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A TEACHER EDUCATOR'S NARRATIVE JOURNEY INTO MINDFULNESS

by

AL-KARIM H. GANGJI

A dissertation submitted to the Graduate Faculty in Urban Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

2020

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A teacher educator's narrative journey into mindfulness

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Al-Karim H. Gangji

This manuscript has been read and accepted for the Graduate Faculty in Urban Education in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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ABSTRACT

A teacher educator's narrative journey into mindfulness

By

Al-Karim H. Gangji

Advisor: Kenneth Tobin

In this manuscript style research study, using multiple approaches and multimethodology, I explore mindfulness and wellness in my college conceptual physics classroom designed primarily for pre-service elementary teachers. This high-stake science course is a pre-requisite class to enter the elementary education program. The subject of physics let alone science, creates high level of anxiety and intense emotions. Over the past three decades, mindfulness has gained an exponential popularity in many fields including education. Mindfulness involves one's ability to pay attention to the present moment. As a tool, mindfulness raises an awareness of intense emotions that often accompany teaching and learning. We can introduce mindfulness using a heuristic as a low-grade intervention. Founded in hermeneutic tradition, a heuristic is designed to reveal the meaning associated with particular social construct. A heuristic enables one to changes in practice by mediating reflexivity.

The first part of the research study will explore the results of the Mindfulness in Education Heuristic (MEH) developed by Malgorzata Powietrzynska and Kenneth Tobin (2014) administered to my pre-service elementary education students in my physics classroom. This landscape study is designed to raise awareness of one's emotions during class. I will describe and

analyze the results of thirty-one characteristics in the MEH administered to seventy-one students. I will study the nuances presented in the student responses in order to explain the level of awareness for each characteristic.

The second study is a co-authored research conducted together with Malgorzata to re-administer the MEU after two-and-a-half years to three selected students from the original study to measure the level of mindfulness. This study looks at the responses of the students, while at the same time reflecting on my classroom practice of modeling mindfulness.

The final study of my research, I am introduced to and explore the ancient art of Jin Shin Jyutsu (JSJ) and mindfulness. JSJ is an ancient knowledge system grounded in traditional medicine practiced in several Asian countries. It is a non-invasive practice of healing and regulating emotions to promote wellness. This is a co-authored research study with Kenneth Tobin, Konstantinos Alexakos, Ana Malyukova, and me (2017). In this study, Ana and myself are the object of research. We both explore this ancient art of body movements and interactions to mediate emotions.

This holistic research study is a teacher educator's narrative journey into mindfulness.

DEDICATION

To my children, Nazeena, Ameer-Hassan, and Saleena

And my granddaughter, Nylah

My Life, My Love, and My Happiness

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First and foremost, I would like to acknowledge, Kenneth Tobin, my mentor, my advisor, my committee chair, and my guide who enlightened my worldview as a teacher, a teacher educator, and most importantly, as a person placed alongside humanity with respect and humility. Ken believed in me, when I lost all confidence if I would ever get to finish my dissertation. Through life's trials and tribulations, he paved the path of hope and encouraged me to believe in myself.

My deepest gratitude goes to my committee members Philip Anderson and Konstantinos Alexakos. Their dedicated hours of reading my manuscript, correcting my errors, improving my ability to express myself with conviction, and seeing and supporting me to the finish line.

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To my closest friends, Brendan Curran, David Pickman, and Valerie Carbery, thank you for dealing with me every day ranting and complaining about myself. Day after day, you listened, you smiled, you helped, and still found ways to make fun of me in a sincere way.

I wish to thank my immediate and extended family members who understood but never complained about my absent-mindedness and quirky ways of being. My sister Izzat Ladha and her family, my brother, Amin Gangji and his family, and my kid brother, Nurez Abji and his family, they have all respected, supported, and championed my quest for academic pursuit. Without my aunt, my second mother, Daulat Allibhai, I would have never had this opportunity to embark on

this journey of intellectual curiosity in the Western world, who sacrificed everything to make sure her entire family settled in the United States for a better life.

I thank my parents, Hassanali and Zubeda Gangji for giving me freedom to grow and seek my own path in life. And lastly, to my late maternal grandfather and grandmother, Hassanali and Khatija Allibhai, you taught me right from wrong, everything I am and everything I stand for, was inspired by your love. May you always rest in eternal peace.

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CHAPTER 1

FOREWORD

A human being is a part of a whole, called by us 'universe' a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest... a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty." - Albert Einstein

The love of physics and mathematics, and the passion for teaching and sharing knowledge, has navigated me on this path to seek higher knowledge, in order to understand the secrets of the universe. I always wondered, and always will, if the universe will ever reveal everything about itself. I am far too limited, compared to the great giants who have pondered this thought for thousands of years. I only seek to understand my place in the universe, the nature of my being and my role in space and time.

Born with traditional Eastern values, raised with ideals founded in a Western canonical system, this journey to seek higher knowledge has returned me back to my foundation, firmly rooted in my peaceful faith and spiritual practice, to understand the mind-body connection. Formal training in science planted the seeds of positivism. The quest for higher knowledge as a doctoral student, in search of the truth of being, has led me to seek the wisdom of the ancients through the contemplative practice of mindfulness. This ancient knowledge system has transformed my ideals and humbled me as I travel on this journey to understand my role, my purpose, my reason, and my

being, only to understand the world around me, non-judgmentally. This is a journey guided by mindfulness and well-being – a personal journey of a doctoral student.

The study I present in this dissertation is based on extensive research on Mindfulness and Science Education conducted at the Urban Education Program at the Graduate Center of CUNY led by my advisor and mentor, Kenneth Tobin. To be present, to be aware, paying attention to our moment-to-moment experience, is the common definition of mindfulness. Based on Buddhist tradition, the goal of mindfulness is to understand the mind and the body, our nature of being, and to free ourselves from suffering. Practicing mindfulness promotes wellness and sustainability. Mindfulness is innate yet elusive if one is not made aware of its practice. Incorporating mindfulness in my daily practice, and integrating it into the way I teach, has transformed my ontology, axiology, and epistemology.

The structure of the following study incorporates a holistic, multimethodology, and integrates multiple approaches with varying populations, blending three studies that build and support each other with a common theme - mindfulness and well-being. Following the auto ethnography in chapter two, I provide the framework of my study and define the methodology employed in the research in chapter three. The following two chapters (four and five) address the first of the three studies. Here, I present the results and analysis of a landscape study of the Mindfulness in Education Heuristic (MEH) given to my students in a college physics classroom. Chapter six, is the second part of the study, conducted with a co-researcher; a follow-up study of MEH with three selected students from the original research. This chapter incorporates my narratives (as third-person point of view) in the analysis. Chapter seven, is the third part of my research. This chapter involves three co-researchers along with myself to study a related field regarding well-being and mindfulness using the ancient art of Jin Shin Jyutsu. In this study, I am

a co-researcher and a research participant. The final chapter, chapter eight, draws the three studies together, with further thoughts regarding mindfulness.

Chapter-by-Chapter Overview

In the second chapter of my dissertation, I journey into understanding myself, my faith, my values, and my passion for learning and teaching science. My story begins from my birth place, Tanzania, East Africa. Here, I share the memories of my early childhood growing up in a tiny town located in central Tanzania. I discuss the impact of my faith and how it has molded the very essence of who I am today. I look at events that sparked my curiosity and the love of science. We then travel on the great journey to the Western world. I explore the challenges of adapting to the new world, embracing education to make a better life, and eventually becoming an educator. Humbled by life's challenges and shaped by adversity, defines who I am as a father, a person, a high school teacher, a teacher-educator and a researcher. I share how my interest in elementary science education developed and how I have transformed my practice as a mindful teacher-educator.

In the third chapter, I share how I have matured as a doctoral student and discuss the foundations of my research. I define a conceptual and an operational definition on mindfulness, including a brief history and the definition of a heuristic. I look at the development of the Mindfulness in Education Heuristic (MEH) and how it is used as the instrument of my research. I then lay out the framework of my landscape study of the implementation of the MEH in my Conceptual Physics class for pre-service elementary teachers.

In chapter four, I share the data concerning the thirty-one characteristics in the MEH. I begin with a general statistical overview of all the data, and then present the data of each characteristic graphically, illustrating the responses based on a 5-point Likert Scale. I define each

characteristic, and study the nuances presented in the optional open-ended responses following the Likert Scale rating for each characteristic. Since the characteristics of the heuristic are meant to create resources for prospective elementary teachers to enhance their mindfulness, I seek to identify and measure the level of mindfulness.

In chapter five, I share the final reflections of the participants regarding the MEH. I also share my personal data of the MEH from the perspective of an educator. My personal results revealed a lack of being mindful for several characteristics. The impact of this awareness has been quite profound in my daily practice of mindfulness. I have been able to regulate my emotions and have a heightened awareness of each sensory experiences I encounter.

In the chapter six, I share a co-authored paper (Powietrzynska & Gangji, 2016) which was a follow-up study after two and a half years of the original implementation of the MEH in my class. We selected three students and re-administered the MEU to see if they showed an increase in mindfulness. In this study, I also share my narratives and my practice to enhance mindfulness for my students as a science teacher educator. This chapter provides a reflexive self-analysis of my role as an educator modeling mindfulness. I also share how I have been shaped by my faith, as a Shia Ismaili Muslim, and the teaching and guidance by the spiritual leader, His Highness Karim Aga Khan.

In chapter seven, I share another co-authored research paper (Tobin, Alexakos, Malyukova, & Gangji, 2017), on Jin Shin Jyutsu (JSJ). Introduced to this ancient art of regulating emotions and enhancing mindfulness, I was a research participant and was the object of study, based upon my posture, bodily positions, and the movement and placement of my arms and legs during a presentation at seminar. JSJ employs the use of life energy, called “chi” which is regulated by

touching various parts of the body to achieve wellness. A careful analysis of how I positioned my arms, my legs as well as my stance revealed, without being aware, that I was using JSJ to regulate my emotions and reduce anxiety and stress due to the presentation. This practice has further enhanced my mindfulness.

CHAPTER 2

FOR THE LOVE OF TEACHING AND LEARNING SCIENCE – A JOURNEY OF A SHIA ISMAILI MUSLIM EDUCATOR

“Refresh your minds with marvels of wisdom because minds too get tired as your
bodies do.” - Hazarat Ali

Why Don't I Know Who I Am?

It is commonly said that we all have a purpose in life. But, will we ever know what it is? From the moment we arrive and take our first breath to that final day we take our last, we seem to be caught in a sandwich of time always between past and future. How often do we capture the present? I think most of us, to a great degree, wonder about why we are the way we are, and, why we chose to become who we wish to be? Why do we even care? How do we see our world? Why do we feel for others less fortunate? Why do some of us seek to find inner peace to allow compassion to become our modus operandi in helping others? Why is it so important to be in the moment to make others meet us in the present? Why is it so important for us, as educators and lifelong learners, to open up to all knowledge systems? I think for most of us, these questions lie deep within us, in order to search for answers that perhaps may never reveal themselves.

A lifelong struggle to understand myself, my ontological standpoint, my epistemological and axiological framework, my faith, and my culture, are all blended in space and time from their origins deeply rooted in an Eastern knowledge system, but strongly influenced by the adopted values of the Western world. Enduring personal failures and triumphs over time, I have embraced the art of being mindful of everything around me and my surroundings. As an educator, I think

this inner reflective journey allows me to understand each student as an individual with their own stories and struggles. The struggle to make something of their own lives, only to be caught up in an educational and social system, defined by culture, obsessed with grades represented by letters and numbers, and sadly supported with superficial knowledge. It seems the love of knowledge and imagination is left for those few who are curious, seeking to learn for the sake of learning only to become better people and worthy citizens.

Early Childhood – My Faith, Meditation, and Mindfulness

This is a story of a Shia Ismaili Muslim on a mindfulness journey to search the inner depths of his purpose and the reason for being, only to search and attempt to understand the meaning of it all and wonder what it shall reveal about him and what he shall leave behind. I am well aware I will never find the answers, but at the least, I hope to make some sense of my purpose. In this post 9/11 world, I wish for you to first and foremost understand my peaceful faith and the values I have embraced from a young age, combined with a caring family, to mold the very essence of who and what I am today. Travel back in time with me to the place of my birth and my early childhood days in East Africa and the subsequent journey during my pre-teen years to the Western world.

I was born in the heartland of Tanzania. Dodoma is a small town located pretty much in the center of the country and is now the national capital of the United Republic of Tanzania. Most of what I recall after more than four decades since we left Tanzania are just bittersweet memories etched deep in the heart that define the very essence of my identity. For a long time, I have wondered what event or encounter in my early childhood propelled me into the world of science. My earliest memory that I vividly remember was the sighting of a “star with a tail” that brought the entire town praying for days fearing great calamities to befall upon the people as this evil omen passed over our heads and was visible for several days and nights. As a curious kid, I was

constantly scolded by my great grandmother for looking up in awe and marveled at this magical thing that terrified everyone. Every evening we had to attend special prayers to save and protect our town. Sadly, I couldn't ask or question, exactly what was that bright thing in the sky with a long cloudy feathered tail? My elementary school education from everything I recall was rather simple, stressing the basics in mathematics, geography, and learning Swahili. The education system was based on a self-reliant society where the focus on education was simplistic and primarily focused on using natural resources for the sake of self-sustenance as a means to provide for the community, and make a living.

By the age of five or six, I was captivated with the wonders and beauty of nature. I began collecting leaves and learned how to dry-press them with newspapers and heavy books. I had collected leaves and flowers from just about every single plant and tree within the town limit and also from my father's farm. I enjoyed catching butterflies and bugs and kept them in jars with punched out lids to provide air. I kept them for a few days and then released them back in the area where I had found them. And by the age of eight, at the school we were put in small groups of about three or four students and were given small portions of land plots within the school compounds to turn them into "our" farms and to develop our own irrigation system and manage several crops. I loved the challenge of maintaining the best and well-organized farm and managed to grow potatoes, carrots, tomatoes, cabbage, spinach, corn, peas, peanuts and peppers. My grandfather loved hot peppers, so I also managed to grow small piri-piri peppers as well, just for him. I took great care of my farm and enjoyed getting my hands dirty with soil and always took care to water and fertilize as best as I could. I wanted to learn everything about plants and was hooked and fascinated with the basic knowledge of agriculture. Just as I was enjoying everything the Earth had to offer, I was completely mesmerized by the Apollo 11 mission to the moon. Once

again, I set my eyes to the heavens and began to wonder about the moon. I maintained a scrap book with every article from any newspaper or magazine my father could find in the tiny town with one bookstore. Once again, my curiosity to understand the mysteries of space and science was ignited. All I could do was think and wonder. Sparked by imagination, but content like my father, a farmer and a merchant was my destiny.

In 1967, under President Julius Nyerere, Tanzania adopted African socialism to maintain a self-reliant society. In a futile effort to teach students to believe that this socialist self-reliant government was “just and good for the people,” the government changed the focus of a Western educational system originally established by the British Empire prior to the Tanzanian independence in 1961, to a focus on farming and providing back to the village and community at large. My formal training in learning about farming began by shadowing my father at his farm on almost a daily basis ever since I was six or seven years old. The mini farm at the school became my testing lab. I was being groomed to one day take over and manage his farm and provide to the local villages.

Schools did provide basic knowledge in learning mathematics, science, art, history, and geography which were all taught in Swahili the national language. Knowledge was presented to be accepted without any critical analysis and the stress was to learn through rote methods. Any infraction of school rules or teacher instructions, resulted in corporal punishment, which was an acceptable and just part of the system. Public humiliation was the norm. Grades were used not only to measure knowledge acquisition but also the ability to conform to school rules and regulations. We had a six-day long school week that began at 7 am and ended at 4 pm on weekdays and half a day on Saturday. After school most of us played football (soccer) until dusk and then returned home to get ready for prayers. In hindsight, considering my parents were fairly religious,

I was grateful for the way they raised us when it came to the practice of faith and the respect for all religions. Their flexibility allowed us to understand the balance between the spiritual and the material world.

On several evenings every week, my parents, along with my younger brother and sister, would sit around our radio to listen to the BBC broadcast via Radio Addis Ababa from Ethiopia and listen to stories of the Western world and all the news about the Apollo space missions. Many times, after listening to the radio, my father (the black sheep of the family) would tell us stories about his hard life growing up homeless since the age of fourteen and living and working by the railroad station and how he managed to eventually save enough money to purchase a small store and a tiny farm. These life lessons I hold dear to my heart. My father's struggles became my drive to achieve the highest academic accomplishments to this very day.

My religion and faith are without a doubt my greatest foundation in all I value dearly and why I became a teacher. Born into the faith of my parents, I identify myself as a proud Shia Ismaili Muslim. Though I may be weak at practicing my faith well, my sense of spirituality and the values of giving and helping others stem from my faith. His Highness Prince Karim Aga Khan is the 49th hereditary Imam (spiritual leader) of the Shia Ismaili Muslims. As far back as I can remember, I was greatly influenced by the messages of the Aga Khan to his spiritual followers. Each message stressed the importance of education, helping others, being kind and compassionate, being loyal citizens, and to always maintain a balance between the spiritual and the material world.

The spiritual world introduced me to meditation. Meditation was a means to connect with the spiritual world in order to understand the significance of god and the soul. For all Ismaili's, meditation is commonly practiced during early morning prayers. Since I was six or seven, every weekend I would go with my mom for these early morning prayers and meditated for a full hour

from 4 to 5 A.M. This early morning time to meditate is considered an ideal time when the mind is most calm and fresh to focus as I have understood it to this very day. I meditated only because I was told, that is what every Ismaili must do to achieve salvation. As a child I practiced meditation, sadly, I never truly understood its meaning or benefits.

Journey to the Western World

Then the unplanned great journey to the modern world happened haphazardly towards the end of 1971 due to the looming crisis of the impending war with Idi Amin's Uganda and the constant pressure of the transformation of the Tanzanian government towards a self-reliant society and a socialist republic. This crisis forced my father to send us away to a new world. Separated from our parents, our journey with my mom's youngest sister, and our maternal grandparents set us first on the path to London, England, where we spent a few months before reaching our final destination to the land of opportunity. We landed at John F. Kennedy International Airport and set foot on the majestic grounds of the most glamorous city in the new world, New York, NY.

Urban schools and urban education in a modern world in the early 70s once again ignited my love of science. I was lucky to have had a wonderful sixth grade science teacher at my junior high school in Queens, a teacher who clearly sparked my curiosity and imagination and single-handedly brought back my passion for learning science. The rest is history still unfolding. After completing an undergraduate degree in physics, while I was a graduate student in the department of physics, I was assigned to teach a lab course for pre-service elementary teachers in a joint program between the physics and elementary education departments.

There could not have been a better script to guide me to the world of teaching. Teaching this lab to students who feared science and math was certainly a challenge. A challenge that allowed me to work hard and develop methods to share science meaningfully with applications to

daily life. At that time, I wondered why they could not see the physical world as I did, nor could they explain it with the language of mathematics. While completing my graduate work, I was offered an opportunity to teach physics for elementary teachers and that is the impetus of my pursuit of a doctoral degree and to make a small difference in the world of elementary science and math education.

Values and Indigenous Knowledge

Immigrating to the Western world at an impressionable age when my culture and values were clearly rooted in Eastern traditions created tremendous inner turmoil and made the process of adjusting a challenge and a major culture shock. Perhaps for this reason to this day, I find myself senselessly searching for a purpose of being and my calling in life. In search of the self, I have always felt and considered myself a “minority” in all norms of life. Back in Tanzania, I was fairly privileged, being the son of a well-established and well-to-do merchant and a respected farmer and land owner before it was all nationalized. My parents were not educated in the Western sense beyond primary school. My father originally worked for the East African Railway Corporation since the days of the British colonization and eventually purchased a small farm which grew rapidly and yielded crop to eventually make my father a land baron. As a well-respected member of the community who understood his humble origins, my father managed to provide food and clothing for all who worked for him and help donate school uniforms to those less fortunate.

My father was well respected by village elders and it is here where I was first exposed to the idea of indigenous knowledge. I had heard many stories regarding the bounties of “Mother” Earth which reflect the stories very similar to those of the Native Americans as well as their struggles. My eldest daughter, who was born in New Mexico, proudly considers herself to be Native American born on the ancestral land of the Navajo and the Apache. When she was young,

she studied a great deal about the life and struggles of the Native Americans. I recall many moments when she shared stories, we discussed the parallels between life in Africa and the tales on the Native Americans.

Respecting the wisdom of the elders are the roots of the indigenous ways. For they are considered to possess great ancestral knowledge of the bounties of Mother Earth. To my father this was most important as he taught us these values of respecting our elders and learning from them. Theirs was the spoken knowledge and I remember sitting with my father and listening to stories told by village elders that I knew were passed from one generation to the next. Indigenous ways of teaching and learning through stories as well as through experience I find quite appealing, contrary to traditional Western school instruction, it is non-intrusive and allows for adjusting teaching to the maturity of the learner. Knowledge is given through relationships and for the purpose of furthering relationships. Relationships are an integral part of learning. I consider this as mindfully teaching and learning. The indigenous sense of being human speaks about compassion, generosity, and the wholeness of relationships.

Thus, the individual makes sense only within the concept of his surroundings and being in the moment. Human relatedness to the environment is represented by indigenous peoples for whom land is a basis for communal existence. Consequently, their value system speaks to the importance of relating to, rather than, mastering nature and the environment. This provides an ethically sound alternative to the Western exploitation of natural resources and lack of respect for our planet earth. Again, it was the wisdom of the village elders that instilled the respect for life and all that the earth provides along with the fascination of the wonders of nature that I still enjoy to this day.

Learning to Teach Science

For more than two and a half decades I have seen my passion and interest develop exponentially as I have worked with pre-service elementary teachers in a physics classroom setting. It was by great luck as a graduate student I was assigned to teach a few recitation and lab classes in the physics department and was asked to help develop and teach a conceptual physics course for non-majors and for pre-service elementary education students. Since the early 1990s, as an adjunct college instructor, I have enjoyed teaching undergraduate physics, in particular teaching a conceptual physics course for elementary teachers. While teaching college in the evenings, my day was equally fun and fulfilling sharing the love of physics with curious high school students.

For many years my focus on teaching conceptual physics was strictly based on providing students, most of whom were pre-service elementary teachers the content knowledge to make sense of the physical universe. Having read and studied works of great education philosophers, psychologists, and historians of the 19th and 20th century, like John Dewey, Jean Piaget, Thomas Kuhn, David Ausubel, Jerome Bruner, Robert Gagne, to name a few, I have experimented with many approaches to teaching my classes both at the high school and college level incorporating their ideas. Though I learn more every year, I try to integrate the concepts of inquiry based “hands-on-minds-on” learning with conceptual change to help my students.

However, over the past several years as a doctoral student I have been challenged to look not only at content and the method of teaching and learning but understand the nature of authentic inquiry (Tobin, 2017). This critical lens has forced me to seek answers far deeper than I could have ever imagined. The reflective experience of learning and teaching science allows me to seek a deeper understanding of the individual and the collective. Considering the complexities of teaching and learning, to teach diverse populations in an urban setting effectively, I find myself

employing the lenses of cultural sociology to focus on every individual during all my interactions with my students. Science knowledge is cultural enactment (Tobin, 2010).

As sad as it is to admit, I had always approached teaching conceptual physics to pre-service elementary teachers using a deficit perspective. I always assumed my students came into my classroom with a weak background in the physical sciences and mathematics. Based on the pre-assessments I have given for years, this assertion seemed valid. Delighted to admit my perspective has changed over the past few years as I have intellectually matured as a doctoral student in the Urban Education Program at the Graduate Center of City University of New York (CUNY) under the advisement of Ken Tobin. I have come to realize that most students who plan to enter the world of elementary education come in with their hearts and minds in the right place but at the same time have great trepidation of learning science especially one that involves a fair amount of mathematical framework.

Many students have admitted their fear of science and mathematics and claim it stems back to their elementary, middle, and high school experiences. It is not because they don't understand science or mathematics, but somewhere in their earlier experience their desire or motivation to question or to understand the subject matter was extinguished, perhaps either due to a poorly trained teacher in early years, or simply their interest in the wonders of nature and the universe waned. By the time they entered high school and faced teachers who were for the most part well-prepared but employed a very rigid approach to teaching science and mathematics aimed at high stakes state examinations. Any little interest left for learning science and math was completely stifled. With the new state teacher assessment programs this problem will get much worse with very little hope in sight.

So, what is left for a teacher educator to do? Bring back the human element filled with social and cultural values to the forefront of the field of science education. A mindful approach to teaching and learning, I think, will become an integral part of igniting the imagination to the wonders of the universe regardless of the students' backgrounds. To spark and motivate a lecture hall with about a hundred students, most of whom are pre-service elementary teacher applicants, is a daunting challenge. A challenge that motivates me to teach and work with students at a large and very diverse public urban higher educational institution. As a teacher educator I always wonder how well my students learn the material and their ability to use and apply that knowledge.

The challenge to experiment is rooted in my training as a physicist, I enjoy learning about and using innovative interactive classroom technologies to engage and help my students succeed. Over the past few years, I have extensively used the Student Response System (SRS) or what is commonly referred to as “clickers” in my lecture classes to promote peer interaction. Peer Instruction, by Eric Mazur (1997), professor at Harvard University describes a structured teaching practice that requires and encourages students to examine their understanding with their classmates. This teaching practice, suggests that students often seem more comfortable seeking guidance from their peers, as compared to pursuing clarification from the instructor, and therefore engage in the course at a higher level when there is the opportunity for peer instruction (Simon & Cutts, 2012).

The responses to clicker questions based on concepts and common misconceptions, allows me to gauge student understanding as well as provide immediate feedback. This keeps my lectures engaging and interactive for my students as well as myself, and provides a fun and friendly environment to engage in learning. Using well-tested questions, I find this alleviates the frustration of learning science in a large lecture hall. In addition, I use online computer simulations for after

class activities as a pre-laboratory exercises to enhance student understanding and encourage “playing” with science without fear of failure to increase the level of confidence before a real “hands-on/minds-on” laboratory experience.

As I embark on my journey to understand how mindfulness plays an integral role in teaching and learning, I take my years of training in physics or science in general and combine it with my life-long values, my faith, and my past experiences to help me understand the human element in teaching with compassion and care, only to make a little difference for the next generation. Along this journey, I hope to learn more about myself as well.

CHAPTER 3

UNDERSTANDING MINDFULNESS IN EDUCATION HEURISTIC

“Whatever you do mindfully is meditation” - Thich Nhat Hahn

Development of the Mindfulness in Education Heuristics

The research study I am about to present is primarily based on the extensive work done at The Graduate Center of the City University of New York (CUNY) led by Professor Kenneth Tobin, my mentor and advisor. This is a landscape study based on the Mindfulness in Education Heuristic (MEH) developed by Malgorzata Powietrzynska and Kenneth Tobin (2014). The impetus for the development of MEH was primarily based on a study conducted by Konstantinos Alexakos and Kenneth Tobin (2012) of pre-service and in-service teachers at a large, urban, public college in the Northeast. The methodology of the study was multi-method, sociocultural, hermeneutic phenomenology that was participatory, reflexive, and interpretive (Tobin & Ritchie, 2012). Powietrzynska was a doctoral student observer/participant at that time. The study revealed how educators or students are unaware and inattentive to their moment-to-moment emotional states that accompany their experiences (Powietrzynska, 2012).

Jonathan Turner (2002) and Randall Collins (2004) suggest the primacy of emotion in human interaction, confirm that much of what happens in social life happens without conscious awareness. We rarely are aware of our moment-to-moment emotional states as we go through our daily activities. It is our natural tendency to react to situations and circumstances, but rarely experience the flow of emotions as a constant function of time. Richard Davidson, a scholar of affective neuroscience, provides evidence that human emotions may be the most powerful

influence on our physical health (Tobin, Powietrzynska, & Alexakos, 2015). Based on earlier research conducted at an urban high school by Kenneth Tobin and Reynaldo Llena (2011), revealed teachers and students experienced high emotional states. The development of interventions, using a heuristic in particular, was necessary to assist in alleviating strong emotions (particularly negative emotions) in order to create a more optimal, high-quality, learning-promoting emotional climate (Powietrzynska, Tobin & Alexakos, 2015).

As an educator/researcher, along with my colleagues at The Graduate Center of CUNY, I argue that raising awareness through the practice of mindfulness may provide a strong and definitive tool for shaping our emotional states. One way to introduce mindfulness to my students is through the use of the MEH, which is considered a low-grade intervention, yet allows a student to reflect on his or her emotional state. I am quite uncertain as to what the responses will reveal, or the nuances they may introduce, but one thing is for certain, an awareness shall be made present. But, before I describe further about the development of the MEH by Powietrzynska and Tobin, it is important to at least set a conceptual framework to define both Mindfulness and Heuristics.

A Conceptual and Operational Definition of Mindfulness

Over the past several decades many empirical studies have examined the constructs of mindfulness, and throughout this period, it appears that the conceptual definition of mindfulness has been repeatedly revised, clarified, and modified. In contemplative science, the term mindfulness stems from Eastern introspective psychological practices dating back over 2,500 years ago by the Buddhists. The origin of this term, Mindfulness, is the English translation from the Pali language, whereby *Sati* is combined with *Sampajana* and this term is translated to mean awareness, circumspection, discernment, and retention (Shapiro, 2009). During the early introduction of the

concepts and practices of mindfulness often associated with meditation to the realm of Western science, many believed it was bound to religious practice and was esoteric, attainable only by few people. Decades of research methodology and scientific discovery have debunked these myths; mindfulness is now widely considered to be an inherent quality of human consciousness (Black, 2011).

Mindfulness is both an outcome (mindful awareness) and a process (mindful practice): (1) *Mindful awareness*: an abiding presence or awareness, a deep *knowing* that manifests as *freedom of mind* (e.g., freedom from reflexive conditioning and delusion), and (2) *Mindful practice*: the systematic practice of intentionally attending in an open, caring, and discerning way, which involves both *knowing* and *shaping* the mind (Shapiro & Carlson, 2009). Therefore, considering both aspects, one can state that mindfulness is the awareness that arises through intentionally attending in an open, accepting, and discerning way to whatever is arising in the present moment (Shapiro & Carlson, 2009).

Bhikku Bodhi, the Theravadan scholar and monk, integrates these multiple definitions of mindfulness as meaning to remember to pay attention to what is occurring in one's immediate experience with care and discernment (Wallace & Bodhi, 2006). Jon Kabat-Zinn (1994), defines mindfulness as paying attention in a particular way: on purpose, in the present moment, and non-judgmentally. This is the most well-recognized Western definition of mindfulness and is central to many studies.

Kabat-Zinn's introduction of Mindfulness-Based Stress Reduction (MBSR) to help in the management of chronic pain (Kabat-Zinn, 1982), is now considered and is widely used to reduce psychological morbidity associated with chronic illness and to treat emotional and behavioral

disorders (Kabat-Zinn, & Chapman-Waldrop, 1988). Immediately following this work, similar conceptual definitions followed. These definitions included; an open and receptive attention to and awareness of what is occurring in the present moment (Brown, & Ryan, 2003); an awareness that arises through intentionally attending an open, accepting, and discerning way to whatever is arising in the present moment (Shapiro, & Carlson, 2009); an attention that is receptive to the whole field of awareness and remains in an open state so that it can be directed to currently experienced sensations, thoughts, emotions, and memories (Jha, Krompinger, & Baime, 2007); and lastly, waking up from a life lived on automatic pilot and based in habitual responding (Siegel, 2007).

Regardless of the finer details of each definition, they all share a common theme, which is a general receptivity and full engagement with the present moment. To capture the definition of mindfulness further, it is important to contrast with experiences of mindlessness that occur when attention and awareness capacities are scattered due to preoccupation with past memories or future plans and worries; this, in turn, leading to a limited awareness and attention to experiences in the present moment (Black, 2011).

A Brief History and Definition of Heuristics

According to the Merriam-Webster dictionary, heuristic, as an adjective is defined: involving or serving as an aid to learning, discovery, or problem-solving by experimental and especially trial-and-error methods. The term heuristic originates from the Ancient Greek verb *heuriskein*, which simply translates ‘to find out’ or ‘to discover.’ Heuristics are commonly referred to as ‘rule of thumb’ or as ‘mental shortcuts.’ The primary function of a heuristic is to reduce the complexity of a problem by ignoring parts of the available information or searching only a subset of all possible

solutions. However, even though heuristics have been considered as necessary and efficient tools, they were unfortunately considered to produce only second-best solutions. More recent psychological research has shown that – under conditions that are rather common in the real world, namely that of limited knowledge and uncertainty – heuristics can in fact outperform more complex strategies (Hertwig & Pachur, 2015). Case in point as we will later, the development of MEH, was based on earlier work by Wolff-Michael Roth and Kenneth Tobin (2002), where a heuristic was used to heighten awareness in social/humanistic situations. It was an agent of change if and when a contradiction arises for a person’s relationship with each characteristic of the heuristic.

Heuristic methods have been considered in various scientific disciplines. However, the operational definition of heuristics varies across the fields. In the field of artificial intelligence (AI), operational methods, mathematics, and including philosophy, heuristics are used as a prescriptive procedure towards a reasonable solution under given constraints not easily solvable by an algorithm and with limited time. By contrast, in the field of biology and psychology, heuristics are used as descriptive models, models that describe how people and other animals sample information from the external and internal (memory) world, and how decisions are made based on the information available to them (Hurtwig & Pachur, 2015).

It is important to note here, that a heuristic is quite different from an algorithm. An algorithm provides a clear step-by-step set of instructions to reach a solution. Algorithms are great to solve well-defined problems in mathematics and physics. However, there are far more problems in the world, in particular in the social construct (social science) that are rather ill-defined for which there are no algorithms to aid in the solution. Here, a heuristic is flexible and context dependent. A heuristic allows the participant to reflect their personal practice to the characteristic

included in the heuristic, and serves as a shape shifter and changes the way a person enacts social life. Each characteristic raises an awareness of a particular feature of mindfulness, allowing the participant to determine the extent the characteristic is relevant to their ontology.

The Hermeneutics Phenomenology of Mindfulness in Education

In a fast-paced globalized world driven by an overflow of information to easily distract our own sense of existence or being, we all need a focus, an internal focus, on the self. Even sadder, is the state of education reform driven by standardized testing and accountability, which takes an emotional toll not only on the students, but educators as well. A society entirely driven by numbers without regards to the well-being of the person. We are a nation in crisis faced with an ever-increasing incidence where mental illness seems to take center stage.

We find young grade school children suffering with stress and anxiety to live up to the expectations of their parents, teachers, and their peers as well. Curriculum reform is important to the quality of education in our country and to society at large, however, the current method of non-stop standardized testing is a detriment to our students and our children. We, as educators, face great challenges ahead as we try to figure out methods to help mediate a balance to help our students succeed and at the same time manage their emotional well-being. Mindfulness is our mediator and the antidote for the well-being of the generation of tomorrow.

The development of MEH is centered on reflexivity, that is, to become aware of the unaware (Bourdieu & Wacquant, 1992). The authors, Powietrzynska and Tobin, theorized that once the research participants became aware of the different characteristics in a heuristic, they would witness evidence of awareness about mindfulness in their language and practices. The authors also believed that encouraging greater mindfulness among teachers and students would

assist them in regulating emotions that accompany teaching and learning. The feedback presented to the authors by the respondents commented that the heuristic made them think and internalize their feelings; made them stop and think more and to be more reflective than they usually were; made them think of things they never thought about; made them think about themselves. It was clearly evident, that the heuristic successfully mediated reflexivity and served as an enhancer of self-awareness.

There is a strong historical foundation to the development of the heuristics used in an educational setting. Tobin, with his close collaboration with Wolff-Michael Roth, developed and used heuristics as pedagogical tools with pre-service teachers in the Teacher Education Program at the University of Pennsylvania and with inner city school students in Philadelphia. *Heuristics for Productive Coteaching* and *Heuristics for Productive Cogenerative Dialogue*, are examples of heuristics developed a decade prior to the development of the MEH. The heuristic characteristics served as a means to capture practices that occurred during effective coteaching and could be used for planning and enacting such practices (Roth & Tobin, 2002).

Based on Tobin's earlier work, Powietrzynska theorized the construct of the heuristic for mindfulness. To make the heuristic meaningful, their approach to developing the heuristic was collaborative, polysemic (involving multiple-meanings), and polyphonic (multiple-voiced) (Powietrzynska, 2015). Based on student responses, the heuristic underwent several iterations. The third and final iteration is the focus of my study.

The third iteration of the heuristic – Mindfulness in Education was administered to students in my Conceptual Physics classroom composed primarily of pre-service elementary education teachers at a large and diverse public urban education institution in the Northeast. As I mentioned

earlier, this is a landscape study to see how my students respond to the 31 characteristics in the heuristic. My intention is to study the responses and seek out nuances of self-awareness and any contradictions the responses may reveal. This is my axiological stance based on what I have learned from my mentor and advisor for this dissertation work that values difference and complexity as resources for learning (Tobin, 2010).

In the next chapter, I present an analysis of the thirty-one characteristics in the MEH. Each characteristic begins with the data presented in graphical form using descriptive statistical analysis. Frequency of responses is presented on the data tables numerically as well as percentage of the total participants. The graphical charts are based on the responses to the 5-point Likert Scale. I define each characteristic followed by an analysis based on selected open-ended responses pertaining to each characteristic. The analysis seeks to understand the nuances in the difference and coherence in the data.

CHAPTER 4

THE STATISTICAL OVERVIEW AND A BRIEF ANALYSIS OF THE MINDFULNESS IN EDUCATION HEURISTIC (MEH) DATA

Presentation of MEH Data

In this chapter I share the analysis of the data obtained from the landscape study of the implementation of the Mindfulness in Education Heuristic (MEH) conducted in a Conceptual Physics class at an urban college during the Fall 2012 semester. All thirty-one characteristics of the MEH are presented, beginning with a graphical representation of the responses based on a five-point Likert Scale. Each graph displays the response frequency along with the percentage. Following each graph, I describe what each characteristic means, and provide the basic statistical analysis of the Likert scale responses, which includes the mean, mode, and standard deviation. I share a few selected open-ended responses for each characteristic based on the central tendencies and shed insight to the nuances based on the outliers (interpretation of the standard deviation).

In addition, where possible, I look at the implications for practice in the classroom as a science teacher educator, based on the qualitative interpretation of the responses. Please note, open-ended responses were optional, and I have selected and grouped a few that represent different stances. For each characteristic, I share my concluding thoughts and reflections of the practice of mindfulness.

In the next chapter I share student reflections and other thoughts regarding the heuristic and look and reflect on the final open-ended question on the MEH on the spiritual nature of the

individual. I also share my personal thoughts and results of the MEH from the perspective of an educator.

General Statistical Overview

Table 4.1: Mean, Mode, and Std. Deviation

Characteristic	Mean	Mode	Std. deviation
1. I am curious about my feelings as they rise and fall.	3.2	3	1.0
2. I find words to describe the feelings I experience.	3.3	4	1.2
3. I identify distracting thoughts but let them go.	3.1	3	1.1
4. I am not hard on myself when I am unsuccessful.	2.6	2	1.1
5. I recover quickly when I am unsuccessful.	3.4	3 ^a	1.0
6. I pay attention to my moment-to-moment sensory	3.1	4	1.2
7. I am aware of the relationship between my emotions	2.4	1 ^a	1.3
8. I am aware of changes in my emotions and pulse rate.	2.3	1	1.2
9. I maintain a positive outlook.	4.1	4	0.8
10. I can tell when something is bothering the teacher.	3.1	4	1.2
11. I can tell when something is bothering other students.	2.9	3	1.2
12. The way in which I express my emotions depends on	3.3	4	1.1
13. The way in which I express my emotions depends on	2.3	2	1.1
14. I can focus my attention on learning.	4.2	4	0.8
15. I feel compassion for myself when I am unsuccessful.	2.8	3	1.0
16. I feel compassion for others when they are	3.0	3	1.2
17. When I produce strong emotions, I easily let them go.	3.1	3	1.0
18. I gauge my emotions from changes in my body	2.0	1 ^a	0.9
19. I am aware of others' emotions from characteristics of	3.5	4	1.0
20. I am aware of my emotions being expressed in my	3.2	3	1.2
21. I recognize others' emotions by looking at their faces.	3.3	3	1.2
22. I am aware of my emotions as they are reflected in my	3.2	3	1.2
23. My emotions are evident from the way I position and	3.0	3	1.2
24. The way I position and move my body changes my	2.5	2	1.1
25. I can tell others' emotions from the way they position	2.5	3	1.1
26. I am aware of emotional climate and my role in it.	2.5	2	1.2
27. Seeking attention from others is not important to me.	3.7	5	1.5
28. Classroom interactions are characterized by winners	1.5	1	0.8
29. I meditate to manage my emotions.	1.9	1	1.1
30. I use breathing to manage my pulse rate.	1.7	1	1.0
31. I use breathing to manage my emotions.	2.0	1	1.1

* a. Multiple modes exist. The smallest value is shown

A Brief Analysis of each Characteristic.

Characteristic 1. I am curious about my feelings as they rise and fall.

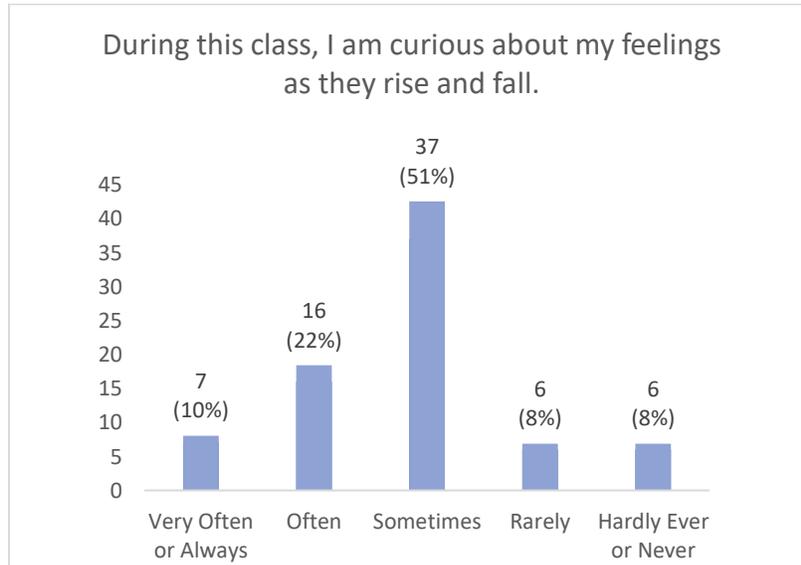


Figure 4.1 - I am curious about my feeling as they rise and fall

Are we aware of the changes in our feelings as we experience them? This characteristic seeks to identify changes in the feelings experienced by the student during the lecture. According to Richard Davidson's Emotional Style, this is Self-awareness, which reflects how well one perceives bodily feeling that reflect emotions. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.2, the Mode is 3, with a Standard Deviation of 1.0.

It appears that more than 30% seem to think that they are often or very often aware of their feelings as it rises and falls. My interpretation is that at least 50% aren't truly aware of their feelings. And more than 15% seem to be rarely or are never aware of how they are feeling. As a teacher educator, we want our students to enjoy our subject matter and if we can make it applicable to everyday lived experiences, we call that a success. The following three student responses (based

on those that selected “very often or always”) allows me to reflect on my practice of raising strong feelings during any given lecture:

I'd like to know more about how physics works in our everyday life. My interest toward physics has much increased during this class because of the professor. He's motivated us and made us curious about physics by explaining lot of aspects that we use everyday life.

I love this class especially with Professor Gangji. He allows us to question ourselves about the world around us and why certain things work the way they do. He makes class so interesting!

Sometimes I feel confused and may get frustrated. Sometimes I understand the material and I'm more interested, excited, and focused.

It is difficult to share responses that are more focused towards myself, but I think it is necessary to see if I am successful in modeling behavior as a science teacher educator. Will the future elementary teachers model their practice to help children learn? Ironically at the extreme end (those that selected “hardly ever or never”), the following two responses seem quite contradictory:

I always have good feelings in this class

Physics does not elicit much emotion in me. I do not find the material particularly challenging therefore I do not experience frustration. Nor do I find it bringing me to a state of euphoria. As my feeling do not rise and fall in the class. I do not contemplate my feelings and there is nothing to be curious about. I am also not thinking about the feelings I experienced over the course of the day because I am focusing on what is being taught.

The second response seems to be from a student just focused on learning the material through rote methods for the sake of attaining a good grade only. With an experience of almost three decades teaching physics and astronomy as a college professor and high school Advanced Placement (AP) physics teacher, this behavior is quite common with a fair percentage of students only driven by numbers and final grades. The joy of learning for the sake of learning seems to be secondary or

minor for the most part. It is difficult to change people with that view who are driven by an achievement based educational system and a society that feeds and rewards only the high achievers.

When we consider how we teach and how students learn, it is important for us as educators to express our feelings in order to touch others equally. If we are successful in achieving that 50% of the time, I think we can consider we have touched our students in some form. This response from a student is what we as educators should expect of the challenges in learning science:

Well, I do know why my feelings rise and fall during class (because I comprehend something or I don't understand it) so I'm not curious about it but I am aware of the changes my emotions go through during class.

It is clear from the response above, of the low emotions when students can't comprehend the material presented. In all the responses above, though the students seem to have an awareness of how they feel, I think the characteristic has raised their curiosity as to why their feelings raise and fall. As educators, we should be mindful of the feelings of our students in order to validate their learning. Observations of facial expressions or just clarifying questions from students, allows me to gauge their feelings at that instant moment. I consider this to be an important element of being an educator.

Characteristic 2. I find words to describe the feelings I experience.

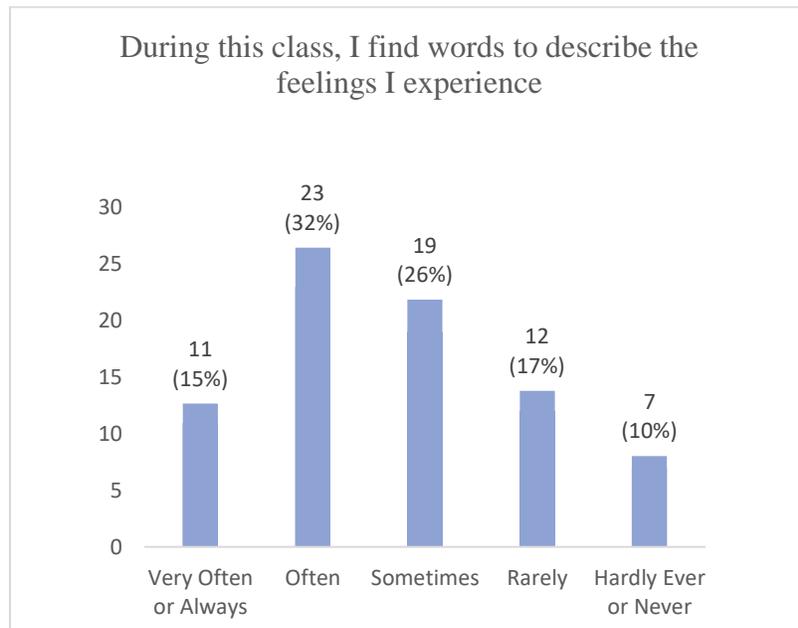


Figure 4.2 - I find words to describe the feelings I experience

Can one find words to describe their feelings? This characteristic describes the ability to express in language or written form of the feelings experienced by the student during the lecture. The intent is to make one express their feelings clearly. According to Davidson’s Emotional Style, this characteristic is based on Self-awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.3, the Mode is 4, with a Standard Deviation of 1.2.

Almost 50% of the students seem to be able to express and describe their feelings. The ability to articulate and internalize one’s feelings, be it pleasant or unpleasant, is a mindful process of self-awareness (Davidson & Begley, 2012). As an educator our feelings seem to always be on a roller coaster ride. As a science educator, the thrill of setting up demonstrations and hoping they work well, and then when they do, the feeling of success is gratifying. But at the same time, I also enjoy the feeling of failure when things go wrong. The joy of trying to figure out why is equally

gratifying as well. I wonder, is this due to the nature of the training in science and the joy of discovery?

The ability to recognize how we feel, enables us to reach our students. A strong relatable feeling for a given topic due to personal experiences allows us to convey and share this knowledge with greater passion. While teaching the concepts of momentum and impulse in order to study the nature of collisions, I discuss and share video clips about driving while intoxicated or just distracted driving, and its consequence. Conveying this message with very strong feelings seems to resonate with the students. The two following responses expresses how they felt during the lecture.

In this class our professor started many topics with an emotional impact and it was very simple for me to find the right words to describe exactly how each video clip or story told made me feel.

Every class I learn something different from what I was taught in earlier grades. I am amazed and shocked how things function in the universe and how we don't really notice these small things.

It is also very important to understand the anticipated feeling that students experience in every lesson and how they may connect it to their daily lived experiences. These small experiential changes provide them with a different view to seeing the world around them. The following two responses share this notion:

Every time. The feelings I experience in this class always makes me want to learn more. I am always excited for the next class to see what we will be learning and the experiments that will be done.

When the professor does certain experiment, I get excited and curious to see what will happen next. I laugh a lot and I am surprised at a lot of the results that take place.

No matter how basic a demonstration may appear to the educator, the ability to cultivate an awareness and having them observe and pay attention to what is occurring in the present, makes teaching that much more meaningful. All four responses above, indicates how well this characteristic has brought an awareness, enabling students to express and articulate their feelings clearly.

Characteristic 3. I identify distracting thoughts but let them go (without them influencing future action)

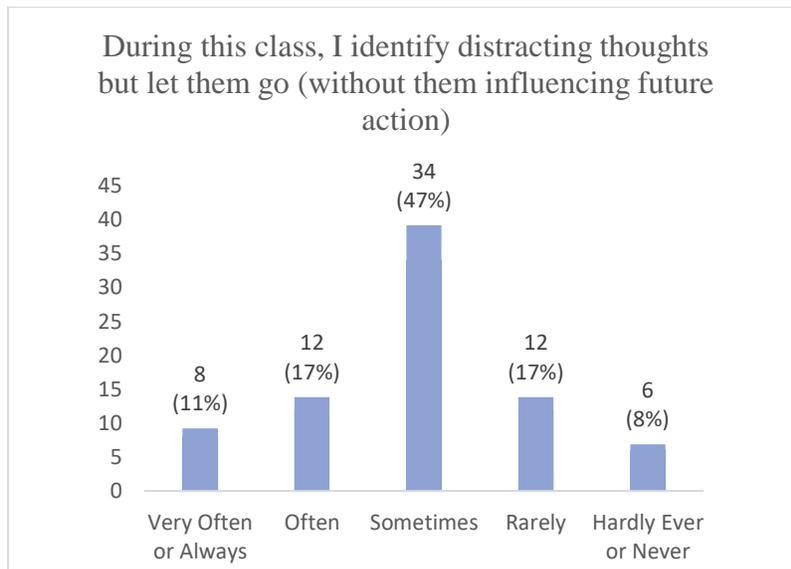


Figure 4.3 – I identify distracting thoughts but let the go (without them influencing future actions)

How mindful are we in identifying distracting thoughts and controlling them? This characteristic describes one’s ability to be cognizant of distracting thoughts as they appear in the moment and the ability to switch them off willingly without influencing any future actions. According to Davidson’s Emotional Style, this is Resilience, which reflects how slowly or quickly one recovers from adversity. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.1, the Mode is 3, with a Standard Deviation of 1.1.

Approximately 25% of the respondents seem to find it difficult to identify and let go of the distracting thoughts, teaching and learning becomes very challenging. Mind wandering is considered a normal human tendency. A large lecture hall does not provide an environment that may be considered focus friendly. In lectures that are almost two hours long, all sort of distractions occurs beyond the normal mind wandering including the minor talking amongst students, the sounds of squeaky furniture, cell phones, and laptops used to stay connected to social media rather than following lecture notes. This characteristic brings an awareness of the interaction between the body and the mind. If students can identify the distracting thought, an awareness becomes present. This is mindfulness. If one parts from the distracting thoughts, one is able to maintain concentration. We can see the awareness of the distractions in the responses below, but none show a clear awareness of letting that distraction go. Each response shows a disconnect between the mind and body. This, according to the teaching of Venerable Pramote Pamojjo, is mindlessness.

I might get a text message but I ignore that because I know it's important not to get distracted. Also, there are kids in class who are playing games or checking their email and that can be distracting.

Class is about two hours long and with lab it is about 4 hours. There are times I get distracted by friends and just random thought but I would try to resist it and focus to class.

It is unfortunate, but I am easily distracted in class and that can get the best of me and really pull my attention away from the lecture.

Just having students think about this characteristic, raises an awareness of the strength in letting go of these distracting thoughts without influencing future actions.

The use of an external mechanism, or a mechanical tool to help students focus is effective, as are Classroom Response Systems (CRS), or commonly referred to as “clickers”. I try my best

to pause a question every 7 to 10-minutes in a 100-minute lecture to help maintain student attention. The clicker questions are designed to allow students to interact with one another in order to select their responses that are mostly based on multiple choice responses or ranking task questions. These brief classroom student discussions I find very useful to keep students engaged in the present moment. This in-turn, helps maintain focus even for those who always seem to be distracted. But it is important to note, the use of this mechanical device to maintain focus is intermittent.

Characteristic 4. I am not hard on myself when I am unsuccessful.

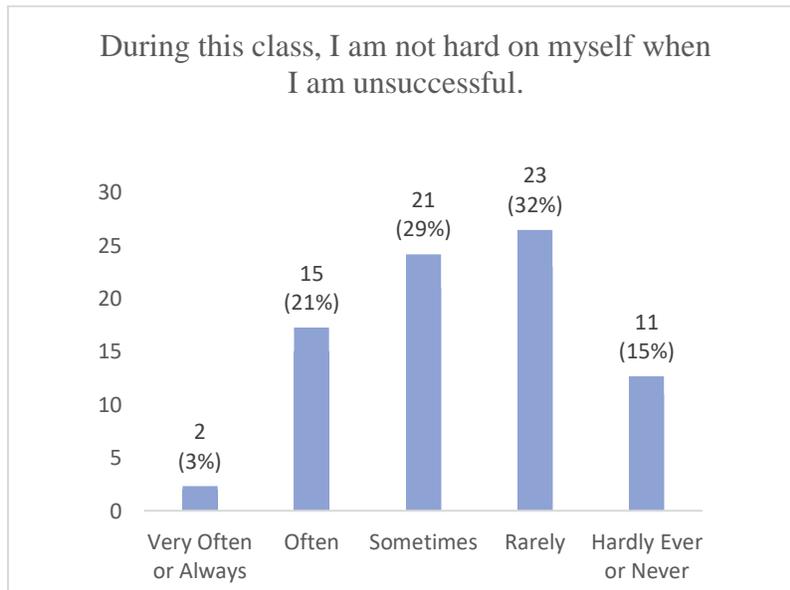


Figure 4.4 - I am not hard on myself when I am unsuccessful.

This characteristic is meant to identify the nature of perseverance or grit of an individual. The ability of oneself to understand the nature of failure and its power to help strive harder to achieve any long-term goal. According to Davidson’s Emotional Style, this is Resilience. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.6, and the Mode is 2, with a Standard Deviation of 1.1.

Considering the responses of the students, it seems that many students (nearly 50%) tend to take failure rather harshly and tend to blame themselves for not succeeding. The following responses clearly reflect this emotion:

I get very upset at myself when I'm doing bad. Right after first exam, I went to my car and cried because I felt like "oh I studied so hard yet I don't know anything!"

I always feel very shameful or embarrassed when I'm being unsuccessful in a class. I always want to be successful but I know sometimes you can't.

Usually when I am unsuccessful, I'm quite hard on myself. It's frustrating when you fail at something that you enjoy so much, especially when you think you understand it.

I become easily upset when I am unsuccessful. I try to work very hard, and when I am unable to achieve the grades I am working for, I find it very disappointing, and there is nobody other than myself to blame.

The feeling of shame, disappointment, regret, frustration, blame, anger and being upset at oneself tend to naturally shadow failure. These feelings are what we experience naturally and is what the mind sees and feels. The characteristic raises the awareness of not being hard on oneself, to except the good and bad, and learn to let these thoughts and feelings go. If we can provide our students the value of perseverance and reassure them that being unsuccessful is just part of the learning and growing process. To provide a sense of encouragement and support in dire times to help another being is compassion at its finest sense.

I wasn't hard on myself when I was unsuccessful because my professor made it feel that way. He made us feel like it was okay to be incorrect sometimes.

My professor always tries to instill in me a sense of self-esteem. I don't get a clicker question right I don't beat myself up over it because I know is a way of me learning how to approach the problem next time.

The above responses indicate a sense of being mindful, to not obsess over failure, in order to progress.

Years of teaching high school students has taught me the value of being open to failure when my students don't succeed at a given task. Taking different approaches and reinforcing the concepts allows students to learn and understand the material better. This self-reflection has allowed me to instill the same attitude into my students and accept failure as a challenge to do better.

Characteristic 5. I recover quickly when I am unsuccessful.

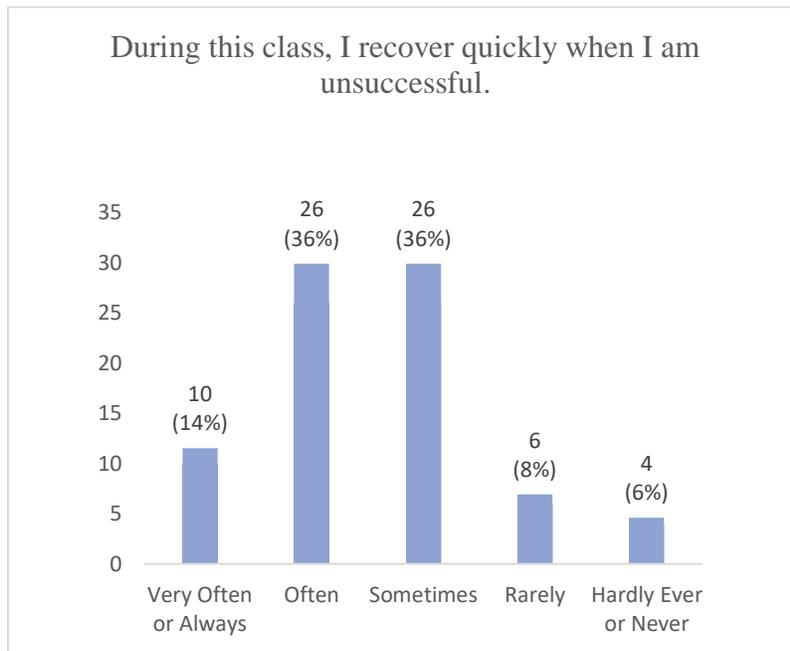


Figure 4.5 - I recover quickly when I am unsuccessful

How does one gather oneself from being unsuccessful? Following from the previous characteristic, where grit and perseverance were essential traits from not being hard on oneself, we find in this characteristic, the value of resilience to be central to recovering quickly from failure. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.4, and the Mode is 3, with a Standard Deviation of 1.0.

If we can reassure our students that they will succeed due to diligent habits and if they took time to understand and not just try to remember or memorize information, they can recover from any challenges they may encounter.

My grade is just a number and it's my understanding that counts.

According to Davidson's Emotional Style, Resilience is how quickly or slowly one recovers from adversity. The ability to reflect on failed tasks and seek to understand why they failed, making certain not to ponder excessively, enables one to map out new paths and possibilities. This is important and essential to emotional wellness.

I take that challenge and use it to succeed in future exams, so I consider that unsuccessful moment as my strength to do good in following tests.

I don't take giving-up as an option when it comes to my grades. If I fail once, I try and try again—until I make it.

If I do bad on an exam, I study harder and change my studying methods for the next one. I am motivated when I get my scores back and I do try harder.

Having a positive outlook in adversity certainly raises different levels of emotional resilience.

Providing a safe environment to learn without a fear of failure is important to allow a student to learn and master topics that may have been perceived to be difficult.

This is due to the professor's gentle nature. He makes me feel comfortable with the work I put in, as long as I try my best.

Again, because my professor always helps when we may have questions or just need clarification. Is very easy to get the next question right.

I don't necessarily recover quickly, however the professor is very understanding when we don't do as well and always helps us with any issues we may be having.

All the responses above, the characteristic raises an awareness of being unsuccessful, but recovery seems to lie in changing one's mental perception. Being mindful of compassion and kindness for others reassures them that our role as educators is far greater than just disseminating information that we have mastered.

Characteristic 6. I pay attention to my moment-to-moment sensory experiences.

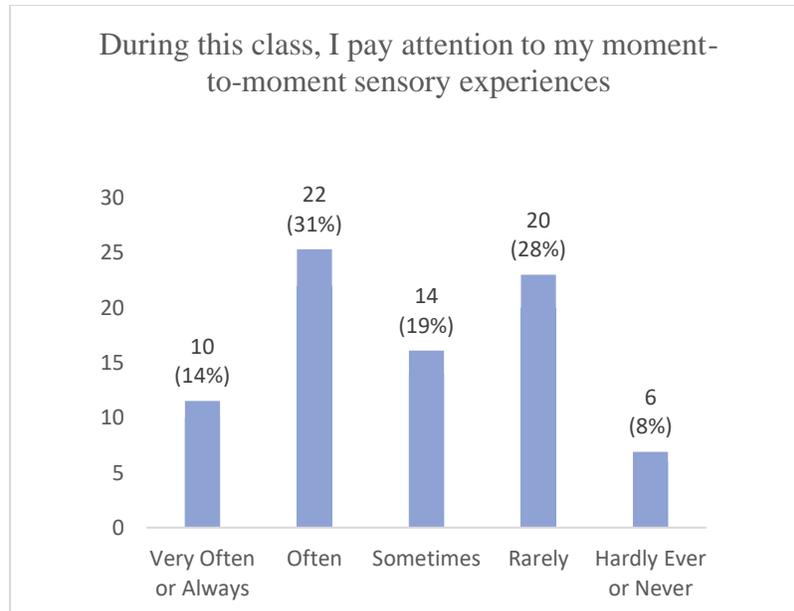


Figure 4.6 - I pay attention to my moment-to-moment sensory experiences

How often are we aware of the moment-to-moment sensory experiences? This characteristic allows one to reflect on the awareness of the physical sensory experiences. Are we constantly attuned to our five basic senses; that of sight, sound, smell, touch, and taste at all times? Davidson describes Emotional Style as Self-awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.1, and the Mode is 4, with a Standard Deviation of 1.2.

Demonstrations, PowerPoint presentations, video clips, and short group activities enabling students to interact with one-another provide a varied dimension of sensory experience. This is essential to understand the nature of science. It is a great challenge to provide constant engagement,

but if we stay animated while lecturing and provide multi-sensory activities, including having students participate during demonstrations, and showing computer simulations of a given phenomenon in our presentations, helps students to maintain focus and stay in the moment.

This professor does demonstrations in class that keep my attention and his humor also keeps my attention.

In addition, we also do short activities that requires us to use our five senses. For example, touching the table and metal to figure out which has a colder temperature.

I pay attention to my moment to moment sensory experiences because I am looking at the PowerPoint presentation.

Though a fair percentage, about a third, responded they weren't aware of any moment-to-moment sensory experiences. They could not recognize that listening and observing attentively is a sensory experience. The act of paying attention and being focused is being in the moment.

I always just try to listen to the lecture because they do help me grasp the information better.

I rarely pay attention to my moment to moment sensory experience.

Unless I'm doing it unconsciously, I'm pretty confident I'm not aware of my sensory experiences in class. Unless of course, for example, someone in my aisle gets out of his/her seat to leave the room, for which I would have to push my seat up to make room for the person to leave, and other such experiences count.

In all the above responses, the characteristic seems to have brought an awareness to their moment-to-moment sensory experiences. Even those who are unaware, may find themselves thinking about it. The nature of the unconscious mind, makes it very difficult for someone to be aware of the unaware. Many of our sensory experiences tend to be on auto-pilot when we are engaged in learning something new or different. In an attempt to focus on thinking, we don't even realize we

are listening or better yet, hearing carefully. This is the essence of mindfulness, to be present in each and every experience in the moment.

Characteristic 7. I am aware of the relationship between my emotions and breathing pattern.

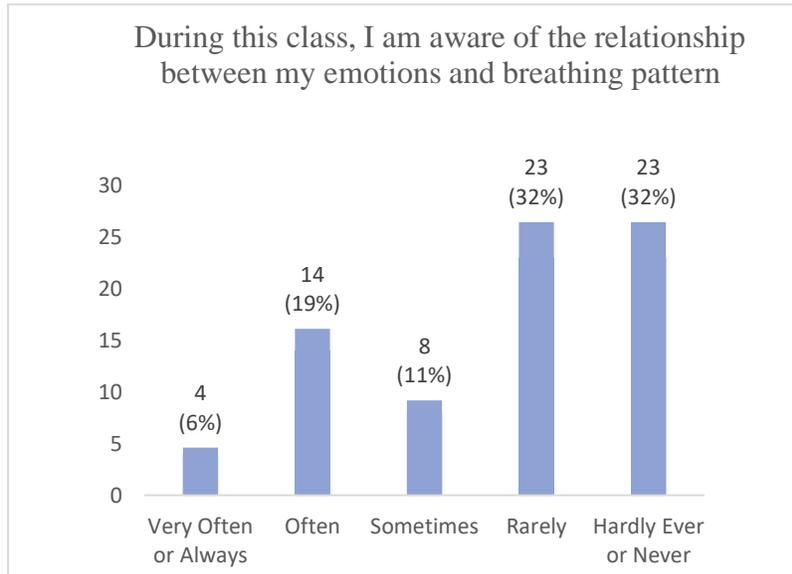


Figure 4.7 - I am aware of the relationship between my emotions and breathing pattern

Are my emotions controlling how I breathe? This characteristic enables one to recognize how breathing patterns vary with our emotions. According to Davidson's Emotional Style, this is Self-awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.4, and the Mode is 1, with a Standard Deviation of 1.3.

More than 60% of the students seem to be unaware of the relationship between their emotions and breathing patterns. We tend to easily recognize our emotions but seldom do we notice how our breathing pattern changes with each emotional experience.

It never appeared to me that we have different breathing patterns as our emotions change therefore, I haven't ever been aware of this change.

I do not usually pay attention to my breathing pattern.

I rarely think about my breathing pattern in class. That is something I could start thinking about.

Both of the responses above have realized the relationship between their breathing pattern and how they are feeling. The characteristic has heightened their awareness. This relationship between emotions and breathing is more noticeable when one experiences high level of anxiety or a very touching experience.

I'm aware of my breathing pattern when I'm nervous especially during test time. I feel very anxious and this increases my breathing pattern. Until, I settle in during the test I begin to feel fine.

I tend to breathe in deeper when I'm getting frustrated.

I think the only time this was applicable was when we watched the videos on drunk driving and on the tsunamis. Otherwise I never notice this relationship.

I notice that the more upset or angry I am the more tense my body gets and the faster and heavier my breathing gets. In class, I am mostly calm and focused so my breathing is always normal.

I never pay much attention to it during class time but, I do notice it during or before an exam. I notice that my breathing depends on my anxiety levels.

Even though the majority seem to express that they are unaware of their breathing patterns in the classroom, few reflections, about 25%, seem to recognize there is a noticeable relationship, but only during heightened levels of emotion. The reflections above indicate an awareness of paying attention to one's breathing patterns. The characteristic has raised a level of consciousness to help students become more mindful of their breathing patterns as their emotions rise and fall.

The practice of mindful breathing before each lecture, will not only help students relax and improve focus, but will bring and awareness of the benefits of breathing meditation.

Characteristic 8. I am aware of changes in my emotions and pulse rate.

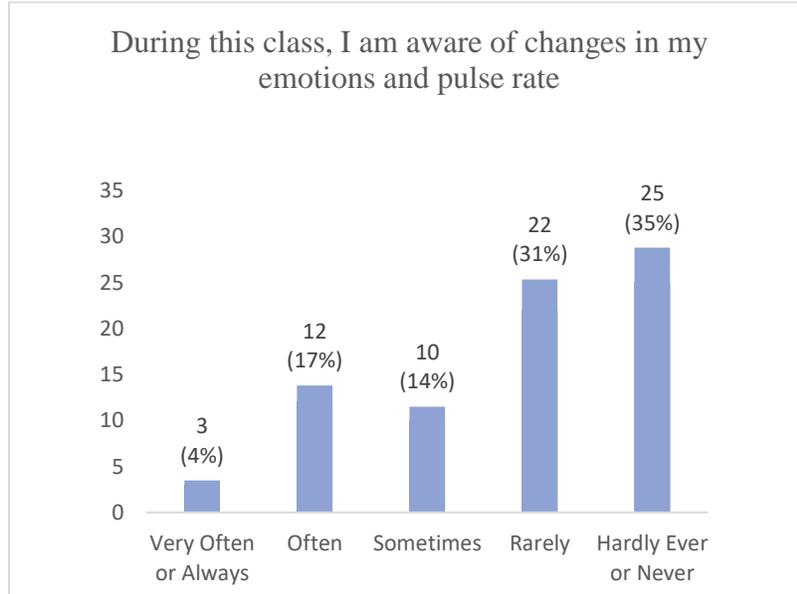


Figure 4.8 - I am aware of changes in my emotions and pulse rate

Are we aware of the changes in our pulse rate as we experience something? This characteristic is designed to recognize the relationship between emotions and pulse rate. According to Davidson's Emotional Style, this is Self-awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.3, and the Mode is 1, with a Standard Deviation of 1.2.

As difficult as it was for the students to recognize the previous relationship between emotions and breathing, this relationship between emotions and pulse rate provides even a greater challenge. Once again, more than 65% of the students seem to be unaware of the relationship between emotion and the pulse rate.

I have not experienced some drastic change in my emotions. However, if I did, then I still would not know my pulse rate. I would not sit and count what my pulse rate is.

I don't think I ever realized pulse rate difference.

When my emotions are changing, I don't really pay attention to my pulse rate. I really never felt my pulse when I am happy or sad or mad. My emotions don't last for very long they are constantly changing in the class.

Not a single response indicated an awareness of the relationship between emotions and pulse rate.

This does not indicate the failure of the characteristic, rather it allowed students to understand the variations in pulse rate as a direct function of their emotions. As we know from the Brooklyn College study (Ritchie & Tobin, 2018), pulse oximeters were used to monitor the heart rate of the participants. Most students as indicated by their responses above, are not aware how their pulse rates vary as they experience different emotions.

Characteristic 9. I maintain a positive outlook.

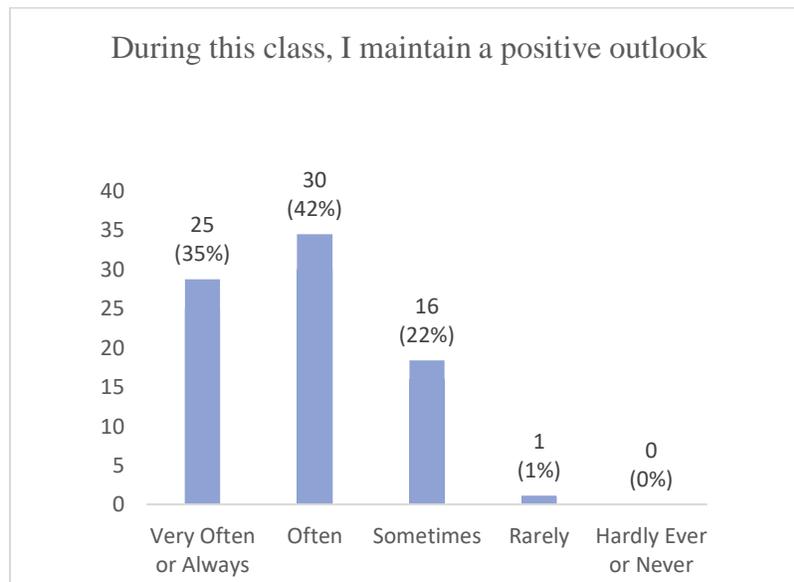


Figure 4.9 - I maintain a positive outlook

Do I consciously try to be optimistic and cheerful? This characteristic is designed for an individual to focus on all that is good in oneself, in one's life, and in others. A positive outlook or positive thinking is a mental attitude which enables one to be optimistic, happier and resilient. According to Davidson's Emotional Style, this is Outlook which reflects how long one is able to sustain

positive emotions. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 4.1, and the Mode is 4, with a Standard Deviation of 0.8.

Providing an atmosphere for students to be successful and eliminating the notion of failure by providing multiple means to learn a given topic, provides a positive outlook for students to succeed. This is a means of encouraging the value of learning to be far greater than the numbers earned on any examination. To learn from mistakes is a valuable lesson.

I always thought since the beginning that I could do well in the class. Even when I got a grade that I did not like I stayed positive.

I always maintained a positive outlook even if I did bad on a specific assignment because I knew that there would be a way to boost up my grade by doing something else.

This is a complete reflection of my professor who always maintains a tranquil, happy, positive aura within the classroom.

I tried to stay positive because I knew that help was readily available if and when I needed it.

I try to remember that I'm here to learn, and the class is not all about test grades. Once I let my stress go, I can focus better.

A safe and caring environment provides hope and encourages one to enjoying learning. Reassuring students to focus on everything positive and eliminating the fear of failure changes the mindset and helps student focus better.

Even though it is a tough class, I tend not to get myself down because the professor ensures us that we will all be okay.

The professor is very positive and tries to encourage us to follow his example. so I try to be as positive and upbuilding as he is when I am feeling down.

Sadly, no matter how much we may try to reassure students that our purpose as educators is to help and provide support and guidance to ensure success, their prior experiences learning science

during their secondary education years was only focused on passing standardized state examinations. This broken-confidence prevents one to have a positive outlook as expressed in the following responses:

Sometimes it's hard to stay positive when learning about something that you just know you're going to have a hard time grasping.

It can be difficult to maintain a positive outlook when you know how important passing a class can be. Especially, if you aren't doing as good as what you hope for.

It has not been easy. Up until recently, I believe my attitude was negative, and quite disheartened. Now, I am trying my best to remain positive and give the final exam and lecture my up most attention.

Even though the three responses above represents a negative perspective contrary to the characteristic, an awareness of hope appears present. Realistic self-expectations may provide some help to change a negative mindset. If one realizes that they have tried their best, and have a sense of self reflection, that, in itself, is a positive attitude and is mindful of one's emotional well-being.

Characteristic 10. I can tell when something is bothering the teacher.

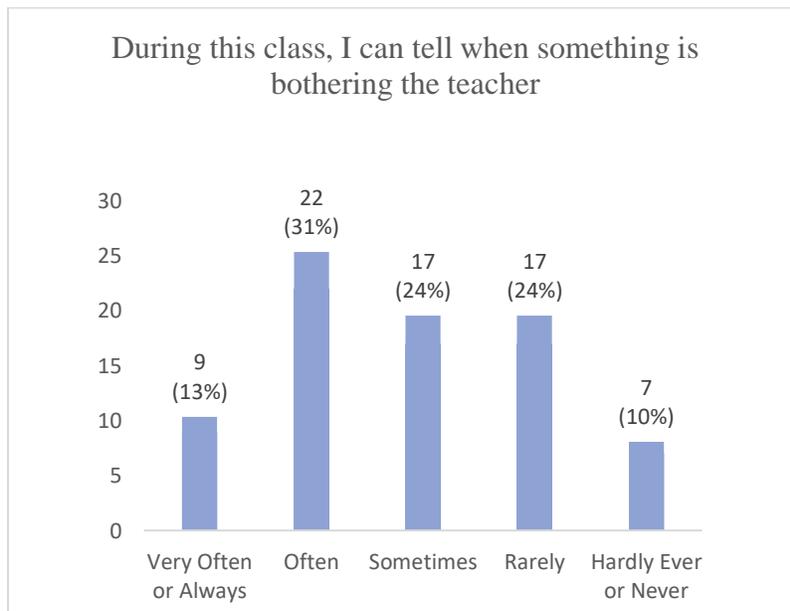


Figure 4.10 - I can tell when something is bothering the teacher

Does the tone of voice or the facial expressions of teacher reveal how they feel? The purpose of this characteristic is to see how sensitive the students are to the emotions and feelings of the teacher/instructor. Its purpose is to see if students can empathize with the teacher. According to Davidson's Emotional Style, this is Social intuition which reflects on one's ability of picking up social signals from people around them. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.1, and the Mode is 4, with a Standard Deviation of 1.2.

As educators we often wonder if students tend to feel or sense our emotions. Many years ago, as a young high school teacher, I was told by my mentor and other veteran teachers, do not smile nor show any emotions until the holidays. That advice always bothered me, and still does. Teaching is a social interaction and requires the human element of compassion and care. We are actors on a tiny stage where every gesture, every facial expression, every chosen word, conveys our thoughts with conviction. Students should understand the role of a teacher is to share the knowledge they so passionately enjoy hoping to make them enjoy learning it as well.

The reflections shared in this characteristic allows me to see myself through the eyes and emotions of my students. Based on the responses below, this characteristic enabled the students to reflect on various moments to recognize the feelings of their teacher.

when students are not paying attention or when they talking among each other I do realize that it bothers the professor.

I can notice when he is a bit annoyed with the class or how we're acting. I can also note when he's disappointed in our clicker question results.

He hardly ever gets upset but even when he does, he's so nice about it. However, he does make it evident, usually in his facial expressions more than his words, when he is upset.

The professor is good at hiding his negative emotions, however there are times where students will bring them out, and he says something to the class; as well he should. Some students can be rude and it's not fair to the professor.

He explicitly tells us when he is bothered by things on the rare occasions that he is bothered.

As a teacher educator, I feel it is important for our students to understand how we are feeling as we teach. The characteristic further reveals a sense of self-reflection for the students to understand the importance of being honest and upfront about their feelings when they teach one day.

Characteristic 11. I can tell when something is bothering other students.

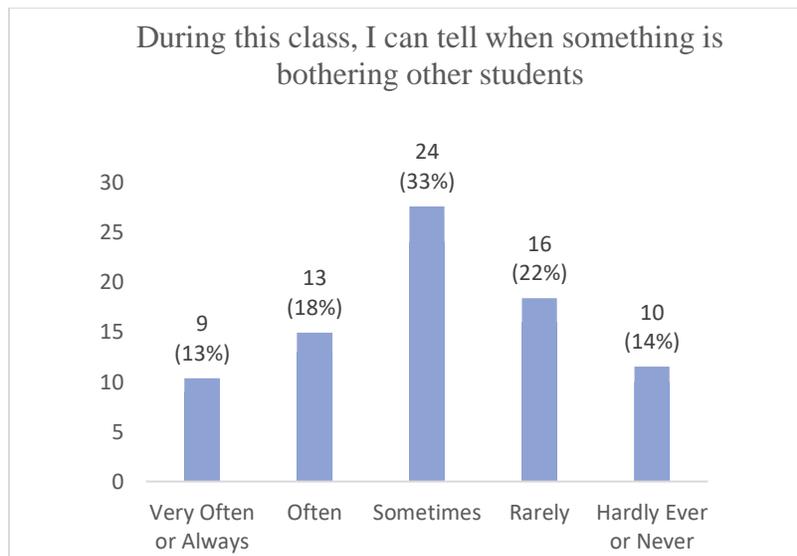


Figure 4.11 - I can tell when something is bothering other students

How compassionate are we to those around us? This characteristic is designed to sense the mood of fellow classmates. However, this characteristic seeks to identify the sympathetic nature of the individual. According to Davidson's Emotional Style, this is Social intuition. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.9, with the Mode of 3, and a Standard Deviation of 1.2.

Being sympathetic to our surroundings is to be in resonance with our feelings and emotions. These feeling and emotions may be expressed verbally or through facial or bodily gestures. The following reflections indicate how students are sensitive to their surroundings:

The students in the class are very verbal about things that are bothering them, perhaps at times a little too much.

There were a few classmates I sat near that always had a complaint about something, whether it was related to their social lives or exams.

when students are shushing other students to stop talking

A lot of times students will make remarks at what the teacher just said or will express a feeling in their facial expressions.

Sometimes I can tell if a student is having a hard day by their facial expressions

This characteristic seems to raise an awareness of the collective environment. It is important to be sensitive to those around us, only to understand the emotional climate at a given moment. Considering the outliers, I am not certain if it is the lack of sympathy or care for the other, rather it seems to be more self-centered and goal oriented. I found the following responses quite disturbing:

I don't pay attention to other students at all. my goal is to go to class, listen to the teacher and get out. each student is there for themselves and I don't really care about what is bothering them because I pay a lot of money to learn something not to be distracted.

I am not connected with other students like that.

The only time I can tell something is bothering other students in the class is if they are talking about it in front of me. If not then I wouldn't even know.

I don't really pay attention to the other students' reactions

Though it may appear the characteristic has revealed exactly opposite reactions, it is the nature of a heuristic to identify difference only to bring awareness.

Could some of the above responses be traits of those teachers who are only focused on the content they teach, but seem removed and aloof from their students as well as their colleagues? To them teaching is just a job, rather than that noblest profession of giving and sharing knowledge unconditionally. Being self-centered is a negative attribute for any future educator, especially teaching at the elementary level.

Characteristic 12. The way in which I express my emotions depends on what is happening.

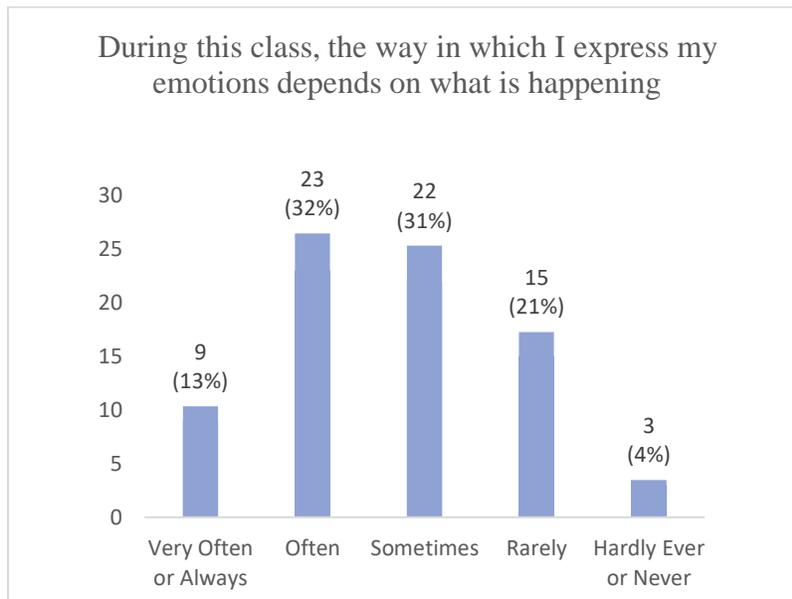


Figure 4.12 - The way in which I express my emotions depends on what is happening

Does one's ability to express emotions resonate with what is happening? This characteristic explores how attuned an individual is with their surroundings. According to Davidson's Emotional Style, this is Sensitivity to context which reflects on how good is one at regulating emotional responses, taking into account the social context they find themselves in. Based on seventy-one coded responses of the five-point Likert scale, here the calculated Mean is 3.3, with the Mode of 4, and a Standard Deviation of 1.1.

Expressing emotions as events unfold in the present, are traits of being sensitive to one's surroundings. As an educator, I feel it is important and essential to be aware of what is happening

around our immediate environment. However, expressing our emotions should be reserved and expressed only in good judgement. Being sensitive to our surroundings should not violate anyone's space. The following responses show how the students react to different situations during the lecture:

The only time I ever express my emotions is when the teacher makes a humorous remark or does something particularly funny. Or when we watch videos that are sad.

If people around me are quiet or not discussing how they felt after a video clip or an experiment I probably won't say how I felt either. However, if I hear others speaking (not necessarily how they felt) then I might tell my neighbor my opinion about what just happened and how I felt.

I remember watching the TAC commercial during class and had tears rolling down my cheeks but it was appropriate and getting frustrating when I don't understand something during class, I'll quietly ask my neighbor (but I won't yell and scream). So, you have to be aware of your surroundings in order to properly react.

If someone is happy, I do not want to bring the mood down. Furthermore, if everyone is laughing and I do not get the joke, I just laugh with it.

if the teacher does or gives us a funny analogy I laugh, if the others are distracting me, I get frustrated.

The responses above show coherence between emotions and the surrounding events. The characteristic reveals the strong emotions while watching sad yet relevant video clips pertaining to a concept in physics. It also indicates the positive emotions expressed during lighter and humorous moments during lecture.

Discussing the nature of collisions in the topic of momentum and impulse, I talk about driving under the influence or distracted driving. This lecture is more personal having lost a loved one to an intoxicated driver. This is a moment when I am fully aware of my emotions as I deliver the lecture. Following the discussion, I demonstrate how to calculate one's reaction time while one is paying attention and also while one is distracted. I have students calculate the stopping distance

of a car moving at various speeds. After they realize how serious this concern is to their lives, I show a compilation video clip from commercials aired by the Transport Accident Commission (TAC) in Australia regarding driving under the influence. Even though the commercial is more than two decades old, as sad as it is, it is equally or even more relevant today.

Characteristic 13. The way in which I express my emotions depends on who is present.

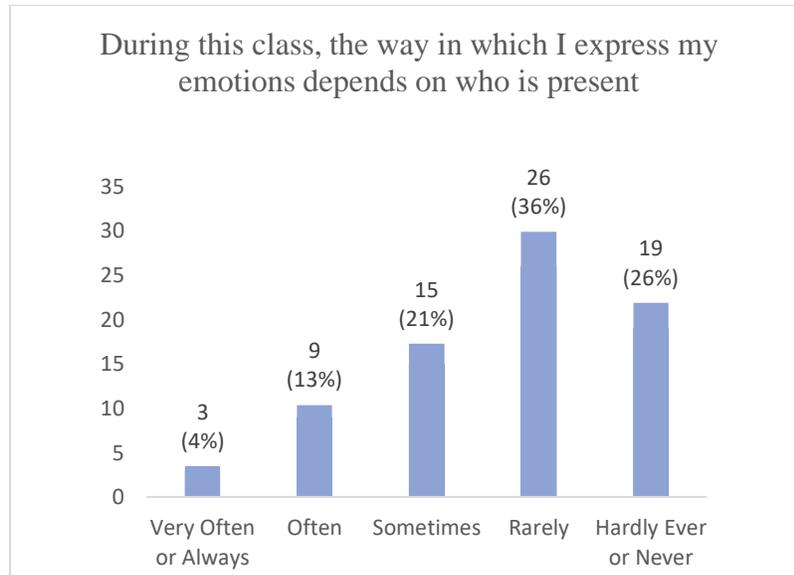


Figure 4.13 - The way in which I express my emotions depends on who is present

How I express my feelings depend on who is around me? This characteristic follows the preceding one, and explores how comfortable someone feels in order to express their emotions based on who is present around them. According to Davidson’s Emotional Style, this is Sensitivity to context. Based on seventy-one coded responses of the five-point Likert scale, here the calculated Mean is 2.3, with the Mode of 2, and a Standard Deviation of 1.1.

Here the central tendency, over 60% of the students seems to indicate that they are fairly reserved.

My emotions don't depend on who is present

It doesn't matter who is present in the class, I'm not there for other people I'm there for myself.

This doesn't really affect my emotions due to the fact that the room is so big and they are so many students that I don't really pay attention to the students.

I feel comfortable with the students next to me, when they are present, I tend to talk more.

Interestingly enough, the small percentage that responded with certainty, expressed equally strong reservations. Perhaps the nature of the environment of a large class in a lecture hall contributes to these reservations. The following responses seem to indicate that:

If there is a lot of people, I try to keep my mouth shut because I don't want anyone complaining about people who don't understand topics.

I only have the ability to show my true emotions to those I am completely comfortable with so that may mean that I hold my emotions inside if there is no one present that I am comfortable with.

When my friends are there, I see myself complaining more. But being with a friend actually helps and makes me feel less distressed

Based on the above responses, the characteristics brings an awareness of their social setting and how it affects their emotions. It appears that most students are mindful of their emotions in context of the surroundings. I think this is a natural human tendency to find comfort in expressing our emotions with those that we can relate to without feeling a threat of being mocked or violated. Even as an educator, considering how animated I tend to be in the classroom, I still find myself extremely reserved with my emotions unless the topic becomes personal. Even then, I express myself sparingly making sure not to offend anyone.

Characteristic 14. I can focus my attention on learning.

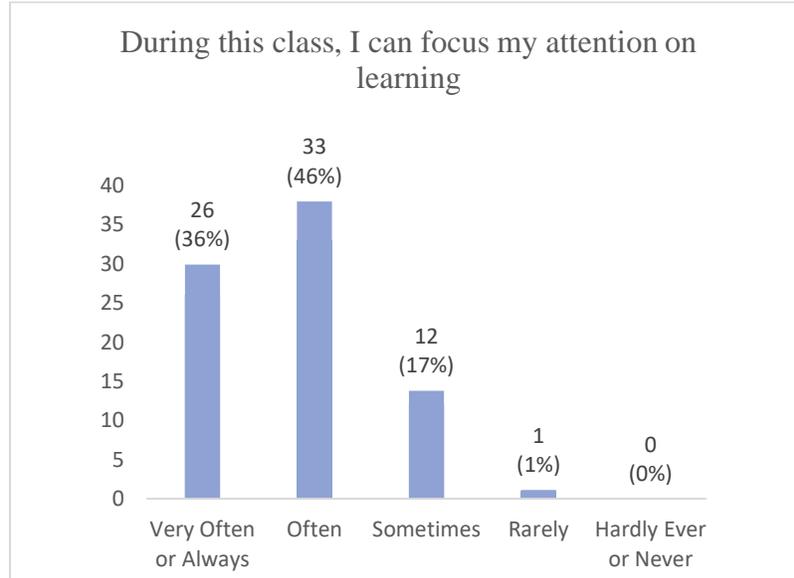


Figure 4.14 – I can focus my attention on learning

Am I attentive and immersed in what I am learning? This characteristic seeks to bring an awareness as to one's ability to be in the moment while learning. Focusing requires us to be connected with the present devoid of distractions. According to Davidson's Emotional Style, this is Attention which reflects how sharp and clear in one's ability to focus. Based on seventy-one coded responses of the five-point Likert scale, here the calculated Mean is 4.2, with the Mode of 4, and a Standard Deviation of 0.8.

From the educator's perspective, how one delivers the material or makes it relevant, plays a great role in helping students focus on learning. Maintaining sustained focus, requires educators to engage students periodically, to discuss the material with other students sitting next to them through well guided questions and discussing their responses. Likewise, from the students' point of view, one's ability to focus on learning is gauged first by interest in the topic, followed by their ability to overcome distracting thoughts and mind wandering.

This professor makes this course so enjoyable that I can't stay out of my attention on learning. I must focus this class otherwise; I might skip any interesting topics that can help on my exam.

Each class is something so new to me that I have no choice but to pay attention because then I would be completely lost and confused.

I feel like in this class it's not about the grade but about learning its self.

The major impediment to learning is the constant fear of failure. Instead of trying to understand the material, students wonder how it will be assessed on the examination. Being in the moment, being mindful, determines the difference between those students who succeed and those that struggle constantly. This is clearly expressed by the following response:

As I have said it is hard to pay attention at times. I really love learning in this class, and the Professor makes it pretty easy to learn, it is the tests that are really hard, and my feeling towards the tests can take away from my attention on learning.

Even though a majority of the responses seems to indicate they can focus on learning, the characteristic reveals their ability or desire to focus is based primarily on how well they will perform on a test in the future. This shows the lack of being in the present moment, hence, the term focus translates to remember rather than understand what is happening around them. This is the norm in an assessment based educational system.

If we can provide students different ways to measure what they have learned or understood, or ensure every opportunity to succeed, perhaps that fear of failing a test can be alleviated. As a science teacher educator, being mindful to allow students to achieve success at their pace, becomes an important element to build confidence in learning a subject they previously dreaded or feared.

Characteristic 15. I feel compassion for myself when I am unsuccessful.

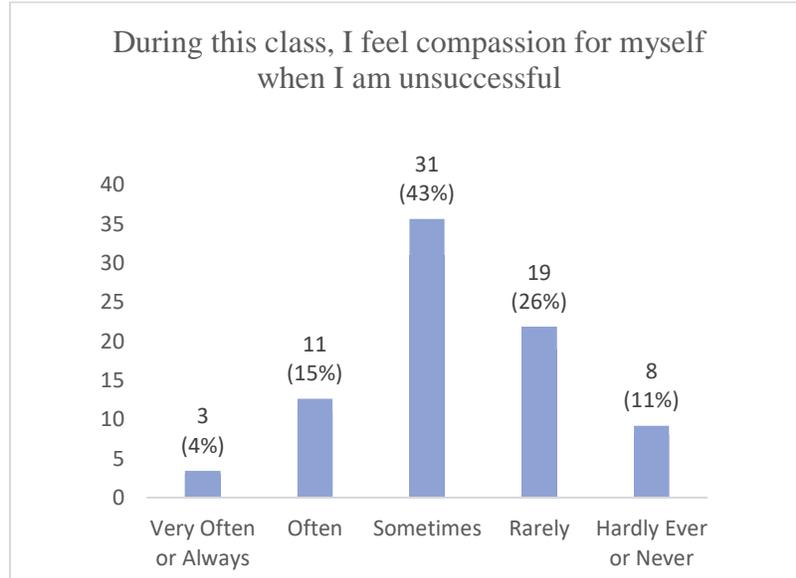


Figure 4.15 - I feel compassion for myself when I am unsuccessful

Am I hard on myself when I fail? This characteristic is designed to measure the level of self-compassion or self-kindness when we fail or feel inadequate. Self-compassion provides positive emotions and makes one more resilient. According to Davidson’s Emotional Style, this is a combination of Outlook and Resilience. Based on seventy-one coded responses of the five-point Likert scale, here the calculated Mean is 2.8, with the Mode of 3, and a Standard Deviation of 1.0.

The distribution of the data above reveals only about a fifth of the students seem to have a good degree of self-compassion. The challenge to succeed in this fast-moving society can be daunting to say the least. In addition, the pressure to succeed academically adds to the never-ending fear of failure and not achieving desired goals. I think as educators we can model through practice the art of self-compassion and convey that losses and short falls in life are natural human condition shared by all. Challenging and difficult subjects tend to exacerbate this sense of inadequacy.

sometimes I think it's my own fault that I am unsuccessful so I don't have any compassion.

I am disappointed at myself when I am unsuccessful because when you do hard work and it doesn't pay off it is really upsetting.

yea because I feel like I could have done better, it just physics and I are hard to get along.

I feel no compassion, I often beat myself up for doing poorly.

Based on the responses above, the characteristic seems to reveal the absence of self-compassion.

The attitude to take on a challenging subject like physics, tends to limit one's outlook considerably.

The common notion that physics is difficult, sadly permeates this fear and makes learning the subject more daunting. To approach challenges with an open-mind, enables one to negate preconceived notions and maintain positive outlook. Even failure at first attempt, one can find inner strength to overcome and persevere. Practicing mindfulness and self-compassion, provides a means to avert negative emotions and feelings of inadequacies.

Characteristic 16. I feel compassion for others when they are unsuccessful.

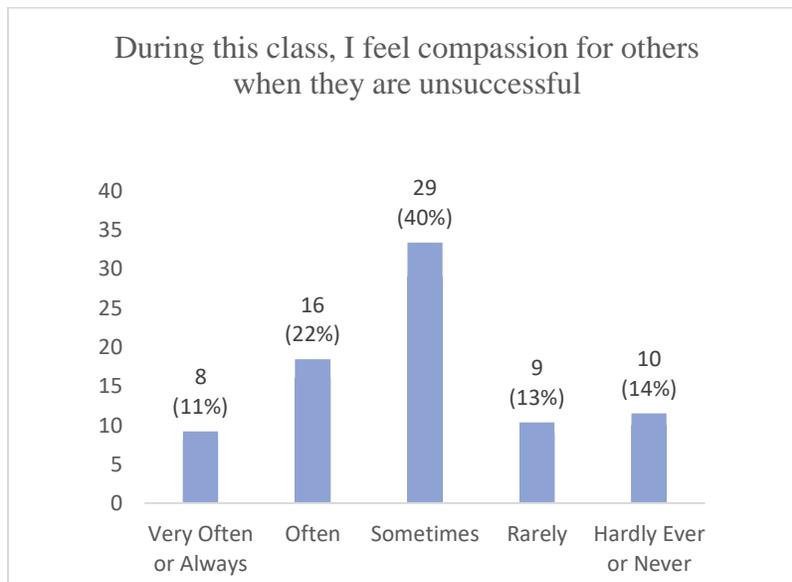


Figure 4.16 - I feel compassion for others when they are unsuccessful

Am I sensitive to the feelings of failures of my classmates? This characteristic is designed to see the level of caring and kindness towards others. Being thoughtful, understanding and considerate enables us to reach out and help others unconditionally. According to Davidson's Emotional Style, this is a combination of Sensitivity to context and Social intuition. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.0, with the Mode of 3, and a Standard Deviation of 1.2.

I think care and compassion for others, is the most important trait of being an educator. It should be the most important trait of being human. Sadly, in a highly globalized and competitive society, many feel they are caught up in a turbulent world of survival of the fittest. This loss of compassion is quite evident of what we observe in the world around us today. A world ripped and divided by war, famine, racism, religion, and by differences we have created because we don't understand the meaning of unconditional acceptance. Sadly, the use of the word tolerance, I think depreciates the value of acceptance out of compassion in a pluralistic society. Just about every day, we see a television add, a social-media post, or we read or hear about a heart wrenching story about a person or a community coming together to help another human being regardless who or what they are, warms our heart as we yearn in desperation for more human compassion.

We can see this lack in the responses since only slightly above 30% seem to truly feel compassion for others. Based on the responses below, it seems that compassion for others is conditional upon circumstances one endures or observes. Social intuition and compassion seem quite evident in these responses.

I always try to help other students on what I know. I often work in group before every exam so that they will do better as well as I do. If they do bad in exam, I also feel compassion for them.

If I know someone worked really hard to try and do well and they didn't do that well, I feel bad because I know how it feels to really try for something and not get it.

I do. I mean I honestly feel that some of the students had to see it coming because they gave absolutely no time to actually study the material—which I know for a fact— but this isn't always the case. Some of the students actually have a really packed schedule, with several other classes and a full-time job, and their own families to take care of. I really can't help but feel that no one deserves no success.

Considering the other extreme, about 30%, we see that compassion for others can become a self-centered perception. This end reveals a complete lack of social intuition.

I don't worry about other people in the class because we are all trying to get a good grade individually. Everyone is worried about themselves and compassion for another person's success is irrelevant in my life.

I don't notice when others are unsuccessful

I don't have a close connection with anyone in the class so when they are not successful or successful, I am unaware.

Based on the above responses, the characteristic has brought an awareness of compassion and caring for others. Those driven to succeed selfishly and focusing on grades alone seem to have a blindfold towards others. Can we study this as a trait of the individual and their upbringing? Or, is this what society or the culture of education has cultivated over time? I strongly fear they will be the educators who will only see numbers as gauges of student performance and miss out knowing the child as a person entirely. Sadly, I feel as though we've all had a share of such teachers and perhaps detested the subject matter they taught.

Characteristic 17. When I produce strong emotions, I easily let them go.

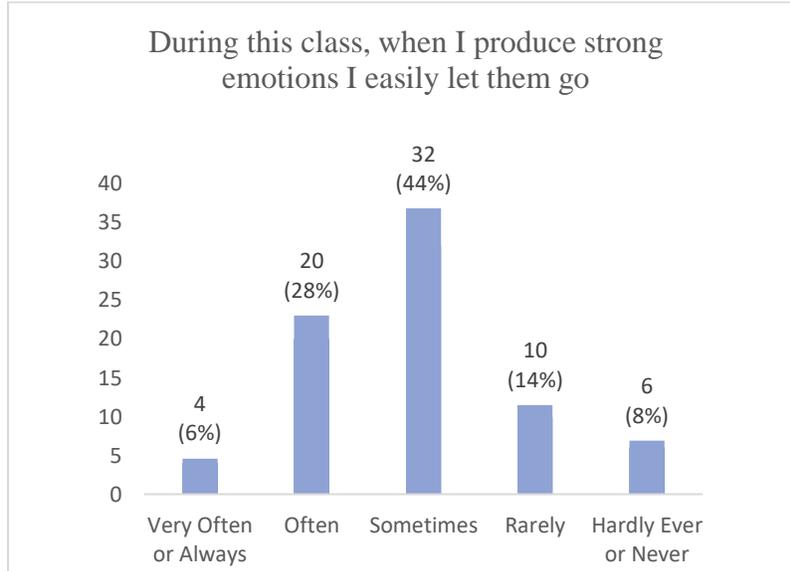


Figure 4.17 - When I produce strong emotions, I easily let them go

Why do I struggle to let go of my feelings? If our circumstances and our mood guide our emotions, this characteristic shall seek to identify the level of emotions we produce and whether or not we can let them go. According to Davidson's Emotional Style, this is a combination of Self-awareness and resilience. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.1, with the Mode of 3, and a Standard Deviation of 1.0.

The central tendency of the responses seems to indicate the unsure nature of one's ability to recognize strong emotions and their ability to let them go.

I don't really know that I produce strong emotions in class, but I suppose if I do, I must easily let them go, because I can't remember that happening.

I try to focus all my energy in class as much as I can regardless of what is happening.

When our professor shared a video with us, I cried.

I think most students only tend to recognize the negative emotions such as anger, sadness, and disgust in a classroom setting. These emotions commonly reflect their struggle with the course

material in general and the challenge of understanding abstract thinking in a physics class tends to exacerbate these emotions further.

The teachings of Venerable Pramote addresses the struggling mind. Making our mind aware of this struggle, enables the mind itself to release these negative emotions. This is the mindful practice of uniting the mind with the body.

I was fortunate to have been part of a study to understand Jin Shin Jyutsu (JSJ) led by Ken Tobin (Tobin, Alexakos, Malyukova, & Gangji, 2017). JSJ is an ancient knowledge system concerned with the flow of universal energy (Qi) in the body. The hands are used as connections or pathways to 26 Safety Energy Locks (SELs) distributed throughout the body, through which Qi flows (Tobin, Powietrzynska, & Alexakos, 2015). The emotion of anger is mitigated by gently holding or massaging the middle finger. Educating and making our students aware of alternate knowledge systems like JSJ, our students can learn to manage their health by regulating and releasing negative energies.

Characteristic 18. I gauge my emotions from changes in my body temperature.

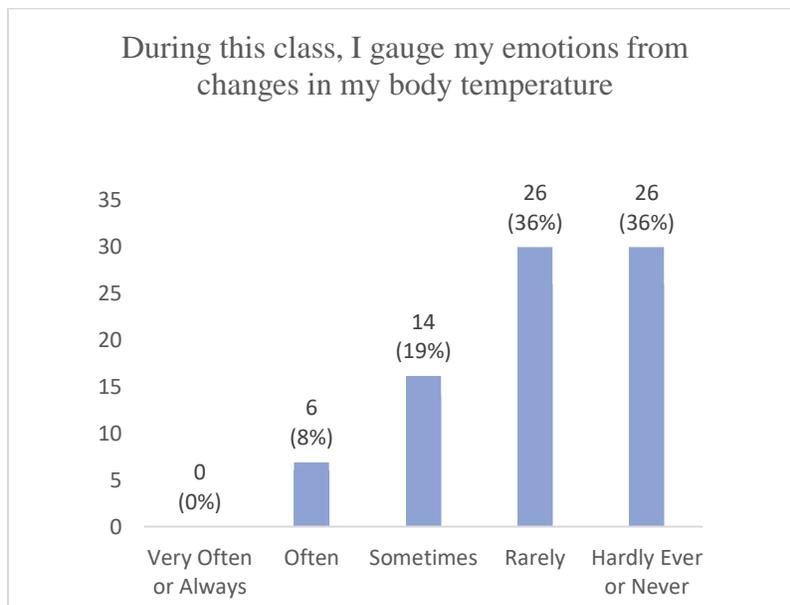


Figure 4.18 - I gauge my emotions from changes in my body temperature

Is my body temperature regulated by how I feel? This characteristic examines the awareness of the changes in body temperature and its relationship to emotions. According to Davidson's Emotional Style, this is Self-Awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.0, with multiple Modes of 1 (and 2), and a Standard Deviation of 1.0.

Gauging the changes in body temperature based on emotions is more difficult than noticing the changes in pulse rate. Well over 70% of the responses indicate a clear unawareness of the changes in one's body temperature based on their emotions.

My body temperature and emotions don't really have any connection to one another, well at least I don't pay attention to that type of thing. My body temperature in the class is fairly normal not too hot or too cold. But as for my emotions, they are always changing in this class.

I never knew that body temperature and emotions are related other than getting warm when you are embarrassed or nervous. Those aren't emotions I feel in this class.

I do not take my body temperature into consideration when I am in class.

The outlier responses indicate the changes in the environmental conditions in the lecture hall rather than bodily or internal temperature fluctuations due to emotional triggers.

I can often tell that I am going to have a hard time paying attention in class if I am very hot or cold in class.

When it's hot in the classroom I tend to become drowsy and cranky but I still find ways to focus.

It is sometimes really cold or really hot in the classroom making it uncomfortable.

It may get harder to focus if the temperature is not comfortable, but that doesn't really play a part in how I learn.

Based on all the responses, the characteristic has raised an awareness of a vital bodily indicator, temperature, and how it enables one to gauge and control emotions. An acute awareness of our body, enables us to regulate our mind (emotions) through mindfully breathing.

Characteristic 19. I am aware of others' emotions from characteristics of their voices.

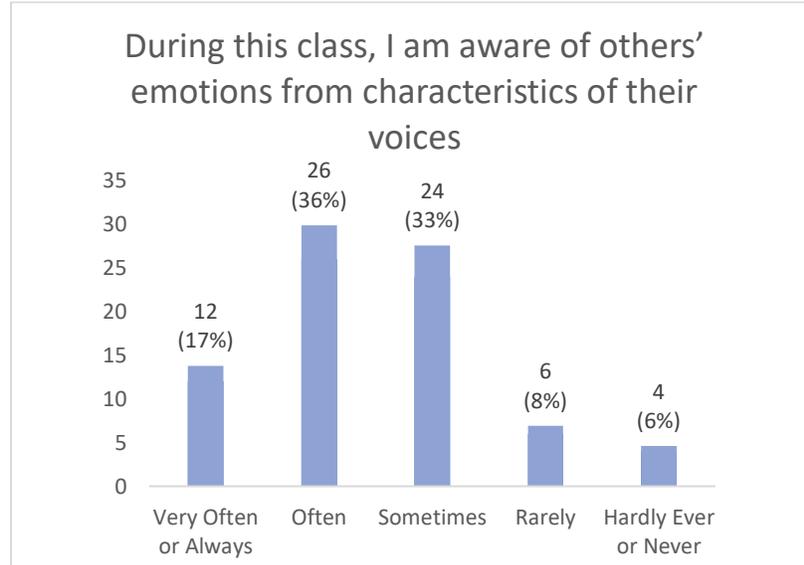


Figure 4.19 - I am aware of others' emotions from characteristics of their voices

When we listen to others, are we aware of the variations in pitch, range, and tone of someone's voice in order to gauge their emotions? This characteristic seeks to identify the auditory sensory mechanism to identify emotions in others. According to Davidson's Emotional Style, this is Social Intuition. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.5, with a Modes of 4, and a Standard Deviation of 1.0.

It appears more than 50% of the students tend to clearly gauge the emotions of others based on the characteristics of their voices. The following responses indicate that most students are sensitive to the tone and range of the voices of other students.

Yes, I guess you can tell how people are feeling by the way they talk. For example, if they're upset (sad way) their tone is lower or if they're angry or frustrated they might speak in a forceful manner.

It's easy to tell when someone is angry or frustrated if their voice range changes.

I can always tell from the tone of someone's voice what their emotions are.

Considering the other extreme, there are students that tend to block out the voices of others in order to stay focused.

I don't listen to other people so I don't really know if anything is going on with their emotions. The only person I selectively want to listen to is the teacher. whatever the teacher says is important not what the students say.

I am not aware of this during class.

The two responses above represent a small percentage of students who are unaware of picking up social signals from their classmates. Here the characteristic has raised awareness of their surroundings.

From an early age, I believe most of us experience and develop a keen sense towards the characteristics of someone's voice. We can all remember the tone of our parents when we disappointed them with our grades or behavior, and recall the cheerful tones when we made them proud. As an educator, the ability to discern the subtle changes in the voices of our students, becomes an important sensory mechanism to serve as an indirect feedback. Picking up the variations in the tones when a student asks a question, should provide a clear indication whether or not the student and perhaps the entire class understood the lesson. As a teacher educator, it is important to respond to questions by referring clearly to their voices, (i.e. paying attention to prosody) in order to bring an awareness of the sensitivity they should develop as future teachers.

Based on the foundation of polyvagal theory, Ken Tobin (2018), studies the relationship between prosody, facial expressions and breathing patterns. Tobin describes the benefit of breathing in and out through the nose and the production of nitric oxide in order to maintain healthy level of blood oxygenation. As an intervention for wellness, he suggests meditation incorporating nasal breathing and humming during the outbreath. Teaching our students to breath mindfully should help raise the level of positive emotions.

Characteristic 20. I am aware of my emotions being expressed in my voice.

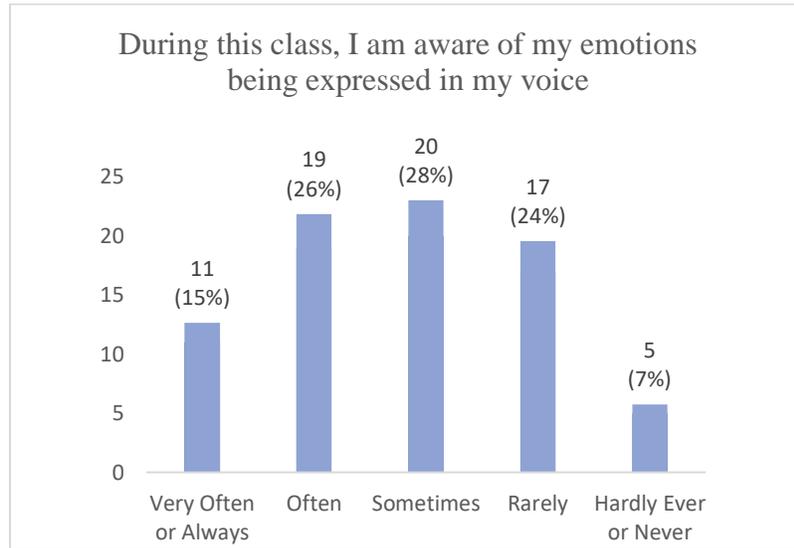


Figure 4.20 - I am aware of my emotions being expressed in my voice

How sensitive are we to the difference in the pitch, tone and the range in our voice to express our emotions? This characteristic examines the awareness of the variation in our voices based on our emotions. According to Davidson’s Emotional Style, this is Self-Awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.2, with a Modes of 3, and a Standard Deviation of 1.2.

More than half of the students seem to indicate an awareness of their emotions being expressed in their voices. One of the most prevailing method to communicate and express oneself sincerely, is the ability to express emotions through the variations in their voices. It enables us to become sensitive to the feelings of those we communicate with. To communicate affectively does not depend on what we say, what matters most, is how we say something. People who are sensitive to their surroundings, are more cognizant of their voices. The following two student responses, indicates an awareness of being sensitive to others, and the varied range of emotions in the process while learning.

I always try to speak in calm voice. I don't want to hurt anybody's feelings. I am always aware of my emotions.

I don't sound happy when I'm confused, but if I'm participating and giving an answer, I am more cheerful and positive.

The tone of our voice, the expressions on our faces, and the physical gestures are an integral part of expressing how we feel. The following response which also corresponds to another characteristic (22) in the heuristic, expresses how our voice and our expressions tell others about how we feel.

I try to keep a steady strong voice when I speak but it's my face which turns red that gives my emotions away rather than my voice.

On the extreme end, there are students who rarely communicate in class or are just afraid to express themselves, find it difficult to relate emotions with their voice.

I do not participate much because It is difficult to express my misunderstanding in a science class being that is it's a difficult subject.

I suppose that my emotions must be expressed in my voice, but I don't think I am very mindful of that.

I do not really hear my tone of voice or pay attention to it.

I am not a public speaker at all. I do not like to participate in any of my classes therefore no one can tell my emotions through my voice. However, when I do speak and I am feeling a certain way my voice does sound different.

Based on the above responses, the characteristic has raised a level of self-awareness. Teaching requires us to communicate to a varied audience; being mindful of our voice to express our emotions, may resonate with the emotions of our students. As in the previous characteristic, we have seen the relationship between prosody and breathing. The awareness of breathing mindfully helps regulate high levels of positive emotions.

Characteristic 21. I recognize others' emotions by looking at their faces.

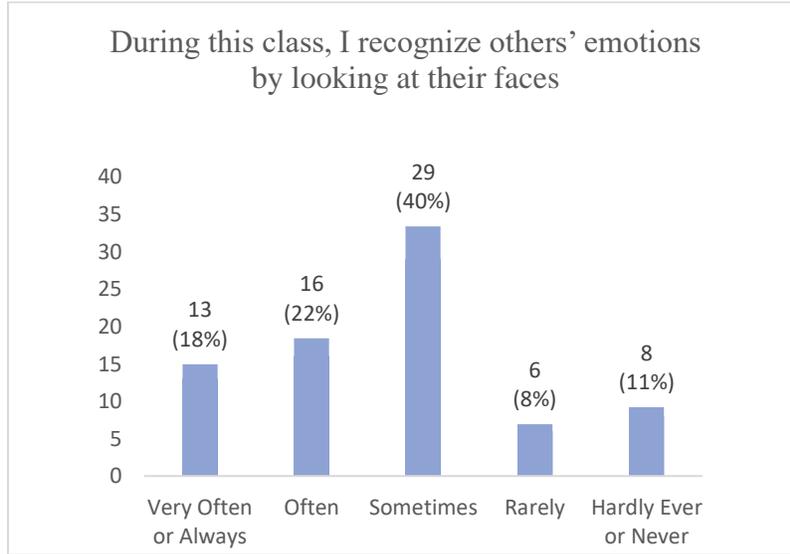


Figure 4.21 - I recognize others' emotions by looking at their faces

What does my face reveal to others? This characteristic seeks to identify one's perceptive nature in order to recognize the emotions of others based on their facial expressions. According to Davidson's Emotional Style, this is Social Intuition. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.3, with a Modes of 3, and a Standard Deviation of 1.2.

A majority of the students (80%) seem to recognize or are sensitive to others' emotions looking at their faces. As a teacher, I consider this to be a form of visual empathy. To be able to sense our students through their facial expressions can help us identify not only the level of engagement, but also recognize the personal struggles one may be facing. The following few responses clearly give a scope of what the majority feel by observing others.

I will know right away by facial expressions the type of mood people are in.

I recognize others' emotion by looking their sad face or angry face.

Facial expressions are very helpful in determining mood and emotion.

I think this is one of the easiest ways to tell how someone is feeling without being directly told.

The very few who tend to focus only on the lecture tend to block out fellow classmates. This is summarized by the following responses:

My attention is generally on the teacher, the blackboard, the slides, or my notes. Not the faces of other students.

I do not focus on others but focus on the material being presented.

Based on all the responses above, the characteristic raises an awareness of sensing and feeling others simply by observing facial expressions. Psychologist, Paul Ekman (2003), describes how facial expressions are indicative of seven universal emotions. These emotions are: anger, contempt, disgust, enjoyment, fear, sadness, and surprise.

An important element in being mindful and being in the present, requires us to be in harmony with those around us. Not feeling or sensing others, we miss an important element of being in the social-present.

Characteristic 22. I am aware of my emotions as they are reflected in my face.

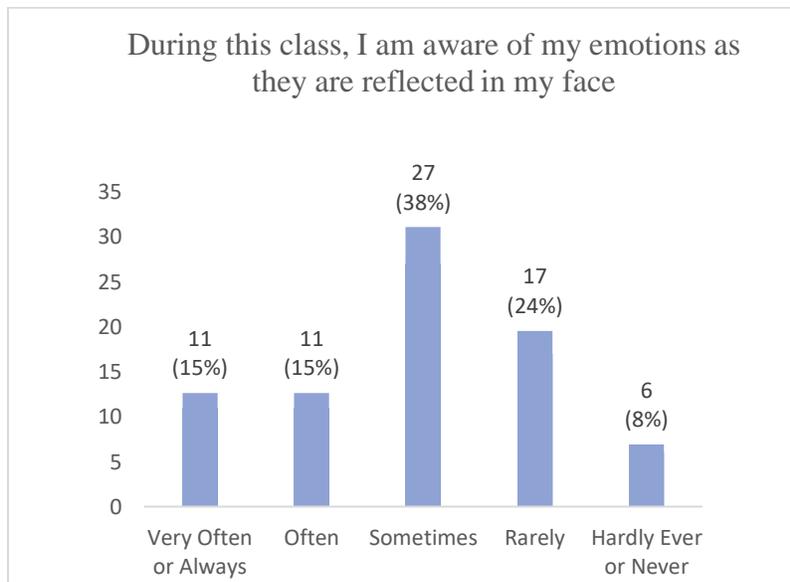


Figure 4.22 - I am aware of my emotions as they are reflected in my face

Do the expressions on my face reflect how I am feeling at the moment? This characteristic seeks to identify if one is aware of their facial expressions based on how they are feeling emotionally. According to Davidson's Emotional Style, this is Self-Awareness. Based on 71 coded responses of the five-point Likert scale, the calculated Mean is 3.1, with a Modes of 3, and a Standard Deviation of 1.2.

I think far more powerful than words are the expressions on our faces to tell others how we truly feel. About a third of the students are keenly aware of emotions being expressed in their faces. The following few responses reflect a strong correlation between emotions and facial expressions clearly:

My face drops when I'm sad. I frown when I'm sad, and smile when I'm happy. My eyes squint/roll when I'm angry. My eyes are wider when I'm happy. I squint and my lips turn to the side when I'm confused. Yes, I'm aware.

My face reflects emotions very well. One can tell exactly how I feel by looking at me.

My facial expressions probably display more because I rarely speak up in class.

I wear my emotion on my face.

The other end of approximately 30% as well seem to go through life either with a poker face or are unaware entirely of their facial expressions. We see this from the following responses:

Usually able to mask my facial expressions.

I do not notice what my facial expressions are usually.

I rarely notice it.

I do not think about my emotions.

I think for those who rarely notice facial expressions, the characteristic seems to have heightened an awareness between facial expressions and emotions. As an educator, we learn to teach with

passion expressed from the depths of our mind and heart. Communicating our thoughts require us to be mindful of the natural process of expressing how we feel through our eyes and facial expressions. Just as important it is to be able to read the faces of others; we must develop a keen sense of reading our own. Facial expressions of emotions are universal and not bound by language nor culture.

Characteristic 23. My emotions are evident from the way I position and move my body.

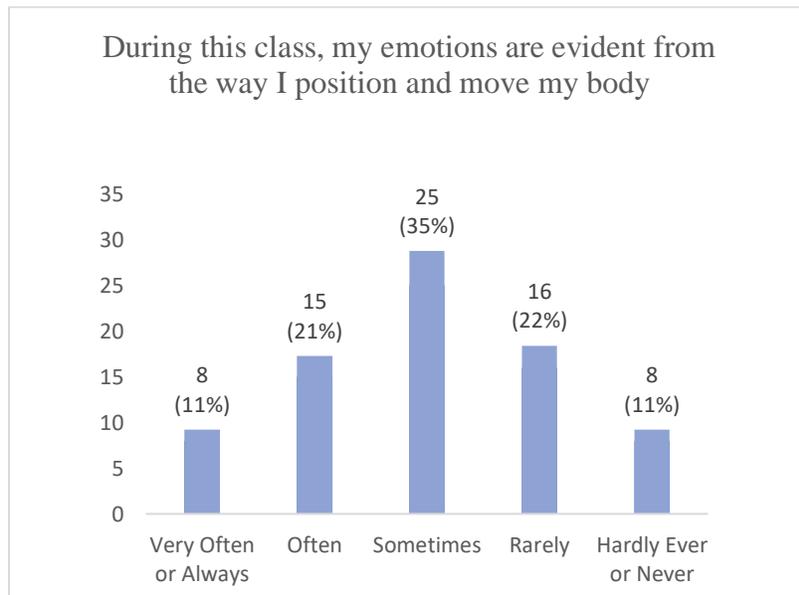


Figure 4.23 - My emotions are evident from the way I position and move my body

How aware are we of our physical posture? How do we stand? How do we move our arms and our body to express how we feel? This characteristic seeks to identify the role of bodily position based on our emotions. According to Davidson’s Emotional Style, this is Self-Awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 3.0, with a Modes of 3, and a Standard Deviation of 1.2.

About 30% of the students are well aware of or recognize how their bodily position relates to their emotions. The following responses support this awareness:

Body language is a key part of telling how somebody if feeling.

I am aware that I tend to communicate with a lot of body language, which also aids me in expressing my emotions at times.

I can tell when I am tired or when I am excited by my body language.

Body language is an excellent way to determine emotion. The other end of approximately 30% as well, seem not to notice or are just unaware of the role of bodily movement and their emotions. We can see this from the following responses:

I haven't noticed.

I don't really position or move my body a lot when I am in class I am mostly still in my seat and my head is up. I like to look appropriate in class when I am learning no matter what my emotions are.

Only time is if I'm tired and I don't feel good that I would slouch.

For those that don't notice or don't pay attention to their body language and its relationship to emotions, the characteristic has made them mindful of this interaction between bodily expressions and emotions as a means to communicate feelings in social settings. As an educator, being mindful of how we position and move our body to express our feelings adds another element to not only show how confident we feel, but also how welcoming we are to those we teach. As a science teacher and as a teacher educator, I find it important to model curiosity and humility in harmony, to express the wonders and secrets of nature through every posture and gesture that is controlled and driven by emotions in the moment.

Characteristic 24. The way I position and move my body changes my emotions.

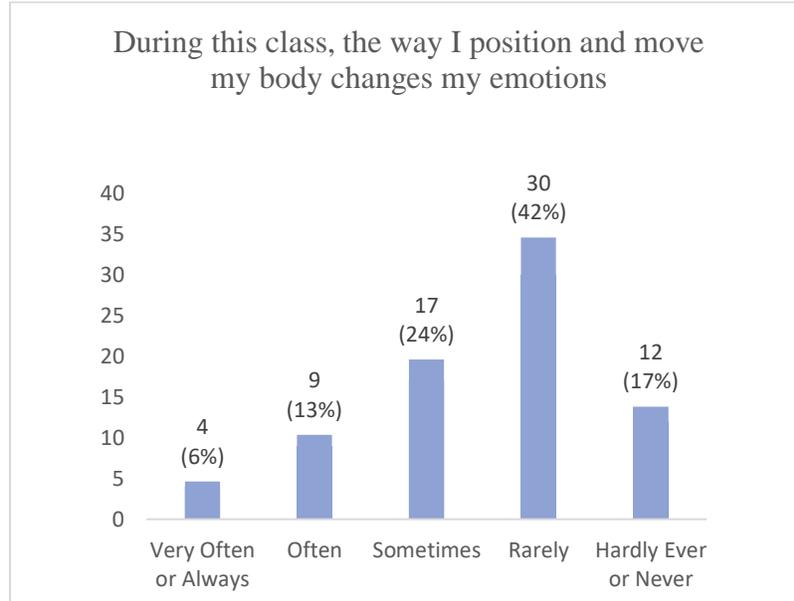


Figure 4.24 - The way I position and move my body changes my emotions

If emotions control how we move or position our body, can we infer that our body movement and position control our emotions? This characteristic investigates if students are aware of this dual interaction between mood and posture. According to Davidson's Emotional Style, this is combination of Self-Awareness and Outlook. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.5, with a Modes of 2, and a Standard Deviation of 1.1.

Almost two-thirds of the student responses seem to indicate the lack in understanding the role of position and movements of the body in order to regulate emotions. The following responses acknowledge the inverse clearly:

The other way around- my emotions change my body position.

I change my body when my emotions change.

The few about a fifth, seem to identify how posture affects their emotions.

If I sit up, I feel energized and happy. Once I lean, I feel lazy and bored.

if I get tired or bored and find myself slumped down, I will pull myself up and rejuvenate myself.

If I am very slouchy in class it does tend to make me not pay attention and feel more tired like I want to go home. So, I try to sit up and it helps me pay attention.

The characteristic here plays a pivotal role to raise and awareness that emotions are regulated by our bodily movements. As teachers we find ourselves cycling through various forms of emotions. The ability to maintain and sustain the level of energy, requires us to be mindful of our body posture in order to elevate positive emotions to stay confident and upbeat.

Characteristic 25. I can tell others' emotions from the way they position and move their bodies.

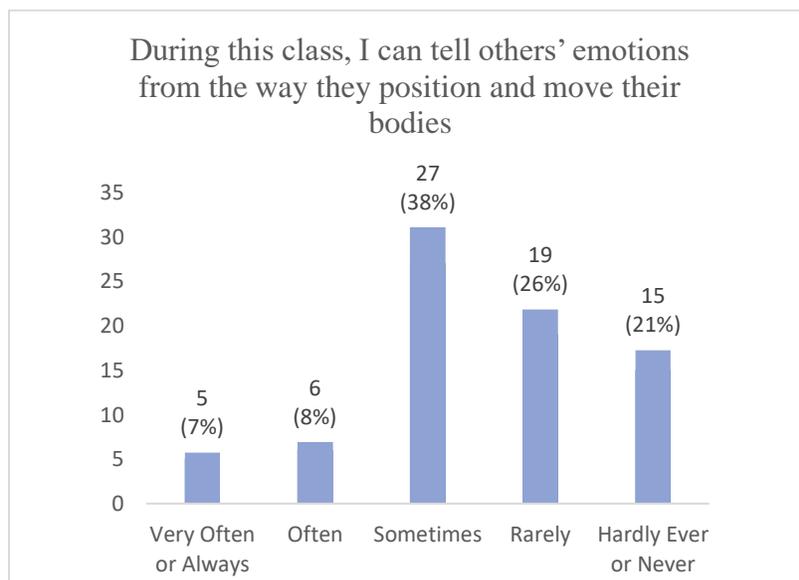


Figure 4.25 - I can tell others' emotions from the way they position and move their bodies

How observant are we to read body language? Can we gauge the emotions of someone by the way they position or move their bodies? This characteristic explores one's ability to sense the other simply by observing body posture. According to Davidson's Emotional Style, this is Social Intuition. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.5, with a Modes of 3, and a Standard Deviation of 1.1.

Only about 15% of the students seem to be acutely observant to recognize the emotions of others from the way they position or move their bodies. The following single response, expresses this keen observation:

Body language is a key part of telling how somebody is feeling. More than half of the students seem to be unaware of this relationship between emotions and physical gestures. The responses below seem to indicate how disconnected the students are in a large lecture hall even though there is a great deal of encouraged interactions to discuss the material and respond to clicker questions.

Body movement isn't really my thing. I don't think I would be able to tell how someone is feeling according to the way they position their body. Hard.

I don't really pay attention to others around me during class.

I do not notice this.

I do not focus on others.

Once again, the characteristic impacts those who seem oblivious to social gestures. Observant and experienced teachers pick up body language as soon as the students enter their classroom. When we observe our students and how they sit or position themselves, we urge them to sit upright with shoulders high so they can focus better. Being mindful of body language enables us to sense the emotional climate in the classroom. It is a subtle yet an important form of non-verbal feedback.

Characteristic 26. I am aware of emotional climate and my role in it.

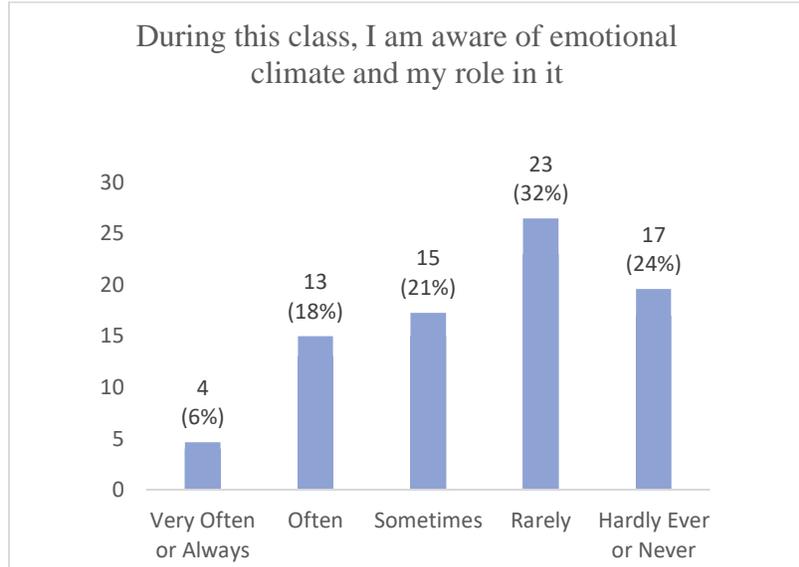


Figure 4.26 - I am aware of emotional climate and my role in it

How attuned are we to the collective emotion of our surrounding? Are we in emotional harmony with those around us? This characteristic seeks to measure the level of emotional agreement in our surrounding. According to Davidson's Emotional Style, this is a combination of Self-Awareness and Sensitivity to Context. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.5, with a Mode of 2, and a Standard Deviation of 1.2.

Less than 25% seem to understand their role in given situations. The following two responses indicate the level of sensitivity to others as well as themselves.

Of course, I'm aware of this because if I'm feeling down, my neighbor may hesitate in asking me a question. But if I'm actively involved (which I usually am), then my neighbor will feel encouraged to join.

Having a positive attitude, I believe will increase the overall emotion of the class.

Considering the other extreme, slightly more than 50% of the students either are unaware of the emotional climate or are not concerned about others. The following responses indicate the level of disconnect with the surroundings:

I never really think of my emotions playing a part of the atmosphere of the class.

I do not know what emotional climate is.

I haven't really noticed an overall emotional climate in class.

I try to be aware of the material presented, nothing else.

The characteristic raises an awareness of classroom emotional climate in general. It is important to focus in the classroom, but not feeling or understanding the emotional atmosphere, reduces the essence of any given lecture. The passion of an instructor teaching is reduced to a mere recording of voice alone; the lecture is nothing more than a text message. Being mindful of the emotional atmosphere and being sensitive to others around us, contributes to a sense of engagement in the moment, resulting in a collective sense of well-being.

Characteristic 27. Seeking attention from others is not important to me.

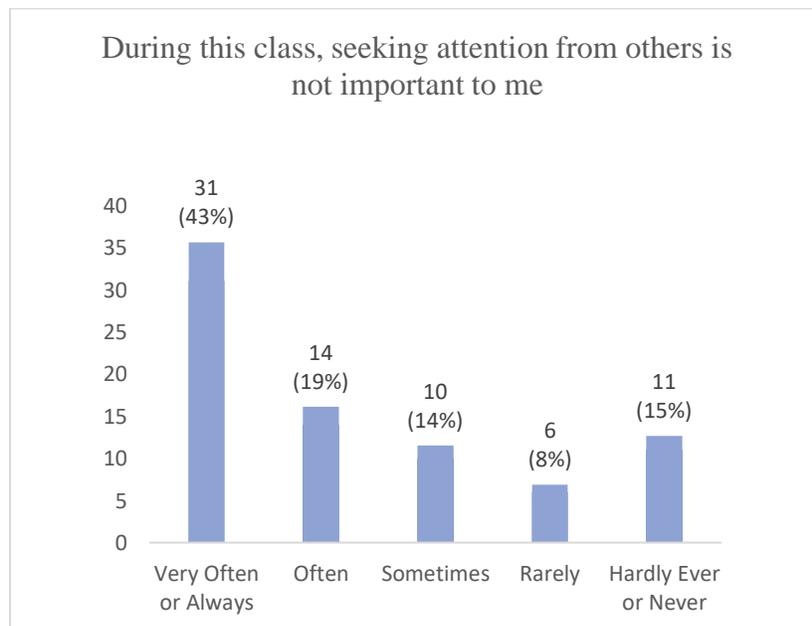


Figure 4.27 - Seeking attention from others is not important to me

Do we disconnect or disengage ourselves from others in an academic setting? This characteristic seeks to measure one's need of approval or acknowledgment by others. Based on seventy-one

coded responses of the five-point Likert scale, the calculated Mean is 3.7, with a Mode of 5, and a Standard Deviation of 1.5.

A large lecture setting provides a very different environment compared to a small classroom. The majority of the students don't seek the attention of others except perhaps the instructor.

I don't care to get anyone's attention because I am not there to make friends or associate with others. I just want to learn what I need to learn and get a good grade.

The only time seeking attention from others in class is important is when I am seeking attention from the professor, if I have a question or a problem.

The only thing important to me in class is the lecture and what the professor is doing. What the others are doing doesn't interest me.

Seeking attention more so from the professor is probably what most students (and sometimes me) do.

Only two responses indicate the need to seek attention of others, but it is for the purpose of reinforcing or aiding in understanding the material.

I often give importance in seeking attention from others because the part I don't understand, sometimes other students can explain very well to get the idea.

I use the attention to voice my concerns about the material being covered and ask for help.

One student response acknowledges the disruptive or counterproductive nature of a small segment of the population. This seems to be common in all settings.

I try not to cause attention to myself, unlike some of the girls in the class who always complain about everything.

It appears that most students are mindful of their surroundings without seeking attention from others. The collective response to this characteristic seems to indicate a sense of being independent in a classroom setting.

Characteristic 28. Classroom interactions are characterized by winners and losers.

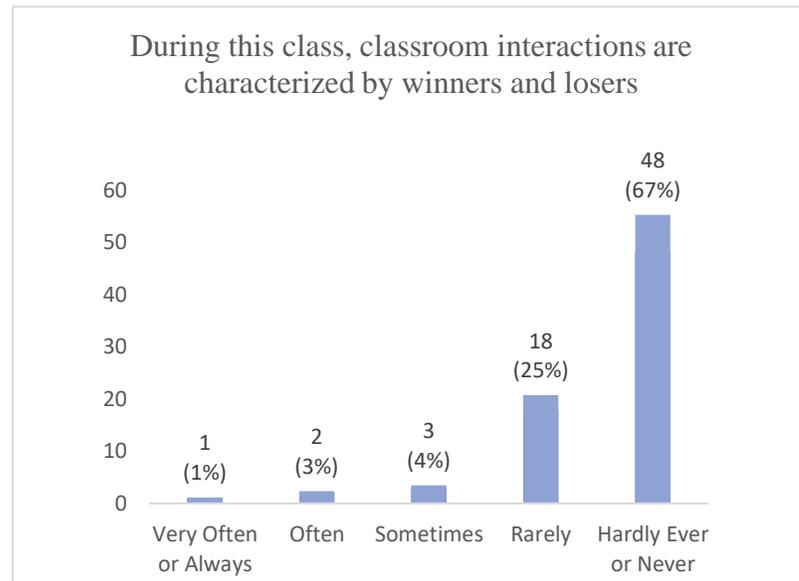


Figure 4.28 - Classroom interactions are characterized by winners and losers

Are classroom interactions a duel? Do we categorize people interactions as winners and losers? This characteristic examines the perception of how students' view classroom interactions. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 1.5, with a Mode of 1, and a Standard Deviation of 0.8.

More than 90% of the students feel learning is a collaborative effort. The following responses collectively give a sense of unity:

Not at all! Students generally try to understand the material to the best of their ability and help each other learn and succeed.

no usually classroom interactions are based on helping each other with difficulties that they may have in class. or questions that they are concerned about. I believe we help each other out when we are seeking for help.

Our interactions aren't based on who's winning or losing at something. We are all on the same goal path so if we work together, we all achieve the same thing at the end.

Classroom environment mediated by the instructor plays a vital role to alleviate that aggressive and competitive nature generally reserved for an arena, not the lecture hall. The anonymous responses to questions using clickers, helps reduce the sense of personal failure.

My professor created an environment in which we all felt comfortable.

Even when people answer the questions incorrectly, the teacher never really puts anyone down. I don't find that when I answer a question incorrectly, I feel like a loser. I think that the anonymity of the responses also helps from feeling like a "loser."

the professor makes us all feel like we're winners

The characteristic seems to clearly discard this competitive nature in a learning environment. Being mindful of the warm and inviting environment we create in our classroom, encourages a cooperative community of learners. This helps reduce stress and anxiety, and promotes learning and wellness.

Characteristic 29. I meditate to manage my emotions.

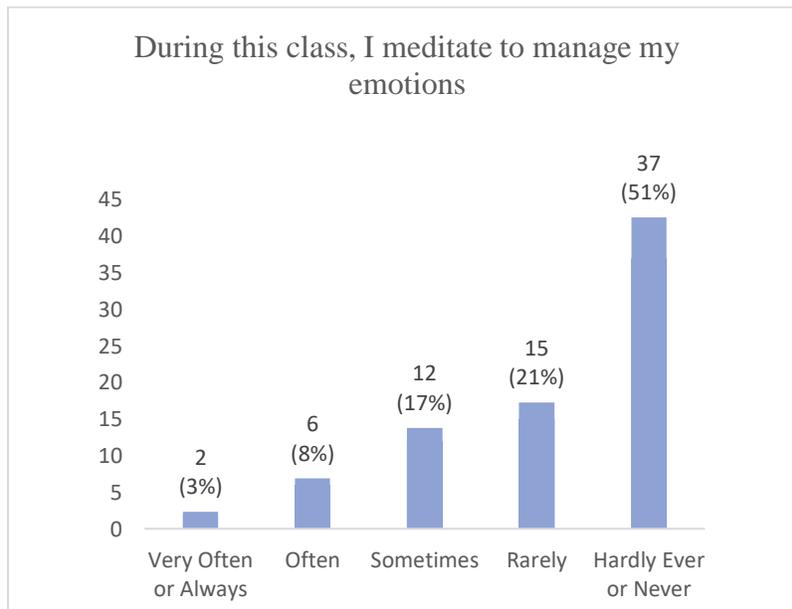


Figure 4.29 - I meditate to manage my emotions

What is the role of meditation and personal well-being? This characteristic brings an awareness of the ancient practice of meditation to regulate emotions. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 1.9, with a Mode of 1, and a Standard Deviation of 1.1.

Majority of the students do not consider meditation to help manage emotion.

It is too distracting and I do not want others to look at me when I meditate.

There are not that many emotions to manage. Usually I am stressed over the class and wanting to do well. Forcing myself to focus or not focusing does not require meditation.

I don't do this in class or anywhere else.

I never meditate. Sometimes I step out for a few minutes to collect my thoughts or reflect on personal matters, but not in class.

I try to forget about what's going on outside of class just to focus.

It is quite evident from all the responses above, many students lack the actual understanding of the meaning of meditation, and the types of meditation. The act of forcing oneself to focus, or the act of stepping out, is in-itself a form of meditation not understood by many. Only one student response shows an awareness of the practice of mediation to regulate emotions.

Sometimes I can manage my emotions by just telling myself to breathe and relax.

The characteristic introduces meditation to manage emotions. Knowing and understanding the practice of mindfulness meditation, allows one to pay attention to what is happening in the present moment. This enables one to focus and concentrate, leading to deeper understanding of the material and promotes wellness.

Characteristic 30. I use breathing to manage my pulse rate.

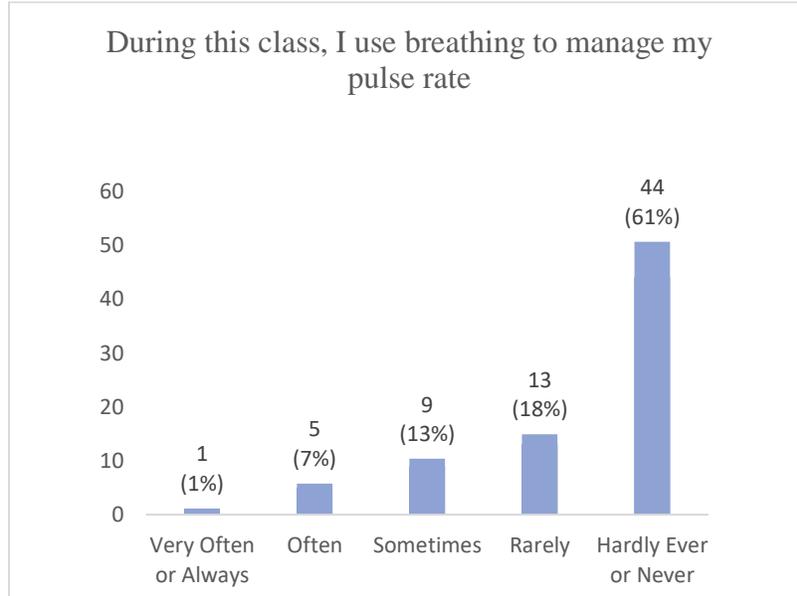


Figure 4.30 - I use breathing to manage my pulse rate

Are we aware of our pulse rate and how it varies with our breathing patterns? This characteristic raises and awareness between breathing and pulse rate. According to Davidson's Emotional Style, this is Self-Awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 1.7, with a Modes of 1, and a Standard Deviation of 1.0.

Just as in characteristic 8 (I am aware of my emotions and pulse rate), most students (80%) are unaware of their pulse rate and how it can be controlled by paying attention to their breathing.

I do not notice my pulse rate.

I've never thought about my pulse rate and how to manage it.

As I said, I have not been very aware of my breathing or pulse rate in class.

If I do, I am not conscious of it.

The remaining 20% seem to have an awareness of how consciously breathing helps manage their pulse rate.

Concentrating on my breathing and picturing deep breaths going in and out help me relax and calm me down.

sometimes I will take a deep breath to calm down or just to get to a mental state of mind that is clear.

Sometimes when I become frustrated with a topic I try to relax and take a deep breath. It helps to release stress and help concentration.

I try and inhale, exhale and take deep breaths in order to bring down my pulse rate.

This characteristic raises an awareness of how our breathing patterns helps us regulate our pulse rate. If we encourage our students to stop for a brief moment and just practice the art of mindful breathing meditation, our students not only will focus better, but it will help improve their overall well-being.

Characteristic 31. I use breathing to manage my emotions.

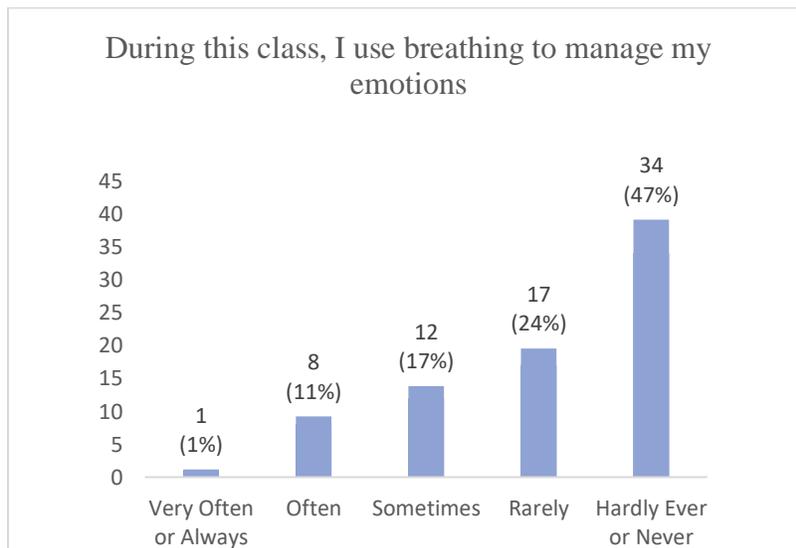


Figure 4.31 - I use breathing to manage my emotions

How often do we take a deep breath before we react? This characteristic looks at one's ability to manage emotions by breathing with awareness. According to Davidson's Emotional Style, this is Self-Awareness. Based on seventy-one coded responses of the five-point Likert scale, the calculated Mean is 2.0, with a Modes of 1, and a Standard Deviation of 1.1.

About 70% of the student responses indicates the lack of understanding how breathing helps manage emotions. This is evident in the following responses:

I do not focus on my breathing ever.

I use other ways to regulate my emotions.

I breathe to live, not to manage my emotions.

The remaining 30% indicate some degree of awareness how breathing helps regulate their emotions.

Breathing is always used to calm people down and I do use breathing to manage my emotions when needed.

Breathing helps to relax me, as well as attempting to clear any negative thoughts.

The few times I've been upset or angry in class I've told myself to close my eyes and take deep breathes to avoid crying or my emotions building up.

If we as teacher educators modeled and practiced breathing meditation, not only would we see a greater retention rate of new teachers, but would noticeably see the decrease in the level of stress and anxiety experienced by all new and seasoned educators.

According to Venerable Pramote Pamojjo, understanding the practice of meditation, requires the presence of mindfulness, it recognizes an object of body or mind, like the breath or an emotion. Practicing meditation promotes wellness and a presence of being in harmony with nature.

Concluding Thoughts

In this landscape study, the primary aim of the MEH was to create resources for prospective elementary teachers to enhance the practice of mindfulness. Raising this awareness, may provide powerful means of enhancing one's emotional state. Throughout each characteristic, the emphasis on practicing mindfulness is to allow one to observe their thoughts, feelings, and bodily sensations moment-by-moment and nonjudgmentally.

Each of the thirty-one characteristics addresses some form of mindfulness. Just raising an awareness may ameliorate well-being and happiness. The simple act of mindful breathing to control our emotions as well as dismiss negative thoughts and feelings, gives us a sense of self-control and calmness. Good body posture, garnished with a smile, keeps us positive, filled with energy and compassion. Reading the emotions of others, simply by looking at their faces, or listening to their voices, or by observing their body language, adds a whole dimension of communication without language.

An important element to mindfulness is the practice of meditation. Though I have practiced meditation from a religious perspective since a very young age, this research on mindfulness has raised a whole different dimension in understanding the ancient art of meditation. In *A Meditator's Guide – The Principles of Mindfulness and Meditation* by Venerable Pramote Pamojjo, I have been exposed to this ancient practice to understand the relationship between the mind and the body, exclusive in form yet unified in mindfulness.

Teaching is not only the delivery of content, it is the delivery of human knowledge filled with compassion and kindness, in order to nurture and foster the care and respect for all living things on earth.

CHAPTER 5

THOUGHTS REGARDING THE MINDFULNESS IN EDUCATION

HEURISTICS

Student's Final Thoughts and Reflections

At the conclusion of the MEH, students were asked to share their thoughts regarding the heuristic. It was an optional open-ended question. The responses clearly support the intention of the MEH, as an instrument of change. I share the following notable responses below:

I found that this heuristic brought to light things that I might be doing that I am not realizing. Maybe my breathing and pulse rate do change, or maybe my emotions are changing during class. I also would like to thank you for mentioning the meditation to manage emotions. I will definitely try that for my harder classes where I do notice my emotions changing.

I understand why people need to ease their emotions in educational field as well as public field. If they are capable of controlling themselves, then they can pay attention or learn something from others. As a future teacher, I believe everyone should have controlling power, and then we can pass our knowledge to children who need help by educating with lots of care.

It was interesting. It was nice to see my reflections.

The heuristic was interesting, I've never taken a survey like this before. it caused me to read the questions more than once and try to understand what was being asked. It causes you to think and become more aware of what's going around you, especially in a classroom; Things that you wouldn't think had bothered you may actually be the reason why you can't focus or are uncomfortable in a class setting.

I never completed a survey with these kinds of questions. But I feel like the questions are very important. Emotions are a big part of our lives. This survey is good one because it connects our emotions to other crucial aspects in class.

Many of the questions asked were of things that I unconsciously did and when my attention was brought to that aspect through a question, I had a realization that I did do many of these things. And as I am aware of them at the moment, I don't really put much thought into it.

I think this survey was very intriguing and made me think a lot about my emotions during a class which I had never considered taking into account.

Well, it definitely got me to think about little everyday things that usually go unnoticed by me; things I never really took the time to think about. I'll probably be a lot more aware of the people around me in class now.

I never actually thought about any of these questions during class, but now that I am looking back, I am noticing more than I thought I did about my surroundings.

After taking this survey, it made me think about how breathing techniques may help my learning and emotions. Studies have shown that breathing techniques may help reduce stress and create stability. I did not think about trying to use different breathing strategies during class to calm myself when feeling stressed.

The major feature of the heuristic was reflexivity, or becoming aware of the unaware (Bourdieu & Wacquant, 1992). Each of the responses above indicates the students actually reflected on the characteristics of the MEH, providing clear evidence of awareness about mindfulness in their expressions and practice.

There were a few responses that questioned the nature of the construct and the wording of the characteristics, and a few even questioned the purpose of the heuristic. Those that claimed to have not understood the purpose of the heuristic, actually reflected on the characteristics but were not mindful of their surroundings and themselves.

The questions were all worded strangely. They are more abstract than typical survey questions.

This heuristic was interesting. The questions asked are not what I expected, which makes me wonder what this will be used for.

I don't think emotions play a huge role in a physics class, but if this was in a psychology class, I feel like a majority of the questions would be more relevant.

some of the questions I didn't fully understand what was being asked

I do not understand some questions regarding emotions to classrooms. I do not know how to answer the question because I do not have the full knowledge of what the question is asking. I suggest the questions to be more clear.

Many questions seemed all too similar and somewhat repetitive.

Based on the above responses, those who found the questions to be worded strangely and were abstract in nature, or even repetitive, or not clearer, did not realize the nature of the heuristic and how it was changing their thinking at that exact moment. The response regarding that emotions are more prevalent in a psychology class compared to physics, may imply the analytical nature of physics voids emotions. The design of the MEH is grounded in the axiological stance that values difference and complexity as a resource for learning (Tobin, 2010).

Are You Spiritual?

The final open-ended question asked; Do you consider yourself a spiritual person? Of the seventy-one participants, 39 students (55%) answered “Yes” and considered themselves to be spiritual, whereas 31 students (44%) answered “No” and claimed not to be. One student refrained from answering. The composition of the class consisted of 65 female students and 6 males with very diverse ethnic and religious backgrounds.

MEH – Self Study

As a teacher and a teacher educator, I took the heuristic along with my students, to learn about myself and how this instrument will allow me to reflect on my practice. Changing the perspective from the student view, where each characteristic was introduced with the phrase, “During this class, ...”, I altered this to, “When I lecture, ...”.

Please note, wherever I have answered “Sometimes” is only because I was uncertain or unaware of clearly identifying my emotional state. Therefore, I have used it more as a neutral response. The following are my responses to the 31 characteristics.

Based on the Likert scale: 5 = very often or always; 4 = Often; 3 = Sometimes; 2 = rarely; 1 = hardly ever or never.

When I lecture,

1. I am curious about my feelings as they rise and fall. (*Very often or always*)
2. I find words to describe the feelings I experience. (*Often*)
3. I identify distracting thoughts but let them go. (*Often*)
4. I am not hard on myself when I am unsuccessful. (*Sometimes*)
5. I recover quickly when I am unsuccessful. (*Often*)
6. I pay attention to my moment-to-moment sensory experiences. (*Sometimes*)
7. I am aware of the relationship between my emotions and breathing pattern. (*Rarely*)
8. I am aware of changes in my emotions and pulse rate. (*Hardly ever or never*)
9. I maintain a positive outlook. (*Often*)
10. I can tell when something is bothering the teacher. (*Very often or always*)
11. I can tell when something is bothering other students. (*Very often or always*)
12. The way in which I express my emotions depends on what is happening. (*Often*)
13. The way in which I express my emotions depends on who is present. (*Often*)
14. I can focus my attention on learning. (*Often*)
15. I feel compassion for myself when I am unsuccessful. (*Sometimes*)
16. I feel compassion for others when they are unsuccessful. (*Very often or always*)
17. When I produce strong emotions, I easily let them go. (*Often*)
18. I gauge my emotions from changes in my body temperature. (*Rarely*)
19. I am aware of others' emotions from characteristics of their voices. (*Often*)

20. I am aware of my emotions being expressed in my voice. (*Often*)
21. I recognize others' emotions by looking at their faces. (*Very often or always*)
22. I am aware of my emotions as they are reflected in my face. (*Often*)
23. My emotions are evident from the way I position and move my body. (*Often*)
24. The way I position and move my body changes my emotions. (*Sometimes*)
25. I can tell others' emotions from the way they position and move their bodies. (*Often*)
26. I am aware of emotional climate and my role in it. (*Very often or always*)
27. Seeking attention from others is not important to me. (*Often*)
28. Classroom interactions are characterized by winners and losers. (*Hardly ever or never*)
29. I meditate to manage my emotions. (*Rarely*)
30. I use breathing to manage my pulse rate. (*Rarely*)
31. I use breathing to manage my emotions. (*Sometimes*)

Analysis of my own responses indicate, that I too reflected greatly on each characteristic, resulting in a heightened awareness of being mindful of regulating my emotions while lecturing. I have never paid much attention to how I breath or notice my pulse rate. Since the beginning of this study, during interactions with people, I have become more reflective on how I answer or respond, taking a deep breath before sharing or expressing my thoughts and views. This practice of being mindfully aware, has expanded beyond the classroom to my personal interactions with family and friends, and in all social domains, including something as trivial as observing people on the train or standing on a line at the supermarket. Mindfulness provides an opportunity to observe and study human behavior while reflecting on my own character and my role on this grand stage.

Concluding Thoughts

Research undertaken by Kenneth Tobin and Rey Llena (2011) in urban high schools and the study by Konstantinos Alexakos and Kenneth Tobin (2012) of pre-service and in-service teachers in a graduate class, revealed high levels of stress and anxiety among teachers and students. The methodology of the study was multi-method, sociocultural, hermeneutic phenomenology that was participatory, reflexive, and interpretive (Tobin & Ritchie, 2012). Acknowledging that educational settings were locations where teachers and students experience high emotional states (Tobin, Powietrzynska, & Alexakos, 2015), led to the development of the Mindfulness in Education heuristic as an intervention to assist in alleviating strong negative emotions in order to create a high-quality educational environment mediated by learning-promoting emotional climate (Powietrzynska & Tobin, 2015).

The landscape research study presented in this dissertation has allowed me to provide resources for prospective elementary teachers to enhance their mindfulness. It has also taken me on an inward journey to understand myself. As an educator, teacher-educator, and a father, I have become more mindful on how I teach, how I interact with my students and colleagues, and how I advise and guide my own children. I have become more reflective in my thoughts and have learned to meditate in a secular sense.

I reflect greatly on the teachings of my faith and the spiritual guidance of His Highness the Aga Khan. His teaching of the values of kindness, compassion, pluralism, service to community and country, helping others, respecting all living things, and to give back to society, echo in my heart and mind since a very young age. My work as a physics teacher/professor, my research interest in elementary science and math education, my paternal role, and as an eldest son

of loving parents, my core values revolve around my faith. The Western world educated me and established my cultural norms. I am the product of Eastern values and Western canons.

In the next chapter, I present a follow-up study of the MEH conducted with a co-researcher, Malgorzata Powietrzynska. The study conducted after two-and-a-half years of the original administration of the MEH, and focuses on three students from the same study, along with my personal narrative as educator and researcher.

CHAPTER 6

EXPLORING MINDFULNESS AND EMOTIONS IN A CONCEPTUAL PHYSICS CLASSROOM OF AN ELEMENTARY TEACHER EDUCATION PROGRAM

Introduction

In this chapter, I present the results of a co-authored study with Malgorzata Powietrzynska (2016). After two-and-a-half years of the implementation of the Mindfulness in Education Heuristic (MEH) in my Conceptual Physics class, Malgorzata and I invited three students and administered the same MEH to see if the students were “more mindful” upon completing the heuristic for the second time. The three selected students had the highest score from the first administration of MEH and provided a narrative to all the characteristics. Total mindfulness score was determined by summing the participants’ numerical scores across all characteristics with greater scores interpreted as demonstrating high levels of mindfulness.

Based on an earlier study conducted at Brooklyn College (BC), two subsequent administrations of the MEH revealed a statistically significant increase in mindfulness (Powietrzynska, 2015). Hence, we hypothesized that similar results would manifest in this follow-up study. We expected the participants to be “more mindful” upon completing the heuristic for the second time. This study was important to support and authenticate the research presented in my thesis (Chapter 3) of the MEH administered to my students.

My Role in this Study

My key contribution to this co-authored paper, are my narratives based on the original administration and my approach to teaching as a teacher-educator/researcher and a practitioner of

mindfulness. Teaching and learning physics in my conceptual physics class is based on demonstrations, videos, and simulations of real-life examples. Teaching with compassion, care, and empathy, I try my best to reduce the fear of failure, and make the subject of physics or science in general more accessible and meaningful.

Creating an environment that focuses on the well-being of my students helps alleviate the stress and anxiety caused by the standard grade-based achievement system. Every opportunity is provided to my students to succeed and earn a respectable grade. Encouraging students to breathe and think periodically, promotes the art of breathing meditation without them realizing the practice. Demonstrations and experiments allow them to pay attention to their moment-to-moment sensory experiences. This mindful approach has enabled my students as well as myself to mediate emotions while teaching and learning. Students feel unthreatened in an environment that is welcoming to learning without the fear of failure.

In this study, I present myself as an educator, a researcher, and a research participant.

“I understand why people need to ease their emotions”

I understand why people need to ease their emotions in educational field as well as public field. If they are capable of controlling themselves, then they can pay attention or learn something from others. As a future teacher, I believe everyone should have controlling power, and then we can pass our knowledge to children who need help by educating with lots of care. (Serena, Fall 2012)

The above quote by a study participant was in response to her experience with Mindfulness in Education Heuristic (MEH). In it, Serena (a pseudonym) appears to recognize that heightened emotional states may interfere with maintaining focused attention. Therefore, she believes that in order to increase awareness of and openness to (learning from and with) others, people need to be able to mediate strong emotions. To be sure, many researchers including Lisa Flook and her

colleagues (2015) note the importance of self-regulatory skills (the capacity to regulate attention and emotion) to academic and life success. Interestingly, Serena sees a potential for learning as occurring not only in the formal educational environment but also, as she states, in the “public field.” Furthermore, she acknowledges that when emotions are kept in check, there is a greater likelihood for assuming compassionate disposition towards providing education (i.e., “educating with lots of care”) to those in need of assistance.

What Serena eloquently communicated in these three sentences is what appears to be deep understanding of the intersection between emotions, education, and mindfulness, which was the focus of our study. Adopting Richard Davidson’s framework on Emotional Styles and their six dimensions (Davidson with Begley 2012) that include constructs identified by Serena (e.g., (self)awareness, attention, and attunement with/to others), we investigated emotional and mindfulness landscape in the conceptual physics course at an urban four-year college. Furthermore, as practitioners of authentic inquiry (Tobin 2014), we sought to increase incidence of mindfulness among the study participants. Informed by our earlier studies (Powietrzynska 2015), we employed heuristic methodology towards attaining both of these goals (i.e., as a data gathering tool and as an intervention). In this manuscript we discuss what we learned from the students’ responses in two administrations of MEH. We bring to focus student perceptions of salience (or lack of thereof) of emotions in this lecture-hall environment and their relevance to teaching and learning. Student responses to the heuristic constitute a feedback loop affording teacher reflection over his instructional practices. Hence, we ponder pedagogical tools practiced by the class instructor (second author) that students identify as evoking emotional responses (both positive and negative). Furthermore, we highlight this teacher’s dispositions and his value system (axiology) that appear to bring to balance his passion for science (understood in a traditional

Western way as a canon-based epistemology) and his approach to teaching that is driven by compassion towards his students many of whom perceive physics as challenging. We argue that adopting mindful disposition affords engaging in practices that assist in regulating emotions and attention that mediate learning of canonical science content. Furthermore, we maintain that, as attested by some of these aspiring teachers, the instructor and his mindfulness-driven practices become a model to be replicated in their future careers. In such context, mindfulness may be perceived as part of what is referred to as a hidden curriculum. It is our position, however, that science classroom is a site where wellness-promoting practices (such as mindfulness) should receive an overt attention by becoming, as argued by Kenneth Tobin (2016), science content to be learned and practiced by all citizens throughout everyday life thus contributing to its improved quality. In recognizing that such position may be challenging to adopt by science educators, we present the way the second author has been grappling with reframing his thinking around teaching science. We encourage educators to utilize heuristic methodology towards reflecting over and informing their practice and as one way of exposing their students to social constructs such as mindfulness.

Why mindfulness?

There is a growing interest by modern nations in how *the science of well-being* can be used to improve lives. The recently released World Happiness Report (WHR) edited by John Helliwell, Richard Layard, and Jeffrey Sachs not only provides a review of the state of happiness (i.e., well-being) in the world today but it also demonstrates how scientific evidence informs our knowledge base about cultivating well-being. In their WHR chapter discussion regarding the importance of mental health of children, Richard Layard and Ann Hagell (2015) are of an opinion that the well-being of students should be an explicit objective of every school and that education should become

as concerned with the well-being of children as it is with their academic performance. One interesting finding of WHR is that, across cultures, emotional rather than academic development is the best predictor of human life satisfaction. In other words, attending to students' socioemotional growth may be as important as nurturing their cognitive abilities. Applying neuroscientific lens, another team of WHR contributors – Richard Davidson and Brianna Schuyler (20015) – report further, “well-being has been found to be elevated when individuals are better able to sustain positive emotion; recover more quickly from negative experiences; engage in empathic and altruistic acts; and express high levels of mindfulness.” Perhaps even more importantly they point out:

the circuits we identify as underlying these four constituents of well-being all exhibit plasticity [the ability to grow and change], and thus can be transformed through experience and training (...) [that] can induce measurable changes in the brain. (...) These findings highlight the view that happiness and well-being are best regarded as skills that can be enhanced through training (p. 101).

One way to develop the four constituents of well-being is through mindfulness-based training. A growing body of research conducted in educational settings shows that adopting mindfulness practices has a potential to produce positive alterations in self-regulatory skills associated with emotion and attention, self-representations, and prosocial dispositions such as empathy and compassion (MLERN 2012). Furthermore, engaging in mindfulness training is found to be associated with benefits such as the reduction of job stress, depression, and burnout (Flook et al. 2013).

The implications for education are profound. If schools are to provide preparation for the increasingly complex life, they may need to aid our young people in developing happiness-promoting skills and, as argued by Tobin (2016), in becoming scientifically literate citizens that are able to “function locally and globally in an appropriate and responsible ways to build and

sustain wellness and well-being of the planet” (p. 29). Hence, what one learns in a science classroom should translate and have applications to multiple fields of social life. For example, learning about emotions and mindful practices in a physics class may assist in mediating one’s and others’ well-being both in and outside of the educational context. Such sociocultural approach to scientific knowledge frames it as enactment thus making it relevant to life. It is meant to depart from the currently privileged assessment- and accountability-driven model of learning and recalling science facts that are often perceived by students (like those in this class) as impersonal, detached, and irrelevant.

As we argue elsewhere (Powietrzynska, Tobin, & Alexakos 2015), in advocating for changes in the nature of science education to reflect the priorities of the twenty first century, we consider mindfulness and the use of a toolkit for ameliorating emotions (such as heuristics) as a valuable component of a science curriculum that orientates toward wellness and sustainability. Nations interested in refocusing education towards similar aims may draw on the Bhutan’s model where Gross National Happiness (GNH) rather than Gross National Product provides a measurement of the country’s well-being. As one of the domains contributing to the GNH Index, Bhutanese education decries current Western model that, in the words of David Orr, often focuses “on turning children into efficient corporate units rather than curious and open-minded adults” (Gross National Happiness 2015). Instead, as we learn in the 2016 manuscript by Sonam Daker, Jambay Lhamo & Sonam Rinchen, in pursuit of Bhutanizing the education system while drawing on the rich contemplative traditions, breath-watching sitting meditation was introduced in schools throughout the country following a series of workshops conducted to promote the values and principles of GNH. Today students of all ages undertake meditation practice at the start of each school day.

Our mindfulness heuristic explores the frequency with which students engage in enacting skills associated with increased well-being in the physics class: their ability to sustain positive emotion (i.e., to maintain positive outlook), to recover quickly from negative experiences (i.e., to be resilient); to engage in empathic and altruistic acts both towards self and others (i.e., having compassion by being intuitive and sensitive to social context); and express high levels of mindfulness (e.g., being self-aware and attentive). At the same time, the heuristic is meant to mediate adoption of mindfulness-based practices that resonate with individual students. As we demonstrate below, our participants find some of the ideas useful and express a desire to include them in their daily enactments.

The retrospective “armchair walkthrough” of the study – the why, the who, and the how

Taking cue from Julianne Cheek and her associates (2015), we now engage in a brief “armchair walkthrough” of our study towards acknowledging that, in its assumed emergent design and hermeneutic nature, it evolved over time. The initial impetus for this study came from our involvement in the collective work lead by our (the authors’) mutual dissertation advisor Kenneth Tobin. At the time, we were focused on developing and refining mindfulness in education heuristic. Our hermeneutically driven strategy was to involve multiple voices and understandings by engaging in the generative process different groups of people including graduate and undergraduate students in teacher education programs (Powietrzynska 2015a). Karim (the second author), who routinely teaches a conceptual physics course (a required course) for an undergraduate elementary teacher education program, suggested that his students be invited to participate. As in previous studies, the aim was threefold: 1) to obtain feedback on the content and format of the heuristic towards its refinement, 2) to educate students about the construct of

mindfulness whereby heuristic functions as an intervention, and 3) to learn about emotions and ascertain the level of mindfulness among a particular group of participants (thus generating what we refer to as a landscape study). When asked which of the goals were most salient in his decision to engage his students in this study, Karim identified yet another dimension i.e., educative authenticity of which he became a beneficiary by gaining new insights into his practice:

In my dialectically related roles as a teacher | researcher, I prefer to think of the goals as complimentary. A multilectical relationship (where one construct presupposes the other) allows us to explore freely without creating well-defined boundaries. I believe that boundaries prevent us from uncovering the complex relationships across multiple fields. My students' responses to the heuristic revealed a great depth into how and what they think and feel which I find extremely important in my quest towards improvements in my practice. Engagement in this research project has made me wonder more about my approach to helping alleviate the fear and anxiety of learning science shared by many of my students. It reassured me that I could help my students see science as something they can grasp with minimal effort if given the opportunity to learn freely and without fear of failure.

The data reported in this manuscript is a subset of a larger database generated by administering the evolving iterations of mindfulness-based heuristics to Karim's classes over several semesters. Specifically, we use responses obtained from 72 students during the Fall 2012 semester of the Conceptual Physics course. In this class, 92 percent of the participants were female, which, according to the instructor, is the norm. The course is a required, high-stakes class in the sense that students must earn a grade of B or higher in order to graduate from the program. The class meets twice a week for an hour and fifty minutes (110 minutes) for lecture and recitation.

The heuristic was administered on-line (using the SurveyMonkey platform) two weeks prior to the conclusion of the semester at which time students had participated in the collective class activities for over 3 months (late August through December). Since at the time of administration, the heuristic was in the early stages of development, it was relatively long; it consisted of 31 characteristics (items) accompanied by a 5-point frequency scale. Furthermore, the

way some characteristics were framed may have made them challenging to rate (e.g., the double negative in: *I am not hard on myself when I am unsuccessful*).

In addition to numerical ratings, the study participants provided 860 comments to some or all characteristics in the heuristic. Moreover, 40 students supplied feedback regarding the heuristic itself. Unlike in the earlier manuscript (Powietrzynska, Tobin, & Alexakos 2015) where we relied almost exclusively on student voices, we draw on relevant experiences of the class instructor. The instructor's insights further inform our understanding of themes identified as salient through the analyses of the heuristic responses supplied by the students. It needs to be noted that unlike Karim, I (Malgorzata) have not experienced a face-to-face interaction with the students in this class. However, reading and analyzing the heuristic comments afforded creating my subjective picture of what it might have felt like to be in the classroom. Throughout the text, we (the co-authors) provide our respective standpoints and interpretations that do not always converge. Such approach is consistent with the theory of difference where social life is assumed to be characterized by thin coherence and contradictions (Sewell 2004).

A portion of our current investigation was a longitudinal inquiry that involved a second administration of the heuristic 26 months following the first. Since MEH offers numerical representations of the ratings for each characteristic provided by study participants (i.e., Very Often or Always = 5; Often = 4; Sometimes = 3; Rarely = 2; Hardly Ever or Never = 1), it is possible to use those to generate a statistical depiction of the mindfulness landscape. A total mindfulness score is arrived at by summing participants' scores across all characteristics with greater scores interpreted as indicating greater levels of mindfulness. In an earlier research project, we registered increases between the first and the subsequent two administrations of MEH, with one being statistically significant (Powietrzynska 2015b). Hence, we theorized that similar result

would emerge here. In other words, we expected that the individuals who participated in Karim's class would emerge as "more mindful" upon completing the heuristic for the second time.

As is customary in interpretive research, we applied a principle of serial and contingent selection (Tobin 2000) and reached out (via email) to three females who appeared to have engaged with the original heuristic to a considerable extent (in addition to the numerical ratings, they provided narrative comments to every single characteristic). As we discuss later, the analysis of their responses revealed that indeed, all three respondents increased their overall mindfulness scores. In addition, we found that as their social standing changed, so did the way they responded to some of the characteristics in the heuristic. For example, Abigail, who since became a teacher, commented, "It is different taking this heuristic as a teacher as opposed to as a student." We invited the three women to review the manuscript before its publication but only Abigail accepted our invitation to do so. We consider such engagement by study participants as a contribution to not only verifying our interpretative work but also as part and parcel of authentic inquiry (Tobin 2015) whereby the participants are able to learn (and thus, benefit) from our findings.

How mindful were students in this physics class?

We begin by presenting what we learned from the first administration of MEH to this group of students. In our depiction of mindfulness landscape, we proceed from laying out some statistical data to highlighting salient themes that emerged from comments made by the study participant. Our focus is on Davidson's dimensions of Emotional Styles that coincide with the four constituents of well-being identified in the World Happiness Report.

Table 6.1
Statistical Descriptives of the Mindfulness in Education Heuristic (First Administration)

	N	Min	Max	Mean	Mode	Std. Deviation
Mindfulness in Education	72	63	128	91.39	93	14.67

As captured in Table 6.1, in this class, the overall mindfulness in education score ranged from a low 63 to a high of 128 (or between 41 and 83 percent of the highest possible score of 155). Mean and mode were relatively high at 91.39 and 93 respectively with standard deviation at 14.67.

As noted earlier, each characteristic in MEH reflects some dimension(s) of Emotional Style (ES) – Attention (A), Self-Awareness (S-A), Resilience (R), Outlook (O), Social Intuition (SI), and Sensitivity to Context (SC) (see Table 6.2). ES is defined as “a consistent way of responding to the experiences of our lives,” which “influences the likelihood of feeling particular emotional states, traits, and moods” (Davidson with Begley 2012, p. xi). How we respond to life experiences mediates our well-being to a considerable extent. For instance, low levels of resilience (i.e., inability to recover quickly from negative experiences) may be associated with prolonged stress caused by dwelling unnecessarily on negative emotions. Davidson’s research demonstrates that people have a significant capacity to shape their emotional style by modifying its dimensions (e.g., by increasing the level of resilience) through engaging in mental training and assuming mindful disposition. The phrasing of characteristics in the heuristic is such that it illustrates what form a mindful enactment (within each dimension of ES) may take in the classroom. One exception is characteristic # 28, which we have since eliminated from the subsequent iterations of MEH. Table 6.2 reflects the mean, mode, and standard deviation associated with each characteristic. We will occasionally make references to some of the values in the table as one way of interpreting the data. It needs to be noted, however, that in our analyses of the mindfulness landscape in this class, we

strive to highlight not only patterns (such as those expressed by statistical descriptives) but also contradictions (i.e., exceptionality and uniqueness) that is inherent in social context such as this science classroom (Sewell 2004).

Table 6.2
Mean, Mode, and Standard Deviation for Mindfulness in Education

Characteristics of Mindfulness in Education	Mean	Mode	Std. Deviation
1. I am curious about my feelings as they rise and fall.	3.17	3	1.007
2. I find words to describe the feelings I experience.	3.26	4	1.199
3. I identify distracting thoughts but let them go.	3.06	3	1.06
4. I am not hard on myself when I am unsuccessful.	2.64	2	1.066
5. I recover quickly when I am unsuccessful.	3.44	3 ^a	1.019
6. I pay attention to my moment-to-moment sensory experiences.	3.14	4	1.214
7. I am aware of the relationship between my emotions and breathing pattern.	2.35	1 ^a	1.269
8. I am aware of changes in my emotions and pulse rate.	2.25	1	1.219
9. I maintain a positive outlook.	4.1	4	0.79
10. I can tell when something is bothering the teacher.	3.13	4	1.198
11. I can tell when something is bothering other students.	2.93	3	1.214
12. The way in which I express my emotions depends on what is happening.	3.28	4	1.064
13. The way in which I express my emotions depends on who is present.	2.32	2	1.124
14. I can focus my attention on learning.	4.17	4	0.751
15. I feel compassion for myself when I am unsuccessful.	2.75	3	0.989
16. I feel compassion for others when they are unsuccessful.	3.04	3	1.168
17. When I produce strong emotions, I easily let them go.	3.08	3	0.989
18. I gauge my emotions from changes in my body temperature.	2	1 ^a	0.949
19. I am aware of others' emotions from characteristics of their voices.	3.5	4	1.048
20. I am aware of my emotions being expressed in my voice.	3.19	3	1.171
21. I recognize others' emotions by looking at their faces.	3.28	3	1.189
22. I am aware of my emotions as they are reflected in my face.	3.06	3	1.161
23. My emotions are evident from the way I position and move my body.	2.99	3	1.157
24. The way I position and move my body changes my emotions.	2.49	2	1.088
25. I can tell others' emotions from the way they position and move their bodies.	2.54	3	1.125

26. I am aware of emotional climate and my role in it.	2.5	2	1.199
27. Seeking attention from others is not important to me.	3.67	5	1.482
28. Classroom interactions are characterized by winners and losers.	1.47	1	.822
29. I meditate to manage my emotions.	1.9	1	1.128
30. I use breathing to manage my pulse rate.	1.69	1	1.03
31. I use breathing to manage my emotions.	1.96	1	1.106

a. Multiple modes exist. The smallest value is shown

Generating and experiencing positive emotions in the physics classroom

Table 6.2 - #14, the characteristic, *I can focus my attention on learning*, received the highest mean and had the lowest standard deviation rating (0.751). Only one student commented that she had “a lot of trouble focusing in general not just in this class.” This characteristic refers to *selective attention*, i.e., the ability to be immersed in the constant sea of stimuli that surrounds us and, yet, to pay attention to only one thing (Davidson and Begley 2012). Attracting and sustaining students’ focused attention is crucial for learning to occur and is therefore of high priority in education. Hence, caring teachers strive to enact in their classrooms attention-grabbing practices. Karim understands that the structures dealt to him and his students (i.e., a large lecture hall, the length of the class session, and the fact that some students attend other classes immediately preceding this) may interfere with paying attention and so he finds ways to mediate the level of engagement in class activities as reflected in the following quotes:

Class can be a challenge to pay attention in at times, leaving me feeling tired, and almost aloof. I can find myself 'spacing out' at times and therefore I do not believe I pay great attention to 'moment-to-moment sensory experiences.' However, that changes when live experiments, extensive writing on the blackboard (by the professor), or ongoing humorous talk is taking place – at those times I can find myself more focused.

It’s easy to focus when you have a great teacher like I do, but sometimes it is difficult because it is such a long class and a huge lecture hall.

Upon reflecting on the high mean for focused attention among his students, Karim concluded, “Of course! Demonstrations and clickers keep them engaged – they don’t have time to wander off. It’s

two hours of lecture. Using humor – funny or gut-wrenching experiences – these are things to remember.” Indeed, what emerges from students’ comments is that certain pedagogical practices help them pay attention in class, as in, “This professor does demonstrations in class that keep my attention and his humor also keeps my attention.” Furthermore, while claiming that they do not generally express their emotions in this class, students identify teacher’s use of demonstrations, video clips, and clickers (audience response system) as the source of emotional responses in, what they otherwise consider, an emotionless classroom.

Alberto Bellocchi and his colleagues (2014) report that pre-service science teachers participating in their studies on emotions identified science demonstrations as high quality learning experiences. One of the reasons behind this finding was that demonstrations were perceived as a highly engaging activity. The same authors also found evidence for the connection between demonstrations, positive emotional climate (EC), and positive emotion. A similar relationship is present in the testimonials by Karim’s students:

The feelings I experience in this class always make me want to learn more. I am always excited for the next class to see what we will be learning and the experiments that will be done (emphasis added).

Demonstrations and other pedagogical strategies become tools Karim enacts instinctively towards creating positive EC in his efforts to remove some of the students’ negative perceptions of science learning. He stated:

To alleviate fear and change the emotional climate from anxiety to a space of learning is to transform my lecture hall to playground and provide an environment that is open to discovery. The simple demonstration of filling a glass with water and covering it with an index card and then flipping it upside down while keeping my hand firmly pressed against the card and then slowly removing my hand and allow the card to support all the water inside, brings a sense of awe which immediately allows me to ask a series of related questions. When material is explained with passion to seek answers to simple questions of how and why things work the way they do with a good sense of humor, allows students to open up to the challenge of wanting to understand. Just that sense of wonder captures them

from day one. Applying these principles to their everyday experiences brings clear meaning to the various concepts in physics and helps students appreciate science in general without the fear to think it is something complicated and meant for the elite few.

Demonstrations and even video clips may be considered mindful activities since they aim at focusing students' attention on the spatial | temporal here-and-now. Oren Ergas (2015) proposes that the practice of attention is where science, wisdom traditions (such as mindfulness) and education intersect. At the same time, he reminds us of the power of students' agency in the success of educational process,

From the first-person perspective, whatever a teacher does in a classroom is an attempt to orient our attention one way or another. It is impossible to think of an attempt to teach without appealing to this fundamental resource that, as [William] James proposed – defines our reality. When 'education' is understood from this perspective it might dawn upon us that this whole endeavor is based on a resource that is not in the hands of society or the teacher but rather in the "hands" of the student's mind. (2015, p. 210)

When investigating reading literacy challenges faced by Mexican youth, Xicoténcatl Martínez Ruiz (2016) assumes a similar position by arguing that skills development is not conditioned solely by the academic environment and pedagogical approaches. Instead, he warns that the mental state of a stressed or depressed student – or one who is absent from the present moment – will have negative effects on the development of requisite competencies. It is, therefore, that much more important to pay attention to students' socio-emotional needs and states.

To be sure, students in my class comment most favorably on the positive attitude (i.e., high level of positive outlook) I foster, which in turn contributes to "feeling positive" since the lectures "are usually given over in a funny manner" and are full of "funny analogies" and "humorous remarks." When prodded about their awareness of teacher's emotions (e.g., characteristic # 10), students describe me as always being in good and happy mood, composed, funny, bubbly professor, always smiling, always making funny jokes, cool, calm, and collected. The infectious

nature of the instructor's positively valenced enactments may be an example of emotional contagion (Collins 2004) that contributes to the quality of the collective EC (described by the students as "tranquil, happy, positive aura in the classroom") and to the good flow and outcome of classroom interactions as exemplified by the following comments:

Having positive attitude when participating in a class, body language, [body] temperature, and the professor all play a vital role in the success of the student in class. Any hint of negative energy will affect the progression of the class and how each individual session carries out.

Having a positive attitude, I believe will increase the overall emotion of the class.

Indeed, the characteristic referring to positive outlook (i.e., how long and how well one can sustain positive emotion) received the second highest mean in this class. In a way, my class becomes a site where "how" to teach (teaching pedagogy) becomes as important as (and perhaps even more important than) what is being taught. These future teachers take cue from their instructor who they say encourages them to follow his example in creating a stress-free environment, which "makes it easier to learn."

It's easy to keep a positive outlook when Gangji is jumping on tables and making everyone laugh! It's pretty difficult to be negative actually.

These students' perceptions of me as an educator, are a reflection of what I aim to accomplish in this classroom and the manner in which I present myself as exemplified by the quote below:

Teaching with sincere passion and being always excited and completely immersed in the topic captures the students' attention and interest as well. I find humor to be a very powerful tool to teach when integrated with funny demonstrations which at times are set to fail intentionally to capture their attention and then spend time explaining why it failed and how it should work followed by a perfectly executed demonstration. I have always found that a majority of the students (if not all) tend to remember those funny moments and when it is used in context to explain something, they tend to recall the material better. The emotion of being passionate is aided by the emotions generated with being humorous.

As noted earlier, ability to sustain positive emotions is one of the contributors to well-being. Therefore, what these pre-service teachers experience in this classroom is an adjunct to and indeed goes well beyond the canonical science content, thus having a potential of being replicated by the class participants in their future professional practice and in other fields of their social lives. Use of heuristic may be considered a practice that expands and further reinforces this knowledge. In this sense, these students are exposed to epistemology, which, despite it not making it to the official course outline, may translate into benefits to its recipients and those they do/will interact with.

Stephen Ritchie and his associates (2013) find the link between discrete emotions and learning to be “much more nuanced than generalizations such as positive emotions are good and negative emotions are bad.” They further remark, “even though positive emotions may be desirable for learning, some negative emotional experiences can afford opportunities for learning” (p. 12). We noted that our study participants associate some memorable and instructive experiences in this class with negatively valenced emotions. One student, for example, commented, “I get *sad* or *frightened* when watching the video clips, and surprised and *anxious* during some of the class experiments.” When responding to characteristic # 12 (*The way in which I express my emotions depends on what is happening*), another participant is fairly open sharing experiences of what might be labeled as negative emotions (sadness and frustration):

I remember watching the TAC [Transport Accident Commission] commercial during class and had tears rolling down my cheeks but *it was appropriate* and getting frustrated when I don't understand something during class, I'll quietly ask my neighbor (but I won't yell and scream). *So, you have to be aware of your surroundings in order to properly react* [emphasis added].

This characteristic probes the Sensitivity to Context dimension of ES (the ability to regulate emotional responses to take into account the context one finds oneself in). This student appears to have a good grasp on social context, recognizing when a particular emotional response is

“appropriate” and emphasizing the need to be aware of one’s surroundings as a condition to “properly react.” When considering a related characteristic (# 13), which focuses on how presence of others mediates emotional response, some students maintain that they will only express emotions with classmates who they feel comfortable with (i.e., those students they have formed a social bond with). But for many (as evident from the relatively low mean for this characteristic), “it doesn’t matter who is present in the class” since, as stated by the participants, “I’m not there for other people” and “I really don’t care what people think.”

Indeed, social bonds, which may be important for science learning (Bellocchi et al. 2015) and, more generally, for well-being (Helliwell, Layard, & Sachs 2015), appear to be minimally present in this class. Some students say that they do not notice, observe, pay attention to, and are not connected to their classmates often attributing it to the class size. Instead, listening to the teacher, focusing on the material being covered and on “what is going on in class” (as if presence of other students was not part of its structural flux) all appear to be the primary goal. Indeed, some of these pre-service teachers consider caring about others as distraction (e.g., “I don’t really care about what is bothering them [other students] because I pay a lot of money to learn something not to be distracted.”) These comments point to what many young people are conditioned to regard and value as education (i.e., “learning something”), which is predetermined by society.

The balancing act: Investigating sources and ways of mediating negative emotions

The society-imposed macro structures that include the need to master the official class content (perceived by students as challenging to learn) and the high stakes nature of the course are identified by these pre-service teachers as sources of negative emotions. Educational researchers such as Aislinn O’Donnell (2015) note, “practices, institutional structures and objectives and aims

in education create stress, comparison and anxiety” (p. 197). For many students in this class, “It can be difficult to maintain a positive outlook when you know how important passing a class can be, especially if you aren't doing as well as what you hoped for.” Furthermore, students find it hard to stay positive “when learning about something that you just know you're going to have a hard time grasping.” Lack of success is framed as not being able to understand, providing a wrong answer to a clicker question, performing poorly on exams, and earning poor grades.

At the same time there is evidence of students placing high expectations on themselves to do well in the class. To that end, they say they use failure as an internal motivator to do better, to study more, to focus more, to try harder, to change study methods, to try to find new ways to succeed and do well. Unsuccessful moments become strength to learn from mistakes, and to get back on track. Students maintain that they recover quickly from their academic failures; we recorded a relatively high mean for the relevant characteristic in the heuristic (#5). The characteristic refers to the Resilience dimension of ES (how quickly one can bounce back after experiencing adversity). At the same time, when responding to the related characteristics (*I am not hard on myself when I am unsuccessful* and) students express a myriad of negative emotional responses that arise in connection with academic difficulty or failure: feelings of shame, embarrassment, disappointment; getting upset and mad; crying; dwelling on the failure; stressing over the workload; putting oneself down; being unhappy, annoyed, frustrated, regretful, angry, and disheartened; blaming oneself and hating it, as exemplified in the following quote:

Usually when I am unsuccessful, I'm quite hard on myself. It's frustrating when you fail at something that you enjoy so much, especially when you think you understand it.

Karim attempts to mediate some of the structures that may be a source of negative emotions. Importantly, the way he approaches framing of the course is an example of engaging in what

Kenneth Zeichner and Daniel Liston (1996) understand as reflective practice whereby the teacher “questions the goals and the values that guide his or her work, the context in which he or she teaches” and “examines his or her assumptions” (p. 1). Karim states:

What is commonly forgotten in the standard practice of preparing a syllabus strictly based on content is the human element to teaching which requires one to be mindful of the audience, their background and their needs. I seek to understand my students first and prepare a syllabus based on what I think is most meaningful for my students. Being aware of the negative emotions and the anxiety that come with the subject title - physics, the challenge is twofold: first, how do I design a course to dispel the myth of this most fundamental and basic subject matter, and second, how can I present the material to capture my students and allow them to enjoy a science course without the fear of failing. Being attuned to my students’ needs and knowing that a majority of them are pre-service elementary education majors, I model mindfully what is taught, and how it is to be taught.

As noted earlier, high level of resilience is associated with improved well-being. Drawing on research showing the importance of resilience in positive mental health, Michelle Keye and Aileen Pidgeon (2013) investigated factors that may strengthen resilience among university students. They found mindfulness and academic self-efficacy (i.e., “the interpretation individuals give to their own performance and achievement” (p. 2)) to be significant predictors of resilience. This finding is consistent with what we uncovered in this study; low levels of resilience may be a reflection of students’ apparent self-perception of their poor academic efficacy and what we consider to be relatively low levels of mindfulness. Thus, mindfulness-based interventions and those that target increasing students’ self-efficacy might be of assistance. As the students commented, in this class, the instructor appears to be a valuable external source in counterbalancing low levels of resilience by making students feel like it is okay to be incorrect sometimes; by helping in any way he can; by trying to instill a sense of self-esteem; by going above and beyond to help them; by creating an environment that helps them understand; and by being less concerned about grades in favor for understanding the ideas. Indeed, some students

appear to understand that grade is just a number, the class is not all about test grades, and it's the understanding that counts. With these statements, the students appear to be aligned with how Karim frames his understanding of the essence of educational pursuits:

Even though (or perhaps, because) this is a high stakes course, I try to create an environment to allow my students to learn and enjoy science by making connections to their personal experiences at a pace where they can reflect on their understanding of the given concept. Hence, each student is allowed to show his/her understanding in multiple ways rather than just determine his/her content knowledge based on a number earned on an exam alone. The quest for knowledge should be based on the desire to learn for the sake of learning rather than driven by the desire to earn a silly number on an examination. It is a challenging task but doable.

Students appear to be much less skillful when it comes to drawing on the internal resources towards faster/smooth recovery from failure. Cultivating self-compassion, which characterizes mindful disposition, may be understood as an alternative to being hard on oneself. Yet, responses to the relevant characteristic (*I feel compassion for myself when I am unsuccessful*) indicate that instead of being self-compassionate students “often beat [themselves] up for doing poorly.” Some may experience self-compassion if they don’t do well provided, they had put in what they consider “sufficient effort;” otherwise, they believe “they deserve” to fail. Part of the problem with low levels of self-compassion among these pre-service teachers may be that they interpret the construct as “feeling sorry for oneself” rather than as suspending judgment towards self-acceptance. With its insistence on/demanding focused attention, education may be discouraging or neglecting the other dimension of attention that is equally valued in contemplative practices – open, non-judgmental awareness (the capacity to remain receptive to whatever might pass into one’s thoughts, view, hearing, or feeling and to do so in non-critical way). Open, non-judgmental awareness is critical for being tuned inwardly and outwardly and as such plays an important role in Self-Awareness (how well one perceives bodily feelings that reflect emotions) and Social

Intuition (how adept one is at picking up social signals from the people around) (Davidson with Begley 2012, pp. 59-60). In a sense the relationship between S-A and SI may be likened to what Ergas (2015) refers to as a spatial split between *in here* (or what it feels like “to be me”) and *out there* (“not-me”).

Several characteristics in MEH address these two dimensions of ES (i.e., being able to recognize emotions in self and in others). We draw on the previous research into the bi-directional relationship between emotions and physiological changes including pulse rate and breathing patterns (Tobin, Alexakos, & Powietrzynska 2015) and the link between emotions and facial expressions, tone of voice, and body movement/positioning investigated by Tobin and Ritchie (2012). The analyses of student responses return mixed results. As noted earlier, for the most part, students do not believe classroom to be a space where emotions are experienced (arise or are present) or where it is appropriate to express them. For some students, awareness may be reserved for and/or limited to the “curricular” matters as in, “I try to be aware of the material presented, nothing else.” But some recognize how their emotions may mediate those of others as expressed in the following quote:

Of course, I'm aware of this [my role in emotional climate] because if I'm feeling down, my neighbor may hesitate in asking me a question. But if I'm actively involved (which I usually am), then my neighbor will feel encouraged to join.

Ability to recognize emotions of others is a precursor for engaging in pro-social behavior through the activation of empathy and compassion. Empathy may be understood as sharing the feelings of others while compassion is a feeling of concern for another (WHR, p. 98). Pro-social behavior is associated with better health and longer life expectancy and these improved health outcomes in turn can contribute to greater well-being. Indeed, one of the strongest predictors of well-being is the quality of an individual’s social relationships. These students appear to be quite adept in

recognizing distress in their instructor (characteristic # 10). They say he gets frustrated, annoyed or disappointed because of students' inappropriate conduct such as not paying attention, engaging in conversations unrelated to the class topic, or not performing well (by not answering the questions correctly, not paying attention to the wording of the questions, or not understanding the concepts). Students "read" teacher's emotions through his lowered tone of voice and facial expressions.

They also recognize the teacher's self-professed ability to "pick up" on facial expressions of his students such as a look of confusion on their faces. While for some students it's easy to recognize when the professor gets upset since he generally displays a positive attitude, others claim he is good at hiding negative emotions. Still others believe that "the teacher never seems like anything is bothering him because "he's always smiling and always making funny jokes" for students "to actually like physics instead of dreading it." There is evidence of students empathizing with the teacher as in, "I feel really bad when Gangji gets upset" and, to a lesser extent, feeling compassion towards their classmates.

Daker and her colleagues (2016) report on the way loving-kindness meditation (which they understand as the wish that all beings be happy) assists Bhutanese pre-service teachers and teacher educators in nurturing connection with students through empathy. It also promotes the capacity to connect with inner self and with others, which fosters collegial dialogue with other educators, helps to develop a loving acceptance of self especially in the difficult situations, promotes a better intra and inter-personal relationship with individuals and in the immediate environment.

In the auto-ethnographical account, Linda Noble (2016), a physically and emotionally stressed veteran teacher, embarks on mindfulness journey in search for ameliorating disharmonies in her life. She discovers that acceptance and non-judgment of self and her students replaces fear.

By being emotionally flexible together they tune in to their needs for positive classroom interactions. Noble maintains, “greater self-awareness and connection makes me empathetic to my students, transforming our relationships” (p. 92).

In our earlier research (Powietrzynska 2015b) we used collective breathing meditation practice as an intervention to regulate emotional reactions and to promote mindfulness among in-service and pre-service science teachers. Even though, we did not formally demonstrate the practice to the students in this study, we indirectly introduced it and its benefits through relevant characteristics in the heuristic (# 29, 30, and 31). The following quote is a testament that our heuristic was indeed of assistance in increasing awareness about and in sparking interest in the benefits associated with breathing meditation:

After taking this survey [heuristic], it made me think about how breathing techniques may help my learning and emotions. Studies have shown that breathing techniques may help reduce stress and create stability. I did not think about trying to use different breathing strategies during class to calm myself when feeling stressed.

In their comments, students point out that the instructor often encourages taking deep breaths prior to exams and when in distress. At the same time, very low means associated with these characteristics seem to indicate that unsurprisingly, the majority of students in this class do not often engage in a breathing meditation practice. What we find encouraging, however, is that a handful of student’s report utilizing the practice towards alleviating anxiety and buildup of negative emotions that might be associated with learning:

Often when I have anxiety and I don’t understand something I tend to breathe in and out so I could control my anxiety.

The few times I’ve been upset or angry in class I’ve told myself to close my eyes and take deep breaths to avoid crying or my emotions building up.

We also learn that the practice may be seen as beneficial in life more generally. Students recognize that “breathing is always used to calm people down.” Some of them say they do use breathing to

manage their emotions when needed. They also comment that deep breathing helps to relax them as well as to clear any negative thoughts. As it brings down their anxiety, they find themselves no longer as frustrated as they might have been before.

Karim's upbringing as an Ismaili Muslim included daily meditation and has shaped his way of being in the world including his identity as a science teacher. As such, his practice is an embodiment of mindfulness he has come to embrace. His life philosophy is expressed in the following quote:

From a very young age growing up in Tanzania, East Africa, my identity was shaped by my faith which instilled in me deep roots of voluntary service, caring for others, and valuing education as the means to helping humanity. The words and teaching of His Highness Karim Aga Khan IV, the spiritual leader of the Ismaili Muslims, have been central to all I have been and wish to become to make a difference in the lives of others to live in a peaceful pluralistic society.

“I just sit down and relax (...) instead of yelling.” Becoming more mindful?

As noted, we reconnected with Karim's three former students 2.5 years after the first administration of MEH asking if they would complete the heuristic again. These three participants were chosen because of what appeared a relatively high level of engagement with the original heuristic (occasion I) – they each provided comments in response to the majority of characteristics. After we made our selection, we discovered that Abigail, Rosina and Serena (all pseudonyms) represented different ethnic/religious backgrounds. This was not a surprise to us since Karim's class was fairly diverse. Thus, Abigail, stated she was “a proud Jewish woman,” Rosina identified as an Italian-American Roman Catholic and Serena as Asian of Islamic faith. Furthermore, our email exchanges with the three women revealed that they each followed a different trajectory after they earned their respective Bachelor's degrees. At the time, Abigail, who graduated with a double major in Elementary Education and in Jewish Studies, was the only one who worked as a licensed teacher. She was providing instruction to 4th grade boys at a local Yeshiva and said she enjoyed

teaching very much. Serena, who is the author of the thoughtful quote opening this manuscript, told us that she submitted application to become a public-school teacher in hopes to start teaching that September. However, she was still struggling with passing the required certification tests. Rosina decided not to pursue a career as an elementary school teacher. Instead, she enrolled in a doctoral program for school psychology with an intention “to work in elementary schools with teachers to develop educational and behavioral plans for special-needs students.”

Upon comparing the statistical results of the two occasions of heuristic administration, we registered an increase in overall scores for all three participants (see Table 6.3). Abigail, who scored the lowest of the three women on the first occasion, made the highest gain (12 points or 17.5%) while Serena and Rosina raised their scores by 16.4% and 10.2% respectively. The second occasion returned higher means and lower standard deviations. We noted that Serena was among the top 10% of the highest scoring students on the original MEH. Furthermore, on second occasion, her overall score of 132 exceeded the maximum score reached by her classmates (128) during the first administration of the heuristic. It could be argued that the change in overall score is indicative of these three participants exhibiting higher levels of mindfulness when compared with their prior results. In other words, the three females might have become more mindful.

Table 6.3
Variation in Values of Statistical Descriptive for Mindfulness Over Two Occasions of Measurement of MEH

	Occasion	Total Score	Min	Max	Mean	Mode	Std. Deviation
Abigail	I	84	1	5	2.71	4	1.27
	II	96	2	4	3.10	4	0.91
Serena	I	114	1	5	3.68	5	1.54
	II	132	1	5	4.26	5	1.18
Rosina	I	92	1	5	2.97	4	1.22
	II	101	1	5	3.26	4	1.00

Our logic model of theory of change draws on Bourdieusian construct of reflexivity (Bourdieu & Wacquant), which may be understood as becoming aware of the unaware. Participants in our studies often comment that heuristics draw their attention to structures they have not considered in the past as in the following quote by one of Karim’s students:

Well, it [the heuristic] definitely got me to think about little everyday things that usually go unnoticed by me; things I never really took the time to think about. I’ll probably be a lot more aware of the people around me in class now.

Thus, heuristics become a site for reflection over the way one enacts social life vis-à-vis other possibilities. We theorize that when this happens changes in conduct are likely to occur. Indeed, Bargh argues:

[S]tudies suggest that an unconsciously perceived stimulus may suffice to cause someone to actually pursue a goal without any awareness of how it originated – no conscious deliberation or free will required (Bargh 2014, p. 37).

Since we acknowledge complexity in social life, we admit that factors other than the heuristic might have also contributed to the increase in mindfulness scores among these three participants. We are not claiming that this shift is attributable to the use of the heuristic alone or that A causes B, i.e., completion of a heuristic by an individual is behind the adjustment in the way she reports

she conducts social life. To be sure, the statistical data is used not to make any causal claims but rather to provide another representation of mindfulness landscape (and its possible transformation) among participants of this study. It is possible that by virtue of their intense engagement with the heuristic, the three women might have given much thought to each characteristic and thus subsequently exhibited higher levels of mindfulness. Alternatively, the level of engagement with the heuristic might have been a consequence of the three women being highly reflective individuals to begin with. When commenting on the original heuristic, Abigail expressed some level of skepticism regarding its applicability to the class environment. At the same time, she acknowledged the awareness raising property of MEH and its focus on emotions:

I thought some of the questions were too far-fetched and did not apply to our class setup. I did, however, find that the questions [characteristics] brought certain concepts to my attention that I did not notice before, for example my emotions.

Indeed, when we analyzed Abigail's responses to the second occasion of the heuristic, we found evidence of her self-reported awareness of expressed emotions in her classroom (e.g., "I will sometimes express my emotions to the class when I am really happy or proud of what they have done or when I am disappointed in their behavior."); her sensitivity to her students' emotional states (e.g., "Some students are easier to understand than others but I try to put myself in their place and understand what's really bothering them."); and her attunement to her body's response to stressful situations/negative emotions and ability to enact what may be considered an in-the-moment mindful practice (e.g., "I often catch myself with a fast heart beat and then just sit down to relax and wait for the boys to calm down, instead of yelling at them."). It appears that Abigail finds the heuristic quite applicable to her practice as a novice teacher.

Garnering the courage and righting the wrongs: Creating mindful climates

We conclude this chapter in the co-author's (Karim's) voice that captures the essence of our mutual conviction that when engaging in the emotional craft of education, we must look beyond narrowly defined curricula and be mindfully aware that *how* we teach is a major element of *what* is being taught | learned:

When I first started teaching this [Conceptual Physics] course, I recall the *fear in most of my students* and no matter what I did, it never made a difference. So, I had to think deep and hard as to what the intention of the course should become and I wondered how I could make my students enjoy physics and succeed. I still didn't have the answers but I had the courage to accept that I was doing something very wrong. (...) Understanding the role of emotion and the emotional climate in the lecture hall helps define that *human element, to teach with compassion and care, to teach mindfully*. Sadly, not many [science teachers] take the time to understand that teaching is a human endeavor that should take into account the person in his/her entirety and not only the content we teach without understanding who the recipient is and how it is received. Emotions and the emotional climate we create in our huge lecture halls can catalyze a disparity and disconnect our students from what we want them to learn and understand (emphasis added).

What I have learned from this study - Modeling the practice of mindfulness

This study has allowed me to reflect further with a critical lens to model the practice of mindfulness for my students. After the first administration of the MEH, I have made it a common practice to administer a short five-minute-long reflective questionnaire before each examination, to help them focus, relieve stress, and openly express how they were feeling at that exact moment. The questions address three points: 1. How well prepared they were, 2. How nervous or anxious they were feeling, and lastly, 3. Describe what the test is all about. Based on student response and just observing my students during the examination, I find them to be more relaxed and focused.

The emotional climate we create in our classrooms to encourage our students to enjoy learning for the sake of learning, allowing them to reflect their understanding with their peers, produces a positive and conducive environment for teaching and learning. The practice of

mindfulness has enabled me to pause more during lectures only to let student discussions guide the lesson. The heuristic has changed my practice and has made me more aware of myself and my students as well.

In the next chapter, I explore and learn about the ancient art of Jin Shin Jyutsu with mindfulness. In this study, I find myself as a researcher and a research participant. This is a co-authored research paper with Kenneth Tobin, Konstantinos Alexakos, Anna Malyukova, and myself (Al-Karim H. Gangji). This research focuses on two students, Anna Malyukova and myself, conducted during a presentation at the Urban Science Education Research – Seminar (USER-S) at the CUNY Graduate Center.

CHAPTER 7

JIN SHIN JYUTSU AND AMELIORATING EMOTION, ENHANCING MINDFULNESS, AND SUSTAINING PRODUCTIVE LEARNING ENVIRONMENTS

Introduction

Complementary to my study of Mindfulness and its implication to the wellbeing of my students and myself, I was introduced to the ancient healing art and practice of Jin Shin Jyutsu (JSJ) by my mentor and advisor, Kenneth Tobin. JSJ is a traditional form of non-invasive acupressure therapy rediscovered by Jiro Murai in Japan in the early 20th century. JSJ is based on the principle that health and illness are related with either the harmony or imbalance of vital life energy called “chi”. Our bodies contain energy pathways that help regulate and nurture internal organs. If any of the pathways become restricted, the flow of energy is interrupted, resulting in pain or illness. JSJ is practiced by applying light finger pressure on specific areas of the body called “safety energy locks” to restore the flow of chi. There are twenty-six “safety energy locks” to address disharmony in the body.

Skeptical at first, due to the formal training in physics and science based on Western canonical ideology, enabled me to reflect deeper on the concept of “life energy”. Understanding the concepts of energy in physics is in-itself an abstract mathematical construct, made me realize, this idea of life energy (chi), in a metaphysics sense, must have significant merit. A curious interest in the art of JSJ began to develop as I reflected on the concept of life energy. Realizing the benefit

of JSJ to relieve stress, anxiety, fatigue, pain, and promote wellness and create emotional equilibrium, enabled me to relate this to my study of mindfulness.

My role in this research

As a doctoral student, along with Anna Malyukova (co-author), we were both, in a dialectical relationship, a researcher | participant, guided by Kenneth Tobin and Konstantinos Alexakos (first and second author) at the Graduate Center of CUNY. While participating in a panel discussion at the Urban Science Education Research - Seminar (USER-S), our presentation was analyzed in terms of the occurrence of JSJ-like touches and holds. The analysis of my body posture and orientation, movement of my arms, legs, and hands, revealed unknowingly in terms of JSJ, everything I naturally do, to relieve stress and maintain positive emotions. Becoming aware of the unaware, heightened my practice of mindfulness. Central to my own research, as a teacher-educator | researcher, JSJ has provided a means to alleviate stress and anxiety, and maintaining my health and wellbeing. It is a practice that I have adapted to mindfulness while teaching.

In a context of graduate education, I study intuitive uses of Jin Shin Jyutsu, a complementary theory of wellness that involves harmony and universal energy flow through the body. I adopt a multilogical approach to research in which we study events selected from videotapes of a doctoral class and two doctoral students (Anna Malyukova and myself) critiquing presentations at a seminar. The research incorporates numerous sociocultural theories together with Jin Shin Jyutsu – adopting a standpoint that different theoretical perspectives illuminate experiences in ways that are synergistic, having the potential to reveal radically different research foci, associated research outcomes, and potential implications. What I have learned is that those we studied (myself included) continuously used touches, holds, and sequences of touches and

holds (i.e., flows) that involved those parts of their body that were accessible to them. The prevalence of JSJ-like touches, holds, and flows are consistent with an assertion that emotions and well-being are controlled intuitively in an ongoing manner that harmonizes universal energy flow and contributes to maintaining good health. This exploratory study sets the stage for further research involving interventions to ameliorate excess emotions and ensure that teacher and student roles do not adversely impact health.

Jin Shin Jyutsu and ameliorating emotion, enhancing mindfulness, and sustaining productive learning environments

Kenneth Tobin (first author) recalls his earlier experience as a participant observer in a high school science class in suburban Perth, Western Australia.

Ken: "Oh my goodness, that was a nightmare! How could he stand to come to school and experience that, five days a week?" It was 1984 and I had just finished being a participant observer in a high school science class in suburban Perth, Western Australia. I was debriefing with a senior colleague from the United States following a class in which the students were extremely disruptive. The totally dysfunctional learning environment was a shock to both of us. Students were verbally disrespectful to the teacher and openly violated etiquette by moving around the classroom, often engaging in horseplay as they pushed one another, laughed boisterously, and loudly called out to peers. In fact, my colleague and I were both highly emotional as we fought back tears. The teacher was a personable, self-assured, well-qualified science teacher, who was also a prominent, highly accomplished martial artist (a status that did not deter students from being disrespectful and interacting with one another physically). The teacher never had a chance to be effective with his students. As science teacher educators we were very sad about what we had experienced. First, we were sad for the teacher who never gave up despite repeated failures to teach effectively. How long would this teacher continue in such unrewarding conditions? Second, we were sad for the students who had no chance to succeed in such an unpleasant and unproductive learning environment.

As we struggled to make sense, we called on our extensive experiences as science teachers, science teacher educators, and classroom researchers. We prided ourselves on being up-to-date with the latest theories and empirical research and had recently embraced interpretive research methods in

an endeavor to address what we considered to be the big questions that faced educators – including macro structures such as the assessment system and tracking that tended to structure schools throughout an entire state of Australia. As rich as our research proved to be, it was silent on the role of emotions and the inability of the teacher and students to ameliorate an excess of emotion when and as necessary (Tobin and Gallagher, 1987). Our silence about the role of emotions and our failure to intervene in what happened in that study lead us to two important points – first, theoretical frameworks illuminate experiences in particular ways that simultaneously obscure other important patterns and contradictions that simply remain unnoticed. Probably it is a good idea for researchers to ask sincerely – what else is happening? What more is there? In asking such questions it is essential to listen and learn from different voices that reflect different life experiences. Second, there is little doubt that our sorrow after the participant observation at the school was genuine and deep. We were shaken up. However, we also benefited a great deal from the research – in ways that did not extend to the teacher and his students. Sure, we could argue that generations of teachers and students would benefit from our hard work in producing good research and publishing what we learned in high impact journals (Gallagher & Tobin, 1987). However, just as we now have a plethora of theories to illuminate classroom experiences, we also have new methodologies and ways of generalizing from research to ensure that participants benefit from their involvement in the research. Although it took two decades to happen, we now adopt methodologies that are designed to benefit all participants equitably (Tobin, 2015a). In the next section of this chapter we describe key features of authentic inquiry, a methodology that addresses equity of individuals and collectives.

Authentic inquiry

Ontological authenticity

Over the years we have developed authentic inquiry from Ebon Guba and Yvonna Lincoln's (1987) fourth generation evaluation (Alexakos, 2015; Tobin, 2015b). Basically, we adopt four authenticity criteria (i.e., ontological, educative, catalytic, and tactical) identified by Guba and Lincoln, adapting them to fit in a multilogical approach to social inquiry (i.e., multiple methodologies that complement one another). Ontological authenticity addresses the perspectives different stakeholder groups have about what is happening and why it is happening. As a result of doing research we seek to use procedures to afford all stakeholder groups changing their perspectives about questions such as: what is happening? Why is it happening? What is normal? What is preferred? What should happen next? Ontological authenticity recognizes that theory illuminates some things that happen and obscures others. Hence, by heightening awareness and understanding of new theories and their applicability to the classroom, all participants have opportunities to see differently, discern changes, and vary their expectations for what ought to happen.

Educative authenticity

Educative authenticity provides opportunities for all participants to learn about others' perspectives – to understand them, see their value, and show respect for difference. As a result of being involved in research all participants should be educated about others and expand their knowledge base to include different perspectives and the values they show for social differences/categories and knowledge systems that differ from what they consider to be true and of value.

Catalytic authenticity

Catalytic authenticity addresses the importance of institutional changes occurring as a result of being involved in research. Collective improvements should occur during the conduct of research; not just higher attainments of individuals. In the case of the research reported in this chapter, catalytic authenticity would entail changes in the teaching and learning practices associated with

a number of collectives involved in the research – including classes in which the four coauthors are currently involved as teachers and/or learners and the enactment of a monthly seminar program. What is learned from the conduct of the research reported here should lead to changes in conduct that goes beyond individuals changing what they do, believe, and value. Specifically, changes in ontology and being educated about others’ perspectives will change the nature and quality of interactions – thereby changing the nature and quality of networks.

Tactical authenticity

Tactical authenticity involves individuals benefiting equitably, in ways that are of value to them, as a result of their participation in a study. For example, researchers might benefit from publication of what they learned, teachers might learn new ways to be effective and earn promotion to leadership positions. Some students might learn how to be more effective learners and others might learn how to focus and sustain their participation and engagement. Care must be taken to help those to succeed who cannot readily help themselves. That is, through the design and enactment of a study all instances of inequity should be addressed proactively. The responsibility extends beyond becoming aware to include designing interventions and ensuring that positive changes occur.

In the following sections we describe the central tenets of a methodology for the research described in this chapter, what we learned from the research and implications for professional changes and for literate citizenry. First, we lay out some central sociocultural perspectives.

Sociocultural perspectives

William Sewell Jr.'s paper on agency and structure (Sewell, 1992) provided us with a connection between agency, structure, and culture – all central tenets of our research in urban science classes, situated in a comprehensive high school in West Philadelphia. The paper served as a catalyst that

led to our equating teaching as enactment and cultural production. Having located Sewell's paper we then searched, found, and read other papers he had published as chapters in books in 1999 (Sewell, 1999a, b). Taken as a set, the three papers authored by Sewell extended our sociocultural framework, which was grounded in Bourdieu's reflexive sociology (Bourdieu, 1992). Key to a reflexive approach is that we endeavor to heighten participants' (Anna and myself) awareness about their own and others' practices (i.e., what is happening from different perspectives). Use of reflexivity is of crucial importance in our research and to all four of the authenticity criteria described in the previous section.

Culture is enacted (i.e., produced) by participants in social fields, which are unbounded (like magnetic fields are unbounded) and are constituted by structures, which are resources for the actions of participants. Action, in all of its forms, is synchronous with enactment, or cultural production, that always is both reproductive and transformative. Social agents, referred to here as actors or participants, are both aware and unaware of their enactments, which are considered to be partly agentic and partly passive. The structured flux associated with a field provides resources for action and is simultaneously reproduced and transformed by action. Accordingly, the structural flux associated with a particular field is similar over space and time (i.e., it is reproduced) and it also is different (i.e., it is transformed). Often, we refer to the structures of a field as bearing a family resemblance to the structures associated with the field at another time and/or another place. As culture is enacted in a field, individuals experience it as a structural flux (i.e., experiential) and as they experience the structures, through interaction, they reproduce and change them. Another way to say this is that actions are structured and structuring. Accordingly, structures do not determine action and neither are they determined by human action.

To cope with the complex maze of structures, participants act according to their familiarity with a particular field. Bourdieu (1992) referred to this as *sens pratique*, a sense of the game, and used the term habitus for situations in which structures of a field support particular, familiar, forms of practice rather than others. When culture is being enacted fluently, that is in settled times, actors think about some aspects of what they are doing and are not consciously monitoring other practices. In such circumstances, actions are appropriate, anticipatory, and timely. That is, enactment is fluent. A person's actions contribute to the structural flux of a field and are thereby resources for others' actions and agency. One way to think about this is in terms of participants acting to expand others' agency.

If something unanticipated happens, such as when something inappropriate is enacted or if actions are out of sync (i.e., not timely), then fluency can be disrupted and habitus can break down. That is, habitus breakdown reveals itself to actors and other participants, in its breakdown. Settled times become unsettled and flow (i.e. fluent enactment of culture) needs to be restored/repaid (Swidler, 1986). When habitus breaks down an actor might quickly resume fluent interactions in some cases, whereas in other cases additional learning (i.e. new productions) may be needed. In such cases the collective can act to support a resumption of productive cultural enactment. On the other hand, a breakdown in fluency is an opportunity for those who would like to prevent particular forms of culture from being enacted, to show resistance through their subsequent actions. This is a very familiar scenario in many urban classrooms.

From Sewell's standpoint culture can be experienced sensually as patterns that have thin coherence and contradictions to those patterns. The contradictions are reflective of the opportunities individual actors have to appropriate resources/structures for their own purposes and associated forms of agency.

The above sociocultural framework evolved in our research in the period from 1998 through 2006. The most central components were dialectical understandings of sociological constructs, represented here with a vertical bar, |, to depict that each related construct is a constituent of a whole, that dialectically related constructs presuppose the existence of one another, and that changes in one constituent will be associated with changes in others. Of course, more than two entities can be related in this way and we use the term multilectical to represent "dialectical" relationships among two or more constructs (Fellner, 2013). Some of the more salient multilectical relationships in our ongoing research are: agency | structure; passivity | agency; passivity | structure; individuals | collective; coherence | contradiction; aware | unaware; part | whole; micro | meso | macro; and reproduction | transformation. Central to our research is the epistemological position that knowledge is cultural production. As such it can be regarded/studied through the lenses outlined above; it is field dependent, and it can be viewed across multiple levels (i.e., micro, meso, macro). Participants interacting in fields enact culture, here considered as socially produced knowledge (reproduced | transformed). Like all forms of culture, knowledge is not contained in the fields of production, but is transmitted to other fields where it serves as a resource for participants' actions in those fields.

We use the construct of field to consider and study cultural enactment. When the focus is on one field, either as a lived experience (i.e. teaching a class) or as a research focus (i.e. doing research in a doctoral class), a field is a social space that can be defined by its primary activities – that is, the individual goals and collective motives of participants (i.e., goals and motives). Consider an example of participants in a research methodology class – which we can regard as a field. When participants do homework, talk with friends about a course, or just think over what happened in class they are participating in that field no matter what the time is, where they are

physically located, and who else is with them. The relationship between participation in a field and the lifeworld more generally is represented as meso | macro.

Because of the dialectical relationships between social fields (i.e., micro | meso | macro) an individual is continuously dealing with the flow of structures from all fields in his/her lifeworld. Thus, individuals experience a unique structural flux that is the foundation for social reality. Persons sharing space and time are not experiencing social life in the same way, even in those social spaces and at the times they are together. Importantly, at all times and in all places, individuals have unique experiences even though the structures produced in a shared field will bear a family resemblance among participants. Importantly, experiences are historically constituted and also reflect structures that flow across and through the fields in each person's lifeworld.

In the next section we address multilogicality (Kincheloe, 2008), a framework that situates authentic inquiry and other theories as complementary methodologies that afford numerous ways of making sense of broad questions such as “what is happening?”, “why is it happening?”, and “what more is there to be seen and learned?”.

Multilogicality

Ken: Elsewhere I have argued that science education is dominated by a mainstream that is grounded in conceptual change theories (Tobin, 2015b) and crypto positivism (Kincheloe & Tobin, 2009). These ways of thinking about research and science education have marginalized other ways of making sense of science and being a science educator. The mainstream has virtually become monosemic (i.e., one way of making sense), is hegemonic to marginalized collectives, and seems impotent to address grand challenges that face humanity, such as climate change, sustainability, and healthy lifestyles (Powietrzynska, Tobin, & Alexakos, 2015). Accordingly, we resisted forces to conform to the mainstream and forged new methodologies to improve science education and, more generally, teaching and learning throughout participants' lifeworlds.

A multilogical approach to research affords our use of a variety of frameworks to design and do research. We have heightened awareness of experience being radically polysemic (i.e., accommodating difference by allowing for many meaning systems to make sense of experience). Accordingly, we seek to maximize our learning by searching for appropriate frameworks and using them to illuminate what we learned from research. To accept a theory as part of a multilogical bricolage is not to regard it as a social truth, but to accept it as a viable way of seeing social life from different perspectives. A consequence of adopting such an approach is that research in science education will be characterized by difference, claims will be nuanced, and many of the differences and nuances will have novel implications for practices of teachers, learners, researchers, and education for literate citizenry.

For the most part our research is grounded in post structural hermeneutic-phenomenology (Madison, 1988), with ethnomethodology (Garfinkel, 1967) providing an invitation to disrupt social equilibria in order to reveal forms of cultural enactment that might otherwise remain invisible. Rather than randomly select “subjects” for study, we prefer to select participants for our research purposefully and serially. We never leave who will be involved in a study to chance and we never regard participants impersonally; as objects of research. Instead, we select participants from whom we can learn and who can contribute a different set of voices to the research. Selecting participants one at a time affords intensive research, selecting additional participants contingently, if and as necessary – that is, depending on what is being learned and what we would next like to learn. Accordingly, the research is emergent and contingent – always dependent on what happens and the sense we make of what happens, why it happens, and what more there is beyond what we have learned already.

Researching emotions

Ken: In the study we report in this chapter, we wanted to learn more about ways in which individuals access and ameliorate emotions as they enact education – which we regard as an important aspect of social life. Our interest in research on emotions began more than a decade ago, in a context of research in urban high school science in inner city Philadelphia. Classes were characterized by intense emotions that cover the entire spectrum of possibilities, including anger, fear, sadness, happiness, pride, surprise, and disgust. We studied emotions as they were expressed in the face, gestures, body orientation and movement, and the voice (e.g., Roth & Tobin, 2010).

When our research was situated mainly in New York City we focused increasingly on relationships between excess emotions and poor health (Tobin & Llena, 2012). Because teachers and students struggled for control in many of the classrooms we studied, we observed at firsthand ways in which emotional intensities cascaded out of control, often increasing stress levels and threat of physical violence. Adherence to authenticity criteria (catalytic and tactical) focused our attention on ways to reduce emotional intensity and to better understand relationships between emotions and well-being. We began to study emotions and their physiological expressions and sought to discover different ways in which emotional intensity could be ameliorated if and when necessary. Although we were concerned about the health of teachers, especially those involved in our research, we were also very much concerned with students and their well-being. It became a priority for us to design interventions to ensure that teaching and learning were not hazardous to the participants' health. We have already have taken steps to learn about different knowledge systems that address wellness and to explore the potential applicability in different facets of education – including research and teaching and learning at the college level (i.e., Tobin, 2016, 2015 a, b; Tobin, Powietrzynska, & Alexakos, 2015). All four of the authors of this chapter have had experience as learners of Jin Shin Jyutsu (hereafter JSJ) and have been involved in independent and collaborative studies in which it has been used as part of an interpretive framework in ongoing studies of mindfulness and wellness.

Jin Shin Jyutsu

JSJ is a knowledge system that is inherently multilogical, grounded in traditional medicine practices from across numerous Asian countries and dating back thousands of years. It was a healing art that was passed on orally, and gradually was lost in large part because of the global dominance of Western medicine. Its reemergence in the 20th century was initiated by the intensive and extensive studies of Jiro Murai (1886-1960), a Japanese philosopher, who studied ancient texts such as the Kojiki (Philippi, 1968) and semi-secret knowledge systems such as Tantric Buddhism that originated in India. Because JSJ is multilogical and involves forms of knowledge as practice that predated widespread use of writing, the retrieval of the "lost knowledge" involves interpretation of art objects such as paintings, sculptures, and jewelry and documents written in ways that were frequently intended to shroud understanding (e.g., the Kojiki, the Record of Ancient Things, is a story of creation that uses allegories). Murai did the hard work of extracting JSJ from these sources and then developed it empirically. In addition, Murai developed deep knowledge of acupuncture and Chinese medicine. In parallel, he undertook detailed, systematic studies of what came to be called JSJ and its applications to myriad health/wellness projects that he and others presented over several decades of the 20th century. Notably, Murai catalyzed this impressive lifetime of research by self-help – overcoming a personal diagnosis of terminal illness at the age of 26, resumed good health, and dedicated himself to a lifetime of clinical research and practices. Because his earlier practices involved documents from the Royal Archives of the Imperial Palace he was restricted from sharing what he learned until after World War II. Murai met Mary Iino (1918-2008), an English-speaking Japanese-American in 1946 and she agreed to participate in his lecture series with the designated purpose of disseminating JSJ to the English-speaking world. With a very small handful of others, Iino studied with Murai for five years before

returning to the United States, where she continued her collaboration with Murai until his death in 1960. On her return to the United States Iino married, becoming Mary Burmeister, and gradually began to add to what she learned in Japan and subsequently co-developed during correspondence with Murai.

When Iino left Japan in 1953, the group that continued to work with Murai included Iino's father, Uhachi Iino (1886-1961), and Haruki Kato (1928-2014), recommended to Murai by Uhachi. Not surprisingly, Burmeister's approach to learning and disseminating, paralleled her master's careful and somewhat conservative approach – developing the knowledge base through careful study and analyses and gradually developing a clinical practice grounded in many years of systematic study. Within an overarching framework of concern for misuse of JSJ, Burmeister also seemed reluctant to share what she knew until the knowledge base was clear in her own mind, and she had developed a network of trusted practitioners. Accordingly, it was not until 1965 that Burmeister began to teach a small number of students; thereby initiating what eventually became global dissemination.

The central tenets of JSJ involve the flow of universal (or revitalizing) energy through the body in circuits that pass through 26 pairs of safety energy locks (SELS). Unlike acupuncture points, SELs are spheres with a diameter approximately the size of the palm of the hand. The flows run vertically, through the SELS, on the center, left, and right of body, diagonally, and through 12 organ flows (e.g., stomach, spleen). The 26 SELs can stop or facilitate the flow of universal energy along these pathways. Figure 7.1 contains a schematic representation of the location of the 26 pairs of SELs on the body.

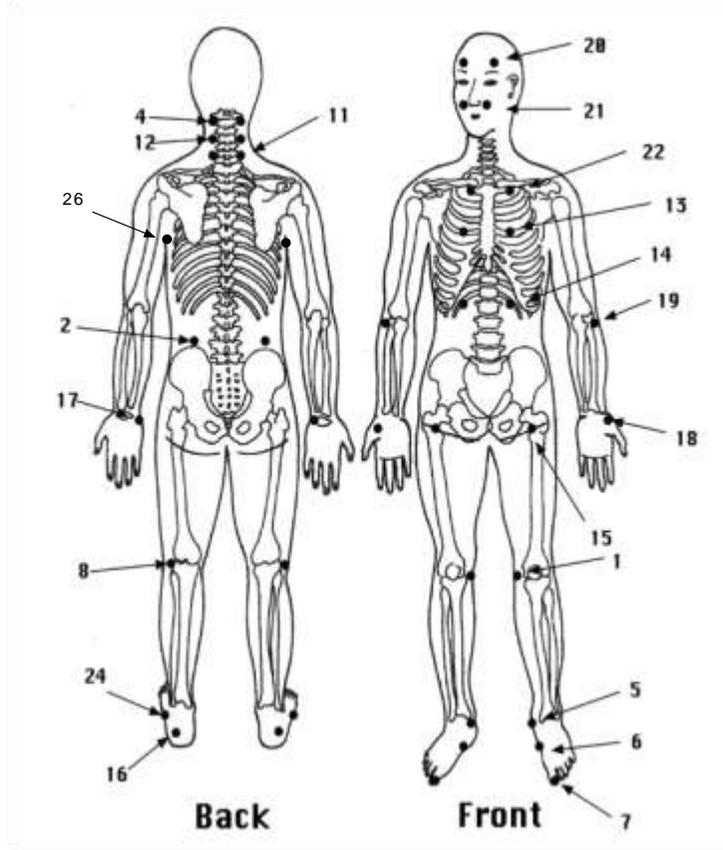


Figure 7.1 – 26 Pairs of Safety Energy locks (SEL)

The multilogical approach employed in this study employs a number of perspectives in a dynamic frame that focuses on body movements and interactions and their possible meanings and purposes. In an interview with Melissa Higgins (1988) Burmeister, perhaps the most influential contributor to the recovery of JSJ, commented: “Plato said, ‘learning is remembering.’ There is nothing we have to learn. We are always utilizing part of Jin Shin Jyutsu naturally ...” We adopt this perspective as a point of departure for observing interactions involving body movements, orientations, touches, holds, and flows (i.e., sequences of holds, and/or touches) during research activities. Similarly, Burmeister connected emotions, which she referred to as attitudes, with wellness, noting that emotions are the root of many health problems (she uses the term project to reflect the temporary nature of health issues). To paraphrase Burmeister (Higgins, 1988), revitalizing energy can be blocked at any of the 26 SELs when we abuse our bodies in everyday

life – mentally, emotionally, digestively, and physically. When blockages occur the body can respond emotionally and physically with symptoms that reflect illness. Using the analogy of jumper cables, Burmeister explained how a person can use his/her own hands, or someone else's, to get the blocked or diverted energy flowing along the appropriate pathways.

Burmeister's standpoint, as articulated above, provides a premise for this paper, which explores the extent to which touches, holds, and flows consistent with JSJ occur naturally in activities associated with the teaching and learning occurring in a graduate course in urban education at the Graduate Center of CUNY, in New York City. Kenneth Tobin, first author of this chapter, teaches the course. Anna Malyukova, a co-author of this chapter, is a student in the course. An additional site for the research reported in this chapter is a monthly seminar at the Graduate Center of CUNY, USER-S, which is a forum for faculty, graduate and undergraduate students, and other co-researchers to disseminate what they learn from their research. As well as providing a means for keeping up with the research of a number of research squads within CUNY and other universities in the New York City region, it is a safe haven for graduate students and faculty to present ongoing research to peers. Although the number of participants varies from month to month, there are typically around about 30-40 at each seminar. In this study we undertook research with Anna and Al-Karim Gangji as they enacted roles as critic for several presentations presented at USER-S.

Event-oriented inquiry

Based on Sewell's (2005) uses of event analysis in research on history we developed event-oriented inquiry (Tobin, 2015a) for uses in multilevel research that involves video analysis. An event is conceptualized as a "spike in the curve." That is, an event consists of phenomena that stand out

from what has been happening. It is something that is of interest and has the potential to be transformative after it has been researched.

Since this study is part of several years of inquiry in which we have researched intuitive uses of JSJ in different educational contexts, we have a strong desire to use what we learn from this study to design toolkits to afford all citizens to use self-help techniques to resolve health projects and ameliorate emotions when and as necessary (e.g., Tobin, 2015b). Accordingly, we looked for relevant events that stood out from what else was happening. We then identified a start and finish of each event and analyzed them in terms of a multilogical framework that we described in the earlier parts of this paper. As it happened, there were many more events to analyze than could be included in this chapter. These events will be addressed in subsequent publications. The following sections address what we learned from this research and an exploration of potential implications.

Enacting the role of critic

One format we have often used at the USER-S for doctoral students is to schedule three of them to present in a one-hour time slot. We divide the number of participants into thirds and each third is assigned to one presenter. After 12 minutes the groups rotate until each presenter has presented to each group (we refer to this activity format as a round-robin). The round-robin format provides new researchers with a comfortable arrangement of space, time, and audience size, allowing them to repeat their presentations three times.

To expand the academic conversation, the presentations conclude with a panel discussion composed of the presenters and two graduate students as discussants/critics so that they can learn how to provide productive critique. This allows the discussants/critics to provide their remarks to

a plenary session, and for the presenters and critics to respond to questions and comments from participants/audience.

At a recent seminar, September 2015, the three presentations from the doctoral students focused on research on mindfulness and wellness. The critics were both graduate students – Anna, finishing up a master's degree in Liberal Studies and Karim, who is writing his doctoral dissertation. We analyze their presentations during the panel activity in terms of the occurrence of JSJ-like touches and holds. Karim provided the first critique in 1 minute 36 seconds. Anna followed, remaining seated for the entire delivery, which took 2 minutes 25 seconds.

JSJ-like touches and holds

Karim is to the left of the other panelists, facing them as he leans back on a lectern (see Figure 7.2). His critique provides a critical review of the three presentations and connects to his own research on mindfulness and science teacher education.



Figure 7.2 – Karim frame 1



Figure 7.3 – Karim frame II

The other panelists listen to Karim, who is leaning on the lectern with his right leg over his left leg, touching lightly at SEL 1 on each leg. On an emotional level, harmonizing SEL 1 can strengthen self-confidence, calm nerves, and release stress. Accordingly, Karim's body orientation allows him to touch both right (R) and left (L) SEL 1s together and perhaps, synchronize the downward energy flow. Keeping the 1s open keeps things moving, including the breath. By holding the 1s the chest is opened up and the lungs can function to exhale and receive new breath. As Karim leans on the lectern, his right arm engages with the top. Although it is not visible, the contact of his wrist and elbow would likely engage R SEL 17 and R SEL 19. In addition, it appears as though R SEL 25, R SEL 2, and R SEL 23 are touching the lectern. If so, the pressure of the body on the lectern is a way to harmonize a number of SELs.

Holding SEL 17 can minimize nervousness and foster intuition. SEL 19 can increase self-confidence and enhance authority. SEL 25 can promote inner stillness by reducing excitement or, at the other end of the energy spectrum, overcome exhaustion. SEL 23 can overcome fear, reduce stress, increase patience, and avoid self-judgments. SEL 2 can overcome doubt, and promote self-knowledge while clarifying perceptions. If a person is sad, harmonizing SEL 2 can ameliorate the intensity of the sadness.

Karim: While I was presenting, I was fairly nervous and at the same time was extremely aware of what I was trying to express with my selected words and keeping in mind to never come across arrogant or too sure of myself. I tried to relate the presenter's work to my work on mindfulness in education. I like humor to break the tension and maintain focus and also feel the emotions of my audience at the same time. In addition, communicating with a larger audience I prefer to stand. Standing helps me relax and allows my hands and legs to be a bit freer to express my gestures clearly. And if there is a support as in this situation luckily, I had a lectern behind me, which allowed me to lean back slightly and cross my legs to calm myself and indicate to the audience that I was comfortable talking.

During Karim's presentation, Anna maintains a reasonably constant body positioning and orientation. Her L SEL 8 engages her R SEL 1 as her left leg is crossed over her right leg. Her left hand rests on her left leg, making contact with L SEL high 1. In addition, her right hand is holding her left wrist at L SEL 17.

When the energy is blocked at SEL 8, it can produce anger. Accordingly, harmonizing SEL 8 can reduce anger and build trust. Blocked 8s can increase rigidity and stubbornness; so, opening 8s can still the mind to receive new ideas. That is, opening the 8s minimizes a tendency to resist while enhancing willpower and determination. As we mentioned above, engaging SEL 1 releases stress and calms the nerves. Therefore, crossing the legs in this way is potentially synergistic. Furthermore, holding SEL 17 reduces nervousness and sets up the mind in ways that are similar to meditation, clearing the mind of the emotions and setting up a state that is ready to receive knowledge. Holding SEL 17 can help to accept new perceptions/ways of seeing, thinking, and acting. By expanding intuition, holding 17 can foster creative thinking and assist Anna to stay in the moment.

Anna: From the analysis of JSJ holds which I did while listening to Karim, I see that I was trying to build trust and be able to receive new ideas by the way my body aligned itself, and that makes me reflect back and remember how I felt at the moment. What comes to my mind first is the overwhelming emotion of anxiety, which I felt at the moment most strongly, and which were characterized in holds on SEL 1 and SEL 17, which releases stress and anxiety, but what I can also see and

reflect on, are the clues about how intelligent my body is without me even knowing it. Anxiety is all I can remember, but my hands and my legs positioned themselves in such a way that it allowed me to become not only more relaxed, but more susceptible to new ideas and new information coming from Karim, which were seen by other holds, like crossing my legs and unlocking the SEL 8s.

Karim sits down, and as he does so, he crosses his arms, resting his left hand on R SEL 14 and his right hand on L SEL 14. Because the right arm is on top of the left-arm, R SEL 17 more than likely makes contact with L SEL 18. Karim maintains this posture throughout Anna's critique of the three presentations. For the most part Karim's holds reflect those that have been mentioned earlier. The exception is SEL 14, which is situated on the front of the body and controls downward energy flows related to all digestive processes associated with organs such as stomach, spleen, pancreas, liver, and gallbladder. When SEL 14 is not in harmony worry and stress can build up. Holding SEL 14 in the way that Karim holds it as he listens to Anna's critique affords him staying calm; in a state of equilibrium. Clearing SEL 14 clears the mind.

There is a possibility that the folded arms are reaching back to the edges of the shoulder blade and that Karim is in fact giving himself a hug, by holding each of the SEL 26s. SEL 26 is located at the edge of the shoulder blade where the shoulder meets the back. Disharmony in the 26s can produce stress, diminish energy, and unsettle the mind. Accordingly, harmonizing the 26s can increase mindfulness by harmonizing all emotions and thereby diminishing stuck-ness. Harmonizing of the 26s also can involve holding the center of the palms of the hands or the soles of the feet.

Karim: As I finished and introduced Anna, I sat down with a sigh of relief, but at the same time was wondering if my critique of the presenters was in sync with my work on mindfulness and the well-being of my students. However, I immediately focused on Anna's response and as she spoke about each presenter and their work I kept thinking and feeling how much, it was related to my personal life regarding my parents and my children. A habit of crossing my hands, I have realized allows me to listen with great care and at the same time helps me calm down. In a very

short period of time (less than half a minute) I could feel my heart beat return to a normal relaxed rate and could also feel my breathing pattern to be more complete (full breaths) and began feeling calm. Yet at the same time, I felt Anna actually tied together the presenters' research work as she individually commented on their talk and connected her research work. While listening to Anna, I reflected that I might have failed in that respect and focused on the larger picture and wasn't too specific as a critic. I was aware of what I think was my failure and it kept me rather uneasy while I was listening to Anna. I managed to listen but I think I was consumed with the thoughts of not completing my responsibilities to the best of my abilities. At the end after the presentation I had a difficult time recalling Anna's remarks. After watching the video, I was relieved that I was not off topic and I actually acknowledged each presenter and then talked about my related research.

Frame-by-frame analyses of the video file raise the possibility that Karim is short of breath, possibly related to the emotion he describes in the above narrative. He seems to be breathing through his mouth at various times and his patterns of breathing appear to be mainly thoracic with an in-out period of about 4 seconds. Philippot, Chapelle and Blairy (2002) reported that primary emotions of happiness, anger, fear, and sadness were associated with characteristic breathing patterns. Use of the characteristic breathing patterns associated with an emotion led to the production of that emotion in the case of happiness, anger, and sadness. Ambiguous results were obtained for fostering fear through the use of fast, irregular, shallow breathing. In contrast, happiness/joy was produced when participants in the study used slow, deep, regular breathing through the nose. Similarly, anger was produced with fast, deep, irregular nasal breathing, and sadness occurred when participants used nasal breathing with average amplitude and frequency. Although the following suggestion is highly tentative, it is possible that the Karim's breathing pattern was associated with low-grade fear about his performance. Salient to this possibility is Karim's body posture (see Figure 7.3). It is possible that sitting in this way helps to harmonize the kidney and bladder organ energy flows. The orientation of Karim's legs presses both little toes onto the floor, his SEL 25s are engaged firmly with the seat, and his SEL 23s are engaged with the

backrest part of the chair. We raise the possibility that this posture is used intuitively to ameliorate buildups of fear, stress, and self-criticism.

As Anna begins to speak, she changes the orientation of her legs such that the left and right SEL 16s are in contact. As she did while Karim was presenting, Anna held L SEL 17 with her right hand. Anna held this posture during her critique of the first presenter. As she switched her attention to her critique of the second presenter, she began to gesture with the right hand and the tendency to touch and hold SEL 17 diminished. Throughout her critique her left hand remained in contact with her left SEL high 1. Even though the contact was not direct, the jumper cabling between the left-hand and the L SEL high 1 is effective; penetrating through the notepad in this case. Finally, as Anna began to review the third speaker, she broke contact between the SEL 16s and placed both feet flat on the floor. During this time the fingers from her right hand overlapped the backside of her left hand and fingers and the left hand retained its contact with L SEL high 1.

Each of the fingers is associated with particular emotions, safety energy locks, and organ flows (see Table 7.1). Accordingly, touching and holding fingers can make an enormous difference to the emotional and physiological harmony of the body. For example, the thumb is associated with the spleen and stomach organ energy flows, SELs 1-4, and worry. Each of the fingers is interconnected with different SELs, organ flows, and emotions in similar ways. Hence, when Anna periodically touches her fingers together, she is mediating all of the body's energy flows. Interestingly, when Anna mistakes Ferzileta's name she instinctively places her hand on Ferzileta's SEL 26. As we mentioned above this would have the effect of minimizing any stress that might be associated with the error and promoting a state of comfort and assurance. In countries like Brazil, Anna's gesture of touching SEL 26 often accompanies an apology.

Table 7.1. Relationships of fingers to organ flows, safety energy locks, and emotions.

Finger	SEL	Organ flow	Emotion
Thumb	1, 9, 16, 19, 21	Spleen Stomach	Worry
Index	5, 8, 10, 11, 22	Kidney Bladder	Fear
Middle	3, 6, 12, 13, 25	Liver Gall bladder	Anger
Ring	2, 4, 7, 14, 17	Lung Large Intestine	Sadness
Pinky	15, 18, 20, 23, 24	Heart Small intestine	Pretense

Anna: Blood was pumping in my ears really loud, as I was trying to absorb what Karim was saying about his experience as a science educator. At the same time I was trying to collect my thoughts about what I needed to say when my turn came, just a few sentences away from that moment. Meanwhile, I wondered if everyone around me could hear my heart beating just as loud as I could. I realized how nervous, how insecure I felt at that moment. In the moment I was aware of how I was being perceived by others. I took a shallow breath and hoped that it was not as evident and overwhelming to others, as it was to me. Later, when I saw the video of the event, I wanted to watch it anxiously. I wanted to observe what I was not able to see while I was in the focus of the camera. I wanted to see what I sounded like, how nervous I seemed, how much my body gave me away. If not for JSJ and the way my body responded to the changes from the outside to harmonize it, I could hardly believe how well I did. I imagine, that only a person who knows me really well, would be able to pick up on the non-verbal cues of how I turned my head on the side, or the way I pursed my lips, when I experienced one emotion or another. And how, without any knowledge of it, my body responded to restore the energy within and help itself in the most poignant (or not) moments, by placing a hand at one SEL or another to help lessen anxiety or help stay awake, help me think, or release the anger building inside. Once you learn about JSJ at least a little bit, and I am saying it from a perspective of someone who is only beginning to understand this alternative framework of Eastern medicine, you cannot help but notice it everywhere: among the people around you, your friends and family, on TV or subway, outside on the streets of the city and finally in yourself.

Writing activity

Ken: A 10-minute free writing activity is an integral part of the graduate class, following directly after a 5-minute breathing meditation that is intended to afford a higher state of mindfulness. On this occasion the free write was a little unusual

since I asked the students, prior to the breathing meditation, to specifically address possible changes to the assessment tasks they would undertake for the remainder of the course. Most of the students did not anticipate that I would provide a focus for writing and nor did they expect I would recommend more autonomy for them in terms of how they would be assessed in the course. Anna's writing reflected the unexpected nature of the structures I provided and the difficulty she had in the meditation of letting go of the focus of the upcoming writing task – it proved to be a distraction for her. During the writing activity Anna wrote 192 words.

Here are two excerpts from Anna's writing:

Anna: The provision of a focus for the writing activity was a bit unexpected. Wow! I was totally not trying to think about the question, and that of course, I could not help myself but think of it. And yet, I was able to catch myself on the thought and let it go. I finally imagined the waves of the ocean and all of a sudden, a thought came to me that looked like the answer to the question for the free write. I acknowledged that thought too and tried to let it go as best I can ...

Anna: I have many interests involving mindfulness and wellness and, I think, what I would like to do is to write short essays about different projects (of a more personal nature), mindfully surfing, mindfully pregnant, mindfully learning, mindfully critiquing and then analyze them from the theoretical frameworks/perspectives that we have been talking about in class.

Eight minutes of the video recording of the writing task showed Anna in the frame. Her upper body was clearly visible for the entire eight minutes, with a front view. Table 7.2 contains a brief summary of the touches and holds that occurred during the writing activity. As Anna writes during the writing activity, we examined the ways in which the fingers touched one another as she wrote. Anna's thumb touched her index finger and other students grasped their pens/pencils in different ways that led to the thumb being over the index finger, and in some cases the thumb over both the index and middle fingers. This opens up the salience of mudras being used intuitively for the purposes of ameliorating emotions and fostering wellness (Hirschi 2000).

Table 7.2. JSJ-like touches and holds during a writing activity

Time	SEL touch or hold
0:00	Left on R14 until
0:16 – 1:12	Left on L11/12 until
1:15	Left flat on table
3:40	Left brief touch on L11/12
03:51-3:54	L on L 20 (extending to R 20)
5:25	Interesting mudra with right when eating
05:29	L on L 21
06:34	L on L 20
06:39	R on R hi 1
06:45	L on L 20 (clears hair). Hand moves around to SEL 4-SEL hi 4
06:51	Head leans on L 4/12 region on the side/front of the neck. This hold continues until about 7:23, when Anna begins to write again. At 6:54 she is resting on 21
07:59	L on L hi 1 (probably – no clear view)
08:16	Anna hands her paper to the professor

Three of the SELs accessed during the free writing (21, 20, 4) involved clearing the mind and improving the quality of thinking. SEL 21 is concerned with worry, mental tension and unproductive thinking. Clearing SEL 21 can provide a boost of energy and an increase in understanding. Placing the hand on SEL 21 can afford improved thinking. Touching and holding SEL 20 promotes clarity of thought and increases the use of common sense, promoting awareness and intuition. SEL 4, when it is cleared, can promote peace and clarity, calming the thoughts and affording logic and common sense. Holding SEL 4 is relaxing.

Touching SEL 12 can facilitate mindfulness in that clearing SEL 12 can release all emotions – worry, fear, anger, sadness, and pretense. Accordingly, touching SEL 12 is a good way to become "unstuck," affording emotional balance, personal humility, and increased tolerance. Harmonizing the 12s can minimize personal desires in favor of “good for all.”

Anna as a student in class

At the conclusion of the writing activity, two graduate students cotaught a lesson centered on critical pedagogy. The focus of the lesson was on the methodology and associated methods used in a study undertaken by Tricia Kress (2015). We reviewed 47 minutes of the class and all students in the captured video images continuously used touches and holds that engaged the SELs on the face, neck, and shoulders. For every student, including Anna, the hands were continuously engaged in touches of various SELs. Because of the camera location and the positioning of bodies in relation to the rectangular tables at which the students were seated, only one student could be viewed holding/touching SEL hi 1s. However, the orientation of the arms in relation to the body suggest that SEL hi 1 may have been the most common hold during the entire lesson. Similarly, the orientations of legs and ankles were only visible for Anna and a student seated adjacent to her. For long periods of the lesson Anna crossed her left leg over her right – probably engaging L8 with R1, as she did in the panel activity. Similarly, when her legs were uncrossed, there were times when she crossed her ankles, engaging L SEL 16/24 with R SEL 24.

The video record provided clear images of the SELs from the waist upwards for six students. Each of these students was rotating her head to have eye contact with the coteachers, referring to her textbook, and writing notes. As well, each student used both hands to continuously touch, hold, and trace over SELs on the face and neck regions. The pattern of touching and holding did not seem to be synchronized, although we might find synchrony in the touches and holds of coteachers.

Anna: In the 47 minutes of class, where I am a student, I engage in many JSJ holds, some are very frequent and some rare but just as significant. As I am staying quiet throughout the entire class, there are moments when I felt the urge to speak up and there is some definite JSJ activity going on at those moments, which is more noticeable, at least to me, as I watch the video. I am mostly trying to stay connected to the speaker and understand their line of thought, and when I am struggling, my

hand is always around SEL 21, which boosts energy and understanding, as well as alleviates mental tension. For the most time the class is an intense exercise in mental thought, and as I work hard on thinking, comprehending the concepts and ideas expressed, I notice my hand on my forehead a lot, which is SEL 20. SEL 20, when unlocked, is associated with clearing the thoughts and promoting awareness and intuition.

Anna: Since I am familiar with JSJ, I often notice the way my body acts not just on the video, but in the moment as well. But when I observe it from a side, I see it as a kind of art, which most of us are unaware of. It is an incredible dance of hands and legs guided by the universal energy flowing in a body. And our body, intelligent beyond our understanding, performs these natural flows and holds in a way, which not only reveals to us as observers, of what goes on in a person's body, but also assists itself in restoring balance and harmony.

Above the waist, Anna consistently engaged all SEL regions on the face, front of the neck, and the SEL 22 region. One pattern that warrants comment involved a sweeping movement of her right finger(s) in an anticlockwise direction that began with R SEL 21 and swept upward toward the outside corner of the right eye before descending down the jaw line to the neck and SEL 22. SELs 21, 12/11 and 22 were involved in the sweep, which was repeated frequently (as many as 10 times on one occasion). Commonly, Anna grasped her hair as she moved it away from her face, completing the sweep as described above. From a JSJ perspective, the path resembles the reverse direction of part of the right stomach flow. Some JSJ practitioners instruct clients to use their index finger to trace over the stomach flow; first in the reverse direction and then in the direction the flow takes when it is in harmony – hereafter referred to as the forward direction. The stomach energy flow is associated with many physical ailments, such as gastritis and myriad emotional imbalances, such as worry, that can affect concentration and fray the nerves. It is worth considering whether worry and frayed nerves could be reduced through the conscious use of reverse and forward tracing of the stomach flow. In this particular case the flow likely extended to SEL high 1 and may have also involved the ankles and feet. This is a possibility that might be a focus for follow-up research, or it might be anticipated in the design and use of a flow that is taught to people

seeking to ameliorate worry and frayed nerves. In the context of designing self-help packages the tracing technique might complement techniques such as holding the thumbs, holding the palms of the hands, and using specified mudras.

Another potential flow that could possibly be involved in Anna's intuitive uses of JSJ is the gallbladder function energy flow, which involves SELs 12, 20, and 22. The forward flow circles around the cheekbone, past the outer edge of the eyebrow, turning around the back of the ear before circling onto the back of the head and up to the forehead. Of course, the gallbladder flow also involves SELs below the waist, which were not visible in the video record. The emotions associated with the gallbladder flow can involve high- and low-grade anger, commonly observed as frustration in many classes. As was the case with the stomach energy flow, tracing the fingers and/or hand over the reverse and forward flows of the gallbladder energy flow might produce conditions of harmony in that flow and ameliorate emotions and physical ailments such as headaches, pains in the side of the body, and stiffness in the neck. If a self-help package were to be designed it might include suggestions about use of the gallbladder flow, finger holds, and mudras together with touching the center of the palm and hugging the SEL 26s.

What did we learn and how did we change as a result of this study?

Authentic inquiry is a central component of the multilogical bricolage that underpins this study and other recent research we have undertaken (e.g., Alexakos 2015). Our ongoing research on mindfulness, emotion, and wellness has systematically disseminated what we've learned in order to change our approaches to teaching and learning in our universities and high schools, and to modify the designs of ongoing studies. In this regard, interventions designed to be used in research, including breathing meditation, mindfulness heuristics, and physiological expressions of emotion (e.g., heightening awareness of oxygen dissolved in the blood) have been systematically infused

into our teaching, research, and international dissemination activities (e.g., conference presentation, publications). Accordingly, what we know from our research makes a discernible difference to our lifeworlds – hopefully benefiting those with whom we interact.

In this study we set out to look at the incidence of touches, holds, and flows in a variety of activities in which graduate students are involved. Because the teaching and learning environments we build in our classes have become increasingly informed by sociocultural theory, we wondered whether the changing roles of teacher and students would be associated with an increase in emotions and perhaps excesses of emotion. If this were to be the case, we wondered whether JSJ-like touches and holds would occur naturally as participants in classroom activities interacted with one another.

As we considered what we might study and report in this chapter we considered the new roles for students in relation to a number of activities that included coteaching involving 2 or 3 graduate students from the class; participating in a writing activity following a short breathing meditation; being a student in a class that is cotaught by peer coteachers (in this case two graduate students); and participating in an exit cogenerative dialogue in which one graduate student participated with two professors, who were coteachers responsible for the course (in this case the first two authors of this paper). The final activities concerned graduate students participating in research seminars, as presenters and critics.

Since the design of the study was emergent and contingent, we began with Anna and Karim, enacting roles as critic for three peers, graduate students making presentations based on research undertaken in their doctoral programs. In this study we focus first on Karim and then on Anna. We were not quite sure what to expect, but benefited from Karim enacting his role while standing up, and leaning on a lectern. In contrast, Anna remained seated and crossed her legs and

ankles as she delivered her critique. Through the study of the two participants we began to see different emergent patterns and contradictions.

Once we noticed that Karim appeared to be using the lectern to make contact with several SELs that could ameliorate a buildup of emotions, we could see that this was an extension of doing much the same thing by crossing the legs and ankles. This expanded our way of analyzing what was happening. The way Karim was sitting in his chair seemed odd, but through the lenses of using objects to engage SELs we were able to see how the chair engaged, in this case, SELs 25 and 23. Similarly, the orientation and movement of his feet may have engaged the little toe on each foot.

When multiple SELs are engaged this can point to a flow, such as one of the organ flows (e.g., bladder, kidney) or a special flow that is designed to address a particular health project (e.g., fatigue flow). In this particular case we felt that Karim might be accessing intuitively the bladder and/or the kidney flows. There were other signs that this might be the case. He seemed short of breath. Evidence of this was that from time to time he appeared to be breathing through his mouth and his breathing pattern was mainly thoracic, shallow, and high frequency. Using frame-by-frame analysis we could clearly see the in and out breaths in the rise and fall of his elbows. It was possible that concerns about his presentation together with issues from his lifeworld may have contributed to a buildup of fear and associated stress. The build-up could have been enhanced further by his breathing pattern. In an effort to offset his attachment to emotions he may have intuitively engaged SELs to harmonize the bladder and kidney flows and to clear emotions.

Based on our analysis of Karim's practices during his own critique and then as he listened to Anna's critique, we identified touches, holds, and flows being enacted intuitively as Karim and Anna enacted roles of critic. After the critic roles had been studied, we decided to research Anna's intuitive uses of JSJ in a writing activity. The additional understanding, we gleaned from this

analysis is highly salient to JSJ in part because Murai used mudras when he successfully treated his terminal illness in a process of commencing his rediscovery of JSJ. As the students wrote, including Anna, the fingers engaged with one another and the pen, in many different configurations. The students were intuitively using mudras, which would likely have implications for emotional expression and wellness. We signal this as an important area for further research. To view an example of three different students, including Anna (Figure 7.6) refer to Figure 7.4 - 7.6. It seems as if the students show their uses of two types of mudra.



Figure 7.4 – Mudra frame I



Figure 7.5 – Mudra frame II

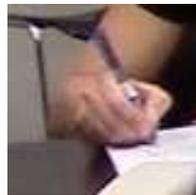


Figure 7.6 – Mudra frame III

In the segment of the class in which Anna was a student, immediately prior to her coteaching with a peer for an hour, Anna employed JSJ-like maneuvers continuously. Consistent with Karim possibly deploying part of two organ flows, Anna utilized light movements on both sides of her face that were consistent with the stomach flow. A sequence of five moments is captured in Figure 7.7 – 7.11 as an illustration of where her fingers traced – either lightly touching the skin or just

above it. The interpretation that her actions were an intuitive enactment of part of the stomach flow is highly speculative, but warrants closer microanalysis.



Figure 7.7 – Anna frame I



Figure 7.8 – Anna frame II



Figure 7.9 – Anna frame III



Figure 7.10 – Anna frame IV



Figure 7.11 – Anna frame V

Finally, throughout the time in which Anna was a student, she momentarily held one finger just above the top lip and beneath the center of her nostrils. A variant was to sometimes trace the finger along the top lip and at other times place one finger above the top lip and one or more fingers below the bottom lip. The possibility we raise, based on some of the experiences described in

lessons conducted by approved JSJ teachers, is that language functioning that may be lost during a stroke can be partially (at least) restored with a similar hold. Furthermore, if people who have previously lost language functionality begin to struggle in remembering or speaking words, a hold involving the fingers above and below the lips can restore/improve functionality. A speculation that is worth researching is that non-native speakers might benefit from similar holds and might use similar holds intuitively when they read, speak, and listen to a non-native language. Since this lesson was in English and Anna's native language is Russian, her uses of holds like those in Images 7.12 and 7.13 are consistent with our speculation.



Figure 7.12 – Anna frame VI



Figure 7.13 – Anna frame VII

By the time we finished our analyses of the writing activity we realized there would be insufficient space in this paper to include analyses of the use of JSJ-like touches, holds, and flows during coteaching and cogenerative dialogue. Accordingly, we truncated the empirical part of our analysis after we had descriptively analyzed the intuitive uses of JSJ-like touches, holds, and flows. The analyses of JSJ-like maneuvers while coteaching and participating in cogenerative dialogue are studies that are bound to be productive.

Next steps

Our next steps are to disseminate what we have learned from this study to the graduate students in the classes involved in the research. Already many of them have read this chapter and participated in conversations about what we have learned. Importantly, we will disseminate what we have learned to colleagues who are teachers and teacher educators, not just in schools and universities, but in any institutions involved in teaching and learning. We are not arguing that every touch represents an intuitive JSJ-like maneuver. However, we are struck by an almost continuous flow of touches and holds that do appear to be used to address disharmonies in the flow of universal energy. It might be helpful to heighten awareness about the occurrence and possible purposes of JSJ-maneuvers so that, when and as necessary, interventions can be used consciously for self-help. We will create intervention packages based on our growing knowledge of JSJ to ameliorate emotions, increase mindfulness, and enhance wellness. It seems imperative that all participants in social life should have the tools to decrease the intensity of emotions that are building to excess, detach conduct from such emotions as they are produced, and attend to minor health projects that arise in the moment-to-moment flow of life.

The dysfunctional classroom from suburban Western Australia, described in the introduction to this chapter, has been a staple feature of our research in high school science from the mid-1980s to the present. That is, for more than three decades teachers and students have displayed excesses of emotion as they participated in science classes. The emotions stuck to and saturated their conduct, making learning virtually impossible. The toll on learning seems to be potentially enormous. But what have been the tolls on staying involved and maintaining good health? If Burmeister is right in her assertion that emotions underlie many health projects, then it makes sense to ask whether teachers and students have created and sustained poor health because

of deleterious emotional climates that have minimized mindful participation in learning tasks, produced excess emotions, and disharmonized bodies for sustained periods of time. We offer the possibility that toolkits like those we propose to design and enact could pave the way for all participants in science education to ameliorate emotions when and as necessary. The incentive to do this is to stay healthy and learn more science.

JSJ in practice - What did I learn from this study?

Most of us without realizing, position our body stance, or move our arms, or cross our legs, or just press our fingers in particular ways in a mindlessness state. As a researcher | participant in this study and reflecting back, I have come to realize, habitually I tend to press on different fingers depending on how I am feeling or what is going on around me. The analysis of my presentation in this study, and understanding the energy flow by pressing different fingers, not sure exactly what I was feeling at that moment, but it allowed me to maintain composure and remain calm and focused on the discussion at that moment.

It wasn't until after we analyzed the data and I learned more about JSJ, I have become extremely mindful in all situations and now when I find myself pressing my fingers, I try to focus on the fingers and at times, use a combination of touches to channel my emotions. I have a great deal to learn how to use JSJ to alleviate pain or discomfort, but JSJ and mindfulness, have helped negotiate stress and anxiety in every aspect of my life. I am aware of my body as I am present in space and time.

CHAPTER 8

SUMMARY AND IMPLICATIONS FOR FURTHER STUDIES

The growth and impact of mindfulness - So, what are we doing to improve the mental health of students and teachers?

Reflecting back more than a decade, when I first began studying mindfulness and adopting it as regular practice, both in my high school classroom and at the college, mindfulness has shown an exponential growth in the field of education around the world. About four years ago, we introduced the idea of mindfulness at our school district in Long Island, New York. A high performing school district with a competitive academic culture, we were beginning to notice high levels of stress and anxiety in our students beginning at the elementary level. Introducing meditation and yoga classes, and stressing mindfulness in many classes, we are beginning to notice that our students have a better approach to learning and are better prepared for all the high-stakes state examinations. Encouraging students to be resilient, maintain a positive outlook, and just do your best attitude, is promoted by teachers throughout the district.

Mindfulness research – Making a difference

A pilot study by Rhoda Wong (2020), a fourth-grade teacher in Bangkok, Thailand, investigated whether a secular mindfulness training course can enhance students' mindfulness, present awareness, attention regulation and metacognition. Secular mindfulness has gained popularity in many fields including education. Secular mindfulness is designed to reassure parents and the administration that mindfulness is not a practice in Buddhism and does not involve any religious ceremonies or content, making parents and students more receptive to the training. Her study was based on a curriculum developed by an organization called Mindfulness in Schools Project (MiSP)

based in the United Kingdom. The organization offers course curricula designed for students in the primary level (ages 7-11), middle level (ages 9-14), and secondary level (ages 11-18). The curricula are called: Paws b [pause be], .breath [dot breath], and .b [dot-be], respectively. The lessons at each level teach a distinct mindfulness skill.

At the primary level (Paws b), there are twelve lessons:

1. Our Amazing Brain
2. Making Choices
3. Puppy Training
4. Everyday Mindfulness
5. Noticing the Wobble
6. Finding A Steady Place
7. Working with Difficulty
8. Choosing Your Path
9. The Story Telling Mind
10. Stepping Back
11. Growing Happiness
12. The Yum Factor

The transition years or middle level (.breath) offers a four-session program and can be taught as part of a broader Personal, Health, Social and Economic Education (PSHE) curriculum. It explores issues around:

- Working with the capacity of attention; exploring how we can work with a wandering mind.
- Why humans worry, and how to support ourselves when we do so.

- Sleep – why it is important and what to do if we struggle to sleep well.
- Being with others – the opportunities and challenges of working skillfully with friendship and other relationships, both in person and online.

At the secondary level (.b), there are nine lessons:

1. Playing Attention
2. Taming the Animal Mind
3. Recognizing Worry
4. Being Here Now
5. Moving Mindfully
6. Stepping Back
7. Befriending the Difficult
8. Taking in the Good
9. Pulling it all Together.

Rhoda's fifteen-week study focused on Paws b, children between the ages of 7-11. The results of the study based on pre- and post-intervention self-report questionnaires, were evaluated using two scales; Cognitive and Affective Mindfulness Scale (CAMS), and Mindful Attention Awareness Scale adapted for Children (MAAS-C). The quantitative results on both scales showed a significant difference. The results showed a general improvement in the participants' awareness, sustained attention, and acceptance of their thoughts and feelings.

The impact of introducing mindfulness at an early age cannot be overemphasized. Introducing and incorporating mindfulness helps students become attentive and conscious learners, and cultivates the seed of awareness to sustain a positive outlook and help regulate their

overall well-being. This awareness results in better citizenship with greater respect for a sustainable global society.

Heesoon Bai et al. (2017) argue there is more to the use of mindfulness at school than to ease stress, lessen anxiety, boost immunity or even raise test scores. They highlight that mindfulness plays a vastly more important and critical purpose than these supplementary outcomes, however beneficial they may appear to be. In order to change the mindset of our civilization and enter a new axial period of human development (Bai, 2013) to usher in a different civilization from one we currently know, will require the return of mindfulness practice to a holistic and integrative paradigm. This paradigm will encompass a comprehensive shift in consciousness and accompany practices that promote such transformations.

Bai, further explains that mindfulness can cultivate wholesome emotions that have moral/ethical power. It can cultivate kindness, compassion, emphatic joy, and inner freedom and peace. She calls it “affective meditation” or “heart meditation.” In the Buddhist literature, these are referred to as The Four Immeasurables – considered to be most important to human collective and individual wellbeing. The cultivation of this holistic and integrative paradigm based on The Four Immeasurables, through mindfulness application to one’s consciousness would be the most radical activism in today’s turbulent world. A world fueled with hatred, greed, power-struggle, suspicion, and discontent.

Mindfulness and McMindfulness

The commodification of mindfulness has brought about a negative connotation and coined the secular practice of mindfulness by its critics as McMindfulness. The images on the internet depicts Ronald McDonald, the Mc Donald’s hamburger icon, seated in a lotus position. According to the critics of mindfulness, McMindfulness occurs when mindfulness is used, with intention or

unknowingly, for self-serving and ego enhancing purpose that is counter to the teachings and practice of Buddhism. They claim it promotes self-importance, or self-focus, feeding one's ego.

David Forbes (2019), author of *Mindfulness and Its Discontents: Education, Self, and Social Transformation*, claims mindfulness has its limitations. He writes, mindfulness cannot cure what ails our society and can do little to nothing to reverse the manifold legacies of racism, sexism, classism, homophobia, and transphobia that continue to plague us. Forbes states: "By encouraging people to look solely to themselves and to look within, in alignment with neoliberal values, (those profiting from mindfulness) have allowed mindfulness to contribute to the therapeutic adjustment to an unhealthy society within schools, corporations, the workplace, the military, and elsewhere."

Forbes criticism should be directed to those that profit financially by marketing mindfulness. Educators who practice and teach mindfulness to support and encourage students to cope with societal norms, realize students are just victims of established cultural standards without voice. Rhoda Wong in her practice sees mindfulness as an inside out journey - cultivating compassion for mankind from within. Heesoon Bai, looks at mindfulness beyond the self as a holistic approach that cultivates moral and ethical values. Societal problems are a result of twisted ideologies and claiming that mindfulness aides to it, is not really understanding mindfulness in-itself. Mindfulness may be rooted in the practice of Buddhism, but the act of being aware, to be present-in-the-moment, is an innate quality of a conscious human being. I see mindfulness as a means to create a more, reflective, peaceful, compassionate and pluralistic society. We only profit from the well-being of our students, ourselves, and a society we cultivate.

Personal thoughts and reflections

Over two and half decades of educating high school and college students, teaching physics in general was relatively easy. Understanding how to teach each individual in a collective setting is

a difficult and a daunting task. Each person enters our classroom, carrying with them the weight of their world, filled with emotions resonating from everything around them. Yet, we teach, believing they comprehend everything we present. We expect them to learn and understand what we have taught, and then assess them and assign a number. Through the entire process, we rarely pay attention to their struggles, nor take time to understand their emotion even though we may recognize them through their facial or bodily expressions or simply the tone of their voices. Society has created this structure, where a grade is the only thing that determines the worth of the person.

We live in a turbulent world, where we don't take time to stop and understand ourselves. Constantly bombarded by news and events, spread instantly through social networks, linking the world at the tips of our fingers. We have forgotten to breath, and enjoy our surroundings. More troubling, we have forgotten to live in the present. Always busy chasing the future, regretting the past, and living to fulfill a material life. This is the sufferings we need to set ourselves free from. We need to seek the path of enlightenment and set free the pain we all carry in our body and in our mind. The following phrase from *The Buddhist Way to Peace of Mind*, Venerable Pramote Pamojjo states: "Becoming a separate and unbiased observer, we come to see the body and mind as they really are. This is the essence of Vipassana meditation." The purpose of Vipassana is to create awareness. An awareness of the deep mind or the deep consciousness.

My research focus on Mindfulness presented in this dissertation has had a profound impact on how I go through life each and every day. It has made me a fostering and loving father, a dependable and supporting son and brother, a non-judgmental friend, and a compassionate educator. Carrying these ideals into my classroom, I hope, I can model these values for my students. Learning the ancient art of Jin Shin Jyutsu and its body-energy system, has provided an

additional method to be more aware of myself and my well-being. Stopping a lecture or a lesson, allowing my students to focus on an image, or exercise breathing meditation, or taking my high school students for a walking meditation has now become a norm in my practice.

The implementation of the Mindfulness in Education Heuristic (MEH) enabled me to provide resources for my students - the prospective elementary teachers to enhance their mindfulness. As teachers one day, hopefully they will reflect on the awareness raised by some if not all of the characteristics in the heuristic. This shape shifting instrument for self-reflection should be used in all teacher education programs to help promote wellness in a high-strung field burdened by varied emotional fluctuations. Mindfulness is a practice that should be introduced to children and young adults from an early age, perhaps then, one day we may see a society living in harmony with compassion and care for one-another. To live in a pluralistic society without hate or discrimination, will be a different world for certain. A compassionate world of love, peace and harmony.

I will never know who I am - Radical mindfulness

My very personal journey as a teacher educator into mindfulness has raised great awareness of everyday life, yet introduced, an inner imbalance I struggle with greatly. It is not a destructive struggle, but a struggle of self-identity. A conflict between what I once considered a separate and parallel world view between my Eastern customs and value system and Western education and upbringing, is questioning my very own being. Is there a truth to either knowledge system? Does my understanding of religions and its practice, provide a better or a different way of knowing? Is mindfulness intricately woven into the fabric of everything I believe and defines my very existence? And, what has it taught me about understanding myself so I can understand the world better?

My early childhood, introduced the bounties of mother Earth, and now educated as a scientist, I am challenged to understand the bounties of the universe. Mindfully, but sadly, I don't understand either. I am aware of how gentle and precious our planet earth is and know its address in the vastness of our galaxy, but understand nothing about how the universe came to be. My beautiful religion taught me about my co-existence of being in both, the spiritual and the material world, balancing each other to find peace and happiness in life and everything that surrounds it. Even that is tarnished by those, with twisted ideologies and interpretations, who destroy and harm others in the name of religion. I seem to find myself tormented greatly as I try to make sense of it all. At times I find solace recalling the words of Pope John Paul II when he pardoned Galileo and paved the way to find harmony and balance between science and faith, reason and dogma. This aspect of mindfulness, allows me to question, not to seek answers, but to justify our existence and our purpose of being one with the universe.

In this dissertation I have presented multiple studies using multimethodologies to understand mindfulness. Born and raised with Eastern values, blended with Western knowledge system, I grew up with a mixture of traditional and Western healing practices. Recalling my late maternal grandmother practicing methods of healing similar to what I have learned from JSJ (the study presented in Chapter 7) has brought me in a full circle back to the roots of my origin. My late maternal grandfather taught me virtues of being a good, kind and compassion human being, and planted the seeds of who I wish to be, and what I practice in my way of being in the world. My late maternal grandmother taught me the values of faith to find peace within and to love and respect everyone and everything.

Mindfulness at times is abstract and at times concrete and revealing. Mindfulness is innate. I believe we are all born with the ability to live and experience everything in the moment, but until

we are made aware of it, it remains elusive. Embracing mindfulness in my practice with my own children, my high school students, my college students, my friends and family, I find myself to be more attentive, cautious in my judgment, and wiser in my advice. Mindfulness is like the DNA molecule with two complementary chains, that exists in the form of a three-dimensional double helix, interconnected by a complex informational structure. Living with awareness are the complementary chains called mindfulness. Mindfulness is a way of life, it is for everyone, it is complimentary from the day we are born, it is simply a way of being.

I conclude my journey with the words from Thich Nhat Hahn's "True Love" (2011, pp.6-7): "The most precious gift you can give to the one you love is your presence."

REFERENCES

Chapter 2

- Mazur, E. (1997). *Peer instruction: a user's manual*. Upper Saddle River, N.J.: Prentice Hall
- Simon, B. and Cutts, Q. (2012) Peer instruction: A teaching method to foster deep understanding, *Communications of the ACM*, 55, 27-29.
<http://dx.doi.org/10.1145/2076450.2076459>
- Tobin, K. (2017). Authentic inquiry as a constituent of methodological bricolage. In Siry, C., Schreiber, C., Gomez Fernandez, R., & Reuter, B. (eds.), *Critical methodologies for researching teaching and learning*, xx–yy. Sense Publishers.
- Tobin, K. (2010). Collaborating to transform and reproduce science education. *Enseñanza de las Ciencias*, 301-313.

Chapter 3

- Black, D.S. (2011). A brief definition of mindfulness. Mindfulness Research Guide. Accessed from <http://www.mindfulexperience.org>
- Bourdieu, P., & Wacquant, L. J. (1992). *An invitation to reflexive sociology*. Chicago, IL: The University of Chicago Press.
- Brown, K. W. & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822.
- Collins, R. (2004). *Interaction ritual chains*. Princeton, NJ: Princeton University Press.
- Hertwig, Ralph & Pachur, Thorsten. (2015). Heuristics, History of. *International Encyclopedia of the Social & behavioral Sciences* (Second Edition), 829-835
<https://doi.org/10.1016/B978-0-08-097086-8.03221-9>
- Jha, A. P. Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, 7(2), 109.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York: Hyperion Books
- Kabat-Zinn, J. (1982). An Outpatient Program in Behavioral Medicine for Chronic Pain Patients Based on the Practice of Mindfulness Meditation: Theoretical Considerations and Preliminary Results. *General Hospital Psychiatry*, 4, 33-47.
[http://dx.doi.org/10.1016/0163-8343\(82\)90026-3](http://dx.doi.org/10.1016/0163-8343(82)90026-3)
- Kabat-Zinn, J. and Chapman-Waldrop, A. Compliance with an outpatient stress reduction program: rates and predictors of completion. *J. Behavioral Medicine*. (1988) 11: 333-352.
- Powietrzyńska, M., & Tobin, K. (2015). Mindfulness and science education. In R. Gunstone (Ed.), *Encyclopedia of science education* (pp. 642–647). Dordrecht: Springer.

- Powietrzynska, M., Tobin, K., & Alexakos, K. (2015). Facing the grand challenges through heuristics and mindfulness. *Cultural Studies of Science Education*, 10 (1), 6581. doi:10.1007/s11422-014-9588-x
- Powietrzynska, M. (2015a). Heuristics for mindfulness in education and beyond. In C. Milne, K. Tobin, & D. Degenero (Eds.), *Sociocultural studies and implications for science education: the experiential and the virtual* (pp. 59-80). Dordrecht, The Netherlands: Springer.
- Roth, W.-M., & Tobin, K. (2002). *At the elbow of another: Learning to teach by coteaching*. Rotterdam, The Netherlands: Sense Publishing.
- Siegel, D. J. (2007). Mindfulness training and neural integration: Differentiation of distinct streams of awareness and the cultivation of well-being. *SCAN*, 2(4), 259.
- Shapiro, S.L. (2009). The integration of mindfulness and psychology. *Journal of Clinical Psychology*. 65(6), 555 doi.org/10.1002/jclp.20602
- Shapiro, S. L. & Carlson, L. E. (2009). *The art and science of mindfulness: Integrating mindfulness into psychology and the helping professions*. Washington, DC: APA
- Tobin, K., & Ritchie, S. M. (2012). Multi-method, multi-theoretic, multi-level research in the learning sciences. *Asia-Pacific Education Researcher*, 21, 117–129.
- Tobin, K., & Llana, R. (2011). Producing and maintaining culturally adaptive teaching and learning of science in urban schools. In C. Murphy and K. Scantlebury, (Eds). *Coteaching in international contexts: Research and practice* (pp. 79-104). Dordrecht: Springer.
- Tobin, K., Powietrzynska, M., & Alexakos, K. (2015). Mindfulness and wellness: Central components of a science of learning. *Innovación Educativa*, 15(67), 61-87.
- Tobin, K. (2010). Collaborating to transform and reproduce science education. *Enseñanza de las Ciencias*, 301-313.
- Turner, J. H. (2002). *Face to face: toward a sociological theory of interpersonal behavior*. Palo Alto: Stanford University Press.
- Wallace, B., & Bodhi, B. (2006). The nature of mindfulness and its role in Buddhist meditation. A correspondence between B. Alan Wallace and Bhikkhu Bodhi. Retrieved from http://shamatha.org/sites/default/files/Bhikkhu_Bodhi_Correspondence.pdf.

Chapter 4

- Bourdieu, P., & Wacquant, L. J. (1992). *An invitation to reflexive sociology*. Chicago, IL: The University of Chicago Press.
- Collins, R. (2004). *Interaction ritual chains*. Princeton, NJ: Princeton University Press.
- Davidson, R. J., & Begley, S. (2012). *The emotional life of your brain: how its unique patterns affect the way you think, feel, and live – and how you can change them*. New York: Hudson Street Press.
- Ekman, P. (2003). *Emotions revealed: Recognizing faces and feelings to improve communication and emotional life*. New York: St. Martin's Griffin.

- Ritchie, S. M. & Tobin, K. (Eds.) (2018). *Eventful learning: Learner emotions* Leiden, The Netherlands: Sense-Brill Publishing.
- Tobin, K., Alexakos, K., Malyukova, A., & Gangji, A.-K. H. (2017). Jin Shin Jyutsu and ameliorating emotion, enhancing mindfulness, and sustaining productive learning environments. In A. Bellocchi, C. Quigley, & K. Otrell-Cass (Eds.), *Exploring emotions, aesthetics and wellbeing in science education research* (pp. 221–247). Dordrecht: Springer.
- Turner, J. H. (2002). *Face to face: toward a sociological theory of interpersonal behavior*. Palo Alto: Stanford University Press.

Chapter 5

- Bourdieu, P., & Wacquant, L. J. (1992). *An invitation to reflexive sociology*. Chicago, IL: The University of Chicago Press.
- Powietrzynska, M., & Tobin, K. (2015). Mindfulness and science education. In R. Gunstone (Ed.), *Encyclopedia of science education* (pp. 642–647). Dordrecht: Springer.
- Tobin, K. (2010). Collaborating to transform and reproduce science education. *Enseñanza de las Ciencias*, 301-313.
- Tobin, K., Powietrzynska, M., & Alexakos, K. (2015). Mindfulness and wellness: Central components of a science of learning. *Innovación Educativa*, 15(67), 61-87.
- Tobin, K., & Ritchie, S. M., (2012). Multi-method, multi-theoretic, multi-level research in the learning sciences. *Asia-Pacific Education Researcher*, 21, 117–129.
- Tobin, K., & Llana, R. (2011). Producing and maintaining culturally adaptive teaching and learning of science in urban schools. In C. Murphy and K. Scantlebury, (Eds). *Coteaching in international contexts: Research and practice* (pp. 79-104). Dordrecht: Springer.

Chapter 6

- Abenavoli, R. M., Patricia A. Jennings, P. A., Greenberg, M. T., Harris, A. R. & Katz, D. A. (2013). The protective effects of mindfulness against burnout among educators. *The Psychology of Education Review*, 37(2), 57-69.
- Bargh, J. A. (2014). Our Unconscious Mind. *Scientific American*, 310(1), 30-37
doi:10.1038/scientificamerican0114-30
- Bellocchi, A., Mills, K. A., & Ritchie, S. M. (2015) Emotional experiences of preservice science teachers in online learning: the formation, disruption and maintenance of social bonds. *Cultural Studies of Science Education*. Advance online publication. doi: 0.1007/s11422-015-9673-9

- Bellocchi, A., Ritchie, S. M., Tobin, K., King, D., Sandhu, M., & Henderson, S. (2014). Emotional Climate and high quality learning experiences in science teacher education. *Journal of Research in Science Teaching*, 51(10), 1301-1325. doi:10.1002/tea.21170
- Cheek, J., Lipschitz, D. L., Abrams, E. M., Vago, D. R., & Nakamura, Y. (2015). Dynamic reflexivity in action: An armchair walkthrough of a qualitatively driven mixed-method and multiple methods study of mindfulness training in schoolchildren. *Qualitative Health Research*, 25(6), 751-762. doi:10.1177/1049732315582022
- Collins, R. (2004). *Interaction ritual chains*. Princeton, NJ: Princeton University Press.
- Daker, S., Lhamo, J., & Rinchen, S. (2016). Mediation: A jewel for reflective teaching. In M. Powietrzynska & K. Tobin (Eds.), *Mindfulness and educating citizens for everyday life* (pp. 73-88). Rotterdam, The Netherlands: Sense Publishing.
- Davidson, R. J., & Schuyler, B. S. (2015). Neuroscience of happiness. In J. Helliwell, R. Layard, & J. Sachs (Eds.), *World happiness report 2015* (pp. 88-105). New York: Sustainable Development Solutions Network.
- Ergas, O. (2015). The deeper teachings of mindfulness-based ‘interventions’ as a reconstruction of ‘education’. *Journal of Philosophy of Education*, 49(2), 203-220. doi:10.1111/1467-9752.12137
- Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout, and teaching efficacy. *Mind, Brain, And Education*, 7(3), 182-195. doi:10.1111/mbe.12026
- Flook, L., Goldberg, S. B., Pinger, L., & Davidson, R. J. (2015). Promoting prosocial behavior and self-regulatory skills in preschool children through a mindfulness-based kindness curriculum. *Developmental Psychology*, 51(1), 44-51. doi:10.1037/a0038256
- Gross National Happiness. (2016). In *The Centre for Bhutan Studies & GNH Research*. Retrieved May 5, 2016, from <http://www.grossnationalhappiness.com/9-domains/education>.
- Helliwell, J., Layard, R., & Sachs, J. (Eds.) (2015). *World happiness report 2015*. New York: Sustainable Development Solutions Network.
- Helliwell, J., Layard, R., & Sachs, J. (2015). Setting the stage. In J. Helliwell, R. Layard, & J. Sachs (Eds.), *World happiness report 2015* (pp. 2-11). New York: Sustainable Development Solutions Network.
- Keye, M.D., Pidgeon, A.M. (2013). An investigation of the relationship between resilience, mindfulness, and academic self-efficacy. *Open Journal of Social Sciences*, 1(6), 1-4. doi:10.4236/jss.2013.16001
- Layard, R., & Hagel, A. (2015). Healthy young minds: Transforming the mental health of children. In J. Helliwell, R. Layard, & J. Sachs (Eds.), *World happiness report 2015* (pp. 106-131). New York: Sustainable Development Solutions Network
- Martínez Ruiz, Xicoténcatl. (2016). Concentration is the seed: Conscious attention in educational scenarios. In M. Powietrzynska & K. Tobin (Eds.), *Mindfulness and educating citizens for everyday life* (pp. 47-58). Rotterdam, The Netherlands: Sense Publishing.

- Noble, L. (2016). Mindfulness: A lived experience in self-awareness, compassion and understanding. In M. Powietrzynska & K. Tobin (Eds.), *Mindfulness and educating citizens for everyday life* (pp. 89-102). Rotterdam, The Netherlands: Sense Publishing.
- O'Donnell, A. (2015). Contemplative pedagogy and mindfulness: Developing creative attention in an age of distraction. *Journal of Philosophy of Education*, 49(2), 187-202. doi: 10.1111/1467-9752.12136
- Powietrzynska, M. (2015a). Heuristics for mindfulness in education and beyond. In C. Milne, K. Tobin, & D. Degenero (Eds.), *Sociocultural studies and implications for science education: the experiential and the virtual* (pp. 59-80). Dordrecht, The Netherlands: Springer.
- Powietrzynska, M. (2015b). To your health! Heuristics and deep breathing as mindfulness promoting interventions in educational context. In K. Tobin & S. R. Steinberg (Eds.), *Doing Educational Research: A Handbook* (2nd ed.) (pp. 337-363). Rotterdam, The Netherlands: Sense Publishers.
- Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology*, 104(3), 700-712. doi: 10.1037/a0027268
- Ritchie, S. M., Hudson, P., Bellocchi, A., Henderson, S., King, D., & Tobin, K. (2013) Evolution of self-reporting methods for identifying discrete emotions in science classrooms. In *National Association for Research in Science Teaching Annual International Conference*, 5-9 April 2013, Rio Grande, Puerto Rico.
- Tobin, K. (2016). Collaborating on global priorities: Science education for everyone – any time and everywhere. *Cultural Studies of Science Education*, 11, 27-40. doi: 10.1007/s11422-015-9708-2
- Tobin, K. (2015). Qualitative research in classrooms: Pushing the boundaries of theory and methodology. In K. Tobin & S. R. Steinberg (Eds.), *Doing educational research: A handbook* (2nd ed.) (pp. 33-75). Rotterdam, The Netherlands: Sense Publishing.
- Tobin, K. (2014). Using collaborative inquiry to better understand teaching and learning. In J. L., Bencze, & S. Alsop, (Eds.). *Activist science and technology education* (pp. 127-147). Dordrecht, The Netherlands: Springer. doi:10.1007/978-94-007-4360-1_8
- Tobin, K. (2000). Interpretive research in science education. In A. E. Kelly & R. Lesh (Eds.), *Handbook of research design in mathematics and science education* (pp. 487-512). Mahwah, NJ: Lawrence Erlbaum Associates.
- Tobin, K., Alexakos, K., & Powietrzynska, M. (2015). Mindfulness and wellness: Central components of a science of learning. *Innovación Educativa*, 15(67), 61-87.
- Tobin, K., & Ritchie, S. M. (2012). Multi-method, multi-theoretic, multi-level research in the learning sciences. *The Asia-Pacific Education Researcher*, 20, 81-87.
- Zeichner, K. M., & Liston, D. P. (1996). *Reflective teaching: An introduction*. Mahwah, NJ: Erlbaum.

Chapter 7

- Alexakos, K. (2015). *Being a teacher | researcher: A primer on doing authentic inquiry research on teaching and learning*. Rotterdam, NL: Sense Publishing.
- Bourdieu, P. (1992). The practice of reflexive sociology (The Paris workshop). In P. Bourdieu & L. J. D. Wacquant, *An invitation to reflexive sociology* (pp. 216-260). Chicago, IL: The University of Chicago Press.
- Gallagher, J. & Tobin, K. (1987). Teacher management and student engagement in high school science. *Science Education*, 71, 535-555.
- Garfinkel, H. (1967). *Studies in ethnomethodology*. Englewood Cliffs, NJ: Prentice Hall.
- Higgins, M. (1988, March/April). An interview with Mary Burmeister, Master of Jin Shin Jyutsu. *Yoga Journal*, 79, 24-29.
- Hirschi, G. (2000). *Mudras: Yoga in your hands*. San Francisco: Weiser Books.
- Kincheloe, J. L. (2008). *Knowledge and critical pedagogy: An introduction*. Dordrecht, The Netherlands: Springer.
- Kress, T. M. (2015). Can't you just know?: Critical research as praxis. In K. Tobin and S. R. Steinberg (eds). *Doing educational research* (second edition) (pp. 167-179). Rotterdam, NL: Sense Publishing.
- Madison, G. (1988). *The hermeneutics of postmodernity: Figures and themes*. Bloomington: Indiana University Press.
- Philippot, P., Chapelle, G., & Blairy, S. (2002). Respiratory feedback in the generation of emotion. *Cognition & Emotion*, 16, 605-627. DOI:10.1080/02699930143000392
- Powietrzynska, M., Tobin, K. & Alexakos, K. (2015). Facing the grand challenges through heuristics and mindfulness. *Cultural Studies of Science Education*, 10, 65-81. DOI: 10.1007/s11422-014-9588-x
- Roth, W.-M., & Tobin, K. (2010). Solidarity and conflict: Prosody as a transactional resource in intra- and intercultural communication involving power differences. *Cultural Studies of Science Education*, 5, 807-847. DOI 10.1007/s11422-009-9203-8.
- Sewell, W. H. Jr. (1992). A theory of structure: duality, agency and transformation. *American Journal of Sociology*, 98, 1-29.
- Sewell, W. H. Jr. (1999a). The concept(s) of culture. In V. E. Bonnell & L. Hunt (Eds.), *Beyond the cultural turn* (pp. 35-61). Berkeley: University of California Press.
- Sewell, W. H. Jr. (1999b). Geertz, cultural systems, and history: From synchrony to transformation. In S. B. Ortner, *The fate of culture: Geertz and beyond*. Berkeley and Los Angeles, CA: University of California Press.
- Sewell, W. H. Jr. (2005). *Logics of history: Social theory and social transformation*. Chicago: University of Chicago Press.
- Swidler, A. (1986). Culture in action: Symbols and strategies. *American Sociological Review*, 51, 273-286.

- Tobin, K. (2015a). The sociocultural turn: Beyond theoretical imperialism and the imperative of learning from difference. In C. Milne, K. Tobin, & D. deGennaro (Eds). *Sociocultural studies and implications for science education* (pp. 3-31). Dordrecht, The Netherlands: Springer. DOI: 10.1007/978-94-007-4240-6_1
- Tobin, K. (2015b). Connecting science education to a world in crisis. *Asia-Pacific Science Education, 1*, DOI 10.1186/s41029-015-0003-z.
- Tobin, K. (2016). Collaborating on global priorities: Science education for everyone – any time and everywhere. *Cultural Studies of Science Education*. DOI: 10.1007/s11422-015-9708-2
- Tobin, K., & Llana, R. (2012). Colliding identities, emotional roller coasters, and contradictions of urban science education. In M. Varelas (Ed.), *Identity construction and science education research: Learning, teaching, and being in multiple contexts* (pp. 141-156). Dordrecht, The Netherlands: Sense Publishers.
- Tobin, K., Powietrzynska, M., & Alexakos, K. (2015). Mindfulness and wellness: Central components of a science of learning. *Innovación Educativa, 15*(67), 61-87.
- Tobin, K., & Gallagher, J. J. (1987). What happens in high school science classrooms? *Journal of Curriculum Studies, 19*, 549-560.

Chapter 8

- Bai, H., Beatch, M., Chang, D., & Cohen, A. (2017). Recalibrating mindfulness. In M. Powietrzynska & K. Tobin (Eds.), *Weaving complementary knowledge systems and mindfulness to educate a literate citizenry for sustainable and healthy lives* (pp. 21–40). Rotterdam: Sense Publishers. DOI: 10.1007/978-94-6351-182-7_2
- Bai, H. (2013). Peace with the Earth: Animism and contemplative ways. *Cultural Studies of Science Education, CSSE, 10*(1), 135-147. <http://dx.doi.org/10.1007/s11422-013-9501-z>
- Forbes, D (2019). *Mindfulness and its discontents: education, self, and social transformation*. Fernwood Publishing
- Hahn, T. (2011). *True love: Practice for awakening the heart*. Boston, MA: Shambhala.
- Pamojjo, P. (2013). *The Buddhist way to peace of mind*. Amarin Book Center Publishing.
- Wong, R. (2020). *Inside-out inquiry for wellness and mindfulness*. Unpublished manuscript. Kasetsart University. Bangkok, Thailand.