiment, metaphors, mental models, and loop learning are theoretical concepts that integrate to shed light on how we structure our reality. Emergent perceptions based on experiences, language and conceptualized views form the patterns that create our decisions. In this section, I discuss how these theories were linked to my findings.

Cognitive Metaphors

When presenting the first area of teacher authenticity, I addressed information regarding teacher education from the metaphorical perspective of inclusion. Instead of approaching from a defensive standpoint, my intention was to encourage leaders to look for the areas in which they were similar or where the gap of difference in practice was closing. During discussion, one example of the comments of the Public Montessori leaders was that things were definitely shifting within public schools:

I just wanted to make a comment on when we were talking about the teachers’ authenticity. I think it originally used to be that in the Montessori school - or in the traditional school, you had the active teacher, and then in the Montessori school, you had the active child, that the teacher is a facilitator there, they’re not doing everything. But just with my experience with the [Montessori public school] education, that is all shifting, and traditional – the environment in a traditional school used to be nobody leaves their desks, and at Montessori you’re on the floor, you’re at a

table, you're at a desk, you're wherever. That is shifting, and in our area, I'm seeing not only the classroom environment shifting as far as furniture and that sort of thing, but they're also doing a lot more multi-grade classrooms, and again having that flexibility. . . I think that's been part of Montessori, and I think traditional schools [are changing].

Vigor vs. rigor.

As previously noted, throughout the workshops I used several metaphors that emphasized a joint journey, in an effort to unify where controversial or divisive metaphors were being used. I attempted to rework the idea of rigor in conjunction with teacher coursework, as the connotation of rigor seemed to be associated with images of harshness or strictness. In an attempt to either create a conceptual change around the idea of rigor or to call into question how rigor is conceptualized, I introduced Kovac's idea of borrowing the health view of using vigor rather than rigor in imagery when considering curriculum and coursework as valid instruments of measure (2010). In Workshop 2, the vigor and rigor concept seemed to open a door for conversation. One traditional leader, who served on a committee which evaluated teachers and their coursework for stipends, stated that she saw that Montessori teacher coursework was "very full".

Journey.

I also added a slide at the end which provided a metaphor of a field along with a quote from Rumi: "Out beyond the ideas of wrongdoing and rightdoing, there is a field. I'll meet you there" (as cited in Barks, 2004). This is indicative of the feeling at the conclusion of Workshop 3, in which leaders recognized that difference is not a negative, but can be seen as connected to a positive metaphor (journey, dance, an opportunity).

Interview metaphors.

Following the workshop, attendees were asked if they were willing to be interviewed regarding latent thoughts or metaphors which may have emerged from the workshop discussions. Interviews involved deeper, probing questions to reach beyond and beneath the surface of the survey questions, and discover the possible mental models that frame their views. They included questions such as "When someone says public education/Montessori education, what image comes to mind? What does that image infer for you?" Some interviews were done via Skype or in person, so that body language could be observed and coded (Table 40).

Table 40
Interview Response

Image (comes to mind re: Montessori)	Image (comes to mind re: traditional education)
"Single flower in grass; poppy maybe"	"I would have said a measuring stick. Now – maybe a question mark coming out of a book."
"A symphony – I'm not sure why"	"A ditto sheet. No, lots of them."

Table 40 Interview Response

Mental Models

Within the nuances of the cognitive science definitions of mental models, framing, schema and scripts, themes aligned with the literature continued to emerge. The workshops began by questioning the schemata inherent within mental models about teaching and learning. Discussions regarding certification, degrees, and teacher credentialing ensued, each slightly different but all clearly framed within their pedagogical underpinnings.

To approach the idea of sensemaking and mental models, I used a video to show a Montessori classroom in action, which fast forwarded through a 3-hour focus on one four year old child who was in their second year in a Montessori classroom. This approach was to open the lens of teaching and to help traditional educators who were unaware of Montessori education, get a real life glimpse into a working Montessori classroom. The video showed the child engaged continually in writing, language arts, numeric understanding, table setting, making and eating snack, cleaning up, completing fine motor work with geometric shapes, grading colors, washing dishes and completed a mathematics layout of numbers with a friend. The child was shown actively busy during the entire time. I asked participants to look for the teacher, who was rarely shown. I purposefully avoided commentary other than to ask at the conclusion of the video, whether what they saw was an example of authentic teaching or not. I invited them to comment on anything that they felt might have been missing in teaching.

Montessori teachers appeared proud of the teacher's invisibility, coupled with the student's active engagement. Pre-K leaders tended to comment on the teacher's assumed lack of engagement. K-12 leaders tended to remark on the academic ability of the child, which they attributed to the teacher's work. One traditional leader said that nothing could be assumed from the video regarding the quality of the teacher. Nevertheless, several Montessori teachers felt the child's engagement, focus and concentration were high indicators of rigorous training and good quality teaching. In the discussion, one leader felt that in some districts, traditional education is moving toward this example of student-centered education. She was able to draw a comparison to the video and a potential shift in traditional education:

I've seen a change in traditional education to try to implement things like centers and more able to provide different needs but certainly special ed[ucation] has always been accommodating children and their needs differently so when you look at a traditional model, there are different models within the model that some do foster independence and help the child grow and learn... so it depends on where you're starting to look at traditional education historically.

As each participant shared their views of the work of a quality teacher, the conversations coalesced around the notion of a teaching self-image construct. Leaders struggled with their model of a qualified teacher, which had changed across time, for several of them. Some were leaders found that they no longer fit the model of an "authentic teacher" due to a change in requirements. One leader, who has a doctorate in Educational Leadership, mentioned that he is permitted teach at the college level, but does so, because he does not have a teaching credential and therefore cannot teach at the elementary through high school level. One leader mentioned that one of her Montessori teachers of 30+ years returned to school for a degree, so that she could 'sit at the table' (and not be a part of the assumed stereotype of 'undereducated' Montessori teachers).

Leaders of Pre-K programs in particular, seemed to struggle with the socially constructed image of a preschool teacher as a non-educator juxtaposed with what appeared to be a strong academic leaning in Montessori classrooms. Some of them defined quiet, focused time in their traditional classrooms as being 'like Montessori'.

All leaders juxtaposed teacher quality with teacher training. Traditional and Montessori teachers' responses indicated that they had different mental models connected to the concept of quality teaching and rigor in teacher preparedness programs. If the rigor of Montessori training or traditional teacher preparedness coursework is true, it is also true that there would be a clear connection to the quality of the classroom. This was the overall sentiment expressed by both

Montessori and non-Montessori leaders as they reflected on the video. However, one traditional leader of a Pre-K program began a discussion on the critical importance of interpersonal relationships in the classroom. She described the necessity of making connections. She mentioned the value of a teacher greeting children each day, for example, placing one's hand on the child's chin and accompanying that connection with eye contact. Within this conversation, traditional teachers asserted the importance of socio-emotional connections to raise a child's self-image. One Montessori teacher responded that there is confusion within traditional education, that a child-centered environment is an emotionally neglected environment. She added that a good Montessori environment, and then she added "any environment" is not only child-centered, but child empowered.

I invited a discussion unpacking the words 'common' and 'standards' and the mental models associated with teaching. That discussion led to a further conversation about the uniformity of teaching. Traditional leaders began to refer to standards governing how a teacher should teach. Some Montessori leaders said that Montessori schools did not have standards, and that standards implied rigidity and uniformity. I used this opportunity to encourage them to view standards as norms, and to consider the models or norms that for them, would govern teaching. I asked questions regarding how children are taught in Montessori schools ('Is it correct that one can go anywhere in the world and walk into a Montessori classroom and children are taught basically with the same materials, in a pretty similar structure and order?' and 'Is it correct that Montessori teachers are trained to identify not only the use of a material, but the developmental milestones necessary for a child to effectively use a material, and the subsequent material that would be the next step after mastery of the current material?') I asked if it was a standard, if it was common, and if so, could these circumstances be seen as a set of common standards in Montessori education. I asked if this is a place where on some level Montessori education and public education meet – even if the standards differ and are not laid out in the same way. Although Montessori leaders in general responded negatively to the concept of commonality of curriculum, there was basic agreement in the room. One leader responded:

I guess I'm talking about...curriculum mapping – *when* you should teach which material at which time, and putting your lesson on the board, for example. Those types of things, some places still have them – this is the subject that you need to teach for this week, etc... But generally speaking in a Montessori environment, it is more – 'this is where this child is at in the process...and they haven't master this yet to move on to get to that place'... It's not a curriculum map or a timeline as much, but a different structure.

The intersubjectivity of mental models was an observed theme across all four workshops: how groups of people who share meanings individually or collectively hold onto their ideologies and how these held ideologies can affect decision making. In workshop 2, for example, the preponderance of Montessori leaders gave voice to the idea that the defining factor of a quality teacher is the strength of child centered education in the classroom. The work of widening their mental models to allow for pedagogical difference without judgment seemed difficult. By contrast, the caring and respectful treatment of children was the collective mantra among traditional leaders that in workshop 3. The difference between those traditional leaders was their *teaching* mental models – which either required or resisted a degree/credential.

I witnessed newly introduced information (eg: teacher requirements, changes in traditional education, accreditation differences, responsibility of accountability) overlay old assumptions, indicative of single-loop learning. In each workshop, however, there was a period

of deep contemplative discussion, which began to deconstruct the reasons for personal ideologies.

As leaders listened to the variety of teaching mental models and particularly the experiences that formed those views, alternative framing of teacher models came up. Leaders listened as others brought meaning to the reasons that Montessori teachers had training in the 1960's/70's without degrees. No degree requirement had also been true during a period in the history of traditional education teaching. Public Montessori leaders brought a completely different model to the discussion, sharing the history of what brought public Montessori schools to require dual certification for their teachers:

I used to believe that it was ok for Montessori teachers to just have training, and that's all we needed back then. But now, that we've gone through the credential process, we know why it's important to have bachelor's degree. We know AMS now requires that and we know why. But for us – for public school Montessori leaders, we are dual certificated, so we have both. We actually have more than everyone.

In workshop #4, there was deep discussion regarding the branding of 'Montessori' in schools. Although there were dissimilarities in things that leaders from traditional education didn't like about Montessori classrooms, there was discovery and agreement that some schools use the name "Montessori" while the practice in their schools isn't reflective of the authentic Montessori pedagogy. Even with a limited knowledge of Montessori education, they had a clear sense that what they saw in some schools did not appear to be a Montessori method of education. There was consensus that the ability for anyone to use the name Montessori in branding their school has resulted in image confusion and misconceptions regarding Montessori education.

When discussing authenticity of accreditation entities, I needed to excavate beneath the espoused mental models, examining the architectural themes that created the governing paradigms and restraining patterns. For California traditional leaders, their mental models of accreditation *could not* seem to allow for the inclusion of a Montessori accrediting body. Examining the history of education in California, it appears that robust forces have defined and maintained how educational governance occurs across the state. I submit that the insertion of an additional accrediting body, which could seemingly bypass the established structure, may have upset the governing paradigm, and created the 'push back' in California that has not existed in other states. Therefore, I attempted to engage the leaders with each other, interspersing the discussion and critical thinking questions with factual information and videos.

A poignant moment was reading a letter I received from the president of WASC, giving "support for California teacher education programs that are accredited by Montessori Accreditation Council for Teacher Education... We believe that the monitoring by the Montessori Accreditation Council for Teacher Education is sufficient even without regional accreditation." This sparked a hearty discussion, as leaders grappled with the notion that the very entity within their schema charged with accreditation had in fact approved of an alternative accrediting entity. It was at these times that sensemaking was critical to enable a mental model shift, since there is no cross correlation to WASC and MACTE in California.

Similarly, when we discussed accountability, traditional educators were confronted by the limitations of their mental model of accountability when they were exposed to a non-traditional education in which there was *lower* accountability, but equal or *higher* student outcomes. Conversely, private Montessori leaders seemed to unconsciously hold two mental models of accountability: an unformulated "espoused" model of external accountability (parents), and their own informal "in use" method of internal accountability within classrooms and schools (Spillane

& Miele, 2007). The effectiveness and consequences of high stakes accountability measures are still in debate. However, the nebulousness of a lenient accountability model and the subsequently strong reliance on personal integrity seemed so beyond the pale of any conventional accountability practices that traditional leaders struggled to comprehend this way of assessing accountability. On the other hand, although Montessori leaders expressed their understanding that in our current day, measures of accountability are needed, they held onto their ‘theory in use’ model of internal accountability, which is currently inconsistent in its effectiveness statewide (Jones, et al, 2011).

Montessori leaders in California have shown themselves to be equally resolute, holding on to their mental model of *traditional education as a threat*. Indeed their fear has some basis, as on both a national and state level, education policy changes have threatened to dilute Montessori pedagogy as it originated. As a result of that fear some Montessori leaders have stayed in a state of protective isolation and ignorance, unaware of the positive changes that have occurred in public education. Indeed, charter Montessori schools may in fact have pioneered some of that change, while simultaneously struggling to mitigate the effects that public school regulations might have on the philosophy.

The ignorance, however, is mutual, as public school leaders have held onto a mental model of *Montessori education as an unaccredited method*. They have seemed unaware that Montessori leaders responded to the need for legitimacy and accountability by establishing an accreditation body that “accredits certification programs based on (1) the evidence they have that they prepare competent, caring, and qualified professional Montessori educators and (2) their capacity to monitor and improve the program’s quality.” Traditional leaders, whose mental model of Montessori is one of a *pedagogy with low socio-emotional support*, seemed unaware that research regarding Montessori socio-emotional practice yielded high outcomes. Both mental models, based on deep-seated beliefs, will continue to be present at the public policy table until work is done through many reflective discussions, to reframe them (Argyris & Schön, Spillane, 2007).

Embodiment: Additional Exercise

Finally, I used one area of confusion which continued to emerge throughout three of the workshops and attempted to use embodied learning to clarify information. The issue was whether Montessori materials could be effective to teach Common Core standards. I gathered ten non-Montessori leaders post intervention for a half day working with Montessori materials followed by an additional one hour exercise. They watched a lesson given by a teacher in mathematics. I provided the Common Core Standards in mathematics for first grade, specifically numbers and operations for base ten. They watched teachers take children through a sequence of Montessori materials: spindle boxes and number rods (which teach numeric and quantitative understanding to 9 and 10, respectively), beads and boards for teaching 11-19, and golden bead material which teaches an understanding of decimal quantitative understanding and numeric quantity. The children in the classroom were 3 – 6 years of age. I then invited the leaders to use the materials themselves, and then they practiced imitating the presentation of the material as it had been demonstrated by the teacher.

I also invited them to sit in on a brief portion of a Montessori teacher preparation class, in which the teacher was learning how to present a lesson using a Montessori material. Within the class, the teacher also learned the rationale governing the material, the pre-existing knowledge required for readiness, extension exercises with the material, and extending language across the

curriculum. They were shown manuals created by the teachers and were invited to create one small section for the presentation they did in the classroom.

I invited them to share their views after the exercise via two simple verbal questions:

- 1) whether the exercise of using the materials and presenting a material added to their understanding of how children might learn in a Montessori environment
- 2) whether the exercise of listening to and preparing a portion of a lesson in a teacher's manual added to their understanding of how Montessori teachers learn.

The response was consistently positive for all leaders, who expressed that the “use of the materials made a difference to understand how a Montessori teacher could keep up with Common Core standards – I always thought these things were just toys.” Opinions about the teacher preparation class were also consistent, although one leader expressed doubts that a teacher could retain all of the information regarding each material sufficiently to teach it and apply differing techniques to children with learning differences.

When interviewing a sample group post intervention, I asked if their perception of Montessori education or traditional education had changed any and if so, what factor influenced the change. Every interviewee replied that the information from the workshop was a key component. For some, it was information that was presented, for others, it was the stories shared. For some it was the video and yet for others, it was the back and forth discourse in which they felt that others had expressed the very confusion or concern that they had felt for years, but never understood. I also asked them if they felt, after all of the information sharing, that there was still an area that was left insufficiently explored, or that they still felt was missing in practice. Interestingly, the same two themes were echoed by each group about the other – socio-emotional development and freedom in the classroom (Table 41):

Table 41
Interview Responses

What is missing in Montessori education?	What is missing in traditional education?
“The socioemotional stuff. It’s great with academics, but the socio-emotional component is important.”	“I think socio-emotional development. That is important in a mixed age environment, and it’s what people say about Montessori, but I think in many traditional settings, it is lost to test scores”.
“Freedom of exploration. Children are taught to use materials a certain way, sit a certain way, be quiet – children need more than that”.	“Freedom of movement. It is something that characterizes Montessori education. In a Montessori environment, children are not confined to a desk, they are free to move, there are often indoor-outdoor environments, and no one is doing the same thing at the same time”.

Table 41 Interview Responses

Summary

Perceptions

Although changing one's perception and mental models takes time, it was apparent that in some situations, participants were open to hearing that other models had been formed within Montessori and traditional education. The discussions seemed to invoke openness however, the

hands-on exercise connected leaders in a different way. Leaders who couldn't comprehend how children learn in a Montessori school or how Common Core standards could be imparted within a Montessori curriculum seemed to have had clarification regarding how the method could work. Within the process of learning the materials, there was also conversation that seemed to open a door of understanding regarding commonalities between both groups.

Interestingly, their discussions reflected that they at least acknowledged that there was some measure of change. There was a realization that traditional education was striving to meet the needs of children in a different way. As a principal of a dual traditional public/ Montessori public school observed:

There's a *big* shift. It is in our best traditional teachers – they're more facilitators. It is true, they have a more free learning environment for the students where the teachers are more facilitators...it has changed, but I think that perception is still out there that that it's not what happens. I even get that from some of my Montessori teachers: 'This child would do better in traditional, because they have a set thing for the child to do'. But that's not the case anymore.

Research Questions/Value of Tools Used

Although my study needs further development, my research questions brought to light that deep-seated views can affect perception, but it is likely that under **conditions of deep reflection, one can rework their mental model**. I found that when **embodied ideas** and metaphorical language connect in learning, there is a greater potential for understanding and perceptual shift. The shift begins to change the 'boxes' in which we have our contrived ideas. In my study, the tools most useful to observe what appeared to be a shift, were loop learning and in the end, embodied cognition. The deep reflection began to occur in the more in depth discussion. Having in person experiences provided a sense of realism that cut through the sense of 'otherness'. However, listening to lived experiences provided the opportunity to reach deeply within. It was then, that I felt their vulnerability and heard participants speak to their commonalities.

When the experience occurred, I saw the 'aha!' moment in the bodies of those using the Montessori materials, as though deep understanding occurred within their senses in that moment. I recalled that my view of police officers began to change after I experienced a 'ride along' in a police car at night. Perhaps these types of experiences are what is needed to bring our differences closer; our understandings clearer. I found although it needs further development, my approach is promising.

Chapter Seven

Discussion

"People find it quite easy to have beliefs and to hold on to them and to let their whole world be a product of their belief system. They also find it quite easy to attack those who disagree. The harder, more courageous thing, which the hero and the heroine, the warrior, and the mystic do, is continually to look one's beliefs straight in the face, honestly and clearly, and then step beyond them. That requires a lot of heart and kindness. It requires being able to touch and know completely, to the core, your own experience, without harshness, without making any judgment."

- Pema Chodron, The Wisdom of No Escape

Introduction

There is a manifest need for partnership among teachers, parents and students in programs designed to cross pedagogical and political barriers, to encourage innovation in the field and to improve test scores and teacher-student interest in learning. Innovation via alternative models of learning also requires fieldwide partnership and an openness to dialogue and understanding. Until progress on a national level towards understanding was recently made, confusion and misconceptions had postponed such a partnership in success based models like Montessori education. California lags behind this national progress and is still working toward clearer understanding and equity among Montessori and even traditional models. Deep-seated historical belief systems seem to be a cause for this delay. This necessitates more than a simple dialogue, but rather a way of deep understanding that plumbs the depths of differing perceptions regarding both Montessori and traditional educations. Connecting with our internal, unconscious ideologies and mental models is not an easy task.

In review, the goal of facilitating this deep understanding and achieving common ground underpins the communication intervention proposed in this paper. Using theories of cognitive psychology, this study explored the potentiality and possible measurement of increasing understanding, opening a door toward changing perceptions, the possible indicators of a change in perception and the conceivable outcome of such an opening between the Montessori and non-Montessori community. I first identified misconceptions held by Montessori educators and traditional educators about each other's practices and philosophy then constructed a communication tool designed to simultaneously provide accurate information and a deeper multimodal experience of comprehension. The study exposed groups of Montessori and traditional leaders to the communication tool intervention and measured whether or not perceptions had been changed as a result of this exposure. The study juxtaposed Montessori and traditional education and examined system level approaches covering areas of alignment, accountability, and standards, with the goal toward measurement of whether each form of education has informed or possibly influenced the other. Finally, the data and process were analyzed with an eye to assessing the possibility that the beginnings of openness to increased and mutual understanding and respect and perhaps even enduring, long-term common ground had been created.

In this section, I discuss how the implementation of the tool has met the challenge of my design. I present information regarding how the findings from this study connect with system reform, especially during the critical juncture of partnership in which traditional and alternative education currently finds itself. I share the limitations of the study, and I further suggest future recommendations and outline ways that the theoretical basis for this study and the communication tool that the study engendered might be a useful model.

Meeting the Design Challenge

The goal of this design was to create a communication intervention tool, aligned with cognitive theories of understanding that would open dialogue and perhaps shift differing perceptions held by Montessori and traditional education leaders. My intention was that instrument design would shed some light regarding on which might help or hinder further discourse in the state of California. The intervention was informed by the following areas of cognitive science:

1. Mental models theory
2. Loop learning theory

3. Cognitive metaphors theory
4. Embodiment theory

The subject matter included in the communication intervention module was derived from a pilot study, which identified three primary areas of confusion in both the Montessori and the traditional/public school educational communities:

1. Teacher authenticity
2. Standards governing teaching and learning
3. Accountability

Conditions for the study were met: educational leaders participated who were willing to engage in honest dialogue, and follow through with the surveys and interviews, as requested. Participants were also willing to abide by the request to explain unclear terminology (acronyms and pedagogically-based expressions) so that everyone understood. Any individuals who did not meet the criteria for the study were eliminated from the data analysis. Data was coded, analyzed and checked for accuracy before statistical analyses occurred.

Findings suggest that such an intervention does indeed facilitate an opening in communication and dialogue, and perhaps begins to shift uninformed perceptions based on deep-seated ideologies and mental models. Each iteration of the intervention revealed an area in which improvement could be made, involving either the inclusion of other metaphors, more embodied experiences, or a change in presentation. Measured across all iterations, over 60% of the attendees judged the communication intervention as a necessary tool to begin to ameliorate some of the barriers that may still exist between Montessori education and traditional education.

Findings: Public School/Traditional View of Montessori Education

A lack of understanding about Montessori education was common across most traditional leaders. Even those with preschool backgrounds, who may have studied about Montessori education in human development courses, had misinformation regarding the system of teaching and teacher certification and credentialing. Two public school leaders in California fought against having a Montessori charter school because they felt that it would change classrooms negatively. They metaphorically compared Montessori classrooms to the way life was in the “hippie era, when everyone was all peace and love, but didn’t work and learn.” Neither of them had observed in a Montessori classroom, but had “heard things.” In fact, at the beginning of each workshop, there was at least one traditional or public school leader who referred to Montessori teachers as untrained or not fully educated. In one workshop, a leader commented about not understanding how individuals who were not educated as teachers “in the real sense could have students in their classrooms who were so proficient in mathematics”.

Interestingly, representatives from other states, including leaders of public Montessori schools, shared the same basic understanding regarding Montessori teacher coursework and the value of the curriculum within private and public schools. I also didn’t experience a feeling of competition or threat on the part of the public and traditional school leaders from other states regarding Montessori education. There were comments however, from Montessori leaders in certain states that “they are not quite there yet.” Leaders voiced that in some states, legislation affecting children at the pre-K level still poses a challenge to fully implement Montessori philosophy within classrooms. Some of the Montessori charter leaders expressed feeling more

confident with teachers who were dual certificated (Montessori education and a public school credential) because it would satisfy onlookers.

In one of the California workshops, there were two common feelings expressed or manifested: being threatened and insecurity. Additionally, traditional or public school leaders expressed doubts over Montessori teachers' ability to meet standards. At the pre-K level, several leaders expressed concern that Montessori teachers did not have the training needed to support children socially or emotionally. Across most pre-K leaders, there was unrest regarding the amount of education Montessori teachers actually have. There was a concern voiced that this Montessori academic information was disconcerting as it "raises the bar for traditional pre-K teachers, who cannot afford more education but are already good teachers".

Across workshops, the issue of accountability in Montessori schools came to the fore. Traditional leaders, on the whole, felt that there were insufficient measures to hold teachers accountable for teaching and learning. One leader in California felt that the heavy handedness of district level accountability made it difficult to see Montessori education in a positive light. "To have to jump through so many hoops on the school, district and state level makes it hard to be accepting of Montessori education with its low level of accountable measures".

Findings Within the Context of System Reform: California

Although I did not seek out leaders from certain states, my study had geo-political findings. The findings indicated that there was more openness and perceptual shift with leaders in other states than there was in California. I searched for shift via domains and workshops, but did not seek to compare shift via geographic regions nor across states. In spite of my not having deliberately considered this particular parameter, the finding emerged through the complexities of the quantitative and qualitative analysis.

I looked for a variable that would have made a difference in the findings, as I equated shift with liberality. I perceived California as the most liberal state in the nation. However, in workshop #1, where there was the most shift, there were no leaders from the state of California. In fact, four of the six states represented are politically rated as highly or above average conservative states (Utah, Indiana, Texas and North Dakota). Workshops 2 and 3 were exclusively California represented. All participants in Workshop 4 were from California except one individual. That individual was originally from California and had moved to Florida.

I scoured the research to discover the ideological or political differences between California and other states that might account for the resistance in California to Montessori education recognition. There were several key factors pointing to the political landscape in California.

California is politically rated "more liberal than conservative" (Independent Journal, 2015). In a recent study that analyzed 13 key metrics ranging from student-teacher ratios and standardized-test scores to dropout rates, California ranked 43 in the nation in "school system quality" (Bernardo, 2015). It had the highest teacher to student ratios (51 in the nation) and the lowest budget dedicated to education. The state has had persistently low academic achievement of racial/ethnic minority students, English learners, students raised in poverty, and students with disabilities. However, California has also proven itself to be progressive and liberal. It is the first state in the nation to track the academic progress of the ~44,000 students in the state's foster care system, to ensure equal access for transgender students, and to pass the Paid Family Leave Program. However liberal, and albeit many political "firsts" under its belt, California's overall group mental models have resulted in *not* being among the first states to pass gay marriage, child labor laws, interracial marriage or seat belt requirements. Indeed, California was the first state to

prohibit bilingual programs in schools, a law which promoted subtractive schooling and has taken years to reverse.

The issue of who holds educational control in California has been active since the Black Panthers initiated the free breakfast program in the 1960's. Stakeholders have been engaged in a struggle over economic, systemic, and pedagogical framing which has shaped the current policy structure in the state. This struggle can be best conceptualized by examining the difference between institutionalist and pluralist pedagogy philosophies. Both institutionalists and pluralists value equality and quality in education, based on different mental models. Institutionalists view equality from a protestant moral ethic. Their frame is underpinned by a model of standardized testing. They hold a tight rein on funding streams and teacher qualifications including the definition and pathways governing teaching and learning, beginning in preschool. Pluralists see equality through a lens of justice. Their frame is underpinned by a model of culture driven education, community engagement and caring with a view toward additive schooling (Fuller, 2007; Valenzuela, 1999).

Public Policy Institute of California (PPIC) reports: "although California votes solidly Democratic, Californians (including non-voters) hold important elements of conservative belief in most parts of the state. On an ideological scale ranging from strong conservative to strong liberal, public opinion data show the average Californian falling in the middle and leaning slightly conservative." The epicenter of the California progressive voice is famously located in the Bay Area, however, it only gives the *appearance* that there is a statewide liberal view. It holds such sway in the public imagination that it has created the illusion of a state wide liberal view. At the critical juncture of decision making, it is the statewide majority of conservative decision makers, reinforced by their historic mental models that are the ones who tip the scale. In such cases, it seems that the potential for progressive, alternative reform is *cognitively* delayed, needing new frames, new mental models.

California is a state with a kaleidoscope of educational and developmental pedagogies, delivery systems, and a diversity of lenses through which we navigate education at the Pre-K through 12th grade level. It is a ripe state to be inclusive of different schemas, to widen models and shift ideologies (Fuller, 2003; Lakoff, 1999). Nevertheless, it is a state that seems to require deeper understanding of what underpins beliefs systems that no longer serve education well.

The overall findings of this study point to a set of intrinsic historically held beliefs by Montessori leaders and non-Montessori leaders. In California, this belief system and the power held within traditional education have influenced views and decisions on education policy in the state. Holding fast to an honest desire to improve student outcomes, traditional mental models have historically limited the sphere of influence in education to what is comfortable, even if it has not proven to be longitudinally successful. Montessori and Public School leaders from other states have provided evidence of their track record to explore new territory – to face the unknown and investigate new phenomenon. However in California, Montessori and traditional leaders overall have seemed to hold more tightly to their mental models, guided by skepticism rather than empiricism. Traditional leaders seem to fear the effects of an educational cognitive reframe, even though past models have not, on the whole, helped the state to shift in its national academic placement.

I spoke with one Assistant Superintendent in the Bay Area, who shared that all of his schools in the district, sans one, were lower achieving schools. The school that was high achieving was a Montessori charter school. I queried whether it behooved him to observe and

consider modeling other schools after the one charter school. His response, with no further consideration, was that he was certain that it wasn't because the school was a Montessori school.

This superintendent's attitude, representative of views held by some of his colleagues, illustrates the necessity for Montessori leaders in the state of California must embark on a consistent path of collaboration. One California Montessori leader remarked that they have "been ongoing in limiting Montessori from gaining too much footing in the public sector, with "my opinion" the fear that it would undermine the private sector. However, in order for Montessori to pursue itself across the broader levels of education with equity to research, it must be a private/public partnership. I'm not sure that will ever really exist while [they] advocate the way they do (confidential communication, 2016)."

One insightful view came from a leader whose origins were in university teacher education but who later became involved in a larger educational governing structure in California. She said that despite the pedagogical differences, she felt that "the biggest issue is aligning with current California practices and regulations for teacher preparation." She felt that the shift has occurred on the side of traditional education already, "The Common Core has revised the thinking of most California teachers to more closely align with Montessori philosophy/practices so it seems a good time to see if Montessori could navigate the California system by revising its expectations to include California requirements without losing the Montessori view of teaching/learning." She gave the example of faith-based institutions who have aligned their teacher preparations standards and assessments, which ultimately prepares teachers for private or public schools. She felt, however, that Montessori associations may not be able to move beyond the need for WASC accreditation.

She also felt that there were barriers that would be difficult to overcome: "I don't think Montessori will ever get anywhere in California unless it is willing to adjust its program to include WASC approval, the CSET [California Subject Examinations for Teachers], RICA [Reading Instruction Competency Assessment], TPAs [Teaching Performance Assessments], and Induction processes as well as aligning to the program standards for content, field work, etc. The measurement of standards and accountability has taken a hiatus in most any California stakeholders' discussion. She went on to ask, "Is this something that Montessori CAN do or would it be too much change from within to make it possible?"

MACTE's work has represented an aggressive outreach to states to bring awareness to their critical role of expertise as *the* national accreditor for Montessori Teacher Education Programs with the authority given by the US Department of Education to acts on behalf of those programs. In California, the issue of state control of career pathways and workforce registries seems to be where educational policy takes its seat. Here, as is typical of California, is where lengthy discussions occur. In this case, the issue is whether teachers should have additional requirements or simply articulation agreements.

As people engage in dialogue, I continue to wonder whether in California, there are alternative ways to envision assessment of teacher competence, and a method of partnership for external accountability that could satisfy everyone. I wonder about the possibility of an articulation agreement between WASC and MACTE regarding California teacher education programs. In the discussion of a possible Pre-K through elementary credential, teacher practicum and overlap of knowledge base through additional coursework was discussed. Montessori teacher education already has a fine model in its mandatory incorporation of teacher practicum in addition to coursework. Additionally, MACTE accredited teacher education coursework includes crossover philosophy in early and elementary education to provide that

overlap for teacher understanding. I wonder how dialogue might influence understanding and articulation in these areas. Moreover, the need for greater accountability and deeper, evolving teacher education are areas seen by traditional education as valid areas of growth for Montessori schools. Internal accountability and child centered additive instruction are areas of growth for public education. I wonder if conjoined measures would be successes to solve the puzzle of balanced accountability systems. These conversations in my research intervention were but a seed in a process needed for systemic maturity to graft different models within the state educational design.

Interestingly, the leader from Florida, who attended Workshop #4, was proud to share the importance of partnerships between Montessori and public education. Her school was awaiting American Montessori Society accreditation approval, making it the nation's first AMS accredited public Montessori school serving children from 3 -15 years old.

Study Limitations

The ability to fully measure openness to understanding or a paradigm shift requires more time than this study could allow. Additionally, the workshops were limited due to the time constraints of leaders and the number of hours that were emotionally possible given the tender subject matter. Extra consideration had to be given due to the small sample size. A larger sample size coupled with a longitudinal study would have provided a deeper analysis.

Finally, challenges in construct definition, measurement and operationalization were major limitations for research that concerns perception. It required researching the many definitions across disciplines and to use the definitions that most consistently corresponded to the purpose of this study. To the extent possible, I used a critical friend to balance my view, and attempted to anchor myself within the literature as my lens. However, any human tasked with analyzing perception is using their own mental models as the lens through which the research is designed and discussed.

Suggestions for Future Iterations

To have deep understanding or to restructure deeply entrenched representations, we need to “repeatedly engage and reconsider information that is difficult to reconcile” with what we already know (Spillane, 2007). If that is the case, it will take more reflective work to assist traditional education leaders and policy makers in California to understand Montessori education, and for Montessori leaders to understand more about public education, policy and partnership. If the lesson is taken from Lakoff & Johnson's (2003) work, the model of embodiment needs to be incorporated on the policy level to assist that understanding. To truly manifest that theory, a strong effort toward education with a focus on double-loop learning would be the charge of Montessori leaders in California.

This was my greatest omission: lack of sufficient concrete living examples to penetrate the misunderstandings. Lakoff's work reminds adults that embodiment traverses the lifespan. For this research to ground cognition in the sensory motor systems, and to understand the complexities of both educational systems, leaders would need to engage in each other's environment. Maria Montessori taught teachers in the same embodied way, not for simplification or pacification, but as a response to complex neural systems.

A future iteration therefore, would include a lengthier workshop model, perhaps over several days. It would involve visits to, or in-house examples of teacher trainings for comparative analysis of rigor. It would include classroom observations and participation to

compare Montessori academic lessons with Common Core objectives. I would also incorporate key discussions with leaders at the accreditation level and small group discussions with a goal toward reaching an understanding of the possibility of an articulation agreement.

Years ago, I suggested this as a first course of action and it is still what I would posit to shift the political landscape. When it was proposed before, the response was that action, not education, was needed. However, I submit that both the results of the work done nationwide and this research point to the fact that the action is radical embodied education.

Implications for Practice

History has revealed how unconscious embedded ideologies play in issues that involve age, race and gender. For example, violence against transgender people comes from external factors and experiences that bump up against unconsciously held belief systems. Gender for many of us is the bedrock of who we are – our norms and values are seated in the deepest places where we are challenged as people to even allow for gender questions to enter our being. To examine what we have believed is truth is a shift which makes others unsettled and/or resistant. For change in attitudes about gender as it has affected lesbians, gays, bisexual and transgender people, I believe that the deep reflection involved in double-loop learning had to occur. It has required a deconstruction of how one holds gender, and a reconstruction of how gender can be considered a concept representing fluidity. This is the same within the field of education, and there is a parallel process that needs to occur.

As this research progressed, it became quickly apparent that this paper was greater than differences between Montessori education and traditional education; greater than perceptions and mental models. It urgently asks the question across all teachers, students, leaders and schools: how do we bridge that gap where people need to unite over a common good? The implications that this has for states, especially for California, may be a schema embedded within policy for how we create change in partnership. If understanding and change can occur in other states, there is potential for understanding in California. If innovative practices via alternative models can occur in other states, more of the same can occur in California. If recognition has occurred in other states for those who share the *same field* of teaching, it can occur in California and elsewhere.

Conclusion

The purpose of this study was to examine perceptions of Montessori education within public and traditional education. Using theories of cognitive psychology, this study explored the potentiality and possible measurement of changing perceptions, the possible indicators of a change in perception, and the conceivable impact of such a change between the Montessori and non-Montessori communities. The platform for this study was a discussion-based workshop with video and a pre and post survey instrument. The session juxtaposed Montessori and traditional education and examined system level approaches covering areas of teacher quality, alignment, accountability and standards, including Common Core.

Upon beginning this research, my thought was that education alone is the vehicle for breaking down barriers – the mechanism to rid biases and establish commonality. I believed, along with many others, that people “just have to be aroused to see and comprehend the world around them (Lakoff, 2016).” However, ideologies are deeply rooted and any work at changing those ideologies requires plowing the field of values, belief systems and opinions. From the depths of our neural circuitry, the world, our world according to *us* - is shaped by how we

internally see it (Lakoff, 2014). I discovered that the body is not so distinct from the brain that it is disengaged from the process of deep understanding and cognition. Therefore, this paper could not examine divergent perceptions and ideologies without taking into account how perceptions emerge, change, and inform decision making.

Montessori taught the importance of the adult crafting a well-prepared environment for the child, as her observation was that the environment informs child self-development. As adults, our environments have already shaped us, and the work is harder, deeper when we must excavate realities that no longer serve us. Additionally, we must also be willing to engage in the struggle to hold the ‘tension of the two opposites’ as theoretical partners in the field of education, appreciating the common ground on both sides. The value of integrity and authenticity are common denominators among those engaged in Montessori and traditional education. Ironically, our shared fears of theoretical imposition suffocate our ability to see the importance of arriving at an agreed place of accountability. The responses from the workshops highlighted the need for ‘edupartnership’ - the creation of partnerships across pedagogies in the field of education, wherein the crucial conversations emerge into substantive reform.

At the workshop’s end, one leader expressed appreciation that in her state, the conversations have already started to change perceptions: “The dialogue thankfully for us has shifted, from such an anti ‘we’re Montessori and we’re better; public education is horrible’ ... to ‘whose needs are we trying to meet here? ... let’s work together.’” Our partnership, shared goals and willingness to join in a field on behalf of children can be strong enough to allow us to be a web of interdependence, looking beyond our individual lens to a wider scope for the future of children. As Rumi (1995) said, “Out beyond ideas of wrongdoing and rightdoing there is a field. I’ll meet you there” (p.36).

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Appendix A

Post Over Time Survey Questions

PLEASE PROVIDE YOUR CLOSEST IDENTIFICATION: ___ public school leader
___public Montessori leader ___ traditional education leader? ___private Montessori leader?

Each question is rated from 1-8 PLEASE PUT A NUMBER BETWEEN 1-8 THAT BEST REFLECTS YOUR BELIEF IF:

1= Not well

4= Fairly well

7/8= Very well

0 = Unsure

Survey Questions About Montessori Education

- a) How well does the concept of a Montessori classroom provide the type of **structure** that is needed to promote sufficient student learning?
- b) How well does the concept of a Montessori classroom provide the type of **freedom** that is needed to promote sufficient student learning?
- c) How do you think Montessori education standards (when compared to traditional education) prepare children to be academically ready for the next grade?
- d) To what extent are Montessori teachers equipped to meet the academic needs of all types of students?
- d) Compared to traditional teacher education coursework, how rigorous is Montessori teacher preparation coursework?
- e) To what extent is a Montessori curriculum able to address children with special needs?

Survey Questions about Traditional or Public School Education

- 1) How well does the concept of a public or traditional classroom provide the type of **structure** that is needed to promote sufficient student learning?
- 2) How well does the concept of a public or traditional classroom provide the type of **freedom** that is needed to promote sufficient student learning?
- 3) How do traditional education standards (when compared to Montessori education curriculum) prepare children to be academically ready for the next grade?
- 4) To what extent are public school or traditional education teachers equipped to meet the academic needs of all types of students?
- 5) Compared to Montessori teacher education coursework, how rigorous is traditional teacher preparation coursework?
- 6) To what extent is a traditional or public school curriculum able to address children with special learning needs?

APPENDIX B

In-depth Interview Questions for Public Sector/Traditional Leaders

1. When someone says Montessori education, what image comes to mind? What does that image infer for you?
2. What if anything is missing in a Montessori environment to prepare a student to be academically ready for the next grade?
3. What do you feel makes a teacher preparation course of study valid?
4. What is one similarity between Montessori schools and public or traditional schools? teachers?
5. What three words would you use to describe a Montessori classroom?
6. What would child centered instruction look like to you?
7. What would a traditional approach look like to you? a non-traditional approach?
8. Are there common values that Montessori education and public or traditional education share?

APPENDIX C

In-depth Interview Questions for Montessori Leaders

1. When someone says public education, what image comes to mind? What does that image infer for you?
2. When someone says traditional education, what image comes to mind? What does that image infer for you?
3. What if anything is missing in a public or traditional school environment to prepare a student to be academically ready for the next grade?
4. What do you feel makes a teacher preparation course of study valid?
5. What is one similarity between Montessori schools or teachers and public or traditional schools or teachers?
6. What three words would you use to describe a public school classroom? traditional classroom?
7. What would child centered instruction look like to you?
8. What would a traditional approach look like to you? a non-traditional approach?
9. Are there common values that Montessori education and public or traditional education share?

APPENDIX D

Observation Tool

Speaker () # _____

1 – mild

2 – moderate

3 – exaggerated (expressive)

During Speaking

Facial Expression	() 1	() 2	() 3
Body Movements	() 1	() 2	() 3
Language	() 1	() 2	() 3

Response to particular expression	() 1	() 2	() 3
Expression: _____			

During Presentation	() 1	() 2	() 3	Topic: _____
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Response to particular expression	() 1	() 2	() 3
Expression: _____			

During Presentation	() 1	() 2	() 3	Topic: _____
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Response to particular expression	() 1	() 2	() 3
Expression: _____			

During Presentation	() 1	() 2	() 3	Topic: _____
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Response to particular expression	() 1	() 2	() 3
Expression: _____			

Significant quotes: _____

Coding: _____

Body language: _____

APPENDIX E

Code Explanations Table

<i>TECHNICAL ASPECTS OF TEACHER EDUCATION</i>			
Code	#	Definition/Example	Lines Indicated
Qualities of a teacher		Indicators of a good teacher of children (eg: patience)/	
Coursework		View of aspects of teacher ed coursework necessary in a quality teacher ed program/	
Rigor		Not clearly defined, but stated in meeting testimony by interviewee as critical	
Teacher Education Programs		Indicators of quality teacher ed programs/	
Degree		Views regarding degree requirements for teachers/	
<i>CONTINUUM OF NON-EVIDENCE BASED VIEWS</i>			
Knowledge Limitations		Statements of interviewees lack of knowledge on the subject/	
Montessori Perceptions		Beliefs that are not based on evidence	
Bias		Bandwagon, etc.	
Concerns in/of the Field		Fears re: children, education, teachers, teacher education which shape views/	